OMRON

Sysmac Catalogue

Fully integrated platform

6th Edition



SYSMAC
always in control

News

Machine controller



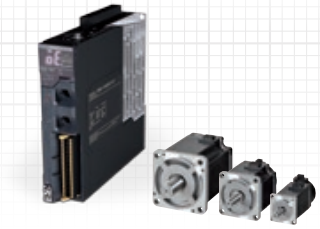
NY5 series - IPC Controller

- Hybrid controller which combines Sysmac machine control and IT technology

NX1 series

- Advanced control for compact machines

Servo system



1S Servo System

- State of the art technology applied to general purpose servo

Robotics



Industrial robots

- Delta, SCARA and Articulated robots.



Mobile robots

- Autonomous Intelligent Vehicles (AIVs), self-mapping, self-navigation.

IO-Link



IO-Link masters

- 2 types of IO-Link master units: NX I/O series with screw-less push-in terminals and IP67 for watery and dusty environments

IO-Link sensors

- Photoelectric and proximity sensors

Sysmac Catalogue

This catalogue is a selection and design tool helping you to create fast, flexible and reliable machines. Sysmac automation platform provides an scalable and integrated solution for factory automation and real-time machine control. The Sysmac studio software tool provides one Integrated Development Environment for configuration, programming, simulation and monitoring.

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Omron provides tailored solutions

Flexible and integrated production business models

In today's globalized manufacturing environment, diverse and complex challenges arise and need to be overcome. The global market rapidly changes, and manufacturing companies are under increasing pressure to supply products in a timely manner that satisfy a wide variety of consumer needs. Omron industrial automation makes efficient, flexible and cost effective manufacturing possible.

Innovation

- New technology for smart manufacturing
- Collaboration between humans and machines
- Environmentally safe products

Productivity

- Integrated systems for optimized manufacturing
- Production data available in real-time
- In-line quality inspection: zero defects

Flexibility

- Quick product changeovers
- Openness and third party connectivity
- Scalable systems for optimum solutions

Reliability

- Non-stop processes, 24/7 operation
- Extended product lifecycle

Globalization

- Products meet global standards
- Local support for training, repairs and spare-parts supply
- Engineering environment compliance with global standards

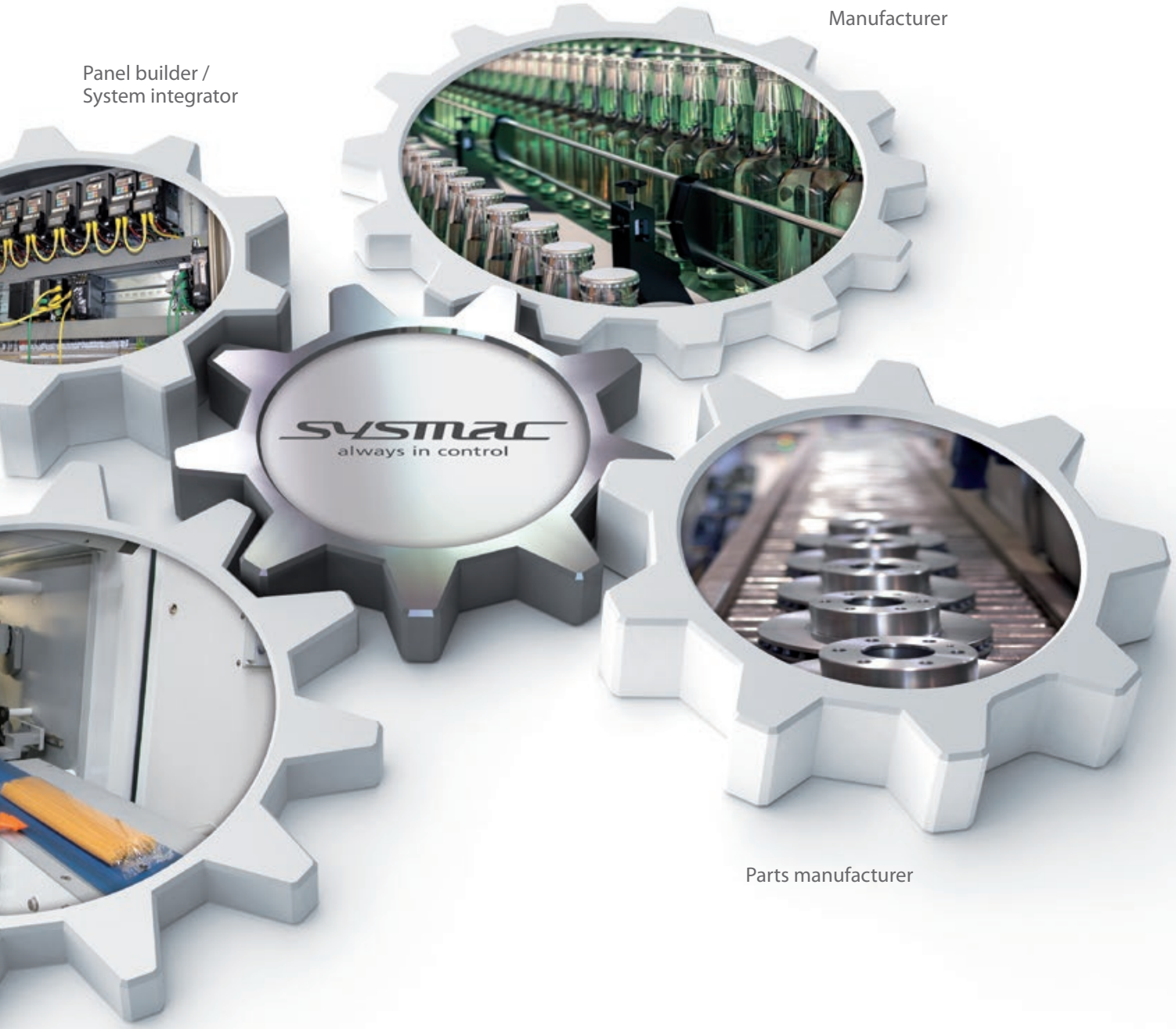
Through automation, **Omron** supports the advancement of manufacturing and contributes to a sustainable society by providing environmentally safe products



Machine / Equipment builder

The product photographs and figures that are used in this catalog may vary somewhat from the actual products.
Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation.

- The **Sysmac** technology platform ensures a flexible and integrated production business model



Sysmac Integrated Platform

Integration and Functionality

Sysmac is an integrated automation platform dedicated to providing complete control and management of your automation plant. At the core of this platform, the Machine Controller series offers synchronous control of all machine devices and advanced functionality such as motion, robotics and database connectivity. This multidisciplinary concept allows you to simplify solution architecture, reduce programming and optimize productivity.

FACTORY AUTOMATION



Machine Automation Controller

MACHINE CONTROL

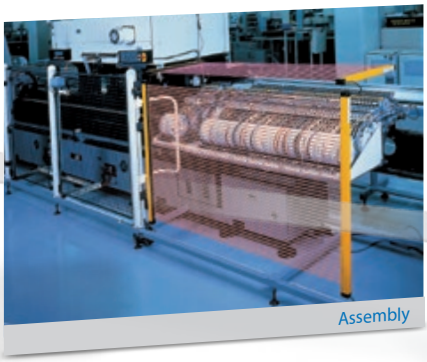
Motion



Filling line

- Motion Control: Integrated within the IDE, and operating in real-time
- Standard PLCopen Function Blocks plus Omron generated motion FB's
- Direct Synchronous control for Position, Speed and Torque

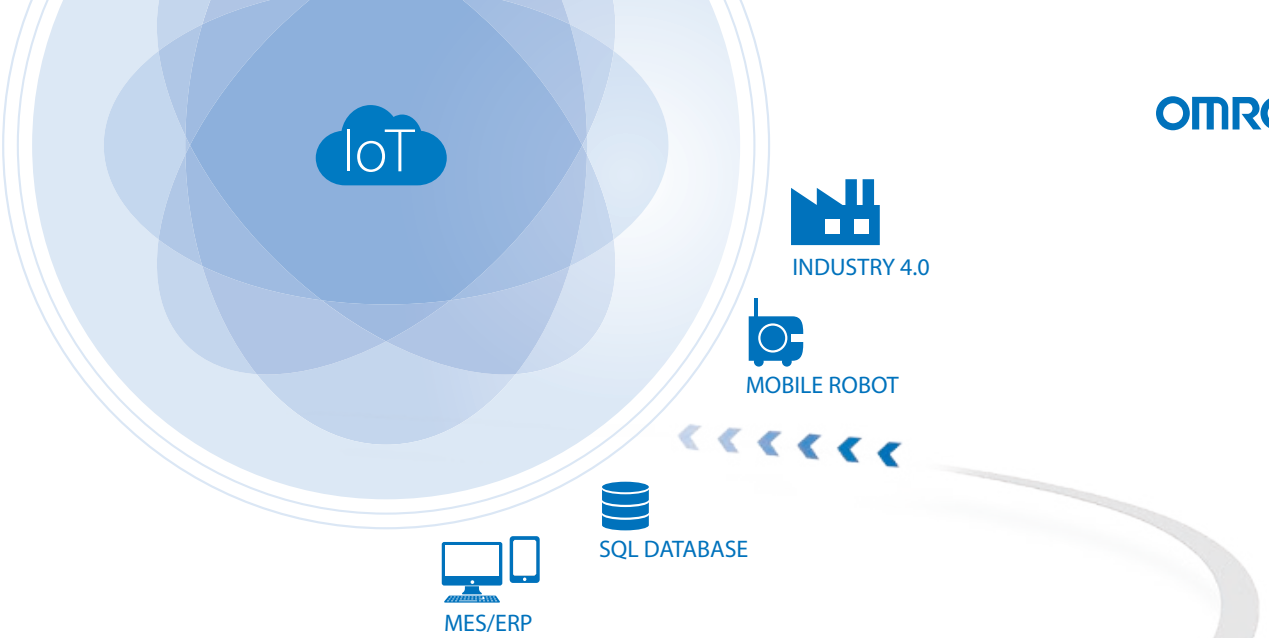
Safety



Assembly

- All safety related data is synchronized with the whole network
- Safety functions such as muting, guard locking, EDM and valve monitoring are simple to manage

One Integrated Development Environment software for Configuration, Programming, Simulation and Monitoring



Information


Pills blister packing

- Sysmac communicates in real-time with Databases such as SQL
- Secure Data: In the event of a server going down or losing communications, data is automatically stored in internal memory
- Sysmac operates with Databases at high speed [1000 table element/ 100 ms] ensuring realistic Big Data Processing to improve productivity and aid predictive maintenance etc.

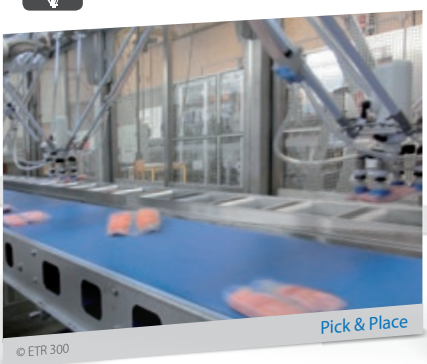
Integrated Automation Control:
The Sysmac platform is scalable and provides the performance and functionality for a wide range of solutions from simple machines through to manufacturing cells

Vision


Quality inspection

- Higher resolution images available without increasing the vision processing time
- Shape search technology: Provides more stable and accurate object detection for Pick & Place projects

Robotics


Pick & Place
© ETR 300

- Delta, SCARA and Cartesian robots control
- Time-based Robotic Function Blocks make programming easier

Sensing

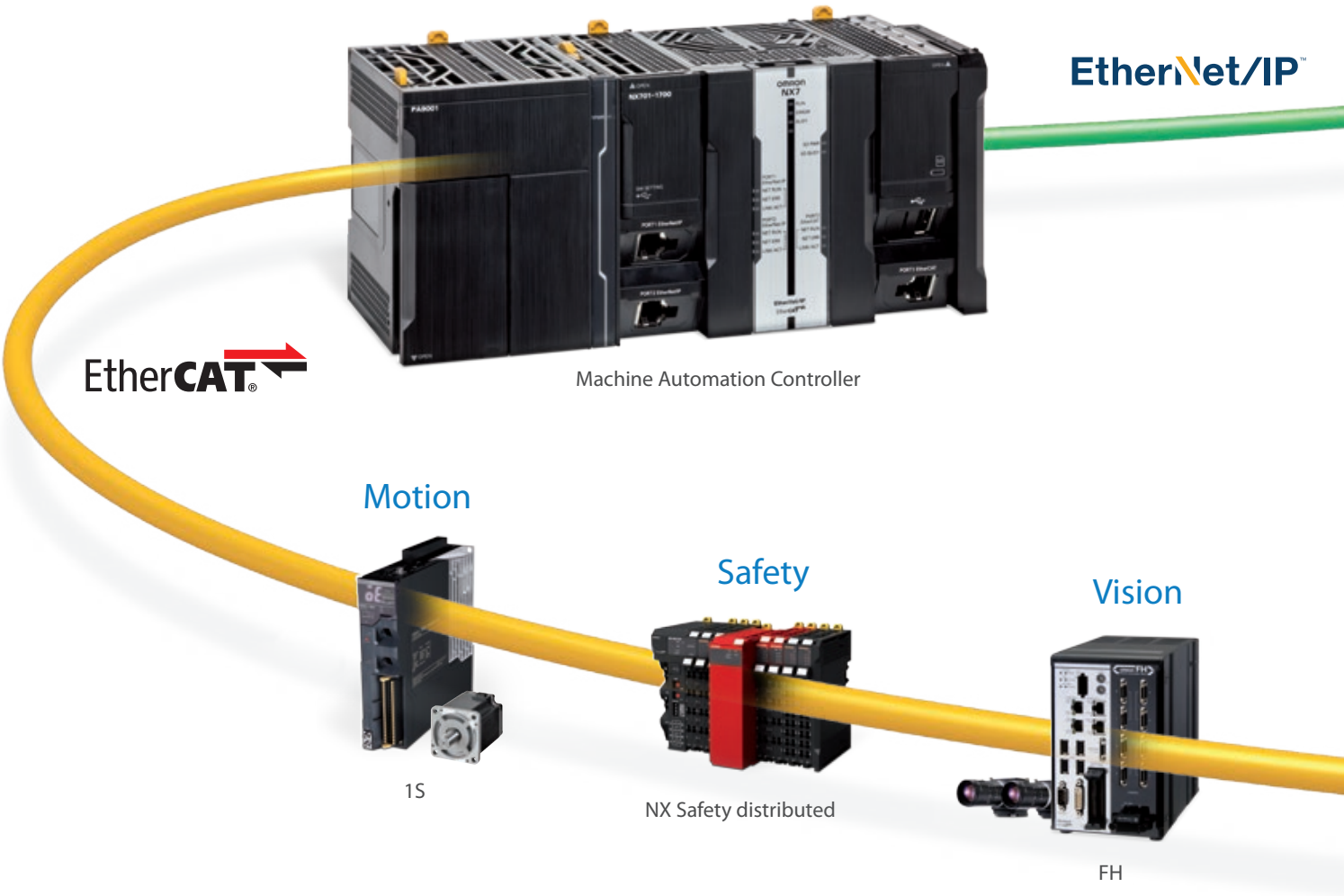

Presence detection of the rubber seal

- Full control of the process parameter setting and predictive maintenance functions
- High precision detection and positioning data synchronized on the network

One Connection - One Software - One Machine Controller

Seamless machine control and factory automation

One machine control through one connection and one software is how we define the Sysmac automation platform. The Machine Automation Controller integrates logic, motion, safety, robotics, vision, information, visualization and networking under one software: Sysmac Studio. This one software provides a true Integrated Development Environment (IDE) that also includes a custom 3D motion simulation tool. The machine controller comes standard with built-in EtherCAT and EtherNet/IP. The two networks with one connection purpose is the perfect match between fast real time machine control and data plant management.



EtherCAT - Machine Control

- Fastest cycle time: 125 µs
- Up to 256 synchronized axes
- 512 slaves
- Embedded in Omron servo drive, inverter, I/O, Safety, Vision and Sensing
- Uses standard STP Ethernet cable with RJ45 connectors

IoT

INDUSTRY 4.0

MOBILE ROBOT

SQL DATABASE

MES/ERP

OPC UA

IDE

Visualization



NA HMI

Sysmac Studio

Ethernet - Factory Automation

- Unified interface communication from machine to machine to IT systems
- OMAC standards for packaging machines. PackML template
- Embedded Database Connection for Microsoft SQL Server, Oracle, IBM DB2, MySQL, PostgreSQL and Firebird
- Standard protocols and services: TCP/IP and UDP/IP, FTP client and server, NTP, SNMP
- CIP protocol

Robotics



Industrial Robots

I/O

NX I/O

IO-Link

Sensing



Photoelectric/Proximity sensor

Integrated architecture from sensor level to factory network

Sysmac family

MACHINE CONTROLLER

IPC CONTROLLER





Model	NY5	
Hardware	Industrial Box PC	Industrial Panel PC (Industrial Box PC + Monitor integrated)
Operating system	Windows Embedded Standard 7 - 64-bit	
Fastest cycle time	500 µs	
Synchronous axis	64, 32, 16	
CPU type	Intel® Core™ i7-4700EQ processor with fan for active cooling	
Task	Multi-tasking program	
Functions	• Logic sequence • Motion	
Software tool	Sysmac Studio	
Programming languages	• Ladder • Structured Text • In-Line ST	
Standard programming	• IEC 61131-3 • PLCopen Function Blocks for Motion Control	
Program capacity	40 MB	
RAM memory (non-ECC type)	8 GB	
Storage	HDD, SSD, SD memory card	
Display size	-	15.4-inches, 12.1-inches
Built-in ports	• Ethernet • EtherNet/IP • EtherCAT • USB 3.0/2.0 • DVI	
EtherCAT slaves	192	
Servo drive	1S, G5 and Integrated servo motor	
Motion control	• Axes groups interpolation and single axis moves • Electronic cams and gearboxes • Direct position control for axis and groups	
Mounting	Book/Wall mount	On panel
Global standards	CE, cULus	
Ordering information (Quick Link *1)	H278	
Product website	https://industrial.omron.eu/en/products/ny5	

*1Note: Quick Links are unique codes assigned to Omron products listed in this catalogue. Enter Quick Link codes in the search box on www.industrial.omron.eu to access detailed information on products.

IPC CONTROLLER OPTIONS



Model	NYM
Type	Industrial Monitor
Display	TFT LCD
Screen size	15.4-inches, 12.1-inches
Resolution	Up to 1,280 x 800 pixels at 60 Hz
Colors	16,770,000 colors
Connectors	• 1 x Power connector • 1 x DVI-D connector • 2 x USB Type-A connector • 2 x USB Type-B connector
Power supply voltage	19.2 to 28.8 VDC
Ordering information (Quick link)	H280
Product website	https://industrial.omron.eu/en/products/industrial-pc



Model	S8BA
Type	Uninterruptible Power Supply (UPS)
Capacity	240 W, 120 W
Input voltage	24 VDC
Output voltage	• Normal operation: Output of input voltage as is • Backup operation: 24 VDC ±5%
Backup time (25°C, initial characteristics)	6 min.
I/O signal	Yes (RJ45)
Ordering information (Quick link)	P247
Product website	https://industrial.omron.eu/en/products/s8ba

MACHINE CONTROLLER

MODULAR CONTROLLER

					
Model	**NX7**	**NJ5**	**NJ3**	**NJ1**	**NX1**
Fastest cycle time	125 µs	500 µs	500 µs	1 ms	2 ms
Synchronous axis	256, 128	64, 32, 16	8, 4	2, 0	4, 2, 0
Task	Multi-tasking program				
Motion core	2 synchronized motion cores	Synchronized motion core			
Functions	• Logic sequence • Motion	• Logic sequence • Motion • Robotics • Database Connection • SECS/GEM	• Logic sequence • Motion	• Logic sequence • Motion • Database connection	• Logic sequence • Motion
Software tool	Sysmac Studio				
Programming languages	• Ladder • Structured Text • In-Line ST				
Standard programming	• IEC 61131-3 • PLCopen Function Blocks for Motion Control				
Program capacity	80 MB	20 MB	5 MB	3 MB	1.5 MB
Storage	SD and SDHC memory card				
Built-in port	• EtherNet/IP • EtherCAT • USB 2.0				• EtherNet/IP • EtherCAT
EtherCAT slaves	512	192	192	64	16
Servo drive	1S, G5 and Integrated servo motor				
Motion control	• Axes groups interpolation and single axis moves • Electronic cams and gearboxes • Direct position control for axis and groups				
Robotics	--	Delta, SCARA and Cartesian robots control	--	--	--
Supported SQL servers	--	• Microsoft SQL Server • Oracle • IBM DB2 • MySQL • PostgreSQL • Firebird	--	• Microsoft SQL Server • Oracle • IBM DB2 • MySQL • PostgreSQL • Firebird	--
Built-in I/O points	-				40, 24
Local I/O	-	CJ series units			NX I/O units
Remote I/O	EtherCAT NX I/O units				
Mounting	DIN rail				
Global standards	CE, cULus	CE, cULus, NK, LR			CE, cULus
Ordering information (Quick link)	H269	H245			H277

HUMAN MACHINE INTERFACE






Model	NA5-15W	NA5-12W	NA5-9W	NA5-7W
Display	TFT colour LCD			
Display size	15-inch widescreen	12-inch widescreen	9-inch widescreen	7-inch widescreen
Resolution	1280 x 800 pixels		800 x 480 pixels	
Display colour	24 bit full colour			
Operator input	• Touch screen • 3 programmable function keys			
Built-in port	• 2 x Ethernet • 3 x USB 2.0			
Power requirements	19.2 to 28.8 VDC			
Software tool	Sysmac Studio			
IP ratings	Front panel controls: IP65 oil-proof type			
Memory card	SD and SDHC memory card			
Features	• Multiple-access level security with password protection • Visual Basic programming with VB.net • Integrated simulator in the Sysmac Studio			
Options	Black and silver frame colours			
Ordering information (Quick link)	N554			

REMOTE I/O



IO-Link





IO-Link

Model	NX Series I/O	GX Series I/O
Type	Modular I/O	Block I/O
Network specification	EtherCAT coupler unit	EtherCAT built-in
Number of units	• Up to 63 I/O units • Max. 1024 bytes in + 1024 bytes out	Block I/O expandable with one digital I/O unit (16 points + 16 points)
I/O types	• Digital I/O • Analog I/O • Encoder input • Pulse output • Temperature control • Load cell input • Safety control • IO-Link master unit (4 channels)	• Digital I/O • Analog I/O • Encoder input • Expansion unit • IO-Link master unit IP67 (8 channels)
I/O connection	• Screwless push-in terminals • MIL connectors • M3 screw terminals • Fujitsu connectors	• M3 screw terminals (1- or 3-wire DI) • M12 connectors, A-coding, female
Features	• Automatic and manual address setting • Standard and high-speed inputs • Digital input filtering • Removable push-in I/O terminals • Synchronous I/O updates using Distributed Clock • I/O units with Time Stamp function • High signal density: 16 digital or 8 analog signals in 12 mm width	• Automatic and manual address setting • High-speed input • Digital input filtering • Removable I/O terminals • Expandable digital I/O
Mounting	DIN rail	
Ordering information (Quick link)	H249	K246 / K262

SAFETY







Model	NX safety controller	NX safety input unit	NX safety output unit
Network specification	FSoE – Safety over EtherCAT		
Performance level	PLe (EN ISO 13849-1)		
Safety integrity level	SIL3 (IEC 61508)		
PFH	4.4E-10	3.80E-10	8.80E-10
PFD	7.0E-06 (20 years)	6.6E-06	7.9E-06
TM (Mission time)	20 years		
Programming	• IEC 61131-3 standard • 46 Safety FB/FUN	–	–
Safety connections	• 128 connections (NX-SL3500 safety CPU) • 32 connections (NX-SL3300 safety CPU)	–	–
I /O signal	–	• 4 points • 8 points	• 2 points • 4 points
Number of test outputs	–	2	–
I/O connection	Screwless push-in terminals		
Maximum load current	–	–	• 2 A • 0.5 A
Features	• Freely mix with standard NX I/O • Flexibility and reusability of the programming code • Variables are part of the NX/NY/NJ controller project	• Freely mix with standard NX I/O • High connectivity for direct connection to safety input devices • I/O data monitoring in the NX/NY/NJ controller project	
Mounting	DIN rail		
Ordering information (Quick link)	H275		

SERVO SYSTEM



Safety over EtherCAT

Model	1S servo drive
Type	Rotary servo drive
Ratings 230 V single-phase	100 W to 1.5 kW
Ratings 400 V three-phase	600 W to 3 kW
Applicable servo motors	1S rotary motors
Position, speed and torque control	EtherCAT
Safety approvals	• Hardwired Safe Torque Off: PLe (EN ISO 13849-1), SIL3 (IEC61508) • Network Safe Torque Off: PLd (EN ISO 13849-1), SIL2 (IEC61508)
Safety function built-in	STO
Ordering information (Quick link)	F393







Model	1S servo motor		
Rated speed	3,000 rpm	2,000 rpm	1,000 rpm
Maximum speed	5,000 to 6,000 rpm	3,000 rpm	2,000 rpm
Rated torque	0.318 Nm to 9.55 Nm	1.91 Nm to 14.3 Nm	8.59 Nm to 28.7 Nm
Sizes	100 W to 3 kW	400 W to 3 kW	900 W to 3 kW
Applicable servo drive	1S servo drive		
Encoder resolution	23-bit absolute		
IP rating	IP67		
Ordering information (Quick link)	F392		

SERVO SYSTEM





Model	Accurax G5 servo drive	
Type	Rotary servo drive	Linear servo drive
Ratings 230 V single-phase	100 W to 1.5 kW	200 W to 1.5 kW
Ratings 400 V three-phase	600 W to 15 kW	600 W to 5 kW
Applicable servomotor	Accurax G5 rotary motors	Accurax linear motors
Position, speed and torque control	EtherCAT	
Safety approvals	• Hardwired Safe Torque Off: PLd (EN ISO 13849-1), SIL2 (IEC61508)	
Safety function built-in	STO	
Full closed loop	Built-in	N/A
Ordering information (Quick link)	F354	



Model	Accurax G5 rotary motor				Accurax G5 high inertia rotary motor		
Rated speed	3,000 rpm	2,000 rpm	1,500 rpm	1,000 rpm	3,000 rpm	2,000 rpm	1,500 rpm
Maximum speed	4,500 to 6,000 rpm	3,000 rpm	2,000 to 3,000 rpm	2,000 rpm	4,500 to 5,000 rpm	3,000 rpm	3,000 rpm
Rated torque	0.16 Nm to 15.9 Nm	1.91 Nm to 23.9 Nm	47.8 Nm to 95.5 Nm	8.59 Nm to 57.3 Nm	0.64 Nm to 2.4 Nm	4.77 Nm to 23.9 Nm	47.8 Nm
Sizes	50 W to 5 kW	400 W to 5 kW	7,5 kW to 15 kW	900 W to 6 kW	200 W to 750 W	1 kW to 5 kW	7,5 kW
Applicable servo drive	Accurax G5 rotary servo drive						
Encoder resolution	20-bit incremental/ 17-bit absolute		17-bit absolute	20-bit incremental/ 17-bit absolute			17-bit absolute
IP rating	IP67				IP65	IP67	
Ordering information (Quick link)	F356						





Model	Accurax linear motor	
Type	Iron-core linear motor	Ironless linear motor
Continuous force range	48 N to 760 N	29 N to 423 N
Peak force range	105 N to 2000 N	100 N to 2100 N
Maximum speed	1 to 10 m/s	1.2 to 16 m/s
Magnetic attraction force	300 N to 4440 N	Zero
Applicable servo drive	Accurax G5 linear servo drive	
Ordering information (Quick link)	F357	F359
Product website	https://industrial.omron.eu/en/products/accurax-fw	https://industrial.omron.eu/en/products/accurax-gw

SERVO SYSTEM






Model	Integrated servo motor			
Rated torque	25 Nm	11,7 Nm	4,3 Nm to 5 Nm	2,55 Nm to 3,2 Nm
Frame size	190 mm	142 mm	100 mm	80 mm
Rated speed	3,000 rpm			
Maximum speed	4,000 rpm			
Encoder resolution	15-bit incremental/18-bit absolute			
IP rating	IP65			
Ordering information (Quick link)	F389			

FREQUENCY INVERTER




Model	RX	MX2
400 V three-phase	0.4 kW to 132 kW	0.4 to 15 kW
200 V three-phase	0.4 kW to 55 kW	0.1 kW to 15 kW
200 V single-phase	N/A	0.1 kW to 2.2 kW
Control method	Sensor-less and closed-loop vector control	• V/F control • Sensor-less vector control
Torque features	• 200% at 0.0 Hz (CLV) • 150% at 0.3 Hz (OLV)	• 200% at 0.5 Hz
Connectivity	EtherCAT option board	
Logic Programming	Standard Firmware	
Customisation options	–	IP54 enclosure
Regenerative solutions	• DC Supply with Regenerative Active Front End • Regenerative Braking unit	–
Application software	• Winder/Unwinder • Pump sequencer • Crane • Indexer positioning	• Winder/Unwinder • Pump sequencer
Ordering information (Quick link)	D224	D228

ROBOTICS







Model	Quattro	Hornet	Delta 2 + 1	Delta 3 + 1	Delta 5
Type	Delta robot				
Degrees of freedom	4	3 + 1 (rotation optional)	2 + 1 (rotation optional)	3 + 1 (rotation optional)	5
Max. Working diameter	1,300 to 1,600 mm	1,130 mm	800 to 1,500 mm	500 to 1,600 mm	650 to 1,300 mm
Max. Payload	4 to 15 kg	3 to 8 kg	3 to 35 kg	1 to 8 kg	1 kg
Protection class	IP66, IP65	IP65	IP65	IP65, IP67, IP69K	IP65
Robot controller	• SmartController EX • NX/NY/NJ series	• Embedded • SmartController EX • NX/NY/NJ series	NJ Robotics		
Mounting type	Inverted				
Ordering information (Quick link)	F628	F627	Y424	F623	Y425





Model	Cobra	eCobra	Viper
Type	SCARA robot		Articulated robot
Degrees of freedom	4	4	6
Max. Reach	350 mm	600 to 800 mm	650 to 850 mm
Max. Payload	5 kg	5.5 kg	5 kg
Protection class	IP20, Clean room C10	IP20, IP65, Clean room C10	IP40, Clean room C10
Robot controller	• eMotionBlox • SmartController EX • NX/NY/NJ series	• Embedded • SmartController EX • NX/NY/NJ series	• eMotionBlox • SmartController EX • NX/NY/NJ series
Mounting type	Table/Floor	Table/Floor, Inverted	Table/Floor, Inverted
Ordering information (Quick link)	F625	F626	F624





Model	Accurax linear motor axis
Type	
Continuous force range	48 N to 760 N
Peak force range	105 N to 2,000 N
Maximum speed	5 m/s
Magnetic attraction force	300 N to 4,440 N
Applicable servo drive	Accurax G5 linear servo drive
Ordering information (Quick link)	F362

Model	OEM Mobile Platform		Car transporter	
Type	Mobile robot			
Max. Load	60 kg	90 kg	105 kg	130 kg
Max. Speed	1.8 m/s	1.35 m/s	1.35 m/s	0.9 m/s
Max. Rotation speed	180°/s		100°/s	
Stop position accuracy*1	± 100 mm position, ± 2° rotation			
Run time*2	13 h (continuous) approx.		12 h (continuous) approx.	
Protection class	IP20			
Ordering information (Quick link)	F629			

*1 With High Accuracy Positioning System option. *2 With no payload condition.

VISION





Model	FH	FQ-M
Description	Flexible machine vision	Designed for object tracking
Interface	EtherCAT, Ethernet, USB and serial ports built-in, SD card	EtherCAT and Ethernet built-in
Inspection items	Over 100 processing items	Shape search, search, labelling, edge position
Registered scenes	4096	32
Image processing method	Real colour or monochrome	
Camera resolution	From 640x480 up to 4096x3072	752 x 480
Features	• Powerful 4-core i7 parallel processor • High speed CMOS camera • Up to 8 camera by one controller • Advanced shape search technology	• Fast and powerful object recognition • Encoder input for object tracking and calibration • Contour based object detection • Sysmac Studio software for vision system operation and setting
Software	Sysmac Studio	
Supply voltage	24 VDC	
Digital I/O	17 in/37 out	9 in/5 out
Ordering information (Quick link)	G639	G455

SENSING

	E3Z-IL series	E3S-DC series	E2E/Q-IL series
	 IO-Link	 IO-Link	 IO-Link
Type	Photoelectric sensor	Color mark photoelectric sensor	Proximity sensor
Max. sensing distance	• Through-beam: 15 m • Retro-reflective with M.S.R.: 4 m • Diffusive-reflective: 1 m and 90 mm	• Diffusive-reflective: 10 mm	• M12: 3mm • M18: 7 mm • M30: 10 mm
Connection method	• Pre-wired (2 m) • Pre-wired M12 connector • M8 connector	• M12 connector	• Pre-wired (2 m) • Pre-wired M12 connector
Baud rate	COM2, COM3		
Material	PBT	Zinc diecast	Stainless steel - IP67 protection
Special models	-	-	Spatter-resistant models
IO-Link master unit	• GX-series IP67 type: GX-ILM08C (8 channels) • NX-series type: NX-ILM400 (4 channels)		
Ordering information (Quick link)	B303	B305	A293 / A294
	ZW-7000 series	N-Smart series	E3X/E3C/E2C
			
Type	Displacement sensor	Fiber/Laser/Contact sensor	Fiber/Laser/Proximity sensor
Measurement methods	White light confocal principle	-	-
Applications	Height, thickness	-	-
Measurement range	Min: 10 ± 0.5 mm, Max: 30 ± 2 mm	-	-
Static resolution	0.004 to 0.016 µm	-	-
Linearity	± 0.45 to 2 µm	-	-
Special features	• Measuring shiny objects with an inclination of ±25 • ±0.5 µm or less linearity for various materials • Ultra-compact, lightweight sensor • Synchronous control and setting of multiple sensors via Ethernet • Wide variety of interfaces (EtherCAT/ Ethernet/RS-232C/Analog voltage and current)	• High speed transmission of I/O-signals and incident values • Up to 30 amplifiers on one communication unit • Synchronized signal transmission • Slave unit for decentralized machine installation	• High speed transmission of I/O-signals • Up to 30 amplifiers on one communication unit
Network specification	EtherCAT built-in	EtherCAT communication unit	
Connectable sensors	-	Up to 30	
Amplifier types	-	• E3NX-FA0 • E3NX-CA0 • E3NC-LA0 • E3NC-SA0 • E9NC-TA0	• E3X-HD0 • E3X-MDA0 • E3C-LDA0 • E2C-EDA0
Mounting	DIN rail (controller)	DIN rail	

SOFTWARE



Model	Sysmac Studio
Functions	• Sysmac Studio is the Integrated Development Environment to configure, program and maintain all Sysmac Controllers and devices. • One single project file for the entire machine. • Intuitive IDE for logic, motion, safety, robotics, drives, vision, HMI and networks. • Reduce engineering and maintenance costs by using Omron libraries and IAGs. Develop your own libraries. • IEC-61131-3 compliant. • PLCopen FBs for motion and safety. • Advanced functions for CAM editing, Drive tuning, 3D simulation, libraries and namespaces, vision algorithms, HMI design and complete machine maintenance. • Full Digital Machine development enviromnent including: EtherNet/IP, EtherCAT, IO-Link, SQL and FTP. • Offline Simulation for logic, motion, robotics, safety and vision. • Advanced security function with 32 digit security password.
Ordering information (Quick link)	L432

ETHERNET AND ETHERCAT MEDIA





Model	Ethernet switch		
Number of ports	5		3
Functions	• QoS for EtherNet/IP • Auto MDI/MDIX • Failure detection: Broadcast storm and LSI error detection 10/100BASE-TX, Auto-Negotiation	• QoS for EtherNet/IP • Auto MDI/MDIX	
Power requirements	24 VDC (±5%)		
Dimensions	48 x 78 x 90 mm		25 x 78 x 90 mm
Mounting	DIN rail		




Model	EtherCAT junction slave (Branching unit)	
Number of ports	6	3
Functions	• Power, Link/Act indicators • Auto MDI/MDIX • Reference clock	
Power requirements	24 VDC (–15% to +20%)	
Dimensions	48 x 78 x 90 mm	25 x 78 x 90 mm
Mounting	DIN rail	

Main content

Sysmac Automation Platform

Machine controller	**IPC controller**	NY5 series	21
	Modular controller	NX7 series	35
		NJ series	47
		NX1 series	67
Remote I/O	**Modular I/O**	NX series I/O	85
	Compact I/O	GX series I/O	135
	IO-Link master	IO-Link master & sensors	147
Safety		NX integrated safety	157
Servo system	**Rotary servo system**	1S servo drive	165
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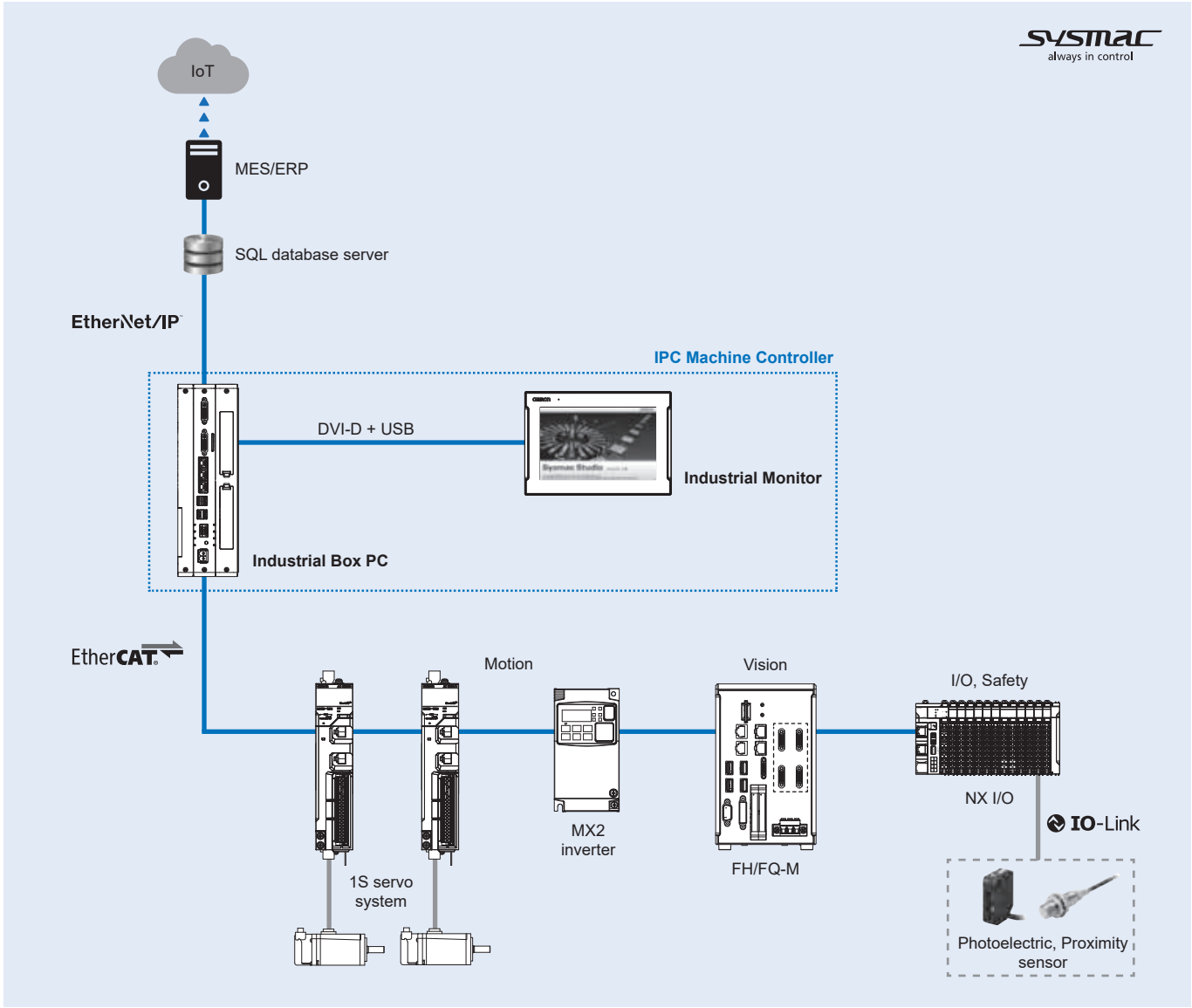
IPC Machine Controller



Hybrid controller which combines Sysmac machine control and IT technology

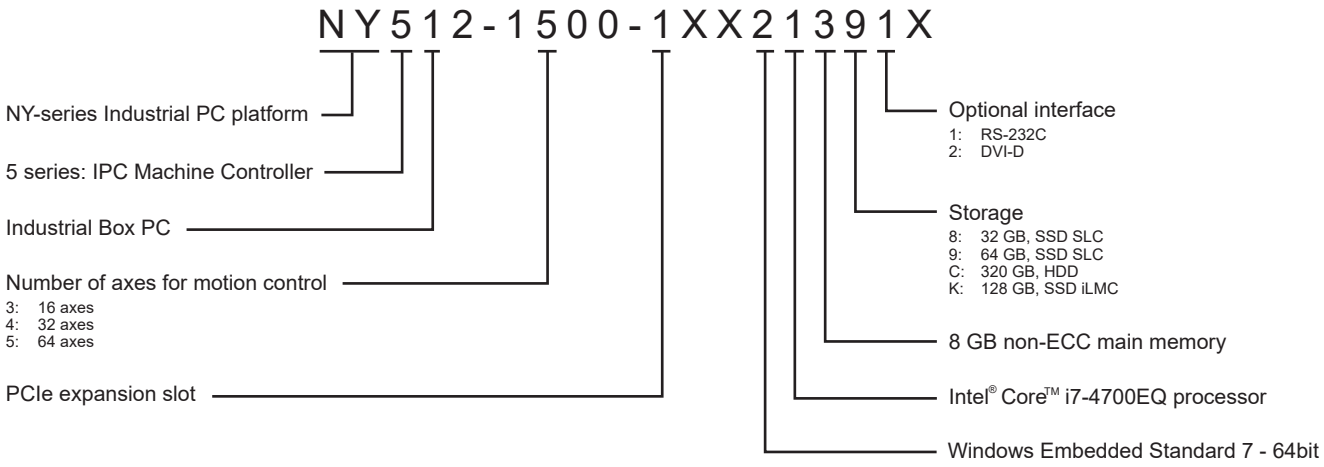
- Intel Core i7 Quad-core processor
- Windows Embedded Standard 7 64-bit
- Open operating system allows running customised software and hardware
- Built-in EtherNet/IP port for your IT systems and machine to machine communication
- Sysmac machine controller inside
- 500 μs system cycle time
- Up to 64 synchronized axes
- Built-in EtherCAT port for up to 192 synchronized slaves

System configuration

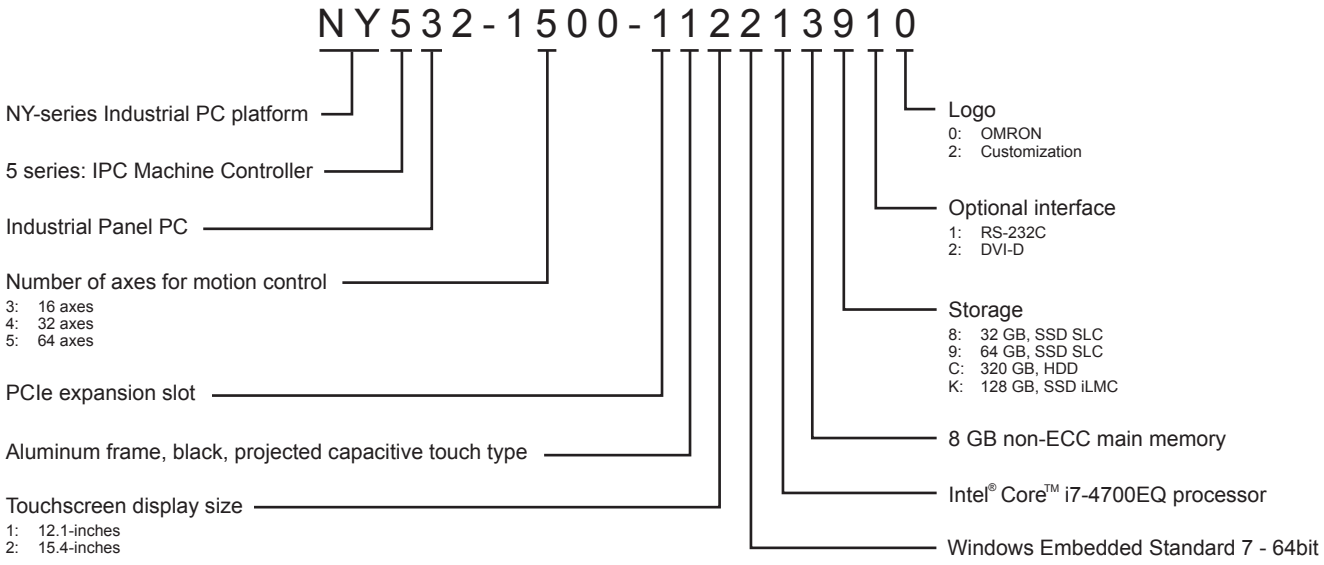


Type designation

Industrial Box PC



Industrial Panel PC (Industrial Box PC + Monitor integrated)



Specifications

General specifications

Model				Industrial Box PC	Industrial Panel PC
Electrical specifications	Rated power supply voltage			24 VDC (20.4 to 28.8 VDC), non-isolated	
	Grounding method			Ground to less than 100 Ω	
	Inrush current			At 24 VDC: 12 A/6 ms max. for cold start at room temperature	
	Overvoltage category			JIS B3502 and IEC 61131-2: Category II	
	EMC immunity level			IEC 61132-2: Zone B	
	RTC accuracy			At ambient temperature of 55ºC: -3.5 to +0.5 min error per month At ambient temperature of 25ºC: -1.5 to +1.5 min error per month At ambient temperature of 0ºC: -3 to +1 min error per month	
	Battery life			5 years at 25ºC (for CJ1W-BAT01 battery)	
	Fan life			8 years continuous operation at 40ºC	
	Power consumption	Max. power consumption including drives and expansions		114 W	132 W
		Industrial PC excluding drives and expansions		81 W	99 W
		Drives	HDD 320 GB	2 W	
			SSD SLC 64 GB	2 W	
			SSD SLC 32 GB	2 W	
			SSD iMLC 128 GB	2 W	
		Expansions	USB	14 W max. ((2 x 500 mA at 5 VDC) + (2 x 900 mA at 5 VDC))	
			PCIe	15 W max.	5 W max.
Environmental specifications	Ambient operating temperature			0 to 55ºC	
	Ambient storage temperature			-20 to 70ºC	
	Ambient operating/storage humidity			10 to 90% with no condensation	
	Operating atmosphere			No corrosive gases	
	Altitude			2,000 m max.	
	Noise immunity			2 kV on power supply line. Conforms to IEC 61000-4-4	
	Vibration resistance (during operation)			Conforms to IEC 60068-2-6: • For a box PC with an SSD: 5 to 8.4 Hz with 3.5 mm single amplitude and 8.4 to 150 Hz with 9.8 m/s^2 for 10 times each in X, Y and Z directions • For a box PC with a HDD the vibration resistance depends on the mounting direction: Book mount 2.5 m/s^2 / Wall mount 4.9 m/s^2	Depends on the storage device: • For a panel PC with only SSD: 5 to 8.4 Hz with 3.5 mm single amplitude and 8.4 to 150 Hz with 9.8 m/s^2 for 10 times each in X, Y and Z directions. Conforms to IEC 60068-2-6 • For a panel PC with one or more HDD the panel PC must be installed in a vibration free environment
	Shock resistance (during operation)			Conforms to IEC 60028-2-27 147 m/s^2, 3 times each in X, Y and Z directions	
	Installation method			Book mount, Wall mount	Mount on panel
	Degree of protection*1			Front of monitor: IP65	
	Pollution degree			2 or less: Conforms to JIS B3502 and IEC 61131-2	
Battery		Life		5 years at 25ºC	
		Model		CJ1W-BAT01	
Fan unit		Life		70,000 hours of continuos operation at 40ºC with 15 to 65% relative humidity	
		Model		NY000-AF00	
LED				PWR, ERR, HDD, RUN	
Applicable standards				EMC Directive (2014/30/EU)	

*1 The Industrial Panel PC may not operate properly in locations subjected to oil splashes for extended periods of time.

Performance specifications

Model				NY5□□-1500□	NY5□□-1400□	NY5□□-1300□
Processing time	Instruction execution time	LD instruction		0.33 ns		
		Math instructions (for long real data)		1.2 ns or more		
Programming	Program capacity*1	Size		40 MB		
		POU definition		3,000		
		POU instance		24,000		
	Variables capacity	No retain attribute		Size: 64 MB Number: 180,000		
		Retain attribute		Size: 4 MB Number: 40,000		
	Data type	Number		4,000		
Unit configuration	Maximum number of NX unit on the system			4,096 (on NX EtherCAT communication coupler unit)		
Motion control	Number of controlled axes	Number of axes		64	32	16
		Linear interpolation control		4 axes max. per axes group		
		Circular interpolation control		2 axes per axes group		
	Number of axes groups			32 groups max.		
	Position units			Pulses, millimeters, micrometers, nanometers, degrees and inches		
	Override factors			0.00% or 0.01% to 500.00%		
	Motion control period			Same as process data communications period of EtherCAT communications		
	Cams	Number of cam data points		65,535 points max. per cam table / 1,048,560 points max. for all cam tables		
		Number of cam tables		640 tables max.		
Communications	Built-in EtherNet/IP port	Number of ports		1		
		Physical layer		10BASE-T, 100BASE-TX or 1000BASE-T		
		Frame length		1,514 bytes max.		
		Media access method		CSMA/CD		
		Modulation		Baseband		
		Topology		Star		
		Baud rate		1 Gbps (1000BASE-T)		
		Transmission media		STP (shielded, twisted pair) cable of Ethernet category 5, 5e or higher		
		Transmission distance		100 m max. (distance between Ethernet switch and node)		
		Cascade connections number		There are no restrictions if an switching hub is used		
		CIP service: Tag data links (cyclic communications)	Number of connections	128 max.		
			Packet interval*2	1 to 10,000 ms in 1.0-ms increments. Can be set for each connection		
			Permissible communications band*3	20,000 pps (including heartbeat)		
			Number of tag sets	128 max.		
			Tag types	Network variables		
			Number of tags per connections	8 (7 tags if controller status is included in the tag set.)		
			Number of tags	256 max.		
			Link data size per node	184,832 bytes (total size for all tags.)		
			Data size per connection	1,444 bytes max.		
			Number of registrable tag sets	128 max. (1 connection = 1 tag set)		
			Tag set size	1,444 bytes max. (two bytes are used if controller status is included in the tag set.)		
			Multi-cast packet filter*4	Supported		
		CIP message service: Explicit messages	Class 3 (number of connections)	64 total (clients plus server)		
			UCMM (non-connection type)	Number of clients that can communicate at one time: 32 max. Number of servers that can communicate at one time: 32 max.		
		Number of TCP sockets		30 max.		
	Built-in EtherCAT port	Number of ports		1		
		Communications standard		IEC 61158, Type 12		
		EtherCAT master specifications		Class B (feature pack motion control compliant)		
		Physical layer		100BASE-TX		
		Modulation		Baseband		
		Baud rate		100 Mbps (100BASE-TX)		
		Duplex mode		Automatic		
		Topology		Line, daisy chain and branching		
		Transmission media		Twisted-pair cable of category 5 or higher (double-shielded straight cable with aluminum tape and braiding)		

Model				NY5□□-1500□	NY5□□-1400□	NY5□□-1300□
Communications	Built-in EtherCAT port	Transmission distance		Distance between nodes: 100 m max.		
		Number of slaves		192 max.		
		Process data size		Inputs/Outputs: 5,736 bytes max.(the maximum number of process data frames is 4)		
		Process data size per slave		Inputs/Outputs: 1,434 bytes max.		
		Communications cycle		500 μs to 8 ms in 250 μs increments		
		Sync jitter		1 μs max.		
Internal clock				At ambient temperature of 55°C: –3.5 to +0.5 min error per month At ambient temperature of 25°C: –1.5 to +1.5 min error per month At ambient temperature of 0°C: –3 to +1 min error per month		
Main system	CPU	Processor type		Intel® Core™ i7-4700EQ		
		Cores / Threads		4 / 8		
		Processor base frequency		2.4 GHz		
		Max. turbo frequency		3.4 GHz		
		Cache		6 MB		
		Cooling details		Requires active cooling (fan)		
	Memory	Size		8 GB		
		Type		DDR3L (non ECC)		
	Trusted platform module (TPM)			• Ensure the integrity of the platform • Disk encryption • Password protection and other uses of encryption		
	Graphics controller			Intel® HD Graphics. Up to two independent screens. Intel® HD Graphics 4600		
	Watchdog			Yes		
Operating system	Windows OS			Windows Embedded Standard 7 - 64 bit		
Storage devices	Drives	Hard disk drive		• HDD - 320 GB • Serial ATA 3.0		
		Solid state drive	SLC type	• SLC type - long life SSD • 32 and 64 GB models • Serial ATA 3.1		
			MLC type	• MLC type - industrial MLC • 128 GB • Serial ATA 3.1		
	Drive bay			• 2 drive slot • HDD or SSD		
Connectors	Power connector			24 VDC		
	I/O connector			• 2 inputs: Power ON/OFF input, UPS mode input • 1 output: Power status output		
	USB connectors	USB 3.0		• 2 ports • 900 mA max. current • 3 m max. cable length		
		USB 2.0		• 2 ports • 500 mA max. current • 5 m max. cable length		
	Ethernet connectors	Number of ports		3		
		Physical layer		10BASE-T, 100BASE-TX, 1000BASE-T		
	DVI-I connector	Video interface		Digital or analog		
		Resolution		Up to 1,920 x 1,200 pixels at 60 Hz		
	Optional connectors	DVI-D connector	Video interface	Digital		
			Resolution	Up to 1,920 x 1,200 pixels at 60 Hz		
		RS-232C connector		Standard SUBD9 connector (non-isolated)		
PCIe card slot	Configuration			x4 (4 lanes) up to Gen 3		
	Card height			Standard height cards, 4.20" (106.7 mm)*5		
	Card length			Half-length cards, 6.6" (167.65 mm)		

*1 This is the capacity for the execution objects and variable tags (including variable names).
*2 Data will be refreshed at the set interval, regardless of the number of nodes.
*3 "pps" means packet per second, i.e., the number of communication packets that can be sent or received in one second.
*4 As the EtherNet/IP port implements the IGMP client, unnecessary multi-cast packets can be filtered by using a switching hub that supports IGMP Snooping.
*5 Low profile cards, 2.536" (64.4 mm) are not supported.

Function specifications

Item				NY5□
Tasks	Function	Function		I/O refreshing and the user program are executed in units that are called tasks. Tasks are used to specify execution conditions and execution priority.
		Periodically executed tasks		Maximum number of primary periodic tasks: 1 Maximum number of periodic tasks: 3
		Conditionally executed tasks		Maximum number of even tasks: 32 When active even task instruction is executed or when condition expression for variable is met.
Programming	POUs (program organization units)	Programs		POUs that are assigned to tasks.
		Function blocks		POUs that are used to create objects with specific conditions.
		Functions		POUs that are used to create an object that determine unique outputs for the inputs, such as for data processing.
	Programming languages	Types		Ladder diagrams[*1] and structured text (ST).
	Namespaces			A concept that is used to group identifiers for POU definitions.
	Variables	External access of variables		Network variables (the function which allows access from the HMI, host computers or other controllers)
	Data types	Basic data types		BOOL, BYTE, WORD, DWORD, LWORD, INT, SINT, DINT, LINT, UINT, USINT, UDINT, ULINT, REAL, LREAL, TIME (durations), DATE, TIME_OF_DAY, DATE_AND_TIME and STRING (text strings)
		Derivative data types		Structures, unions, enumerations
		Structures	Function	A derivative data type that groups together data with different variable types. Number of members: 2,048 max. Nesting levels: 8 max.
			Member data types	Basic data types, structures, unions, enumerations, array variables
			Specifying member offsets	You can use member offsets to place structure members at any memory locations.
		Unions	Function	A derivative data type that groups together data with different variable types. Number of members: 4 max.
			Member data types	BOOL, BYTE, WORD, DWORD and LWORD.
		Enumerations	Function	A derivative data type that uses text strings called enumerators to express variable values.
	Data type attributes	Array specifications	Function	An array is a group of elements with the same data type. You specify the number (subscript) of the element from the first element to specify the element. Number of dimensions: 3 max. Number of elements: 65,535 max.
			Array specifications for FB instances	Supported.
		Range specifications		You can specify a range for a data type in advance. The data type can take only values that are in the specified range.
		Libraries		User libraries.
Motion control	Control modes			Position control, velocity control, torque control
	Axis types			Servo axes, virtual servo axes, encoder axes and virtual encoder axes
	Positions that can be managed			Command positions and actual positions
	Single-axis	Single-axis position contol	Absolute positioning	Positioning is performed for a target position that is specified with an absolute value.
			Relative positioning	Positioning is performed for a specified travel distance from the command current position.
			Interrupt feeding	Positioning is performed for a specified travel distance from the position where an interrupt input was received from an external input.
			Cyclic synchronous absolute positioning	The function which output command positions in every control period in the position control mode.
		Single-axis velocity control	Velocity control	Velocity control is performed in position control mode.
			Cyclic synchronous velocity control	A velocity command is output each control period in the velocity control mode.
		Single-axis torque control	Torque control	The torque of the motor is controlled.
		Single-axis synchronized control	Starting cam operation	A cam motion is performed using the specified cam table.
			Ending cam operation	The cam motion for the axis that is specified with the input parameter is ended.
			Starting gear operation	A gear motion with the specified gear ratio is performed between a master axis and slave axis.
			Positioning gear operation	A gear motion with the specified gear ratio and sync position is performed between a master axis and slave axis.
			Ending gear operation	The specified gear motion or positioning gear motion is ended.
			Synchronous positioning	Positioning is performed in sync with a specified master axis.
			Master axis phase shift	The phase of a master axis in synchronized control is shifted.
			Combining axes	The command positions of two axes are added or subtracted and the result is output as the command position.
		Single-axis manual operation	Powering the servo	The servo in the servo drive is turned ON to enable axis motion.
			Jogging	An axis is jogged at a specified target velocity.

Item				NY5□
Motion control	Single-axis	Auxiliary functions for single-axis control	Resetting axis errors	Axes errors are cleared.
			Homing	A motor is operated and the limit signals, home proximity signal, and home signal are used to define home.
			Homing with parameter	Specifying the parameter, a motor is operated and the limit signals, home proximity signal and home signal are used to define home.
			High-speed homing	Positioning is performed for an absolute target position of 0 to return to home.
			Stopping	An axis is decelerated to a stop at the specified rate.
			Immediately stopping	An axis is stopped immediately.
			Setting override factors	The target velocity of an axis can be changed.
			Changing the current position	The command current position or actual current position of an axis can be changed to any position.
			Enabling external latches	The position of an axis is recorded when a trigger occurs.
			Disabling external latches	The current latch is disabled.
			Zone monitoring	You can monitor the command position or actual position of an axis to see when it is within a specified range (zone).
			Enabling digital cam switches	You can turn a digital output ON and OFF according to the position of an axis.
			Monitoring axis following error	You can monitor whether the difference between the command positions or actual positions of two specified axes exceeds a threshold value.
			Resetting the following error	The error between the command current position and actual current position is set to 0.
			Torque limit	The torque control function of the servo drive can be enabled or disabled and the torque limits can be set to control the output torque.
			Position compensation	The function which compensate the position for the axis in operation.
			Start velocity	You can set the initial velocity when axis motion starts.
	Axes groups	Multi-axes coordinated control	Absolute linear interpolation	Linear interpolation is performed to a specified absolute position.
			Relative linear interpolation	Linear interpolation is performed to a specified relative position.
			Circular 2D interpolation	Circular interpolation is performed for two axes.
			Axes group cyclic synchronous absolute positioning	A positioning command is output each control period in Position control mode.
		Auxiliary functions for multi-axes coordinated control	Resetting axes group errors	Axes group errors and axis errors are cleared.
			Enabling axes groups	Motion of an axes group is enabled.
			Disabling axes groups	Motion of an axes group is disabled.
			Stopping axes groups	All axes in interpolated motion are decelerated to a stop.
			Immediately stopping axes groups	All axes in interpolated motion are stopped immediately.
			Setting axes group override factors	The blended target velocity is changed during interpolated motion.
			Reading axes group positions	The command current positions and actual current positions of an axes group can be read.
			Changing the axes in a group	The composition axes parameter in the axes group parameters can be overwritten temporarily.
	Common items	Cams	Setting cam table properties	The end point index of the cam table that is specified in the input parameter is changed.
			Saving cam tables	The cam table that is specified with the input parameter is saved in non-volatile memory in the CPU unit.
			Generating cam tables	The cam table that is specified with the input parameter is generated from the cam property and cam mode.
		Parameters	Writing MC settings	Some of the axis parameters or axes group parameters are overwritten temporarily.
			Changing axis parameters	You can access and change the axis parameters from the user program.
	Auxiliary functions	Count modes		You can select either linear mode (finite length) or rotary mode (infinite length).
		Unit conversions		You can set the display unit for each axis according to the machine.
		Acceleration/deceleration control	Automatic acceleration/deceleration control	Jerk is set for the acceleration/deceleration curve for an axis motion or axes group motion.
			Changing the acceleration and deceleration rates	You can change the acceleration or deceleration rate even during acceleration or deceleration.
		In-position check		You can set an in-position range and in-position check time to confirm when positioning is completed.
		Stop method		You can set the stop method to the immediate stop input signal or limit input signal.
		Re-execution of motion control instructions		You can change the input variables for a motion control instruction during execution and execute the instruction again to change the target values during operation.

Item				NY5□
Motion control	Auxiliary functions	Multi-execution of motion control instructions (buffer mode)		You can specify when to start execution and how to connect the velocities between operations when another motion control instruction is executed during operation.
		Continuous axes group motions (transition mode)		You can specify the transition mode for multi-execution of instructions for axes group operation.
		Monitoring functions	Software limits	Software limits are set for each axis.
			Following error	The error between the command current value and the actual current value is monitored for an axis.
			Velocity, acceleration/deceleration rate, torque, interpolation velocity and interpolation acceleration/deceleration rate	You can set warning values for each axis and each axes group.
		Absolute encoder support		You can use an OMRON 1S servomotor or Accurax-G5 series servomotor with an absolute encoder to eliminate the need to perform homing at startup.
		Input signal logic inversion		You can inverse the logic of immediate stop input signal, positive limit input signal, negative limit input signal or home proximity input signal.
	External interface signals			The servo drive input signals listed below are used. Home signal, home proximity signal, positive limit signal, negative limit signal, immediate stop signal and interrupt input signal.
Unit (I/O) management	EtherCAT slaves	Number of slaves		192 max.
Communications	EtherNet/IP port	Communication protocol		TCP/IP, UDP/IP
		TCP/IP functions	CIDR	The function which performs IP address allocations without using a class (class A to C) of IP address.
			IP forwarding	The function which forward IP packets between interfaces.
			Packet filter*2	Check the IP packet, the function to determine wether to receive the source IP address and TCP port number.
			NAT	Function for transfer by converting the two IP address.
		CIP communications service	Tag data links	Programless cyclic data exchange is performed with the devices on the EtherNet/IP network.
			Message communications	CIP commands are sent to or received from the devices on the EtherNet/IP network.
		TCP/IP applications	Socket services	Data is sent to and received from any node on EtherNet using the UDP or TCP protocol. Socket communications instructions are used.
			FTP client	File can be read from or written to computers to other Ethernet nodes from the CPU unit. FTP client communications instructions are used.
			FTP server	Files can be read from or written to the SD memory card in the CPU unit from computers at other Ethernet nodes.
			SNMP agent	Built-in EtherNet/IP port internal status information is provided to network management software that uses an SNMP manager.
	EtherCAT port	Supported services	Process data communications	Control information is exchanged in cyclic communications between EtherCAT master and slaves. This communications method is defined by CoE.
			SDO communications	A communication method to exchange control information in noncyclic event communications between the EtherCAT master and slaves. This communications method is defined by CoE.
		Network scanning		Information is read from connected slave devices and the slave configuration is automatically generated.
		DC (distributed clock)		Time is synchronized by sharing the EtherCAT system time between all EtherCAT devices (including the master).
		Packet monitoring		The frames that are sent by the master and the frames that are received by the master can be saved. The data that is saved can be viewed with WireShark or other applications.
		Enable/disable settings for slaves		The slaves can be enabled or disabled as communications targets.
		Disconnecting/connecting slaves		Temporary disconnects a slave from the EtherCAT network for maintenance, such as for replacement of the slave and then connects the slave again.
		Supported application protocol	CoE	SDO messages that conform to the CANopen standard can be sent to slaves via EtherCAT.
	Communications instructions			The following instructions are supported: CIP communications instructions, socket communications instructions, SDO message instructions, FTP client instructions and Modbus RTU protocol instructions.
System management	Event logs	Function		Events are recorded in the logs.
		Number of events per event log		• System event log: 2,048 max. • Access event log: 1,024 max. • User-defined event log: 1,024 max.
Debugging	Online editing			Programs, function blocks, functions and global variables can be changed online. Different operators can change different POUs across a network.
	Forced refreshing	Forced refreshing		The user can force specific variables to TRUE or FALSE.
		Number of forced variables	For EtherCAT slaves	64 max.
	MC test Run			Motor operation and wiring can be checked from the Sysmac Studio.
	Synchronization			The project file in the Sysmac Studio and the data in the CPU unit can be made the same when online.
	Differentiation monitoring	Differentiation monitoring		Rising/falling edge of contacts can be monitored.
		Number of contacts		8 max.

Item				NY5□
Debugging	**Data tracing**	**Types**	**Single triggered trace**	When the trigger condition is met, the specified number of samples are taken and then tracing stops automatically.
			Continuous trace	Data tracing is executed continuously and the trace data is collected by the Sysmac Studio.
		Number of simultaneous data trace		4 max.
		Number of records		10,000 max.
		Sampling	**Number of sampled variables**	192 variables max.
		Timing of sampling		Sampling is performed for the specified task period, at the specified time or when a sampling instruction is executed.
		Triggered traces	**Triggered traces**	Trigger conditions are set to record data before and after an event.
			Trigger conditions	When BOOL variable changes to TRUE or FALSE. Comparison of non-BOOL variable with a constant. Comparison method: Equals (=), greater than (>), greater than or equals (≥), less than (<), less than or equals (≤), not equal (≠).
			Delay	Trigger position setting: A slider is used to set the percentage of sampling before and after the trigger condition is met.
	Simulation			The operation of the CPU unit is emulated in the Sysmac Studio.
Reliability	**Self-diagnosis**	**Controller error levels**		Major fault, partial fault, minor fault, observation and information.
		User-defined errors	**User-defined errors**	User-defined errors are registered in advance and then records are created by executing instructions.
			Levels	8 levels
Security	**Protecting software assets and preventing operating mistakes**	**CPU unit names and serial IDs**		When going online to a CPU Unit from the Sysmac Studio, the CPU Unit name in the project is compared to the name of the CPU Unit being connected to.
		Protection	**User program transfer with no restoration information**	You can prevent reading data in the CPU unit from the Sysmac Studio.
			CPU unit write protection	You can prevent writing data to the CPU unit from the Sysmac Studio or SD memory card.
			Overall project file protection	You can use passwords to protect .smc files from unauthorized opening on the Sysmac Studio.
			Data protection	You can use passwords to protect POUs on the Sysmac Studio.
		Verification of operation authority	**Verification of operation authority**	Online operations can be restricted by operation rights to prevent damage to equipment or injuries that may be caused by operating mistakes.
			Number of groups	5
		Verification of user program execution ID		The user program cannot be executed without entering a user program execution ID from the Sysmac Studio for the specific hardware (CPU unit).
Memory card	**Location to store**			Shared folder: The folder that exist on the HDD/SDD that Windows is running.
	Application	**Memory card operation instructions**		You can access memory cards from instructions in the user program.
		File operations from the Sysmac Studio		You can perform file operations for Controller files in the memory card and read/write standard document files on the computer.
		File operations from FTP client/ server		You can store and read files by the FTP client function and FTP server function.
Backup	**SD memory card backup functions**	**Operation**	**Using system defined variables**	You can use system-defined variables to backup or compare data.
			Memory card operations dialog box	Backup and verification operations can be performed from the SD memory card operations dialog box on the Sysmac Studio.
			Using instruction	Backup operation can be performed by using instruction.
		Protection	**Backing up data to the SD card**	Prohibit SD memory card backup functions.
	Sysmac Studio controller backup functions			Backup, restore and verification operations for units can be performed from the Sysmac Studio.

*1 Inline ST is supported (Inline ST is ST that is written as an element in a ladder diagram).
*2 Internal port only.

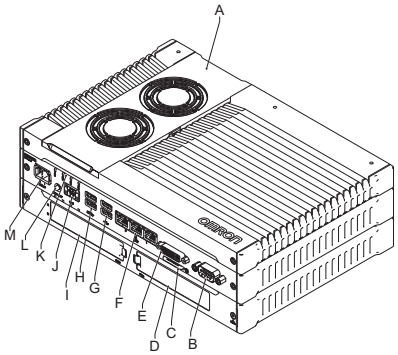
Display specifications

Model			15.4-inch	12.1-inch
Display	Display panel[*1]	Display device	TFT LCD	
		Screen size	15.4-inches	12.1-inches
		Resolution	1,280 x 800 pixels (horizontal x vertical) at 60 Hz	
		Colors	16,770,000 colors	
		Effective display area	331 x 207 mm (horizontal x vertical)	261 x 163 mm (horizontal x vertical)
		View angles	Left/Right/Top/Bottom: 60º	
		Life	50,000,000 operations min.	
		EMC	Correct touchscreen operation is possible within allowable EMC immunity conditions	
	Backlight	Life	50,000 hours min.[*2]	
		Brightness adjustment[*3]	200 levels	
Touch screen	Technology	Type	Projected capacitive	
		Multitouch	Up to 5 simultaneous touches	
		Touch resolution	Touch accuracy 1.5% (4-5 mm)	
		Surface treatment	Anti glare treatment	
		Surface hardness	Mohs scale 5-6	
	Features		• Water detection[*4] • Hand palm rejection[*5] • Gloves[*6]	

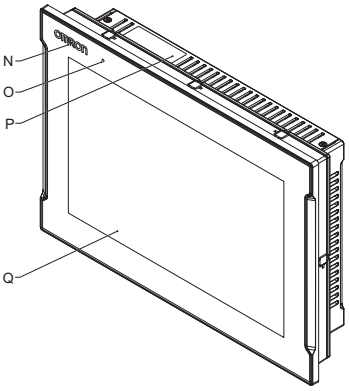
[*1] There may be some defective pixels in the display. This is not a fault as long as the numbers of defective light and dark pixels fall within the following standard range: light and dark pixels 10 or less. (There must not be 3 adjacent light/dark pixels.)
[*2] This is the estimated time before brightness is reduced by half at room temperature. The life expectancy is drastically shortened if used at high temperatures.
[*3] If the brightness is set to very dark, it causes flickering or the screen will be too dark to use.
[*4] If water is detected the touch functionality will not be available.
[*5] If a palm is detected that specific area is neglected.
[*6] The touchscreen can be operated when wearing gloves. Check correct usage of the gloves before using them.

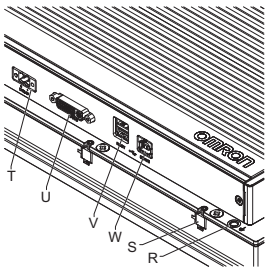
Nomenclature

Industrial Box PC

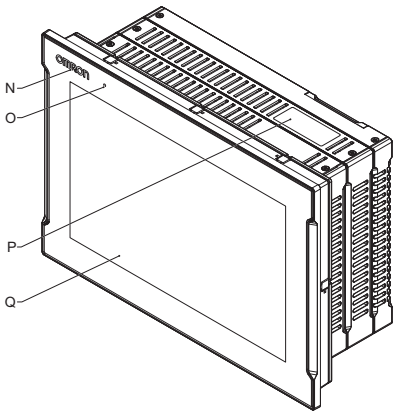


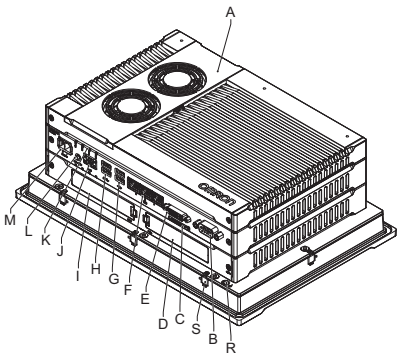
Industrial Monitor





Industrial Panel PC
(Industrial Box PC + Monitor integrated)

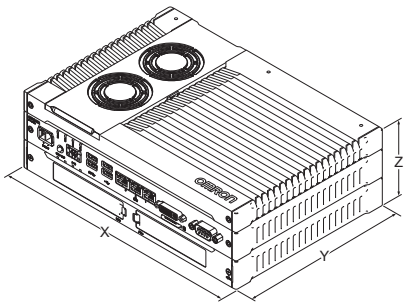




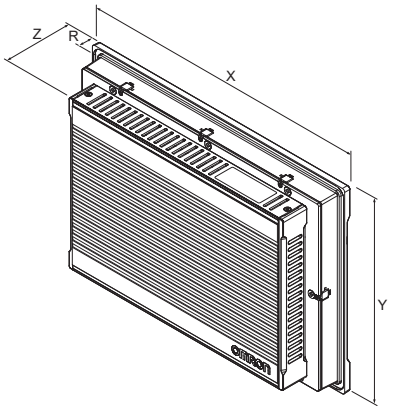
Symbol	Name	Description
A	Cover	Provides access to the battery and to the fans for units that have active cooling
B	Option port	Interface connection options: RS-232C interface port (default) or DVI-D interface port for additional monitor connection
C	SD card slot	Slot to insert the SD card
D	PCIe bay	PCI Express mounting slot
E	DVI interface port	DVI digital visual interface connector
F	10BASE-T/100BASE-T/1000BASE-T Ethernet interface ports	3 x RJ45 Gb Ethernet interface connectors
G	USB 2.0 interface connectors	2 USB 2.0 interface connectors
H	USB 3.0 interface connectors	2 USB 3.0 interface connectors
I	Drive bay	Two 2.5-inch drive bays for HDD/SSD storage devices: Slot A: Pre-installed Windows OS and main storage. Slot A is the slot at the side of the connectors Slot B: Optional drive for additional storage. Slot B is the slot at the outside of the unit
J	I/O connector	2 inputs (power ON/OFF input and UPS mode input) and 1 output (power status output)
K	LED indicators	Visual indicators for the operating state of the unit
L	Power button	Pushbutton to manually power ON/OFF the unit
M	Power connector	Lockable power connector
N	Logo LED indicator	Backlit Omron LED logo with adjustable brightness
O	Status LED indicator	LED to indicate power and connection status with adjustable brightness
P	ID information label	Label containing Model ID, Lot No. and other unit specific information
Q	Touch screen LCD	Multi-touch LCD display
R	Frame grounding	Connection for frame grounding
S	Mounting brackets	8 retractable mounting brackets to secure the unit on a mounting surface
T	Power supply connector	24 VDC power supply connector
U	DVI-D video connector	DVI-D dual link connector for host video connection
V	USB Type-A connectors	2 USB connectors for external device connection
W	USB Type-B connector	USB connector for connection with the host PC

Dimensions

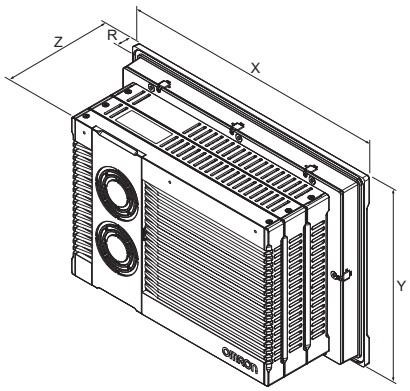
Industrial Box PC



Industrial Monitor



Industrial Panel PC
(Industrial Box PC + Monitor integrated)

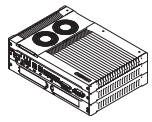


Item		X	Y	Z	R	Weight (kg)
Industrial Box PC		282	195*1	88.75	-	3.8
Industrial Monitor	12.1-inch display size	332	234	66	8	3.3
	15.4-inch display size	401	277			4.3
Industrial Panel PC	12.1-inch display size	332	234	121		6.1
	15.4-inch display size	401	277			7.2

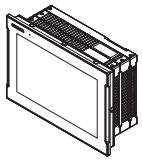
*1 200 mm including the DVI connectors.

Ordering information

Industrial Box PC

Appearance	Specifications	Number of axes	Storage device	Optional port	Model
	i7-4700EQ processor 8 GB DRAM (non-ECC) WES7 (64-bit) operating system PCIe slot	64	SSD 128 GB (iMLC)	RS-232C	NY512-1500-1XX213K1X
			SSD 64 GB (SLC)		NY512-1500-1XX21391X
		32	SSD 128 GB (iMLC)		NY512-1400-1XX213K1X
			SSD 64 GB (SLC)		NY512-1400-1XX21391X
		16	SSD 128 GB (iMLC)		NY512-1300-1XX213K1X
			SSD 64 GB (SLC)		NY512-1300-1XX21391X

Industrial Panel PC (Industrial Box PC + Monitor integrated)

Appearance	Specifications	Screen size	Number of axes	Storage device	Optional port	Model
	i7-4700EQ processor 8 GB DRAM (non-ECC) WES7 (64-bit) operating system PCIe slot Widescreen with capacitive touchscreen	15.4-inches	64	SSD 128 GB (iMLC)	RS-232C	NY532-1500-112213K10
				SSD 64 GB (SLC)		NY532-1500-112213910
			32	SSD 128 GB (iMLC)		NY532-1400-112213K10
				SSD 64 GB (SLC)		NY532-1400-112213910
			16	SSD 128 GB (iMLC)		NY532-1300-112213K10
				SSD 64 GB (SLC)		NY532-1300-112213910
		12.1-inches	64	SSD 128 GB (iMLC)		NY532-1500-111213K10
				SSD 64 GB (SLC)		NY532-1500-111213910
			32	SSD 128 GB (iMLC)		NY532-1400-111213K10
				SSD 64 GB (SLC)		NY532-1400-111213910
			16	SSD 128 GB (iMLC)		NY532-1300-111213K10
				SSD 64 GB (SLC)		NY532-1300-111213910

Industrial Monitor

Appearance	Specifications	Model
	15.4-inches display with capacitive touchscreen	NYM15W-C1000
	12.1-inches display with capacitive touchscreen	NYM12W-C1000

Accessories

Type	Specifications	Model
Mounting brackets*1	Book mount	NY000-AB00
	Wall mount	NY000-AB01
SD memory card	2 GB	HMC-SD291
	4 GB	HMC-SD491
USB memory	2 GB	FZ-MEM2G
	8 GB	FZ-MEM8G
Storage devices	HDD 320 GB	NY000-AH00
	SSD 32 GB (SLC)	NY000-AS00
	SSD 64 GB (SLC)	NY000-AS01
	SSD 128 GB (iMLC)	NY000-AS02
DVI cable	Length: 2 m	NY000-AC00 2M
	Length: 5 m	NY000-AC00 5M
USB A to USB B cable	Length: 2 m	FH-VUAB 2M
	Length: 5 m	FH-VUAB 5M
Power supply	Output voltage: 24 VDC	S8VK-G
UPS	Output voltage during backup operation: 24 VDC ±5%	S8BA*2
UPS communication cable	Signals for signal output (BL, TR, BU, WB), remote ON/OFF input, UPS stop signal input (BS) Length: 2 m	S8BW-C02

*1 Only applicable to Industrial Box PC.
*2 Revision number 04 or higher is required.

Spare parts (included with the Industrial Box PC and Industrial Panel PC)

Type	Specifications	Model
Battery	Service life: 5 years at 25ºC	CJ1W-BAT01
Fan unit	Service life: 70,000 hours of continuous operation at 40ºC with 15 to 65% relative humidity	NY000-AF00
Accessory kit	Power connector, I/O connector, drive bracket and 4 mounting screws for drive installation, PCIe card support and clip for PCIe card installation	NY000-AK00

Recommended EtherCAT and EtherNet/IP communication cables

Refer to “Recommended EtherCAT and EtherNet/IP communication cables” in the NJ-series machine controller datasheet Cat. No. I180E-EN (www.industrial.omron.eu/en/products/downloads) for the recommended cables.

Computer software

Specifications	Model
Sysmac Studio version 1.17 or higher	SYSMAC-SE2□□□

Included support software (pre-installed on the Industrial Box PC and the Industrial Panel PC)

Item	Description
Industrial PC Support Utility	The Industrial PC Support Utility is a software utility to assist in diagnosing and resolving problems of the Industrial PC.
Industrial PC Tray Utility	The Industrial PC Tray Utility is a software utility that provides information about the current state of the Industrial PC, its related devices and associated software.
Industrial PC System API	The Industrial PC System API allows programmers to create programs that can retrieve information or set an indicator status of the Industrial PC. The API makes use of the included IPC System Service to manage the hardware.
Industrial Monitor Utility	The Industrial Monitor Utility provides a user interface to control settings and display details of connected Industrial Monitors.
Industrial Monitor Brightness Utility	The Industrial Monitor Brightness Utility is a small software utility that allows you to control the brightness of the screen backlight and LEDs of all connected Industrial Monitors.
Industrial Monitor API	The Industrial Monitor API allows programmers to create applications that can control the hardware features and retrieve information from connected Industrial Monitors.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I190E-EN-01 In the interest of product improvement, specifications are subject to change without notice.

NX7□

NX7 series machine controller

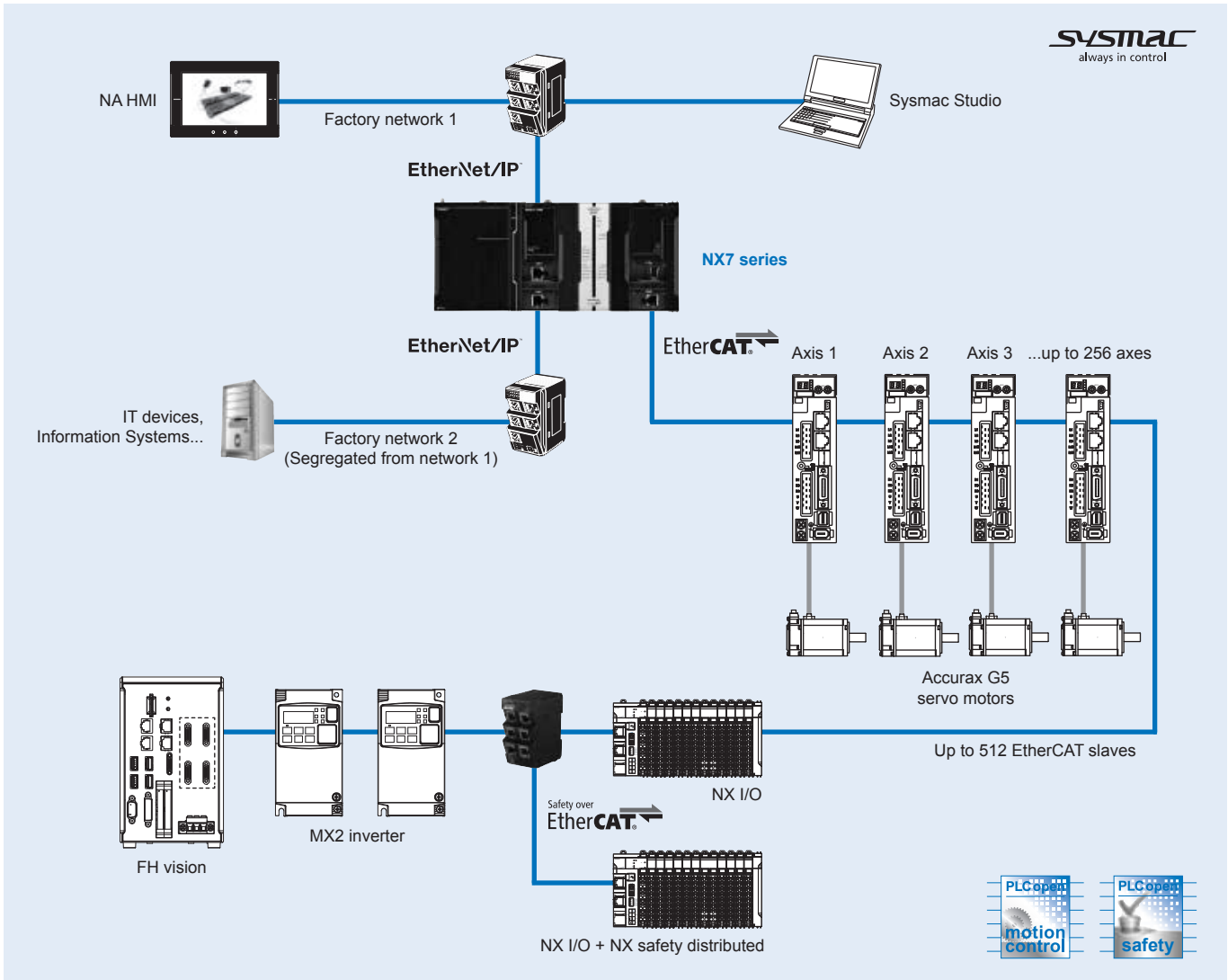


Sysmac controller - NX7 series

The NX7 series is a high performance machine controller that includes two synchronized motion cores controlling up to 256 axes.

- Fastest cycle time: 125 µs
- Number of axes: 256, 128
- Two synchronized motion cores
- Functions: Logic sequence and Motion
- Multi-tasking
- Built-in EtherCAT and two EtherNet/IP (1 Gbps) ports
- Fully conforms to IEC 61131-3 standards
- Certified PLCopen function blocks for motion control

System configuration



Specifications

General specifications

Item		NX7□ CPU Unit
Enclosure		Mounted in a panel
Grounding		Less than 100 Ω
CPU unit dimensions (H × D × W)		100 mm × 100 mm × 132 mm
Weight		880 g (including end cover)
Power consumption		40 W (including SD Memory card and end cover)
Operation environment	Ambient operating temperature	0 to 55°C
	Ambient operating humidity	10% to 95% (with non condensation)
	Atmosphere	Must be free from corrosive gases
	Ambient storage temperature	–25 to 70°C (excluding battery)
	Altitude	2,000 m or less
	Pollution degree	2 or less: Conforms to JIS B3502 and IEC 61131-2.
	Noise immunity	2 kV on power supply line (conforms to IEC 61000-4-4.)
	Overvoltage category	Category II: Conforms to JIS B3502 and IEC 61131-2
	EMC immunity level	Zone B
	Vibration resistance	Conforms to IEC 60068-2-6 5 to 8.4 Hz with 3.5 mm amplitude, 8.4 to 150 Hz. Acceleration of 9.8 m/s^2 for 100 min in X, Y and Z directions (10 sweeps of 10 min each = 100 min total)
	Shock resistance	Conforms to IEC 60068-2-27 147 m/s^2, 3 times in X, Y and Z directions (100 m/s^2 for relay output units)
Battery	Life	2.5 years (at 25°C, power ON time rate 0% (power OFF))
	Model	CJ1W-BAT01
Applicable standards		Conforms to cULus, EC directives, RCM and KC registration.

Performance specifications

Item				NX701-1700	NX701-1600
Processing time	Instruction execution time	LD instruction		0.37 ns or more	
		Math instructions (for long real data)		3.2 ns or more	
Programming	Program capacity*1	Size		80 MB	
		POU definition		6,000	
		POU instance		48,000	
	Variables capacity	No retain attribute		Size: 256 MB Number: 360,000	
		Retain attribute		Size: 4 MB Number: 40,000	
	Data type	Number		8,000	
Unit configuration	Maximum number of NX unit on the system			4,096 (on NX EtherCAT communication coupler unit)	
	Number of expansion racks			0	
	Power supply unit for CPU rack and expansion racks	Model		NX-PA9001 NX-PD7001	
		Power OFF detection time	AC power supply	30 to 45 ms	
			DC power supply	5 to 20 ms	
Motion control	Number of controlled axes	Number of real axes*2		256 axes max.	128 axes max.
		Number of total axes*3		256 axes max.	128 axes max.
		Linear interpolation control		4 axes max. per axes group	
		Circular interpolation control		2 axes per axes group	
	Number of axes groups			64 groups max.	
	Position units			Pulses, millimeters, micrometers, nanometers, degrees or inches	
	Override factors			0.00% or 0.01% to 500.00%	
	Motion control period			Same as process data communications period of EtherCAT communications	
	Cams	Number of cam data points		65,535 points max. per cam table / 1,048,560 points max. for all cam tables	
		Number of cam tables		640 tables max.	
Communications	Peripheral USB port	Supported services		Sysmac Studio connection	
		Physical layer		USB 2.0-compliant B-type connector	
		Transmission distance		5 m max.	

Item				NX701-1700	NX701-1600
Communications	Built-in EtherNet/IP port	Number of ports		2	
		Physical layer		10BASE-T/100BASE-TX/1000BASE-T	
		Frame length		1514 max.	
		Media access method		CSMA/CD	
		Modulation		Baseband	
		Topology		Star	
		Baud rate		1 Gbps (1000BASE-T)	
		Transmission media		STP (shielded, twisted-pair) cable of Ethernet category 5, 5e or higher	
		Transmission distance		100 m max. (distance between Ethernet switch and node)	
		Cascade connections number		There are no restrictions if an switching hub is used	
		CIP service: Tag data links (cyclic communications)	Number of connections	256 per port, total 512	
			Packet interval*4	0.5 to 10,000 ms in 0.5-ms increments. Can be set for each connection.	
			Permissible communications band	40,000 pps*5 (including heartbeat)	
			Number of tag sets	256 per port, total 512	
			Tag types	Network variables	
			Number of tags	8 (7 tags if controller status is included in the tag set.)	
			Link data size per node	256 per port, total 512	
			Number of tag	369,664 bytes max.	
			Data size per connection	1,444 bytes max.	
			Number of registrable tag sets	256 per port, total 512 (1 connection = 1 tag set)	
			Tag set size	1,444 bytes max. (two bytes are used if controller status is included in the tag set.)	
			Multi-cast packet filter*6	Supported.	
		CIP message service: Explicit messages	Class 3 (number of connections)	128 per port, total 256 (clients plus server)	
			UCMM (non-connection type)	Number of clients that can communicate at one time: 32 per port, total 64 Number of servers that can communicate at one time: 32 per port, total 64	
		Number of TCP socket service		30 max.	
	Built-in EtherCAT port	Communications standard		IEC 61158, Type 12	
		EtherCAT master specifications		Class B (feature pack motion control compliant)	
		Physical layer		100BASE-TX	
		Modulation		Baseband	
		Baud rate		100 Mbps (100Base-TX)	
		Duplex mode		Automatic	
		Topology		Line, daisy chain and branching	
		Transmission media		Twisted-pair cable of category 5 or higher (double-shielded straight cable with aluminum tape and braiding)	
		Transmission distance		Distance between nodes: 100 m max.	
		Number of slaves		512 max.	
		Process data size		Inputs/Outputs: 11,472 bytes max.	
		Process data size per slave		Inputs/Outputs: 1,434 bytes max.	
		Communications cycle		• Primary periodic task: 125 μs, 250 μs to 8 ms (in 250 μs increments) • Priority-5 periodic task: 125 μs, 250 μs to 100 ms (in 250 μs increments)	
		Sync jitter		1 μs max.	
Internal clock				At ambient temperature of 55°C: –3.5 to +0.5 min error per month At ambient temperature of 25°C: –1.5 to +1.5 min error per month At ambient temperature of 0°C: –3 to +1 min error per month	

*1 This is the capacity for the execution objects and variable tables (including variable names).
*2 This is the total number of axes that are set as servo axes or encoder axes and are also set as used axes.
*3 This is the total for all axis types.
*4 Data is updated on the line in the specified interval regardless of the number of nodes.
*5 Means packets per second, i.e., the number of communication packets that can be sent or received in one second.
*6 An IGMP client is mounted for the EtherNet/IP port. If an Ethernet switch that supports IGMP snooping is used, filtering of unnecessary multicast packets is performed.

Function specifications

Item				NX7□ CPU Unit
Tasks	Function	Function		I/O refreshing and the user program are executed in units that are called tasks. Tasks are used to specify execution conditions and execution priority.
		Periodically executed tasks		Maximum number of primary periodic tasks: 1 Maximum number of periodic tasks: 4
		Conditionally executed tasks		Maximum number of even tasks: 32 When active even task instruction is executed or when condition expression for variable is met.
Programming	POUs (program organization units)	Programs		POUs that are assigned to tasks.
		Function blocks		POUs that are used to create objects with specific conditions.
		Functions		POUs that are used to create an object that determine unique outputs for the inputs, such as for data processing.
	Programming languages	Types		Ladder diagrams*1 and structured text (ST).
	Namespaces			A concept that is used to group identifiers for POU definitions.
	Variables	External access of variables		Network variables (the function which allows access from the HMI, host computers or other controllers)
	Data types	Basic data types		BOOL, BYTE, WORD, DWORD, LWORD, INT, SINT, DINT, LINT, UINT, USINT, UDINT, ULINT, REAL, LREAL, TIME (durations), DATE, TIME_OF_DAY, DATE_AND_TIME and STRING (text strings)
		Derivative data types		Structures, unions, enumerations
		Structures	Function	A derivative data type that groups together data with different variable types. Number of members: 2,048 max. Nesting levels: 8 max.
			Member data types	Basic data types, structures, unions, enumerations, array variables
			Specifying member offsets	You can use member offsets to place structure members at any memory locations.
		Unions	Function	A derivative data type that groups together data with different variable types. Number of members: 4 max.
			Member data types	BOOL, BYTE, WORD, DWORD and LWORD.
		Enumerations	Function	A derivative data type that uses text strings called enumerators to express variable values.
	Data type attributes	Array specifications	Function	An array is a group of elements with the same data type. You specify the number (subscript) of the element from the first element to specify the element. Number of dimensions: 3 max. Number of elements: 65,535 max.
			Array specifications for FB instances	Supported.
		Range specifications		You can specify a range for a data type in advance. The data type can take only values that are in the specified range.
		Libraries		User libraries.
Motion control	Control modes			Position control, velocity control, torque control
	Axis types			Servo axes, virtual servo axes, encoder axes and virtual encoder axes
	Positions that can be managed			Command positions and actual positions
	Single-axis	Single-axis position contol	Absolute positioning	Positioning is performed for a target position that is specified with an absolute value.
			Relative positioning	Positioning is performed for a specified travel distance from the command current position.
			Interrupt feeding	Positioning is performed for a specified travel distance from the position where an interrupt input was received from an external input.
			Cyclic synchro-nous absolute positioning	The function which output command positions in every control period in the position control mode.
		Single-axis velocity control	Velocity control	Velocity control is performed in position control mode.
			Cyclic synchronous velocity control	A velocity command is output each control period in the velocity control mode.
		Single-axis torque control	Torque control	The torque of the motor is controlled.
		Single-axis synchronized control	Starting cam operation	A cam motion is performed using the specified cam table.
			Ending cam operation	The cam motion for the axis that is specified with the input parameter is ended.
			Starting gear operation	A gear motion with the specified gear ratio is performed between a master axis and slave axis.
			Positioning gear operation	A gear motion with the specified gear ratio and sync position is performed between a master axis and slave axis.
			Ending gear operation	The specified gear motion or positioning gear motion is ended.
			Synchronous positioning	Positioning is performed in sync with a specified master axis.
			Master axis phase shift	The phase of a master axis in synchronized control is shifted.
			Combining axes	The command positions of two axes are added or subtracted and the result is output as the command position.
		Single-axis manual operation	Powering the servo	The servo in the servo drive is turned ON to enable axis motion.
			Jogging	An axis is jogged at a specified target velocity.

Item				NX7□ CPU Unit
Motion control	Single-axis	Auxiliary functions for single-axis control	Resetting axis errors	Axes errors are cleared.
			Homing	A motor is operated and the limit signals, home proximity signal, and home signal are used to define home.
			Homing with parameter	Specifying the parameter, a motor is operated and the limit signals, home proximity signal and home signal are used to define home.
			High-speed homing	Positioning is performed for an absolute target position of 0 to return to home.
			Stopping	An axis is decelerated to a stop at the specified rate.
			Immediately stopping	An axis is stopped immediately.
			Override factors	The target velocity of an axis can be changed.
			Changing the current position	The command current position or actual current position of an axis can be changed to any position.
			Enabling external latches	The position of an axis is recorded when a trigger occurs.
			Disabling external latches	The current latch is disabled.
			Zone monitoring	You can monitor the command position or actual position of an axis to see when it is within a specified range (zone).
			Enabling digital cam switches	You can turn a digital output ON and OFF according to the position of an axis.
			Monitoring axis following error	You can monitor whether the difference between the command positions or actual positions of two specified axes exceeds a threshold value.
			Resetting the following error	The error between the command current position and actual current position is set to 0.
			Torque limit	The torque control function of the servo drive can be enabled or disabled and the torque limits can be set to control the output torque.
			Position compensation	The function which compensate the position for the axis in operation.
			Start velocity	You can set the initial velocity when axis motion starts.
	Axes groups	Multi-axes coordinated control	Absolute linear interpolation	Linear interpolation is performed to a specified absolute position.
			Relative linear interpolation	Linear interpolation is performed to a specified relative position.
			Circular 2D interpolation	Circular interpolation is performed for two axes.
			Axes group cyclic synchro-nous absolute positioning	A positioning command is output each control period in Position control mode.
		Auxiliary functions for multi-axes coordinated control	Resetting axes group errors	Axes group errors and axis errors are cleared.
			Enabling axes groups	Motion of an axes group is enabled.
			Disabling axes groups	Motion of an axes group is disabled.
			Stopping axes groups	All axes in interpolated motion are decelerated to a stop.
			Immediately stopping axes groups	All axes in interpolated motion are stopped immediately.
			Setting axes group override factors	The blended target velocity is changed during interpolated motion.
			Reading axes group positions	The command current positions and actual current positions of an axes group can be read.
			Changing the axes in a group	The composition axes parameter in the axes group parameters can be overwritten temporarily.
	Common items	Cams	Setting cam table properties	The end point index of the cam table that is specified in the input parameter is changed.
			Saving cam tables	The cam table that is specified with the input parameter is saved in non-volatile memory in the CPU unit.
			Generating cam tables	The cam table that is specified with the input parameter is generated from the cam property and cam mode.
		Parameters	Writing MC settings	Some of the axis parameters or axes group parameters are overwritten temporarily.
			Changing axis parameters	You can access and change the axis parameters from the user program.

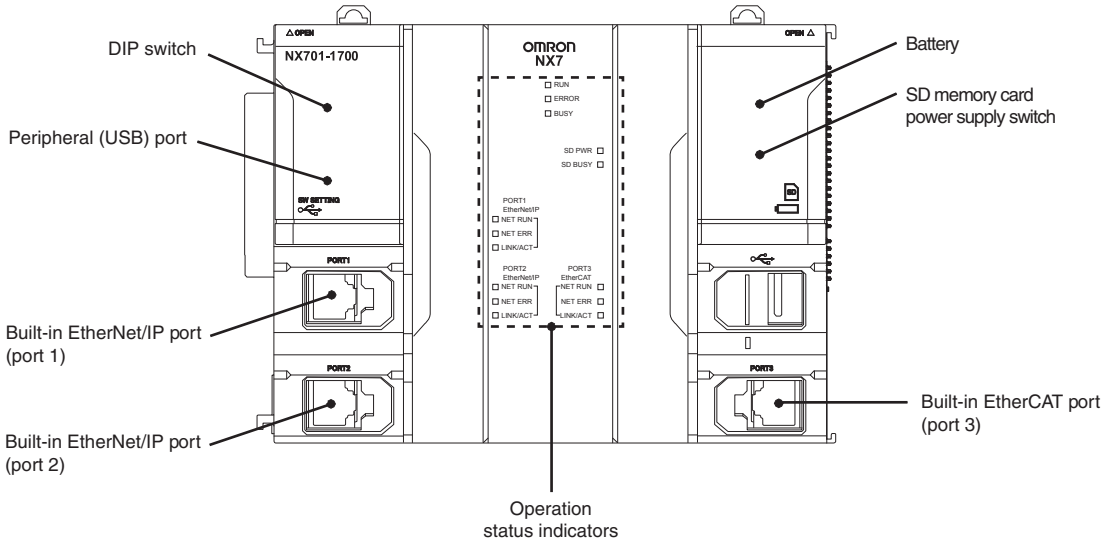
Item				NX7□ CPU Unit
Motion control	Auxiliary functions	Count modes		You can select either linear mode (finite length) or rotary mode (infinite length).
		Unit conversions		You can set the display unit for each axis according to the machine.
		Acceleration/deceleration control	Automatic acceleration/deceleration control	Jerk is set for the acceleration/deceleration curve for an axis motion or axes group motion.
			Changing the acceleration and deceleration rates	You can change the acceleration or deceleration rate even during acceleration or deceleration.
		In-position check		You can set an in-position range and in-position check time to confirm when positioning is completed.
		Stop method		You can set the stop method to the immediate stop input signal or limit input signal.
		Re-execution of motion control instructions		You can change the input variables for a motion control instruction during execution and execute the instruction again to change the target values during operation.
		Multi-execution of motion control instructions (buffer mode)		You can specify when to start execution and how to connect the velocities between operations when another motion control instruction is executed during operation.
		Continuous axes group motions (transition mode)		You can specify the transition mode for multi-execution of instructions for axes group operation.
		Monitoring functions	Software limits	Software limits are set for each axis.
			Following error	The error between the command current value and the actual current value is monitored for an axis.
			Velocity, acceleration/deceleration rate, torque, interpolation velocity and interpolation acceleration/deceleration rate	You can set warning values for each axis and each axes group.
		Absolute encoder support		You can use an OMRON 1S servomotor or Accurax-G5 series servomotor with an absolute encoder to eliminate the need to perform homing at startup.
		Input signal logic inversion		You can inverse the logic of immediate stop input signal, positive limit input signal, negative limit input signal or home proximity input signal.
	External interface signals			The servo drive input signals listed on below are used. Home signal, home proximity signal, positive limit signal, negative limit signal, immediate stop signal and interrupt input signal.
Unit (I/O) management	EtherCAT slaves	Number of slaves		512 max.
Communications	Peripheral USB port			A port for communications with various kinds of support software running on a personal computer.
	EtherNet/IP port	Communication protocol		TCP/IP, UDP/IP
		CIP communications service	Tag data links	Programless cyclic data exchange is performed with the devices on the EtherNet/IP network.
			Message communications	CIP commands are sent to or received from the devices on the EtherNet/IP network.
		TCP/IP applications	Socket services	Data is sent to and received from any node on EtherNet using the UDP or TCP protocol. Socket communications instructions are used.
			FTP client	File can be read from or written to computers to other Ethernet nodes from the CPU unit. FTP client communications instructions are used.
			FTP server	Files can be read from or written to the SD memory card in the CPU unit from computers at other Ethernet nodes.
			Automatic clock adjustment	Clock information is read from the NTP server at the specified time or at specified interval after the power supply to the CPU unit is turned ON. The internal clock time in the CPU unit is updated with the read time.
			SNMP agent	Built-in EtherNet/IP port internal status information is provided to network management software that uses an SNMP manager.
	EtherCAT port	Supported services	Process data communications	Control information is exchanged in cyclic communications between the EtherCAT master and slaves.
			SDO communications	A communication method to exchange control information in noncyclic event communications between the EtherCAT master and slaves. This communications method is defined by CoE.
		Network scanning		Information is read from connected slave devices and the slave configuration is automatically generated.
		DC (distributed clock)		Time is synchronized by sharing the EtherCAT system time between all EtherCAT devices (including the master).
		Packet monitoring		The frames that are sent by the master and the frames that are received by the master can be saved. The data that is saved can be viewed with WireShark or other applications.
		Enable/disable settings for slaves		The slaves can be enabled or disabled as communications targets.
		Disconnecting/connecting slaves		SDO messages of the CAN application can be sent to slaves via EtherCAT.
		Supported application protocol	CoE	SDO messages that conform to the CANopen standard can be sent to slaves via EtherCAT.
	Communications instructions			The following instructions are supported: CIP communications instructions, socket communications instructions, SDO message instructions and FTP client instructions.
Operation management	RUN output contacts			The output on the power supply unit turns ON in RUN mode.
System management	Event logs	Function		Events are recorded in the logs.
		Number of events per event log		• System event log: 2,048 max. • Access event log: 1,024 max. • User-defined event log: 1,024 max.

Item				NX7□ CPU Unit
Debugging	Online editing			Programs, function blocks, functions and global variables can be changed online. Different operators can change different POUs across a network.
	Forced refreshing	Forced refreshing		The user can force specific variables to TRUE or FALSE.
		Number of forced variables	For EtherCAT slaves	64 max.
	MC test Run			Motor operation and wiring can be checked from the Sysmac Studio.
	Synchronization			The project file in the Sysmac Studio and the data in the CPU unit can be made the same when online.
	Differentiation monitoring	Differentiation monitoring		Rising/falling edge of contacts can be monitored.
		Number of contacts		8 max.
	Data tracing	Types	Single triggered trace	When the trigger condition is met, the specified number of samples are taken and then tracing stops automatically.
			Continuous trace	Data tracing is executed continuously and the trace data is collected by the Sysmac Studio.
		Number of simultaneous data trace		4 max.
		Number of records		10,000 max.
		Sampling	Number of sampled variables	192 variables max.
		Timing of sampling		Sampling is performed for the specified task period, at the specified time or when a sampling instruction is executed.
		Triggered traces	Triggered traces	Trigger conditions are set to record data before and after an event.
			Trigger conditions	When BOOL variable changes to TRUE or FALSE. Comparison of non-BOOL variable with a constant. Comparison method: Equals (=), greater than (>), greater than or equals (≥), less than (<), less than or equals (≤), not equal (≠).
			Delay	Trigger position setting: A slider is used to set the percentage of sampling before and after the trigger condition is met.
	Simulation			The operation of the CPU unit is emulated in the Sysmac Studio.
Reliability	Self-diagnosis	Controller error levels		Major fault, partial fault, minor fault, observation and information.
		User-defined errors	User-defined errors	User-defined errors are registered in advance and then records are created by executing instructions.
			Levels	8 levels
Security	Protecting software assets and preventing operating mistakes	CPU unit names and serial IDs		When going online to a CPU Unit from the Sysmac Studio, the CPU Unit name in the project is compared to the name of the CPU Unit being connected to.
		Protection	User program transfer with no restoration information	You can prevent reading data in the CPU unit from the Sysmac Studio.
			CPU unit write protection	You can prevent writing data to the CPU unit from the Sysmac Studio or SD memory card.
			Overall project file protection	You can use passwords to protect .smc files from unauthorized opening on the Sysmac Studio.
			Data protection	You can use passwords to protect POUs on the Sysmac Studio.
		Verification of operation authority	Verification of operation authority	Online operations can be restricted by operation rights to prevent damage to equipment or injuries that may be caused by operating mistakes.
			Number of groups	5
		Verification of user program execution ID		The user program cannot be executed without entering a user program execution ID from the Sysmac Studio for the specific hardware (CPU unit).
SD memory card	Storage type			SD memory card, SDHC memory card
	Application	Automatic transfer from SD memory card		The data in the autoload folder on an SD memory card is automatically loaded when the power supply to the controller is turned ON.
		SD memory card operation instructions		You can access SD memory cards from instructions in the user program.
		File operations from the Sysmac Studio		You can perform file operations for Controller files in the SD memory card and read/write standard document files on the computer.
		SD memory card life expiration detection		Notification of the expiration of the life of the SD memory card is provided in a system-defined variable and event log.
Backup	SD memory card backup functions	Operation	Using front switch	You can use front switch to backup, compare or restore data.
			Using system-defined variable	You can use system-defined variables to backup or compare data.
			Memory card operations dialog box	Backup and verification operations can be performed from the SD memory card operations dialog box on the Sysmac Studio.
			Using instruction	Backup operation can be performed by using instruction.
		Protection	Backing up data to the SD memory card	Prohibit SD memory card backup functions.
	Sysmac Studio controller backup functions			Backup, restore and verification operations for units can be performed from the Sysmac Studio.

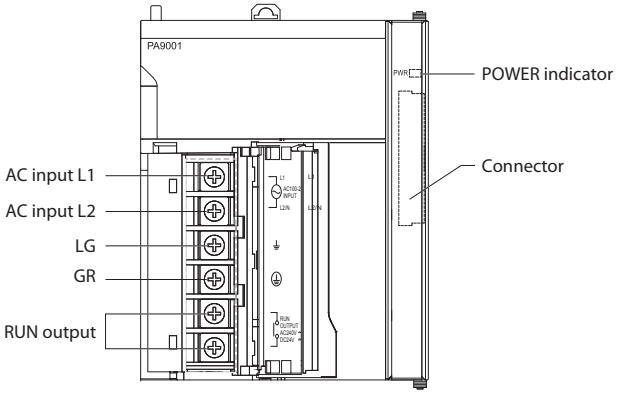
*1 Inline ST is supported (Inline ST is ST that is written as an element in a ladder diagram).

Nomenclature

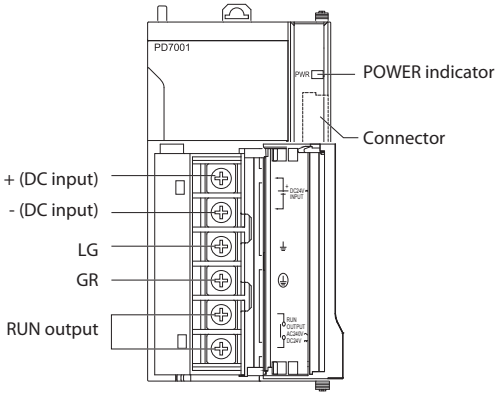
NX7 CPU unit



100 to 240 VAC power supply unit (NX-PA9001)

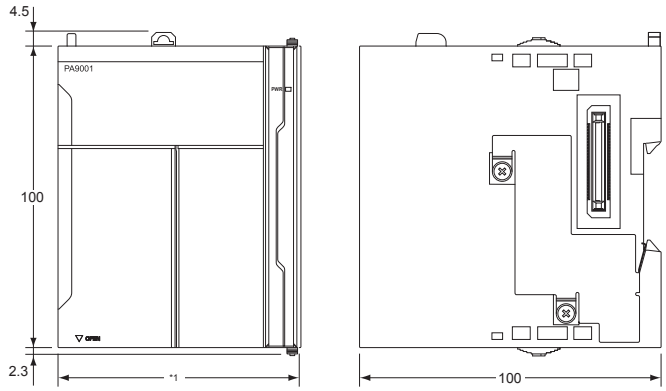


24 VDC power supply unit (NX-PD7001)



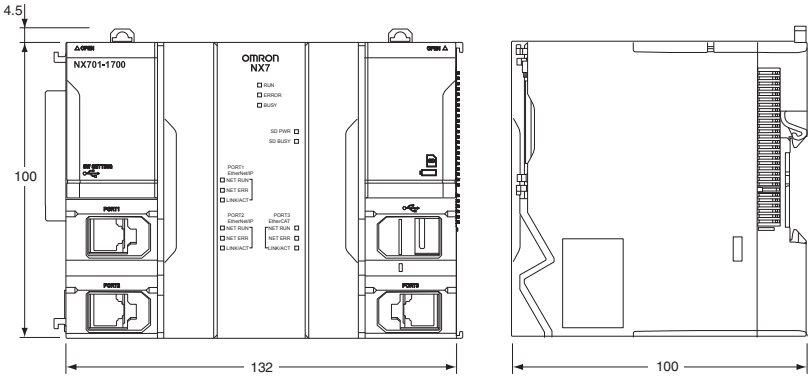
Dimensions

Power supply unit (NX-PA9001/PD7001)

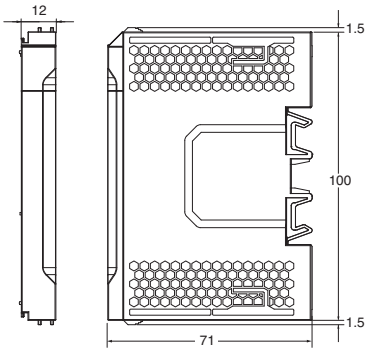


Note: 1. This dimension depends on the selected power supply unit:
- 51 mm: NX-PD7001
- 80 mm: NX-PA9001

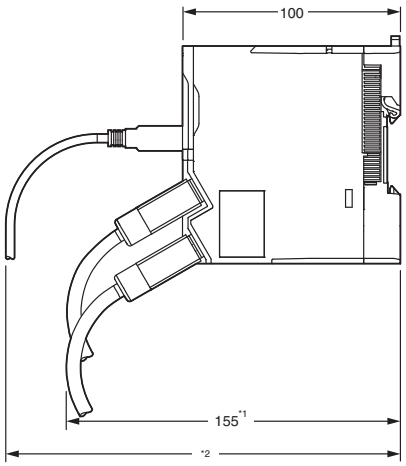
NX7 CPU unit



End cover (NX-END01)



Mounting height

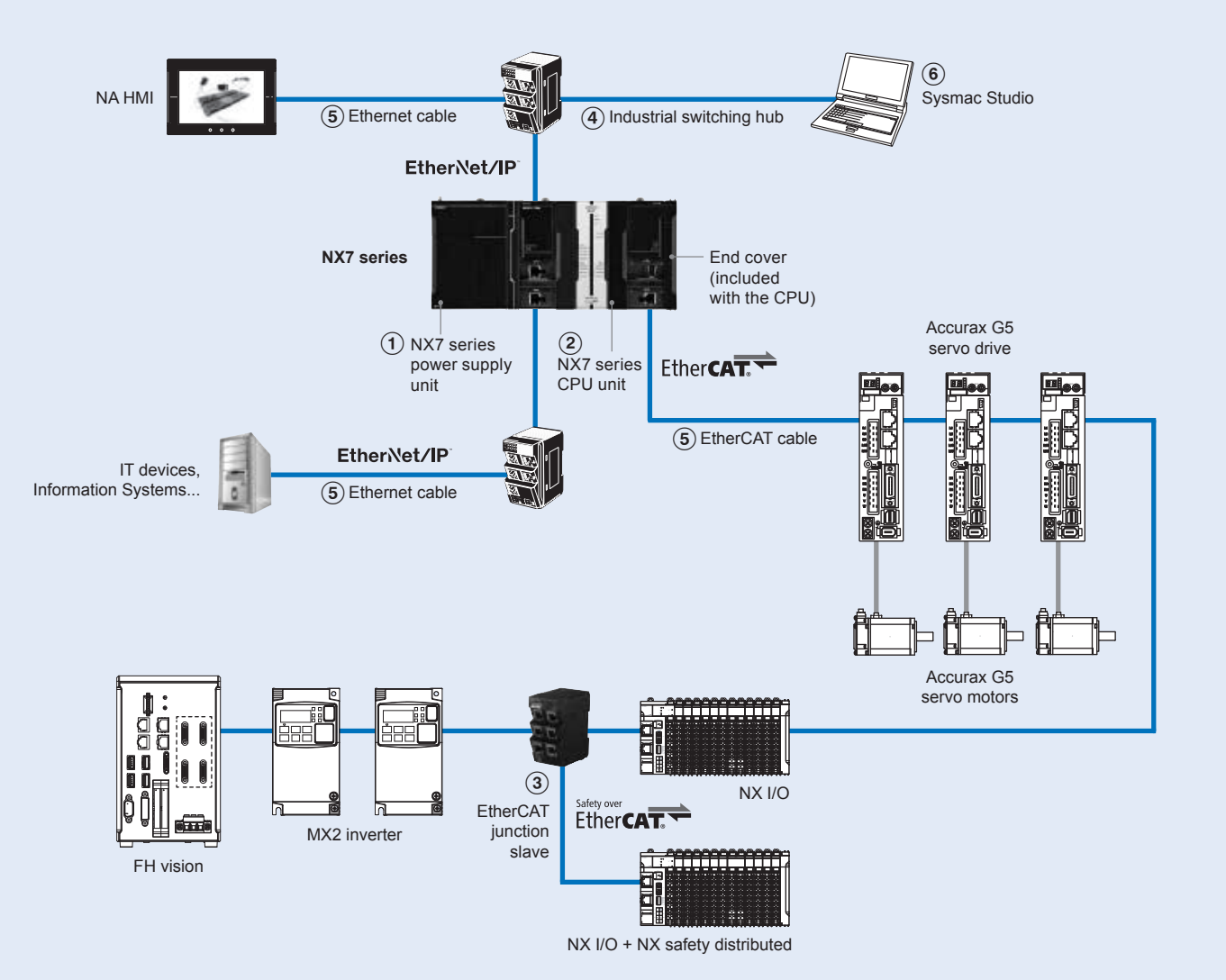


Note: 1. This is the dimension from the back of the unit to the communication cables:
- 155 mm: When an XS6G-T421-1 connector is used.

2. This dimension depends on the specifications of the commercially available USB cable.

Ordering information

NX7 series system



Power supply units

Symbol	Description	Output capacity	RUN output	Model
		Total		
①	100 to 240 VAC power supply unit for NX7 CPU	90 W	Supported	NX-PA9001
	24 VDC power supply unit for NX7 CPU	70 W		NX-PD7001

NX7 series CPU units

Symbol	CPU	Program capacity	Variables capacity	Specifications	Number of axes	Model
②	NX701	80 MB	4 MB: Retained 256 MB: Not retained	Power consumption: 40 W	256	NX701-1700
					128	NX701-1600

Note: The end cover unit NX-END01 is included with the CPU unit.

EtherCAT junction slave

Symbol	Name	No. of ports	Power supply voltage	Current consumption (A)	Dimensions (W x D x H)	Weight	Model	Appearance
③	EtherCAT junction slave	3	20.4 to 28.8 VDC (24 VDC –15 to 20%)	0.08	25 mm × 78 mm × 90 mm	165 g	GX-JC03	
		6		0.17	48 mm × 78 mm × 90 mm	220 g	GX-JC06	

Note: 1. Please do not connect EtherCAT junction slave with OMRON position control unit, Model CJ1W-NC□81/□82.

2. EtherCAT junction slave cannot be used for Ethernet/IP and Ethernet.

Industrial switching hub

Symbol	Specifications			Accessories	Current consumption (A)	Model	Appearance
	Functions	No. of ports	Failure detection				
④	Quality of Service (QoS): EtherNet/IP control data priority. Failure detection: Broadcast storm and LSI error detection 10/100 BASE-TX, Auto-Negotiation	3	No	Power supply connector	0.22	W4S1-03B	
		5	No			W4S1-05B	
		5	Yes	Power supply connector and connector for informing error		W4S1-05C	

Recommended EtherCAT and EtherNet/IP communication cables

Symbol	Item			Manufacturer	Colour	Cable length (m)	Model
⑤	EtherCAT cable	Cat 5e, AWG22, 2-pair cable M12/Smartclick connectors Improved shield for EtherCAT communications	Standard type Cable with connectors on both ends (M12 straight/M12 straight) 	OMRON	Black	0.5	XS5W-T421-BM2-SS
						1	XS5W-T421-CM2-SS
						2	XS5W-T421-DM2-SS
						3	XS5W-T421-EM2-SS
						5	XS5W-T421-GM2-SS
						10	XS5W-T421-JM2-SS
			Rugged type Cable with connectors on both ends (M12 straight/RJ45) 		Black	0.5	XS5W-T421-BMCSS
						1	XS5W-T421-CMC-SS
						2	XS5W-T421-DMC-SS
						3	XS5W-T421-EMC-SS
						5	XS5W-T421-GMC-SS
						10	XS5W-T421-JMC-SS
	Ethernet/ EtherCAT patch cable	Cat 6a, AWG27, 4-pair cable Cable sheath material: LSZH*1 **Note:** This cable is available in yellow, green and blue colours.	Standard type Cable with connectors on both ends (RJ45/RJ45) 		Yellow	0.2	XS6W-6LSZH8SS20CM-Y
						0.3	XS6W-6LSZH8SS30CM-Y
						0.5	XS6W-6LSZH8SS50CM-Y
						1	XS6W-6LSZH8SS100CM-Y
						1.5	XS6W-6LSZH8SS150CM-Y
						2	XS6W-6LSZH8SS200CM-Y
						3	XS6W-6LSZH8SS300CM-Y
						5	XS6W-6LSZH8SS500CM-Y
						7.5	XS6W-6LSZH8SS750CM-Y
						10	XS6W-6LSZH8SS1000CM-Y
						15	XS6W-6LSZH8SS1500CM-Y
						20	XS6W-6LSZH8SS2000CM-Y
					Green	0.2	XS6W-6LSZH8SS20CM-G
						0.3	XS6W-6LSZH8SS30CM-G
						0.5	XS6W-6LSZH8SS50CM-G
						1	XS6W-6LSZH8SS100CM-G
						1.5	XS6W-6LSZH8SS150CM-G
						2	XS6W-6LSZH8SS200CM-G
						3	XS6W-6LSZH8SS300CM-G
						5	XS6W-6LSZH8SS500CM-G
						7.5	XS6W-6LSZH8SS750CM-G
						10	XS6W-6LSZH8SS1000CM-G
						15	XS6W-6LSZH8SS1500CM-G
						20	XS6W-6LSZH8SS2000CM-G
		Cat 5e, AWG26, 4-pair cable Cable sheath material: PUR*1	Standard type Cable with connectors on both ends (RJ45/RJ45) 		Green	0.5	XS6W-5PUR8SS50CM-G
						1	XS6W-5PUR8SS100CM-G
						1.5	XS6W-5PUR8SS150CM-G
						2	XS6W-5PUR8SS200CM-G
						3	XS6W-5PUR8SS300CM-G
						5	XS6W-5PUR8SS500CM-G
						7.5	XS6W-5PUR8SS750CM-G
						10	XS6W-5PUR8SS1000CM-G
						15	XS6W-5PUR8SS1500CM-G
						20	XS6W-5PUR8SS2000CM-G
	Ethernet/ EtherCAT patch cable	Cat 5e, AWG22, 2-pair cable	Rugged type Cable with connectors on both ends (RJ45/RJ45) 		Grey	0.3	XS5W-T421-AMD-K
						0.5	XS5W-T421-BMD-K
						1	XS5W-T421-CMD-K
						2	XS5W-T421-DMD-K
						3	XS5W-T421-EMD-K
						5	XS5W-T421-GMD-K
						10	XS5W-T421-JMD-K
						15	XS5W-T421-KMD-K

Symbol	Item			Manufacturer	Colour	Cable length (m)	Model
⑤	Ethernet/ EtherCAT patch cable	Cat 5e, AWG22, 2-pair cable	Rugged type Cable with connectors on both ends (M12 straight/RJ45) 	OMRON	Grey	0.3	XS5W-T421-AMC-K
						0.5	XS5W-T421-BMC-K
						1	XS5W-T421-CMC-K
						2	XS5W-T421-DMC-K
						3	XS5W-T421-EMC-K
						5	XS5W-T421-GMC-K
						10	XS5W-T421-JMC-K
						15	XS5W-T421-KMC-K
			Rugged type Cable with connectors on both ends (M12 L right angle/RJ45) 		Grey	0.3	XS5W-T422-AMC-K
						0.5	XS5W-T422-BMC-K
						1	XS5W-T422-CMC-K
						2	XS5W-T422-DMC-K
						3	XS5W-T422-EMC-K
						5	XS5W-T422-GMC-K
						10	XS5W-T422-JMC-K
						15	XS5W-T422-KMC-K
	Ethernet installation cable	Cat 5, SF/UTP, 4 × 2 × AWG 24/1 (solid core), Polyurethane (PUR)		Weidmüller	Green	100	WM IE-5IC4x2xAWG24/1-PUR
		Cat 5, SF/UTP, 4 × 2 × AWG 26/7 (stranded core), Polyurethane (PUR)			Green	100	WM IE-5IC4x2xAWG26/7-PUR
	Connectors	RJ45 metallic connector For AWG22 to AWG26			–	–	WM IE-T0-RJ45-FH-BK
		RJ45 plastic connector For AWG22 to AWG24		OMRON	–	–	XS6G-T421-1
	RJ45 socket	DIN-rail mount socket to terminate installation cable in the cabinet		Weidmüller	–	–	WM IE-T0-RJ45-FJ-B

*1 The lineup features low smoke zero halogen cables for in-cabinet use and PUR cables for out-of-cabinet use.

Note: Please be careful while cable processing, for EtherCAT, connectors on both ends should be shield connected and for EtherNet/IP, connectors on only one end should be shield connected.

WE70 FA wireless LAN units

Name	Area	Type	Model	Appearance
WE70 FA wireless LAN units	Europe	Access point (Master)	WE70-AP-EU	
		Client (Slave)	WE70-CL-EU	
Directional magnetic-base antenna		1 set with two antennas, 2.4 GHz/5 GHz Dual-band compatible	WE70-AT001H	
DIN rail mounting bracket		For TH35 7.5	WT30-FT001	
		For TH35 15	WT30-FT002	
Antenna extension cable		5 m	WE70-CA5M	

Note: Special versions are available for USA, Canada, China and Japan.

Accessories

Specifications		Model	Appearance
SD memory card	2 GB	HMC-SD291	
	4 GB	HMC-SD491	
DIN track	Length: 0.5 m; height: 7.3 mm	PFP-50N	
	Length: 1 m; height: 7.3 mm	PFP-100N	
	Length: 1 m; height: 16 mm	PFP-100N2	
Battery for NX/NY/NJ CPU unit (The battery is included with the CPU unit)		CJ1W-BAT01	
End cover (The end cover is included with the CPU unit. Necessary to be connected to the right end of the CPU rack)		NX-END01	
Fan unit (The fan unit is included with the CPU unit)		NX-FAN01	

Computer software

Symbol	Specifications	Model
⑥	Sysmac Studio version 1.13 or higher	SYSMAC-SE2□□□*1

*1 Refer to the Sysmac Studio datasheet (Cat. No. SysCat_I181E) for detailed information or contact your OMRON representative.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I186E-EN-01B In the interest of product improvement, specifications are subject to change without notice.

NJ5□, NJ3□, NJ1□

NJ series machine controller

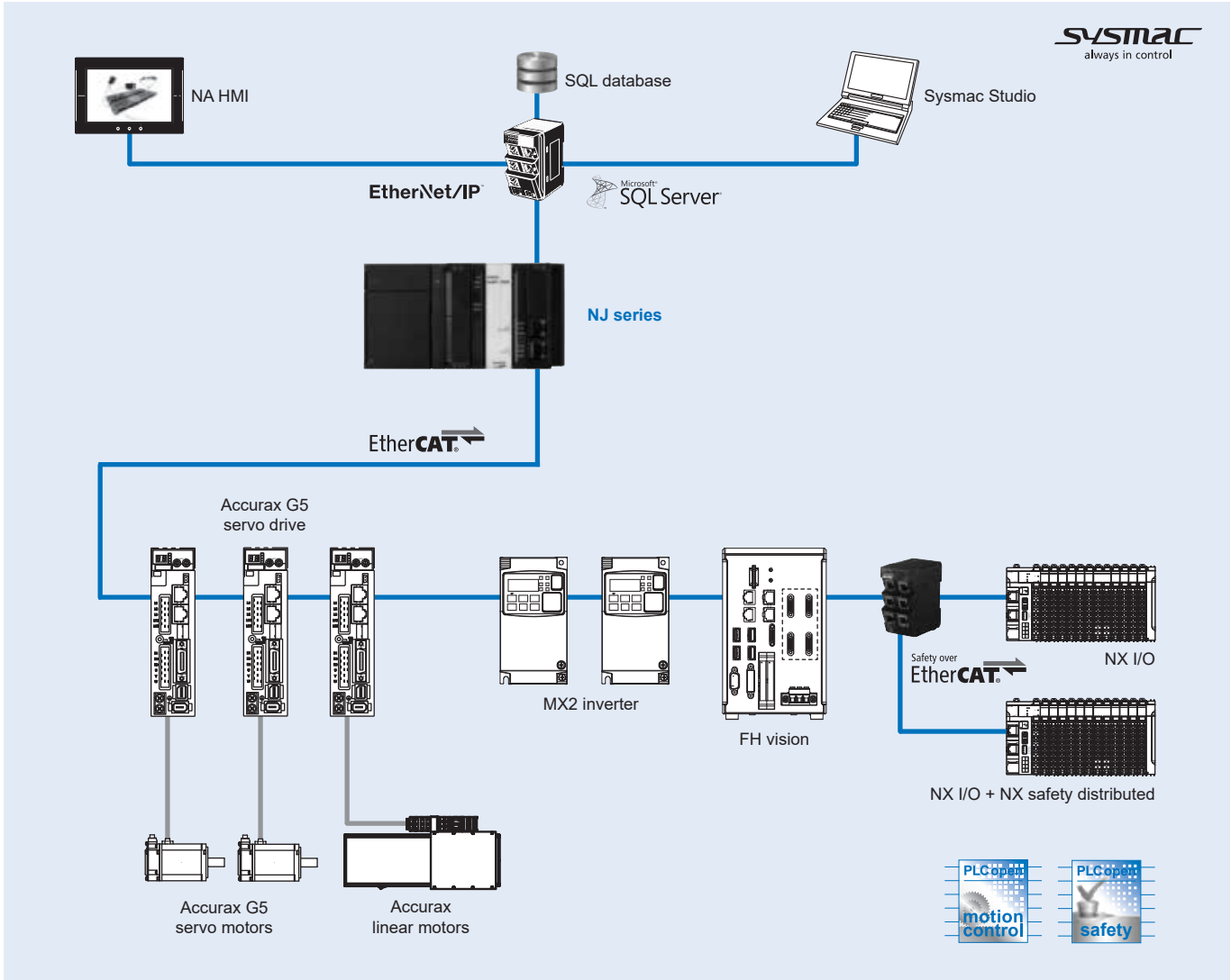


Sysmac controller - NJ series

The NJ series is an scalable machine controller for logic sequence and motion control that includes options for advanced functions such as robotics and database connection.

- Fastest cycle time: 500 μs
- Number of axes: 64, 32, 16, 8, 4, 2
- Synchronized motion core
- Functions: Logic sequence, Motion, Robotics, Database connection and SECS/GEM
- Delta, SCARA and Cartesian robots control
- DB connection: SQL client for Microsoft SQL server, Oracle, IBM DB2, MySQL, PostgreSQL, Firebird
- Multi-tasking
- Built-in EtherCAT and EtherNet/IP ports

System configuration



Specifications

General specifications

Item		NJ□ CPU Unit
Enclosure		Mounted in a panel
Grounding		Less than 100 Ω
CPU unit dimensions (H × D × W)		90 mm × 90 mm × 90 mm
Weight		550 g (including end cover)
Current consumption		5 VDC, 1.90 A (including SD Memory card and end cover)
Operation environment	Ambient operating temperature	0 to 55°C
	Ambient operating humidity	10% to 90% (with non condensation)
	Atmosphere	Must be free from corrosive gases
	Ambient storage temperature	–20 to 75°C (excluding battery)
	Altitude	2,000 m or less
	Pollution degree	2 or less: Conforms to JIS B3502 and IEC 61131-2.
	Noise immunity	2 kV on power supply line (conforms to IEC 61000-4-4.)
	Overvoltage category	Category II: Conforms to JIS B3502 and IEC 61131-2
	EMC immunity level	Zone B
	Vibration resistance	Conforms to IEC 60068-2-6 5 to 8.4 Hz with 3.5 mm amplitude, 8.4 to 150 Hz. Acceleration of 9.8 m/s^2 for 100 min in X, Y and Z directions (10 sweeps of 10 min each = 100 min total)
	Shock resistance	Conforms to IEC 60068-2-27 147 m/s^2, 3 times in X, Y and Z directions (100 m/s^2 for relay output units)
Battery	Life	5 years at 25°C
	Model	CJ1W-BAT01
Applicable standards		Conforms to cULus, NK, LR, EC directives, C-Tick and KC registration*1.

*1. Supported only by the CPUs with unit version 1.01 or higher.

Performance specifications

Common performance specifications

Item				NJ5□ CPU Unit	NJ3□ CPU Unit	NJ1□ CPU Unit
Processing time	Instruction execution time	LD instruction		1.2 ns (1.9 ns max.)	2.0 ns (3.0 ns max.)	3.3 ns (5.0 ns max.)
		Math instructions (for long real data)		26 ns or more	42 ns or more	70 ns or more
Programming	Program capacity*1	Size		20 MB	5 MB	3 MB
		POU definition		3,000	750	450
		POU instance		9,000 (Sysmac Studio v.1.06 or higher) / 6,000 (Sysmac Studio v.1.05 or lower)	3,000 (Sysmac Studio v.1.05 or higher) / 1,500 (Sysmac Studio v.1.04 or lower)	1,800
	Variables capacity	No retain attribute*2		Size: 4 MB Number: 90,000	Size: 2 MB Number: 22,500	
		Retain attribute*3		Size: 2 MB Number: 10,000	Size: 0.5 MB Number: 5,000 (Sysmac Studio v.1.05 or higher) / 2,500 (Sysmac Studio v.1.04 or lower)	Size: 0.5 MB Number: 5,000
	Data type	Number		2,000	1,000	
	Memory for CJ-Series units (can be specified with AT specifications for variables.)	CIO area		6,144 words (CIO 0 to CIO 6143)		
		Work area		512 words (W0 to W511)		
		Holding area		1,536 words (H0 to H1535)		
		DM area		32,768 words (D0 to D32767)		
		EM area		32,768 words × 25 banks (E0_00000 to E18_32767)	32,768 words × 4 banks (E0_00000 to E3_32767)	
Unit configuration	Maximum number of CJ/NX unit per CPU rack or expansion rack			10 units		
	Maximum number of CJ unit on the system			40 units		
	Maximum number of NX unit on the system			4,096 (on NX EtherCAT communication coupler unit)		400 (on NX EtherCAT communication coupler unit)
	Number of expansion racks			3 max.		
	I/O Capacity (CJ units)			2,560 points max.		
	Power supply to CPU rack and expansion racks	Model		NJ-P□3001		
		Power OFF detection time	AC power supply	30 to 45 ms		
			DC power supply	22 to 25 ms		
Motion control	Number of controlled axes	Number of real axes*4		NJ501-□5□0: 64 axes max. NJ501-□4□0: 32 axes max. NJ501-□3□0: 16 axes max.	NJ301-1200: 8 axes max. NJ301-1100: 4 axes max.	NJ101-10□0: 2 axes max. NJ101-90□0: 0
		Number of total axes*5		NJ501-□5□0: 64 axes max. NJ501-□4□0: 32 axes max. NJ501-□3□0: 16 axes max.	NJ301-1200: 15 axes max. NJ301-1100: 15 axes max.	NJ101-10□0: 6 axes max. NJ101-90□0: 0
		Linear interpolation control		4 axes max. per axes group		
		Circular interpolation control		2 axes per axes group		
	Number of axes groups			32 groups max.		
	Position units			Pulses, millimeters, micrometers, nanometers, degrees or inches		

Item				NJ5□ CPU Unit	NJ3□ CPU Unit	NJ1□ CPU Unit
Motion control	Override factors			0.00% or 0.01% to 500.00%		
	Motion control period			Same as process data communications period of EtherCAT communications		
	Cams	Number of cam data points		65,535 points max. per cam table / 1,048,560 points max. for all cam tables	65,535 points max. per cam table / 262,140 points max. for all cam tables	
		Number of cam tables		640 tables max.	160 tables max.	
Communications	Peripheral USB port	Supported services		Sysmac Studio connection		
		Physical layer		USB 2.0-compliant B-type connector		
		Transmission distance		5 m max.		
	Built-in EtherNet/IP port	Number of ports		1		
		Physical layer		10Base-T or 100Base-TX		
		Frame length		1514 max.		
		Media access method		CSMA/CD		
		Modulation		Baseband		
		Topology		Star		
		Baud rate		100 Mbps (100Base-TX)		
		Transmission media		STP (shielded, twisted-pair) cable of Ethernet category 5, 5e or higher		
		Transmission distance		100 m max. (distance between Ethernet switch and node)		
		Cascade connections number		There are no restrictions if an switching hub is used		
		CIP service: Tag data links (cyclic communications)	Number of connections	32		
			Packet Interval[*6]	1 to 10,000 ms in 1.0-ms increments.[*7] Can be set for each connection. (Data will be refreshed at the set interval, regardless of the number of nodes.)		
			Permissible communications band	3,000 pps[*8 *9] (including heartbeat)		
			Number of tag sets	32		
			Tag types	Network variables, CIO, Work, Holding, DM and EM Areas		
			Number of tags	8 (7 tags if controller status is included in the tag set.)		
			Link data size per node	256 max. (total size for all tags.)		
			Number of tag	19,200 bytes max.		
			Data size per connection	600 bytes max.		
			Number of registrable tag sets	32 max. (1 connection = 1 tag set)		
			Tag set size	600 bytes max. (two bytes are used if controller status is included in the tag set.)		
			Multi-cast packet filter[*10]	Supported.		
		CIP message service: Explicit messages	Class 3 (number of connections)	32 (clients plus server)		
			UCMM (non-connection type)	Number of clients that can communicate at one time: 32 max. Number of servers that can communicate at one time: 32 max.		
		Number of TCP socket service		30 max.[*11]		
	Built-in EtherCAT port	Communications standard		IEC 61158, Type 12		
		EtherCAT master specifications		Class B (feature pack motion control compliant)		
		Physical layer		100BASE-TX		
		Modulation		Baseband		
		Baud rate		100 Mbps (100Base-TX)		
		Duplex mode		Automatic		
		Topology		Line, daisy chain and branching		
		Transmission media		Twisted-pair cable of category 5 or higher (double-shielded straight cable with aluminum tape and braiding)		
		Transmission distance		Distance between nodes: 100 m max.		
		Number of slaves		192 max.		64 max.
		Process data size		Inputs/Outputs: 5,736 bytes max. (However, the maximum number of process data frames is 4)		
		Process data size per slave		Inputs/Outputs: 1,434 bytes max.		
		Communications cycle		500/1,000/2,000/4,000 μs[*12]		1,000/2,000/4,000 μs
		Sync jitter		1 μs max.		
Internal clock				At ambient temperature of 55°C: –3.5 to +0.5 min error per month At ambient temperature of 25°C: –1.5 to +1.5 min error per month At ambient temperature of 0°C: –3 to +1 min error per month		

*1. This is the capacity for the execution objects and variable tables (including variable names).
*2. Words for CJ-series units in the holding, DM and EM areas are not included.
*3. Words for CJ-series units in the CIO and work areas are not included.
*4. This is the total number of axes that are set as servo axes or encoder axes and are also set as used axes.
*5. This is the total for all axis types. The maximum number of axes of the CPU unit version 1.05 or lower is 8 axes (NJ301-1200), 4 axes (NJ301-1100).
*6. Data is updated on the line in the specified interval regardless of the number of nodes.
*7. The packet interval of the CPU unit version 1.02 or lower is 10 to 10,000 ms in 1.0 ms increments.
*8. Means packets per second, i.e., the number of communication packets that can be sent or received in one second.
*9. The permissible communications band of the CPU unit version 1.02 or lower is 1,000 pps.
*10. An IGMP client is mounted for the EtherNet/IP port. If an Ethernet switch that supports IGMP snooping is used, filtering of unnecessary multicast packets is performed.
*11. The maximum number of TCP socket service of the CPU unit version 1.02 or lower is 16.
*12. The maximum communications cycle of the NJ301 CPU unit version 1.02 or lower is 1,000/2,000/4,000 μs.

Performance specifications for CPU units with robotics functionality

Item			NJ501-4□□0 CPU Unit				
			NJ501-4500	NJ501-4400	NJ501-4300	NJ501-4320	NJ501-4310
Motion control	Robotics	Delta robot	Delta-2, Delta-3, Delta-3R, Delta-5				
		SCARA robot	SCARA RRP, SCARA RRP+R, SCARA PRR, SCARA PRR+R				
		Cartesian robot	Cartesian 2D (XY/XZ/YZ), Cartesian 2D Gantry, H-Bot XY, Cartesian 3D, Cartesian 3D Gantry				
		Max. number of robots	Up to 8 robots				1 robot
		Max. number of controllable axes	64 axes	32 axes	16 axes		
		Additional functionality	–			Database connection	–

Note: For robot control by NJ501-4□□0, use the 1S or Accurax G5 servo drive with built-in EtherCAT communications, absolute encoder and brake.

Performance specifications for CPU units with database connection

Item			NJ501-□□20 CPU Unit	NJ101-□□20 CPU Unit
Programming	Memory for CJ-series units (can be specified with AT specifications for variables)	EM area	32,768 words × 25 banks (E0_00000 to E18_32767)*1	32,768 words × 4 banks (E0_00000 to E3_32767)*2

*1. When the spool function of the NJ501-□□20 is enabled, the DB connection service uses E9_0 to E18_32767.
*2. When the spool function of the NJ101-□□20 is enabled, the DB connection service uses E1_0 to E3_32767.

Function specifications

Common function specifications

Item				NJ□ CPU Unit
Tasks	Function	Function		I/O refreshing and the user program are executed in units that are called tasks. Tasks are used to specify execution conditions and execution priority.
		Periodically executed tasks		Maximum number of primary periodic tasks: 1 Maximum number of periodic tasks: 3
		Conditionally executed tasks*1		Maximum number of even tasks: 32 When active even task instruction is executed or when condition expression for variable is met.
	Setup	System service monitoring settings		The execution interval and the percentage of the total user program execution time are monitored for the system services (processes that are executed by the CPU Unit separate from task execution).
Programming	POUs (program organization units)	Programs		POUs that are assigned to tasks.
		Function blocks		POUs that are used to create objects with specific conditions.
		Functions		POUs that are used to create an object that determine unique outputs for the inputs, such as for data processing.
	Programming languages	Types		Ladder diagrams*2 and structured text (ST).
	Namespaces*3			A concept that is used to group identifiers for POU definitions.
	Variables	External access of variables		Network variables (the function which allows access from the HMI, host computers or other controllers)
	Data types	Basic data types		BOOL, BYTE, WORD, DWORD, LWORD, INT, SINT, DINT, LINT, UINT, USINT, UDINT, ULINT, REAL, LREAL, TIME (durations), DATE, TIME_OF_DAY, DATE_AND_TIME and STRING (text strings)
		Derivative data types		Structures, unions, enumerations
		Structures	Function	A derivative data type that groups together data with different variable types. Number of members: 2,048 max. Nesting levels: 8 max.
			Member data types	Basic data types, structures, unions, enumerations, array variables
			Specifying member offsets	You can use member offsets to place structure members at any memory locations.*3
		Unions	Function	A derivative data type that groups together data with different variable types. Number of members: 4 max.
			Member data types	BOOL, BYTE, WORD, DWORD and LWORD.
		Enumerations	Function	A derivative data type that uses text strings called enumerators to express variable values.
	Data type attributes	Array specifications	Function	An array is a group of elements with the same data type. You specify the number (subscript) of the element from the first element to specify the element. Number of dimensions: 3 max. Number of elements: 65,535 max.
			Array specifications for FB instances	Supported.
		Range specifications		You can specify a range for a data type in advance. The data type can take only values that are in the specified range.
		Libraries		User libraries.

Item				NJ□ CPU Unit
Motion control[*4]	Control modes			Position control, velocity control, torque control
	Axis types			Servo axes, virtual servo axes, encoder axes and virtual encoder axes
	Positions that can be managed			Command positions and actual positions
	Single-axis	Single-axis position contol	Absolute positioning	Positioning is performed for a target position that is specified with an absolute value.
			Relative positioning	Positioning is performed for a specified travel distance from the command current position.
			Interrupt feeding	Positioning is performed for a specified travel distance from the position where an interrupt input was received from an external input.
			Cyclic synchro-nous absolute positioning[*1]	The function which output command positions in every control period in the position control mode.
	Single-axis	Single-axis velocity control	Velocity control	Velocity control is performed in position control mode.
			Cyclic synchronous velocity control	A velocity command is output each control period in the velocity control mode.
		Single-axis torque control	Torque control	The torque of the motor is controlled.
		Single-axis synchronized control	Starting cam operation	A cam motion is performed using the specified cam table.
			Ending cam operation	The cam motion for the axis that is specified with the input parameter is ended.
			Starting gear operation	A gear motion with the specified gear ratio is performed between a master axis and slave axis.
			Positioning gear operation	A gear motion with the specified gear ratio and sync position is performed between a master axis and slave axis.
			Ending gear operation	The specified gear motion or positioning gear motion is ended.
			Synchronous positioning	Positioning is performed in sync with a specified master axis.
			Master axis phase shift	The phase of a master axis in synchronized control is shifted.
			Combining axes	The command positions of two axes are added or subtracted and the result is output as the command position.
		Single-axis manual operation	Powering the servo	The servo in the servo drive is turned ON to enable axis motion.
			Jogging	An axis is jogged at a specified target velocity.
		Auxiliary functions for single-axis control	Resetting axis errors	Axes errors are cleared.
			Homing	A motor is operated and the limit signals, home proximity signal, and home signal are used to define home.
			Homing with parameter[*1]	Specifying the parameter, a motor is operated and the limit signals, home proximity signal and home signal are used to define home.
			High-speed homing	Positioning is performed for an absolute target position of 0 to return to home.
			Stopping	An axis is decelerated to a stop at the specified rate.
			Immediately stopping	An axis is stopped immediately.
			Override factors	The target velocity of an axis can be changed.
			Changing the current position	The command current position or actual current position of an axis can be changed to any position.
			Enabling external latches	The position of an axis is recorded when a trigger occurs.
			Disabling external latches	The current latch is disabled.
			Zone monitoring	You can monitor the command position or actual position of an axis to see when it is within a specified range (zone).
			Enabling digital cam switches[*5]	You can turn a digital output ON and OFF according to the position of an axis.
			Monitoring axis following error	You can monitor whether the difference between the command positions or actual positions of two specified axes exceeds a threshold value.
			Resetting the following error	The error between the command current position and actual current position is set to 0.
			Torque limit	The torque control function of the servo drive can be enabled or disabled and the torque limits can be set to control the output torque.
			Position compensation[*6]	The function which compensate the position for the axis in operation.
			Start velocity[*7]	You can set the initial velocity when axis motion starts.

Item				NJ□ CPU Unit
Motion control[*4]	Axes groups	Multi-axes coordinated control	Absolute linear interpolation	Linear interpolation is performed to a specified absolute position.
			Relative linear interpolation	Linear interpolation is performed to a specified relative position.
			Circular 2D interpolation	Circular interpolation is performed for two axes.
			Axes group cyclic synchronous absolute positioning	A positioning command is output each control period in Position control mode.[*3]
		Auxiliary functions for multi-axes coordinated control	Resetting axes group errors	Axes group errors and axis errors are cleared.
			Enabling axes groups	Motion of an axes group is enabled.
			Disabling axes groups	Motion of an axes group is disabled.
			Stopping axes groups	All axes in interpolated motion are decelerated to a stop.
			Immediately stopping axes groups	All axes in interpolated motion are stopped immediately.
			Setting axes group override factors	The blended target velocity is changed during interpolated motion.
	Axes groups	Auxiliary functions for multi-axes coordinated control	Reading axes group positions	The command current positions and actual current positions of an axes group can be read.[*3]
			Changing the axes in a group	The composition axes parameter in the axes group parameters can be overwritten temporarily.[*3]
	Common items	Cams	Setting cam table properties	The end point index of the cam table that is specified in the input parameter is changed.
			Saving cam tables	The cam table that is specified with the input parameter is saved in non-volatile memory in the CPU unit.
			Generating cam tables[*8]	The cam table that is specified with the input parameter is generated from the cam property and cam mode.
		Parameters	Writing MC settings	Some of the axis parameters or axes group parameters are overwritten temporarily.
			Changing axis parameters[*8]	You can access and change the axis parameters from the user program.
	Auxiliary functions	Count modes		You can select either linear mode (finite length) or rotary mode (infinite length).
		Unit conversions		You can set the display unit for each axis according to the machine.
		Acceleration/deceleration control	Automatic acceleration/deceleration control	Jerk is set for the acceleration/deceleration curve for an axis motion or axes group motion.
			Changing the acceleration and deceleration rates	You can change the acceleration or deceleration rate even during acceleration or deceleration.
		In-position check		You can set an in-position range and in-position check time to confirm when positioning is completed.
		Stop method		You can set the stop method to the immediate stop input signal or limit input signal.
		Re-execution of motion control instructions		You can change the input variables for a motion control instruction during execution and execute the instruction again to change the target values during operation.
		Multi-execution of motion control instructions (buffer mode)		You can specify when to start execution and how to connect the velocities between operations when another motion control instruction is executed during operation.
		Continuous axes group motions (transition mode)		You can specify the transition mode for multi-execution of instructions for axes group operation.
		Monitoring functions	Software limits	Software limits are set for each axis.
			Following error	The error between the command current value and the actual current value is monitored for an axis.
			Velocity, acceleration/deceleration rate, torque, interpolation velocity and interpolation acceleration/deceleration rate	You can set warning values for each axis and each axes group.
		Absolute encoder support		You can use an OMRON 1S servomotor or Accurax-G5 series servomotor with an absolute encoder to eliminate the need to perform homing at startup.
		Input signal logic inversion[*7]		You can inverse the logic of immediate stop input signal, positive limit input signal, negative limit input signal or home proximity input signal.
	External interface signals			The servo drive input signals listed on below are used. Home signal, home proximity signal, positive limit signal, negative limit signal, immediate stop signal and interrupt input signal.
Unit (I/O) management	EtherCAT slaves	Number of slaves		NJ5/NJ3: 192 max. NJ1: 64 max.
	CJ-series units	Maximum number of units		40
		Basic I/O units	Load short-circuit protection and I/O disconnection detection	Alarm information for basic I/O units is read.

Item				NJ□ CPU Unit
Communications	Peripheral USB port			A port for communications with various kinds of support software running on a personal computer.
	EtherNet/IP port	Communication protocol		TCP/IP, UDP/IP
		CIP communications service	Tag data links	Programless cyclic data exchange is performed with the devices on the EtherNet/IP network.
			Message communications	CIP commands are sent to or received from the devices on the EtherNet/IP network.
		TCP/IP applications	Socket services	Data is sent to and received from any node on EtherNet using the UDP or TCP protocol. Socket communications instructions are used.
			FTP client*8	File can be read from or written to computers to other Ethernet nodes from the CPU unit. FTP client communications instructions are used.
			FTP server	Files can be read from or written to the SD memory card in the CPU unit from computers at other Ethernet nodes.
			Automatic clock adjustment	Clock information is read from the NTP server at the specified time or at specified interval after the power supply to the CPU unit is turned ON. The internal clock time in the CPU unit is updated with the read time.
			SNMP agent	Built-in EtherNet/IP port internal status information is provided to network management software that uses an SNMP manager.
Communications	EtherCAT port	Supported services	Process data communications	Control information is exchanged in cyclic communications between EtherCAT master and slaves.
			SDO communications	A communication method to exchange control information in noncyclic event communications between the EtherCAT master and slaves. This communications method is defined by CoE.
		Network scanning		Information is read from connected slave devices and the slave configuration is automatically generated.
		DC (distributed clock)		Time is synchronized by sharing the EtherCAT system time between all EtherCAT devices (including the master).
		Packet monitoring*9		The frames that are sent by the master and the frames that are received by the master can be saved. The data that is saved can be viewed with WireShark or other applications.
		Enable/disable settings for slaves		The slaves can be enabled or disabled as communications targets.
		Disconnecting/connecting slaves		SDO messages of the CAN application can be sent to slaves via EtherCAT.
		Supported application protocol	CoE	SDO messages that conform to the CANopen standard can be sent to slaves via EtherCAT.
	Communications instructions			The following instructions are supported: CIP communications instructions, socket communications instructions, SDO message instructions, no-protocol communications instructions, protocol macro instructions and FTP client instructions*8.
Operation management	RUN output contacts			The output on the power supply unit turns ON in RUN mode.
System management	Event logs	Function		Events are recorded in the logs.
		Number of events per event log		• System event log: NJ5: 1,024 max., NJ3/NJ1: 512 max. • Access event log: NJ5: 1,024 max., NJ3/NJ1: 512 max. • User-defined event log: NJ5: 1,024 max., NJ3/NJ1: 512 max.
Debugging	Online editing			Programs, function blocks, functions and global variables can be changed online. Different operators can change different POUs across a network.
	Forced refreshing	Forced refreshing		The user can force specific variables to TRUE or FALSE.
		Number of forced variables	For EtherCAT slaves	64 max.
			For CJ-series units	64 max.
	MC test Run*10			Motor operation and wiring can be checked from the Sysmac Studio.
	Synchronization			The project file in the Sysmac Studio and the data in the CPU unit can be made the same when online.
	Differentiation monitoring*1	Differentiation monitoring*1		Rising/falling edge of contacts can be monitored.
		Number of contacts*1		8 max.
	Data tracing	Types	Single triggered trace	When the trigger condition is met, the specified number of samples are taken and then tracing stops automatically.
			Continuous trace	Data tracing is executed continuously and the trace data is collected by the Sysmac Studio.
		Number of simultaneous data trace		NJ5: 4 max*11. NJ3/NJ1: 2 max.
		Number of records		10,000 max.
		Sampling	Number of sampled variables	NJ5: 192 variables max. NJ3/NJ1: 48 variables max.
		Timing of sampling		Sampling is performed for the specified task period, at the specified time or when a sampling instruction is executed.
		Triggered traces	Triggered traces	Trigger conditions are set to record data before and after an event.
			Trigger conditions	When BOOL variable changes to TRUE or FALSE. Comparison of non-BOOL variable with a constant. Comparison method: Equals (=), greater than (>), greater than or equals (≥), less than (<), less than or equals (≤), not equal (≠).
			Delay	Trigger position setting: A slider is used to set the percentage of sampling before and after the trigger condition is met.
	Simulation			The operation of the CPU unit is emulated in the Sysmac Studio.
Reliability	Self-diagnosis	Controller error levels		Major fault, partial fault, minor fault, observation and information.
		User-defined errors	User-defined errors	User-defined errors are registered in advance and then records are created by executing instructions.
			Levels	8 levels

Item				NJ□ CPU Unit
Security	Protecting software assets and preventing operating mistakes	CPU unit names and serial IDs		When going online to a CPU Unit from the Sysmac Studio, the CPU Unit name in the project is compared to the name of the CPU Unit being connected to.
		Protection	User program transfer with no restoration information	You can prevent reading data in the CPU unit from the Sysmac Studio.
			CPU unit write protection	You can prevent writing data to the CPU unit from the Sysmac Studio or SD memory card.
			Overall project file protection	You can use passwords to protect .smc files from unauthorized opening on the Sysmac Studio.
			Data protection	You can use passwords to protect POUs on the Sysmac Studio. *3
		Verification of operation authority	Verification of operation authority	Online operations can be restricted by operation rights to prevent damage to equipment or injuries that may be caused by operating mistakes.
			Number of groups	5 *12
		Verification of user program execution ID		The user program cannot be executed without entering a user program execution ID from the Sysmac Studio for the specific hardware (CPU unit).
SD memory card	Storage type			SD memory card, SDHC memory card
	Application	Automatic transfer from SD memory card *1		The data in the autoload folder on an SD memory card is automatically loaded when the power supply to the controller is turned ON.
		SD memory card operation instructions		You can access SD memory cards from instructions in the user program.
		File operations from the Sysmac Studio		You can perform file operations for Controller files in the SD memory card and read/write standard document files on the computer.
		SD memory card life expiration detection		Notification of the expiration of the life of the SD memory card is provided in a system-defined variable and event log.
Backup *1	SD memory card backup functions	Operation	Using front switch	You can use front switch to backup, compare or restore data.
			Using system-defined variable	You can use system-defined variables to backup or compare data.
			Memory card operations dialog box	Backup and verification operations can be performed from the SD memory card operations dialog box on the Sysmac Studio.
			Using instruction *8	Backup operation can be performed by using instruction.
		Protection	Backing up data to the SD memory card	Prohibit SD memory card backup functions.
	Sysmac Studio controller backup functions			Backup, restore and verification operations for units can be performed from the Sysmac Studio.

*1. Supported only by the CPU units with unit version 1.03 or higher.
*2. Inline ST is supported (Inline ST is ST that is written as an element in a ladder diagram).
*3. Supported only by the CPU units with unit version 1.01 or higher.
*4. The NJ101-90□0 CPU unit doesn't support motion control.
*5. Supported only by the CPU units with unit version 1.06 or higher.
*6. Supported only by the CPU units with unit version 1.10 or higher.
*7. Supported only by the CPU units with unit version 1.05 or higher.
*8. Supported only by the CPU units with unit version 1.08 or higher.
*9. For NJ301 CPU, supported only by the CPU units with unit version 1.10 or higher.
*10. Cannot be used with the NJ101-90□0 CPU unit.
*11. Maximum number of simultaneous data trace of the NJ501-□□20 CPU unit version 1.08 or higher is 2.
*12. When the NJ501 CPU units with unit version 1.00 is used, this value becomes two.

Function specifications for CPU units with robotics functionality

Item				NJ501-4□□0 CPU Unit
Robot control functions	Axes group	Multi-axes coordinated control	Robot parameter settings	Sets the parameters (such as kinematics type and link length) for the robot.
			Time-specified absolute positioning command	Moves the robot to a specified position in a specified time.
			Synchronization with conveyor	Makes the active TCP follow a workpiece on the conveyor performing the conveyor tracking function.
			Robot jog	Jogs a robot defined by an axes group according the selected target velocity, coordinate system and TCP.
			Transition mode and buffering	Select the method to use between robot instructions to perform smooth trajectories.
	Auxiliary functions	Multi-axes coordinated control	User coordinate system	Two types of coordinate systems, Machine Coordinate System (MCS) and User Coordinate System (UCS) can be used for robots.
			Robot tool	Defines multiple TCP's (Tool Center Point) for the robots.
			Inverse kinematics	Transforms the coordinate values (X, Y, Z) of the robot's TCP to the coordinate values of each axis.
		Monitoring functions	Monitor	Reads the current position and current velocity of the robot.
			Workspace check	Checks if the robot is moving within the definable working volume.

Function specifications for CPU units with database connection

Item		NJ501-□□20 CPU Unit	NJ101-□□20 CPU Unit
Supported port		Built-in EtherNet/IP port	
Supported DB		Microsoft Corporation: SQL Server 2008/2008 R2/2012/2014[*1] Oracle Corporation: Oracle Database 10g/11g/12c[*1] MySQL Community Edition 5.1/5.5/5.6[*2] International Business Machines Corporation (IBM): DB2 for Linux, UNIX and Windows 9.5/9.7/10.1/10.5 Firebird Foundation Incorporated: Firebird 2.1/2.5 The PostgreSQL Global Development Group: PostgreSQL 9.2/9.3/9.4[*1]	
Number of DB connections (number of databases that can be connected at the same time)		3 connections max.[*3]	
Instruction	Supported operations	The following operations can be performed by executing DB connection instructions in the NJ series CPU units. Inserting records (INSERT), updating records (UPDATE), retrieving records (SELECT) and deleting records (DELETE)	
	Number of columns in an INSERT/UPDATE/SELECT operations	SQL server: 1,024 columns max. Oracle: 1,000 columns max.	
	Number of records in the output of a SELECT operation	65,535 elements max. 4 MB max.	
Run mode of the DB connection service		Operation mode or Test mode: • Operation mode: When each instruction is executed, the service actually accesses the DB. • Test mode: When each instruction is executed, the service ends the instruction normally without accessing the DB actually.	
Spool function	Spool function	Used to store SQL statements when an error occurred and resend the statements when the communications are recovered from the error.	
	Spool capacity	1 MB[*4]	192 KB[*4]
Operation log function		The following three types of logs can be recorded: • Execution log: Log for tracing the executions of the DB connection service. • Debug log: Detailed log for SQL statement executions of the DB connection service. • SQL execution failure log: Log for execution failures of SQL statements in the DB.	
DB connection service shutdown function		Used to shut down the DB connection service after automatically saving the operation log files into the SD memory card.	

*1. SQL Server 2014, Oracle Database 12c and PostgreSQL 9.2/9.3/9.4 are supported by DBCon version 1.02 or higher.
*2. The supported storage engines of the DB are InnoDB and MyISAM.
*3. When two or more DB connections are established, the operation cannot be guaranteed if you set different database types for the connections.
*4. Refer to “NJ-Series database connection CPU units user’s manual (W527)” for more information.

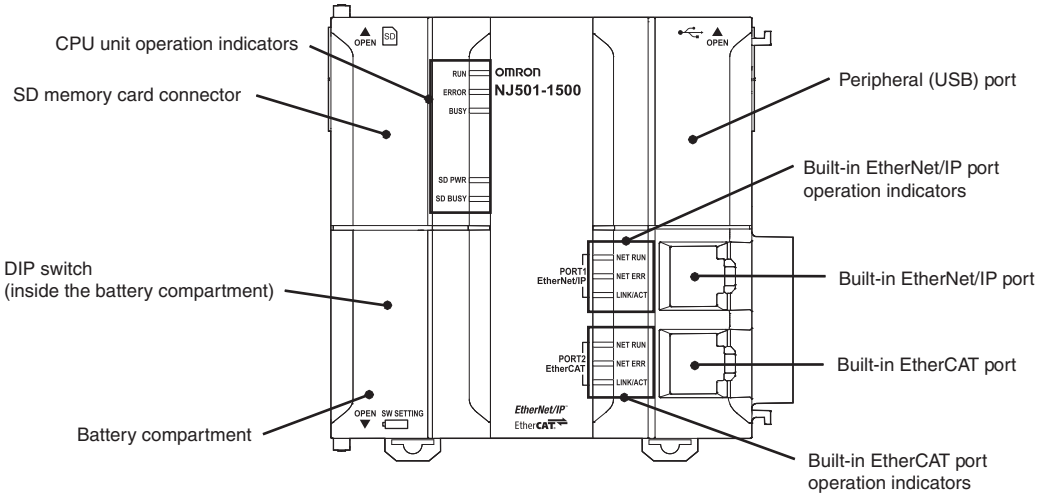
Function specifications for CPU units with SECS/GEM communications

Item	NJ501-1340 CPU Unit
Supported port	Built-in EtherNet/IP port
Supported standard[*1]	The unit conforms to the following SEMI standards: E37-0303, E37.1-0702, E5-0707 and E30-0307
Fundamental GEM requirement	State model, equipment processing state, host-initiated S1, F13/F14 scenario, event notification, on-line identification, error message, control (operator initiated), documentation
Additional GEM capability	Establish communications, dynamic event report configuration, variable data collection, trace data collection, status data collection, alarm management, remote control, equipment constant, process recipe management[*1], material movement, equipment terminal service, clock, limit monitoring, spooling[*2], control (host initiated)
User defined message	You can create non-GEM compliant communication messages and have host communications
GEM specific instruction	The unit supports 29 instructions to perform the following: • Changing the GEM service status • Setting HSMS communications • Reporting events and alarms • Acknowledging host commands and enhanced remote commands • Changing equipment constants • Uploading and downloading process programs • Sending and acknowledging equipment terminal messages • Requesting to change time • Sending user-defined messages • Getting SECS communications log
GEM service log	Can record the following information: • HSMS communication log: Keeps log of HSMS communication operations • SECS message log: Keeps log of SECS-II communication messages • Execution log: Keeps log of executions of GEM instructions[*2]
Shutting down the GEM service	Saves the spool data and GEM service log records into an SD memory card and ends the GEM service

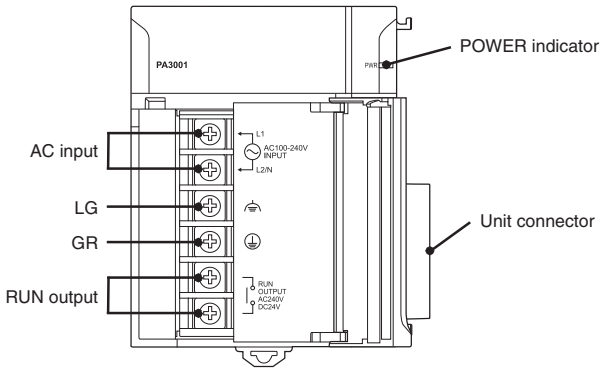
*1. E42 recipes, large process programs and E139 recipes are not supported.
*2. The capability is not available when no SD memory card is mounted.

Nomenclature

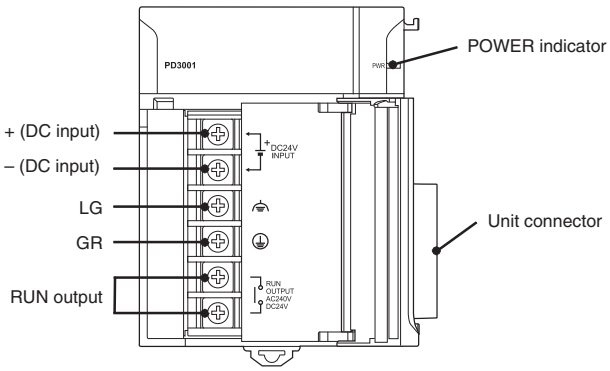
NJ CPU unit



100 to 240 VAC power supply unit (NJ-PA3001)

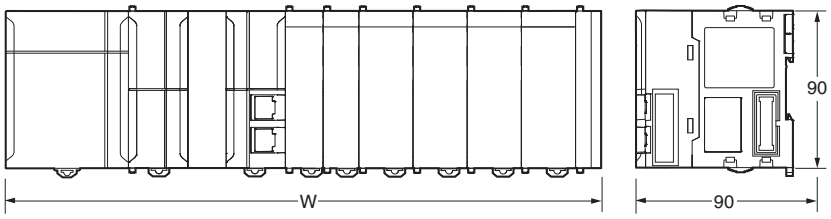


24 VDC power supply unit (NJ-PD3001)



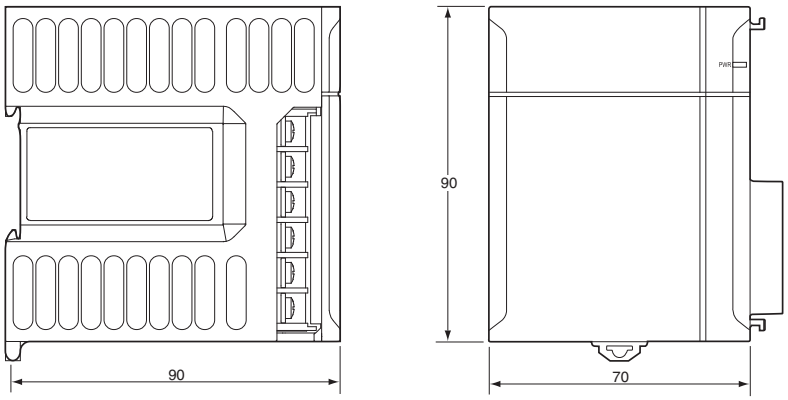
Dimensions

NJ-Series system (NJ-P□3001 + NJ□01-□□□□ + one I/O unit + CJ1W-TER01)

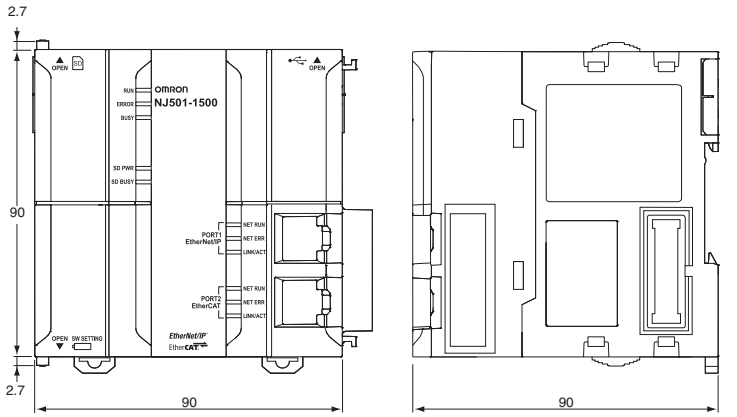


No. of units mounted with 31-mm width	Rack width (mm)
	With NJ CPU
1	205.7
2	236.7
3	267.7
4	298.7
5	329.7
6	360.7
7	391.7
8	422.7
9	453.7
10	484.7

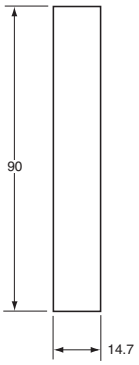
Power supply unit (NJ-PA3001/PD3001)



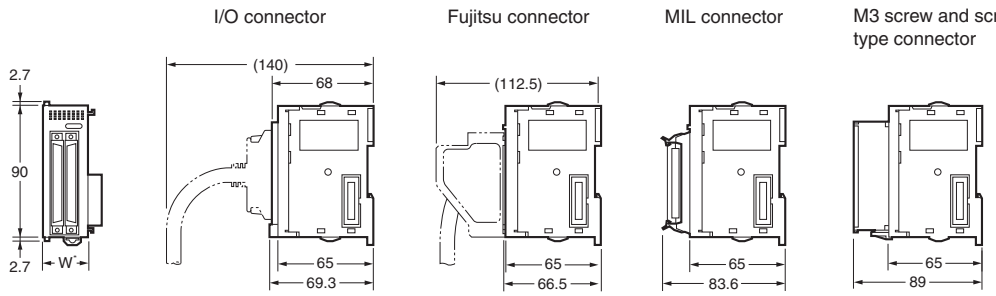
NJ CPU unit



End cover (CJ1W-TER01)

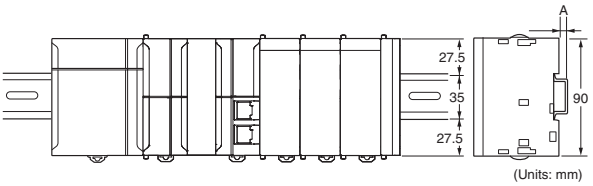


CJ units



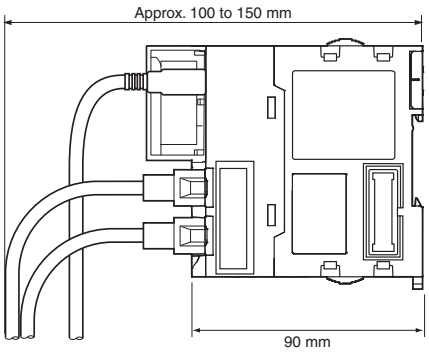
* Refer to the CJ unit tables in the ordering information section for the specific unit width.

Mounting dimensions

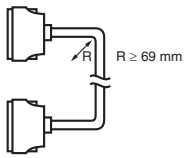


DIN track model number	A
PFP-100N2	16 mm
PFP-100N	7.3 mm
PFP-50N	7.3 mm

Mounting height



Expansion cable



Note: **1.** Consider the following points when expanding the configuration:
- The total length of I/O connecting cable must not be exceed 12 m.
- I/O Connecting cables require the bending radius indicates below.

2. Outer diameter of expansion cable: 8.6 mm.

Power supply units current consumption

Checking current and power consumption

After selecting a power supply unit based on considerations such as the power supply voltage, calculate the current and power requirements for each rack.

Condition 1: Current requirements

There are two voltage groups for internal power consumption: 5 V and 24 V.
Current consumption at 5 V (internal logic power supply)
Current consumption at 24 V (relay driving power supply)

Condition 2: Power requirements

For each rack, the upper limits are determined for the current and power that can be provided to the mounted units. Design the system so that the total current consumption for all the mounted units does not exceed the maximum total power or the maximum current supplied for the voltage groups shown in the following tables.

The maximum current and total power supplied for CPU racks and expansion racks according to the power supply unit model are shown below.

Power supply units	Max. current supplied			(C) Max. total power supplied
	(A) 5 VDC CPU racks*1	(A) 5 VDC expansion rack	(B) 24 VDC	
NJ-PA3001	6.0 A	6.0 A	1.0 A	30 W
NJ-PD3001	6.0 A	6.0 A	1.0 A	30 W

*1. Including supply to the CPU unit.

Conditions 1 and 2 are below must be satisfied.

Condition 1: Maximum current
(1) Total unit current consumption at 5 V ≤ (A) value
(2) Total unit current consumption at 24 V ≤ (B) value

Condition 2: Maximum power
(1) × 5 V + (2) × 24 V ≤ (C) value

Note: **1.** For CPU racks, include the CPU unit current and power consumption in the calculations. When expanding, also include the current and power consumption of the I/O control unit in the calculations.

2. For expansion racks, include the I/O interface unit current and power consumption in the calculations.

Example: Calculating total current and power consumption

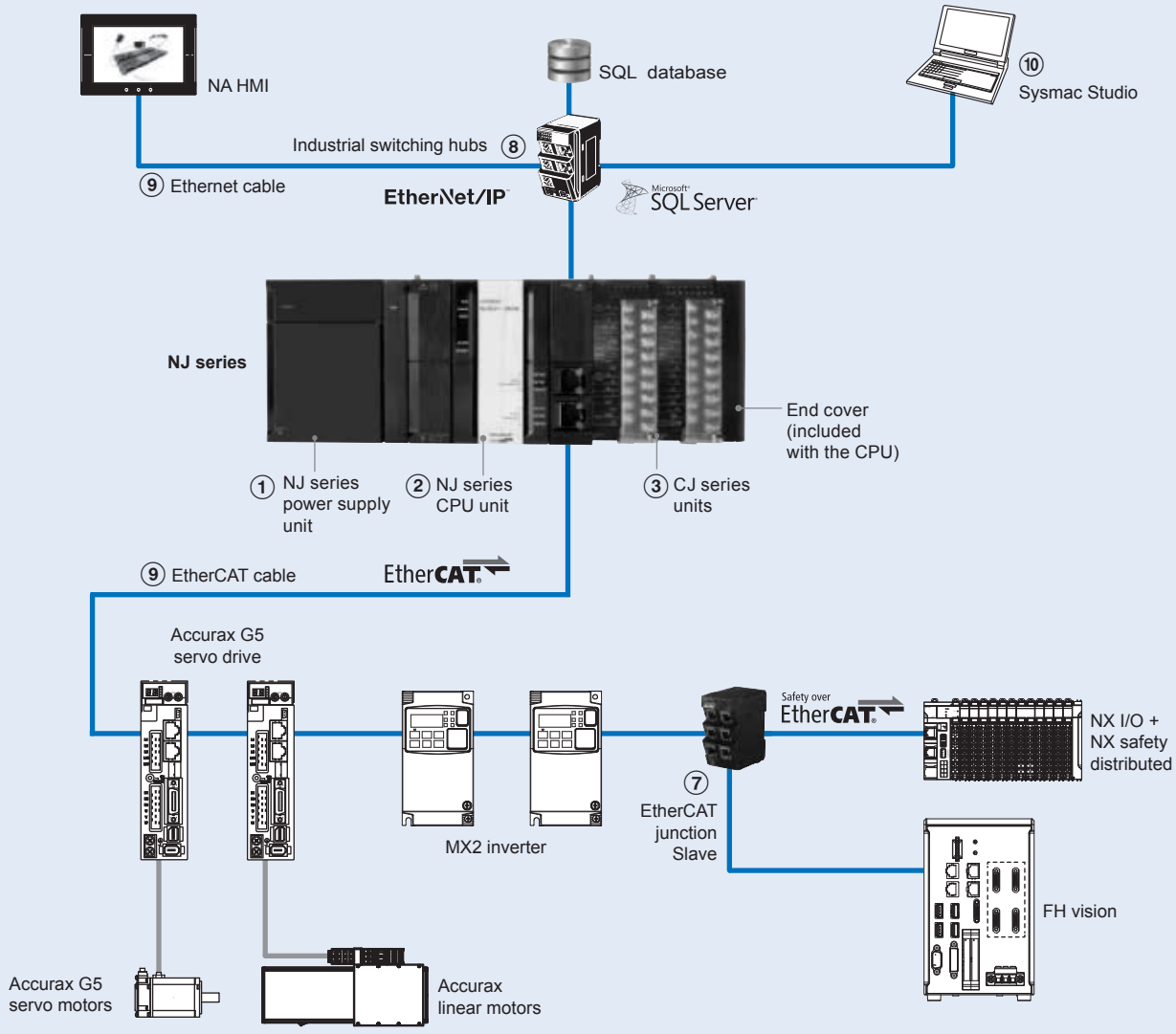
When the following units are mounted to a NJ series CPU rack using a NJ-PA3001 power supply unit.

Unit type	Model	Quantity	Voltage group	
			5 V	24 V
CPU unit	NJ501-1500	1	1.90 A	–
I/O control unit	CJ1W-IC101	1	0.02 A	–
Basic I/O units (input units)	CJ1W-ID211	2	0.08 A	–
	CJ1W-ID231	2	0.09 A	–
Basic I/O units (output units)	CJ1W-OC201	2	0.09 A	0.048 A
Special I/O unit	CJ1W-DA041	1	0.12 A	–
CPU bus unit	CJ1W-SCU22	1	0.29 A	–
Current consumption	Total		1.90 A + 0.02 A + 0.08 A × 2 + 0.09 A × 2 + 0.09 A × 2 + 0.12 A + 0.29 A	0.048 A × 2
	Result		2.85 A (≤ 6.0 A)	0.096 A (≤ 1.0 A)
Power consumption	Total		2.85 A × 5 V = 14.25 W	0.096 A × 24 V = 2.3 W
	Result		14.25 W + 2.3 W = 16.55 W (≤ 30 W)	

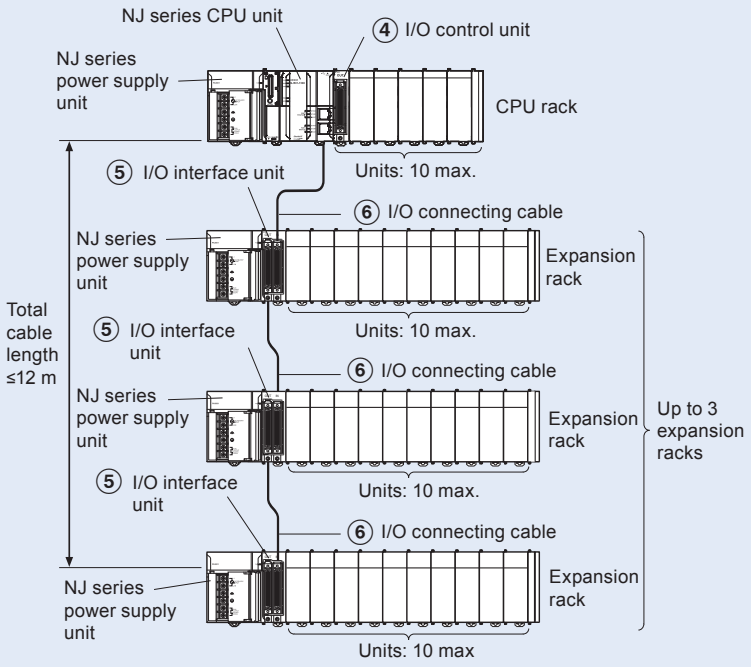
Note: For details on unit current consumption, refer to ordering information.

Ordering information

NJ series system



NJ series expansion racks



Power supply units

Symbol	Name	Output capacity			RUN output	Model
		5 VDC	24 VDC	Total		
①	100 to 240 VAC power supply unit for NJ CPU	6.0 A	1.0 A	30 W	Supported	NJ-PA3001
	24 VDC power supply unit for NJ CPU					NJ-PD3001

Note: Power supply units for the CJ Series cannot be used as a power supply for a CPU rack of the NJ System or as a power supply for an expansion rack.

NJ series CPU units

Symbol	CPU	Program capacity	Variables capacity	Specifications	Functionalities					Number of axes	Model
					Sequence	Motion	DB connection	Robotics	SECS/ GEM		
②	NJ501	20 MB	2 MB: Retained 4 MB: Not retained	I/O capacity: 2,560 points	●	●	●			64	NJ501-1520
				CPU rack: 10 units max.	●	●	●			32	NJ501-1420
					●	●	●			16	NJ501-1320
				Expansion rack: 10 units max. (Up to 3 expansion racks)	●	●	●	●		16	NJ501-4320
					●	●		●		64	NJ501-4500
					●	●		●		32	NJ501-4400
				40 units max. per system (CPU rack + 3 expansion racks)	●	●		●		16	NJ501-4300
					●	●		●		16	NJ501-4310*1
					●	●			●	16	NJ501-1340
				Current consumption: 1.90 A at 5 VDC	●	●				64	NJ501-1500
					●	●				32	NJ501-1400
					●	●				16	NJ501-1300
	NJ301	5 MB	0.5 MB: Retained 2 MB: Not retained		●	●				8	NJ301-1200
					●	●				4	NJ301-1100
	NJ101	3 MB			●	●	●			2	NJ101-1020
					●		●			0	NJ101-9020
					●	●				2	NJ101-1000
					●					0	NJ101-9000

*1. The NJ501-4310 CPU unit only supports one Delta, SCARA or Cartesian robot.

Note: The end cover unit CJ1W-TER01 is included with the CPU unit.

CJ series digital I/O units

Symbol	Points	Type	Rated voltage	Rated current	Width	Remarks	Current consumption (A)		Connection type	Model
							5 VDC	24 VDC		
③	8	AC input	240 VAC	10 mA	31 mm	–	0.08	–	M3	CJ1W-IA201
	16		120 VAC	7 mA	31 mm	–	0.09	–	M3	CJ1W-IA111
	8	DC input	24 VDC	10 mA	31 mm	–	0.08	–	M3	CJ1W-ID201
	16		24 VDC	7 mA	31 mm	–	0.08	–	M3	CJ1W-ID211
					31 mm				Screwless	CJ1W-ID211(SL)
	16		24 VDC	7 mA	31 mm	Fast-response (15 μs is ON, 90 μs is OFF)	0.13	–	M3	CJ1W-ID212
	16		24 VDC	7 mA	31 mm	Inputs start interrupt tasks in PLC program	0.08	–	M3	CJ1W-INT01
	16		24 VDC	7 mA	31 mm	Latches pulses down to 50 μs pulse width	0.08	–	M3	CJ1W-IDP01
	32		24 VDC	4.1 mA	20 mm	–	0.09	–	Fujitsu	CJ1W-ID231
	32		24 VDC	4.1 mA	20 mm	–	0.09	–	MIL	CJ1W-ID232
	32		24 VDC	4.1 mA	20 mm	Fast-response (15 μs is ON, 90 μs is OFF)	0.20	–	MIL	CJ1W-ID233
	64		24 VDC	4.1 mA	31 mm	–	0.09	–	Fujitsu	CJ1W-ID261
	64		24 VDC	4.1 mA	31 mm	–	0.09	–	MIL	CJ1W-ID262
	8	Triac output	250 VAC	0.6 mA	31 mm	–	0.22	–	M3	CJ1W-OA201
	8	Relay contact output	250 VAC	2 A	31 mm	–	0.09	0.048	M3	CJ1W-OC201
					31 mm				Screwless	CJ1W-OC201(SL)
	16		250 VAC	2 A	31 mm	–	0.11	0.096	M3	CJ1W-OC211
					31 mm				Screwless	CJ1W-OC211(SL)
	8	DC output (sink)	12 to 24 VDC	2 A	31 mm	–	0.09	–	M3	CJ1W-OD201
	8		12 to 24 VDC	0.5 A	31 mm	–	0.10	–	M3	CJ1W-OD203
	16		12 to 24 VDC	0.5 A	31 mm	–	0.10	–	M3	CJ1W-OD211
					31 mm				Screwless	CJ1W-OD211(SL)
	16		24 VDC	0.5 A	31 mm	Fast-response (15 μs is ON, 80 μs is OFF)	0.15	–	M3	CJ1W-OD213
	32		12 to 24 VDC	0.5 A	20 mm	–	0.14	–	Fujitsu	CJ1W-OD231
	32		12 to 24 VDC	0.5 A	20 mm	–	0.14	–	MIL	CJ1W-OD233
	32		24 VDC	0.5 A	20 mm	Fast-response (15 μs is ON, 80 μs is OFF)	0.22	–	MIL	CJ1W-OD234
	64		12 to 24 VDC	0.3 A	31 mm	–	0.17	–	Fujitsu	CJ1W-OD261
	64		12 to 24 VDC	0.3 A	31 mm	–	0.17	–	MIL	CJ1W-OD263
	8	DC output (source)	24 VDC	2 A	31 mm	Short-circuit protection	0.11	–	M3	CJ1W-OD202
	8		24 VDC	0.5 A	31 mm	Short-circuit protection	0.10	–	M3	CJ1W-OD204
	16		24 VDC	0.5 A	31 mm	Short-circuit protection	0.10	–	M3	CJ1W-OD212
					31 mm				Screwless	CJ1W-OD212(SL)
	32		24 VDC	0.5 A	20 mm	Short-circuit protection	0.15	–	MIL	CJ1W-OD232
	64		12 to 24 VDC	0.3 A	31 mm	–	0.17	–	MIL	CJ1W-OD262
	16 + 16	DC in + out (sink)	24 VDC	0.5 A	31 mm	–	0.13	–	Fujitsu	CJ1W-MD231
	16 + 16		24 VDC	0.5 A	31 mm	–	0.13	–	MIL	CJ1W-MD233
	32 + 32		24 VDC	0.3 A	31 mm	–	0.14	–	Fujitsu	CJ1W-MD261
	32 + 32		24 VDC	0.3 A	31 mm	–	0.14	–	MIL	CJ1W-MD263

Symbol	Points	Type	Rated voltage	Rated current	Width	Remarks	Current consumption (A)		Connection type	Model
							5 VDC	24 VDC		
③	16 + 16	DC in + out (source)	24 VDC	0.5 A	31 mm	–	0.13	–	MIL	CJ1W-MD232
	32 + 32	DC in + out (TTL)	5 VDC	35 mA	31 mm	–	0.19	–	MIL	CJ1W-MD563

Note: MIL = Connector according to MIL-C-83503 (compatible with DIN 41651/IEC 60603-1).

CJ series analogue I/O and control units

Symbol	Points	Type	Ranges	Resolution	Accuracy*1	Conversion time	Width	Remarks	Current (A)		Connection type	Model
									5 V	24 V		
③	4	Universal analogue input	0 to 5 V, 1 to 5 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA, K, J, T, L, R, S, B, Pt100, Pt1000, JPt100	V/I: 1/12,000 T/C: 0.1°C RTD: 0.1°C	V: 0.3% I: 0.3% T/C: 0.3% RTD: 0.3%	250 ms/4 points	31 mm	Universal inputs, with zero/span adjustment, configurable alarms, scaling, sensor error detection	0.32	–	M3	CJ1W-AD04U
											Screwless	CJ1W-AD04U(SL)
	4	Analogue input	0 to 5 V, 0 to 10 V, –10 to 10 V, 1 to 5 V, 4 to 20 mA	1/8,000	V: 0.2% I: 0.4%	250 μs/point	31 mm	Offset/gain adjustment, peak hold, moving average, alarms	0.42	–	M3	CJ1W-AD041-V1
											Screwless	CJ1W-AD041-V1(SL)
	4	High-speed analogue input	1 to 5 V, 0 to 10 V, –5 to 5 V, –10 to 10 V, 4 to 20 mA	1/40,000	V: 0.2% I: 0.4%	35 μs/4 points	31 mm	Direct conversion (CJ2H special instruction)	0.52	–	M3	CJ1W-AD042
	8	Analogue input	1 to 5 V, 0 to 10 V, –10 to 10 V, 1 to 5 V, 4 to 20 mA	1/8,000	V: 0.2% I: 0.4%	250 μs/point	31 mm	Offset/gain adjustment, peak hold, moving average, alarms	0.42	–	M3	CJ1W-AD081-V1
											Screwless	CJ1W-AD081-V1(SL)
	2	Analogue output	0 to 5 V, 0 to 10 V, –10 to 10 V, 1 to 5 V, 4 to 20 mA	1/4,000	V: 0.3% I: 0.5%	1 ms/point	31 mm	Offset/gain adjustment, output hold	0.12	0.14	M3	CJ1W-DA021
											Screwless	CJ1W-DA021(SL)
	4	Analogue output	1 to 5 V, 0 to 10 V, –10 to 10 V, 1 to 5 V, 4 to 20 mA	1/4,000	V: 0.3% I: 0.5%	1 ms/point	31 mm	Offset/gain adjustment, output hold	0.12	0.2	M3	CJ1W-DA041
											Screwless	CJ1W-DA041(SL)
	4	High-speed analogue output	1 to 5 V, 0 to 10 V, –10 to 10 V	1/40,000	0.3%	35 μs/4 points	31 mm	Direct conversion (CJ2H special instruction)	0.40	–	M3	CJ1W-DA042V
	8	Voltage output	1 to 5 V, 0 to 10 V, –10 to 10 V, 1 to 5 V	1/8,000	0.3%	250 μs/point	31 mm	Offset/gain adjustment, output hold	0.14	0.14	M3	CJ1W-DA08V
											Screwless	CJ1W-DA08V(SL)
	8	Current output	4 to 20 mA	1/8,000	0.5%	250 μs/point	31 mm	Offset/gain adjustment, output hold	0.14	0.17	M3	CJ1W-DA08C
											Screwless	CJ1W-DA08C(SL)
	4 + 2	Analogue in + out	1 to 5 V, 0 to 10 V, –10 to 10 V, 1 to 5 V, 4 to 20 mA	1/8,000	in: 0.2% out: 0.3%	1 ms/point	31 mm	Offset/gain adjustment, scaling, peak hold, moving average, alarms, output hold	0.58	–	M3	CJ1W-MAD42
											Screwless	CJ1W-MAD42(SL)
	4	Universal analogue input	DC voltage, DC current, thermocouple, Pt100/Pt1000, potentiometer	1/256,000	0.05%	60 ms/4 points	31 mm	All inputs individually isolated, configurable alarms, maintenance functions, user-defined scaling, zero/span adjustment	0.30	–	M3	CJ1W-PH41U
	2	Process input	4 to 20 mA, 0 to 20 mA, 0 to 10 V, –10 to 10 V, 0 to 5 V, –5 to 5 V, 1 to 5 V, 0 to 1.25 V, 1.25 to 1.25 V	1/64,000	0.05%	5 ms/point	31 mm	Configurable alarms, maintenance functions, user-defined scaling, zero/span adjustment, square root, totaliser	0.18	0.09	M3	CJ1W-PDC15
	6	Temperature control loops, thermocouple	K-type (–200 to 1,300°C) J-type (–100 to 850ºC)	0.1°C	0.5%	40 ms/point	31 mm	Basic I/O unit, setup by DIP switches, adjustable filtering 10/50/60 Hz	0.22	–	M3	CJ1W-TS561
											Screwless	CJ1W-TS561(SL)
	6	Temperature control loops	Pt100 (–200 to 650°C) Pt1000 (–200 to 650°C)	0.1°C	0.5%	40 ms/point	31 mm	Basic I/O unit, setup by DIP switches, adjustable filtering 10/50/60 Hz	0.25	–	M3	CJ1W-TS562
											Screwless	CJ1W-TS562(SL)
	2	Temperature control loops, thermocouple	B, J, K, L, R, S, T	0.1°C	0.3%	500 ms total	31 mm	Open collector NPN outputs	0.25	–	M3	CJ1W-TC003

Symbol	Points	Type	Ranges	Resolution	Accuracy[*1]	Conversion time	Width	Remarks	Current (A)		Connection type	Model
									5 V	24 V		
③	2	Temperature control loops, thermocouple	B, J, K, L, R, S, T	0.1°C	0.3%	500 ms total	31 mm	Open collector PNP outputs	0.25	–	M3	CJ1W-TC004
	2	Temperature control loops	Pt100, JPt100	0.1°C	0.3%	500 ms total	31 mm	Open collector NPN outputs	0.25	–	M3	CJ1W-TC103
	2	Temperature control loops	Pt100, JPt100	0.1°C	0.3%	500 ms total	31 mm	Open collector PNP outputs	0.25	–	M3	CJ1W-TC104

*1. Accuracy for voltage and current inputs/outputs as percentage of full scale and typical value at 25°C ambient temperature (consult the operation manual for details)
Accuracy for temperature inputs/outputs as percentage of process value and typical value at 25°C ambient temperature (consult the operation manual for details)

CJ series special I/O units

Symbol	Channels	Type	Signal type	Width	Remarks	Current consumption (A)		Connection type	Model
						5 V	24 V		
③	2	500 kHz Counter	24 V, line driver	31 mm	2 configurable digital inputs + outputs	0.28	–	Fujitsu	CJ1W-CT021
	4	100 kHz Counter	Line driver, 24 V via terminal block		Target values trigger interrupt to CPU	0.32	–	1 × MIL (40 pt)	CJ1W-CTL41-E

CJ series communication units

Symbol	Type	Ports	Data transfer	Protocols	Width	Current consumption (A)		Connection type	Model
						5 V	24 V		
③	Serial communications units	2 × RS-232C	High-speed	CompoWay/F, host link, NT link, Modbus, user-defined	31 mm	0.29	–	9 pin D-Sub	CJ1W-SCU22
		2 × RS-422A/RS-485			31 mm	0.46	–	9 pin D-Sub	CJ1W-SCU32
		1 × RS-232C + 1 × RS-422/RS-485			31 mm	0.38	–	9 pin D-Sub	CJ1W-SCU42
	EtherNet/IP	1 × 100 Base-Tx	–	EtherNet/IP, UDP, TCP/IP, FTP server, SNTP, SNMP	31 mm	0.41	–	RJ45	CJ1W-EIP21[*1]
	EtherCAT	2 × 100 Base-Tx	–	EtherCAT	31 mm	0.34	–	RJ45	CJ1W-ECT21[*2]
	DeviceNet	1 × CAN	–	DeviceNet	31 mm	0.29	–	5-p detachable	CJ1W-DRM21
	CompoNet	4-wire, data + power to slaves (Master)	–	CompoNet (CIP-based)	31 mm	0.4	–	4-p detachable IDC or screw	CJ1W-CRM21[*3]
	PROFIBUS-DP	1 × RS-485 (Master)	–	DP, DPV1	31 mm	0.40	–	9 pin D-Sub	CJ1W-PRM21
		1 × RS-485 (Slave)	–	DP	31 mm	0.40	–		CJ1W-PRT21
	PROFINET-IO	1 × 100 Base-Tx	–	PROFINET-IO controller, FINS/UDP	31 mm	0.42	–	RJ45	CJ1W-PNT21
	RS-422A converter accessory	RS-232C to RS-422A/RS-485 signal converter. Mounts directly on serial port						9 pin D-Sub to screw clamp terminals	CJ1W-CIF11

*1. Supported only by the EtherNet/IP units with unit version 2.1 or higher, CPU units with unit version 1.01 or higher and the Sysmac Studio version 1.02 or higher.
*2. Supported only by the CPU units with unit version 1.10 or higher and the Sysmac Studio version 1.13 or higher.
*3. Supported only by the CPU units with unit version 1.01 or higher and the Sysmac Studio version 1.02 or higher.

CJ series ID sensor units

Symbol	Type	Specifications				Current consumption (A)		Model
		Connected ID systems	No. of connected R/W heads	External power supply	No. of unit numbers allocated	5 V	24 V	
③	ID sensor units	V680-Series RFID system	1	Not required	1	0.26[*1]	0.13[*1]	CJ1W-V680C11
			2		2	0.32	0.26	CJ1W-V680C12

*1. To use a V680-H01 antenna, refer to the V680 Series RFID system catalog (Cat. No. Q151)

Note: The data transfer function using intelligent I/O commands can not be used.

Expansion racks

CJ series I/O control unit (mounted on CPU rack when connecting expansion racks)

Symbol	Name	Connecting cable	Connected Unit	Width	Current consumption (A)		Model
					5 V	24 V	
④	CJ-Series I/O control unit	CS1W-CN□□3	CJ1W-II101	20 mm	0.02 A	–	CJ1W-IC101

Note: Mount to the right of the power supply unit.

CJ series I/O interface unit (mounted on expansion rack)

Symbol	Name	Connecting cable	Width	Current consumption (A)		Model
				5 V	24 V	
⑤	CJ-Series I/O interface unit	CS1W-CN□□3	31 mm	0.13 A	-	CJ1W-II101

Note: Mount to the right of the power supply unit.

I/O connecting cables

Symbol	Name	Specifications		Model
⑥	I/O connecting cable	• Connects an I/O control unit on NJ series CPU rack to an I/O interface unit on a NJ series expansion rack. or • Connects an I/O interface unit on NJ series expansion rack to an I/O interface unit on another NJ series expansion rack.	Cable length: 0.3 m	CS1W-CN313
			Cable length: 0.7 m	CS1W-CN713
			Cable length: 2 m	CS1W-CN223
			Cable length: 3 m	CS1W-CN323
			Cable length: 5 m	CS1W-CN523
			Cable length: 10 m	CS1W-CN133
			Cable length: 12 m	CS1W-CN133-B2

EtherCAT junction slave

Symbol	Name	No. of ports	Power supply voltage	Current consumption (A)	Dimensions (W × D × H)	Weight	Model	Appearance
⑦	EtherCAT junction slave	3	20.4 to 28.8 VDC (24 VDC –15 to 20%)	0.08	25 mm × 78 mm × 90 mm	165 g	GX-JC03	
		6		0.17	48 mm × 78 mm × 90 mm	220 g	GX-JC06	

Note: 1. Please do not connect EtherCAT junction slave with OMRON position control unit, Model CJ1W-NC□81/□82.
2. EtherCAT junction slave cannot be used for Ethernet/IP and Ethernet.

Industrial switching hubs

Symbol	Specifications			Accessories	Current consumption (A)	Model	Appearance
	Functions	No. of ports	Failure detection				
⑧	Quality of Service (QoS): EtherNet/IP control data priority. Failure detection: Broadcast storm and LSI error detection 10/100 BASE-TX, Auto-Negotiation	3	No	Power supply connector	0.22	W4S1-03B	
		5	No			W4S1-05B	
		5	Yes	Power supply connector and connector for informing error		W4S1-05C	

Recommended EtherCAT and EtherNet/IP communication cables

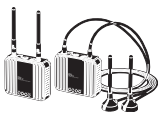
Symbol	Item			Manufacturer	Colour	Cable length (m)	Model
⑨	EtherCAT cable	Cat 5e, AWG22, 2-pair cable M12/Smartclick connectors Improved shield for EtherCAT communications	Standard type Cable with connectors on both ends (M12 straight/M12 straight) 	OMRON	Black	0.5	XS5W-T421-BM2-SS
						1	XS5W-T421-CM2-SS
						2	XS5W-T421-DM2-SS
						3	XS5W-T421-EM2-SS
						5	XS5W-T421-GM2-SS
						10	XS5W-T421-JM2-SS
			Rugged type Cable with connectors on both ends (M12 straight/RJ45) 		Black	0.5	XS5W-T421-BMCSS
						1	XS5W-T421-CMC-SS
						2	XS5W-T421-DMC-SS
						3	XS5W-T421-EMC-SS
						5	XS5W-T421-GMC-SS
						10	XS5W-T421-JMC-SS
	Ethernet/ EtherCAT patch cable	Cat 6a, AWG27, 4-pair cable Cable sheath material: LSZH*1 **Note:** This cable is available in yellow, green and blue colours.	Standard type Cable with connectors on both ends (RJ45/RJ45) 		Yellow	0.2	XS6W-6LSZH8SS20CM-Y
						0.3	XS6W-6LSZH8SS30CM-Y
						0.5	XS6W-6LSZH8SS50CM-Y
						1	XS6W-6LSZH8SS100CM-Y
						1.5	XS6W-6LSZH8SS150CM-Y
						2	XS6W-6LSZH8SS200CM-Y
						3	XS6W-6LSZH8SS300CM-Y
						5	XS6W-6LSZH8SS500CM-Y
						7.5	XS6W-6LSZH8SS750CM-Y
						10	XS6W-6LSZH8SS1000CM-Y
						15	XS6W-6LSZH8SS1500CM-Y
						20	XS6W-6LSZH8SS2000CM-Y
					Green	0.2	XS6W-6LSZH8SS20CM-G
						0.3	XS6W-6LSZH8SS30CM-G
						0.5	XS6W-6LSZH8SS50CM-G
						1	XS6W-6LSZH8SS100CM-G
						1.5	XS6W-6LSZH8SS150CM-G
						2	XS6W-6LSZH8SS200CM-G
						3	XS6W-6LSZH8SS300CM-G
						5	XS6W-6LSZH8SS500CM-G
						7.5	XS6W-6LSZH8SS750CM-G
						10	XS6W-6LSZH8SS1000CM-G
						15	XS6W-6LSZH8SS1500CM-G
						20	XS6W-6LSZH8SS2000CM-G

Symbol	Item			Manufacturer	Colour	Cable length (m)	Model
⑨	Ethernet/ EtherCAT patch cable	Cat 5e, AWG26, 4-pair cable Cable sheath material: PUR*1	Standard type Cable with connectors on both ends (RJ45/RJ45) 	OMRON	Green	0.5	XS6W-5PUR8SS50CM-G
						1	XS6W-5PUR8SS100CM-G
						1.5	XS6W-5PUR8SS150CM-G
						2	XS6W-5PUR8SS200CM-G
						3	XS6W-5PUR8SS300CM-G
						5	XS6W-5PUR8SS500CM-G
						7.5	XS6W-5PUR8SS750CM-G
						10	XS6W-5PUR8SS1000CM-G
						15	XS6W-5PUR8SS1500CM-G
						20	XS6W-5PUR8SS2000CM-G
		Cat 5e, AWG22, 2-pair cable	Rugged type Cable with connectors on both ends (RJ45/RJ45) 		Grey	0.3	XS5W-T421-AMD-K
						0.5	XS5W-T421-BMD-K
						1	XS5W-T421-CMD-K
						2	XS5W-T421-DMD-K
						3	XS5W-T421-EMD-K
						5	XS5W-T421-GMD-K
						10	XS5W-T421-JMD-K
						15	XS5W-T421-KMD-K
			Rugged type Cable with connectors on both ends (M12 straight/RJ45) 		Grey	0.3	XS5W-T421-AMC-K
						0.5	XS5W-T421-BMC-K
						1	XS5W-T421-CMC-K
						2	XS5W-T421-DMC-K
						3	XS5W-T421-EMC-K
						5	XS5W-T421-GMC-K
						10	XS5W-T421-JMC-K
						15	XS5W-T421-KMC-K
			Rugged type Cable with connectors on both ends (M12 L right angle/RJ45) 		Grey	0.3	XS5W-T422-AMC-K
						0.5	XS5W-T422-BMC-K
						1	XS5W-T422-CMC-K
						2	XS5W-T422-DMC-K
						3	XS5W-T422-EMC-K
						5	XS5W-T422-GMC-K
						10	XS5W-T422-JMC-K
						15	XS5W-T422-KMC-K
	Ethernet installation cable	Cat 5, SF/UTP, 4 × 2 × AWG 24/1 (solid core), Polyurethane (PUR)		Weidmüller	Green	100	WM IE-5IC4x2xAWG24/1-PUR
		Cat 5, SF/UTP, 4 × 2 × AWG 26/7 (stranded core), Polyurethane (PUR)			Green	100	WM IE-5IC4x2xAWG26/7-PUR
	Connectors	RJ45 metallic connector For AWG22 to AWG26			–	–	WM IE-T0-RJ45-FH-BK
		RJ45 plastic connector For AWG22 to AWG24		OMRON	–	–	XS6G-T421-1
	RJ45 socket	DIN-rail mount socket to terminate installation cable in the cabinet		Weidmüller	–	–	WM IE-T0-RJ45-FJ-B

*1. The lineup features low smoke zero halogen cables for in-cabinet use and PUR cables for out-of-cabinet use.

Note: Please be careful while cable processing, for EtherCAT, connectors on both ends should be shield connected and for EtherNet/IP, connectors on only one end should be shield connected.

WE70 FA wireless LAN units

Name	Area	Type	Model	Appearance
WE70 FA wireless LAN units	Europe	Access point (Master)	WE70-AP-EU	
		Client (Slave)	WE70-CL-EU	
Directional magnetic-base antenna		1 set with two antennas, 2.4 GHz/5 GHz Dual-band compatible	WE70-AT001H	
DIN rail mounting bracket		For TH35 7.5	WT30-FT001	
		For TH35 15	WT30-FT002	
Antenna extension cable		5 m	WE70-CA5M	

Note: Special versions are available for USA, Canada, China and Japan.

NJ series options and accessories

Specifications		Model	Appearance
SD memory card	2 GB	HMC-SD291	
	4 GB	HMC-SD491	
DIN track	Length: 0.5 m; height: 7.3 mm	PFP-50N	
	Length: 1 m; height: 7.3 mm	PFP-100N	
	Length: 1 m; height: 16 mm	PFP-100N2	
End plate to secure the units on the DIN track (2 pieces are included with the CPU unit and I/O interface unit)		PFP-M (2 pcs)	

Specifications	Model	Appearance
Battery for NX/NY/NJ CPU unit (The battery is included with the CPU unit)	CJ1W-BAT01	
End cover (The end cover is included with each CPU unit and I/O interface unit)	CJ1W-TER01	

Computer software

Symbol	Specifications		Model
⑩	Sysmac Studio[*1][*2]		SYSMAC-SE2□□□[*3]
	License for the SECS/GEM configurator[*4]	Software to make HSMS, SECSII and GEM settings for the NJ501 CPU units with SECS/GEM communications	WS02-GCTL1

*1. For the NJ101-□000 CPU units, Sysmac Studio version 1.13 or higher is needed.
*2. For the NJ101-□020 CPU units (with database connection), Sysmac Studio version 1.14 or higher is needed.
*3. Refer to the Sysmac Studio datasheet (Cat. No. SysCat_I181E) for detailed information or contact your OMRON representative.
*4. SECS/GEM configurator files are included in the Sysmac Studio standard edition DVD.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I180E-EN-06C In the interest of product improvement, specifications are subject to change without notice.

NX1□

NX1 series machine controller

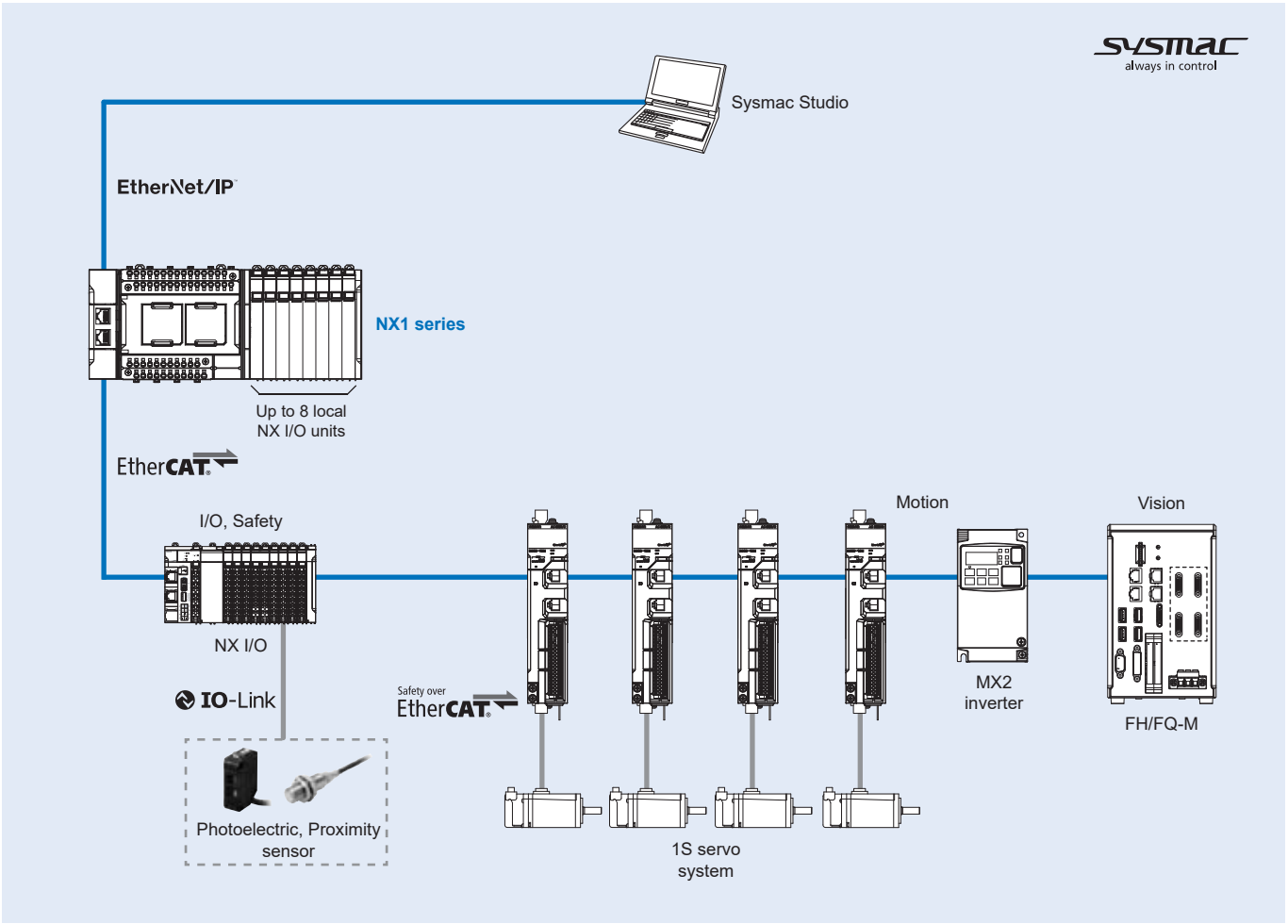


Compact in size, powerful in functionality

The NX1 completes the NX/NY/NJ machine controllers family offering same functionality in a compact design. The NX1 provides synchronized control of all machine devices such as motion, I/O, safety and vision under one Integrated Development Environment.

- Fastest cycle time: 2 ms
- Functions: Logic sequence and Motion control
- Up to 8 axes (4 synchronized axes)
- Built-in I/O: 40 or 24 I/O points
- Up to 8 local NX I/O units
- Built-in EtherCAT and EtherNet/IP ports
- Up to 16 EtherCAT slaves
- Up to 2 option boards can be connected to add serial communications or analog I/O functionality

System configuration



Specifications

General specifications

Item		NX1□ CPU Unit
Enclosure		Mounted in a panel
Grounding		Less than 100 Ω
Operation environment	Ambient operating temperature	0 to 55°C
	Ambient operating humidity	10% to 95% (with non condensation)
	Atmosphere	Must be free from corrosive gases
	Ambient storage temperature	–25 to 70°C (excluding battery)
	Altitude	2,000 m or less
	Pollution degree	2 or less: Conforms to JIS B3502 and IEC 61131-2.
	Noise immunity	2 kV on power supply line (conforms to IEC 61000-4-4.)
	Overvoltage category	Category II: Conforms to JIS B3502 and IEC 61131-2
	EMC immunity level	Zone B
	Vibration resistance	Conforms to IEC 60068-2-6 5 to 8.4 Hz with 3.5 mm amplitude, 8.4 to 150 Hz. Acceleration of 9.8 m/s^2 for 100 min in X, Y and Z directions (10 sweeps of 10 min each = 100 min total)
	Shock resistance	Conforms to IEC 60068-2-27 147 m/s^2, 3 times in X, Y and Z directions
Battery	Life	5 years at 25°C
	Model	CJ1W-BAT01 (sold separately)
Applicable standards	EU Directives	EN 61131-2
	cULus	Listed UL 61010-2-201 and ANSI/ISA 12.12.01
	Others	KC

Electrical and mechanical specifications

Item		NX1P2-1□40DT□	NX1P2-9024DT□
CPU unit dimensions (H × D × W)		100 mm × 71 mm × 154 mm	100 mm × 71 mm × 130 mm
Weight		660 g (including end cover)	590 g (including end cover)
CPU unit power supply	Power supply voltage	24 VDC (20.4 to 28.8 VDC)	
	Unit power consumption	NX1P2-1□40DT: 7.05 W NX1P2-1□40DT1: 6.85 W	NX1P2-9024DT: 6.70 W NX1P2-9024DT1: 6.40 W
	Inrush current*1	For cold start at room temperature: 10 A max./0.1 ms max. and 2.5 A max./150 ms max.	
	Current capacity of power supply terminal*2	4 A max.	
	Isolation method	No isolation between the unit power supply terminal and internal circuit	
NX unit power supply	Capacity	10 W max.	
	Efficiency	80%	
	Isolation method	No isolation between the unit power supply terminal and NX unit power supply	
I/O power supply to NX units		Not provided*3	
External connection terminals	Communications connector	RJ45 for EtherNet/IP communications x 1 RJ45 for EtherCAT communications x 1	
	Screwless push-in terminal block	For unit power supply input, grounding and input signal x 1 (removable) For output signal x 1 (removable)	
	Output terminal (service supply)	Not provided	
	Run output terminal	Not provided	
	NX bus connector	8 NX I/O units can be connected	
	No. of option board slots	2	1

*1. The inrush current may vary depending on the operating conditions and other conditions. Therefore, select fuses, breakers and external power supply devices that have enough margin in characteristic and capacity, considering the condition under which the devices are used.

*2. The amount of current that can be passed constantly through the terminal. Do not exceed this current value when you use a through-wiring for the unit power supply.

*3. When the type of the I/O power supply to NX units you use is the supply from NX bus, an additional I/O power supply unit is required. The maximum I/O power supply current from an additional I/O power supply unit is 4 A.

Performance specifications

Item				NX1P2-1140DT□	NX1P2-1040DT□	NX1P2-9024DT□
Processing time	Instruction execution time	LD instruction		3.3 ns		
		Math instructions (for long real data)		70 ns or more		
Programming	Program capacity[*1]	Size		1.5 MB		
		POU definitions		450		
		POU instances		1,800		
	Memory capacity for variables[*2]	No retain attribute		Size: 2 MB Number of variables: 90,000		
		Retain attribute		Size: 32 KB Number of variables: 5,000		
	Data type	Number		1,000		
	Memory for CJ-Series units (can be specified with AT specifications for variables.)	CIO area		0 to 6,144 channel (0 to 6,143)[*3]		
		Work area		0 to 512 channel (W0 to W511)[*3]		
		Holding area		0 to 1,536 channel (H0 to H1,535)[*4]		
		DM area		0 to 16,000 channel (D0 to F15,999)[*4]		
		EM area		-		
Unit configuration	Maximum number of connectable units	Maximum number of NX I/O units that can be mounted to the NX1 CPU unit		8 units		
		Maximum number of NX I/O units for entire controller		24 units (8 units on CPU rack + 16 units on EtherCAT slave terminals)		
	Power supply	Model		A non-isolated power supply for DC input is built into the CPU unit		
		Power OFF detection time		2 to 8 ms		
Motion control	Number of controlled axes	Number of controlled axes		12 axes (8 motion control axes + 4 single-axis position control axes)	10 axes (6 motion control axes + 4 single-axis position control axes)	4 axes (4 single-axis position control axes)
		Number of used real axes		8 axes (4 motion control servo axes + 4 single-axis position control servo axes)	6 axes (2 motion control servo axes + 4 single-axis position control servo axes)	4 axes (4 single-axis position control servo axes)
		Linear interpolation control		4 axes max. per axes group		-
		Circular interpolation control		2 axes per axes group		-
	Number of axes groups			8 groups max.		-
	Position units			Pulses, millimeters, micrometers, nanometers, degrees or inches		
	Override factors			0.00% or 0.01% to 500.00%		
	Motion control period			Same as the period for primary periodic task		
	Cams	Number of cam data points		65,535 points max. per cam table / 262,140 points max. for all cam tables		-
		Number of cam tables		80 tables max.		-
Communications	Built-in EtherNet/IP port	Number of ports		1		
		Physical layer		10BASE-T, 100BASE-TX		
		Frame length		1,514 bytes max.		
		Media access method		CSMA/CD		
		Modulation		Baseband		
		Topology		Star		
		Baud rate		100 Mbps (100BASE-TX)		
		Transmission media		STP (shielded, twisted-pair) cable of Ethernet category 5, 5e or higher		
		Transmission distance		100 m max. (distance between Ethernet switch and node)		
		Cascade connections number		There are no restrictions if an switching hub is used		
		CIP service: Tag data links (cyclic communications)	Number of connections	32		
			Packet Interval[*5]	2 to 10,000 ms in 1-ms increments Can be set for each connection.		
			Permissible communications band	3,000 pps[*6] (including heartbeat)		
			Number of tag sets	32 max.		
			Tag types	Network variables, CIO/WR/HR/DM		
			Number of tags per connection (i.e., per tag set)	8 (7 tags if controller status is included in the tag set.)		
			Number of tags	256 max.		
			Link data size per node (total size for all tags)	19,200 bytes max.		
			Data size per connection	600 bytes max.		
			Number of registrable tag sets	32 max. (1 connection = 1 tag set)		
			Tag set size	600 bytes max. (two bytes are used if controller status is included in the tag set.)		
			Multi-cast packet filter[*7]	Supported.		
		CIP message service: Explicit messages	Class 3 (number of connections)	32 (clients plus server)		
			UCMM (non-connection type)	Number of clients that can communicate at one time: 32 max. Number of servers that can communicate at one time: 32 max.		
		Number of TCP socket service		30 max.		

Item			NX1P2-1140DT□	NX1P2-1040DT□	NX1P2-9024DT□
Communications	Built-in EtherCAT port	Communications standard	IEC 61158, Type 12		
		EtherCAT master specifications	Class B (feature pack motion control compliant)		
		Physical layer	100BASE-TX		
		Modulation	Baseband		
		Baud rate	100 Mbps (100BASE-TX)		
		Duplex mode	Automatic		
		Topology	Line, daisy chain and branching		
		Transmission media	Twisted-pair cable of category 5 or higher (double-shielded straight cable with aluminum tape and braiding)		
		Transmission distance	Distance between nodes: 100 m max.		
		Number of slaves	16 max.		
		Range of node addresses	1 to 192		
		Process data size	Inputs/Outputs: 1,434 bytes max. (However, the maximum number of process data frames is 1)		
		Process data size per slave	Inputs/Outputs: 1,434 bytes max.		
		Communications cycle	2,000 μs to 8,000 μs in 250-μs increments		
		Sync jitter	1 μs max.		
	Serial communications[*8]	Communications method	Half duplex		
		Synchronization	Start-stop		
		Baud rate	1.2/2.4/4.8/9.6/19.2/38.4/57.6/115.2 kbps		
		Transmission distance	Depends on the option board		
		Supported protocol	Host link, Modbus-RTU master and no-protocol		
Option board	Number of slots		2		1
Built-in I/O	Input	Number of inputs	24		14
	Output	Number of outputs	16		10
		Load short-circuit protection	NPN models: Not provided PNP models: Provided		
Internal clock	Accuracy		At ambient temperature of 55°C: –3.5 to +0.5 min error per month At ambient temperature of 25°C: –1.5 to +1.5 min error per month At ambient temperature of 0°C: –3 to +1 min error per month		
	Retention time of built-in capacitor		At ambient temperature of 40ºC: 10 days		

[*1.] This is the capacity for the execution objects and variable tables (including variable names).
[*2.] Memory used for CJ series units is included.
[*3.] The value can be set in 1 ch increments. The value is included in the total size of variables without a retain attribute.
[*4.] The value can be set in 1 ch increments. The value is included in the total size of variables with a retain attribute.
[*5.] Data will be refreshed at the set interval, regardless of the number of nodes.
[*6.] Means packets per second, i.e., the number of communication packets that can be sent or received in one second.
[*7.] As the EtherNet/IP port implements the IGMP client, unnecessary multi-cast packets can be filtered by using an Ethernet switch that supports IGMP Snooping.
[*8.] Supported only with the Serial communications option board.

Serial communications option board specifications

Item	NX1W-CIF01	NX1W-CIF11	NX1W-CIF12
Communications port	1 x RS-232C	1 x RS-422A/485	1 x RS-422A/485 (isolated)
Communications method	Half-duplex		
Synchronization method	Start-stop synchronization		
Baud rate	1.2/2.4/4.8/9.6/19.2/38.4/57.6/115.2 kbps		
Transmission distance	15 m	50 m	500 m
Supported protocol	Host link, Modbus-RTU master and no-protocol		
Terminal block type	Screwless push-in terminals 9 terminals	Screwless push-in terminals 5 terminals	
Applicable wire size	AWG28 to 20	AWG24 to 20	
Dimensions (H × D × W)	35.9 mm x 13.5 mm x 35.9 mm		
Weight	16 g	13 g	14 g
Power consumption	The option board power consumption is included in the CPU unit power consumption.		
Isolation method	No isolation		Isolation[*1]

[*1.] The terminals are isolated from the internal circuits of the CPU unit.

Analog I/O option board specifications

Item		NX1W-ADB21	NX1W-DAB21V	NX1W-MAB221
I/O	Type	Analog input	Analog output	Analog I/O
	Voltage/current input	0 to 10 V 0 to 20 mA 2 words total	-	0 to 10 V 0 to 20 mA 2 words total
	Voltage output	-	0 to 10 V 2 words	0 to 10 V 2 words
Terminal block type		Screwless push-in terminals 5 terminals	Screwless push-in terminals 3 terminals	Screwless push-in terminals 8 terminals
Applicable wire size		AWG24 to 20		
Dimensions (H × D × W)		35.9 mm x 28.2 mm x 35.9 mm		
Weight		24 g		26 g
Power consumption		The option board power consumption is included in the CPU unit power consumption.		
Isolation method		No isolation		

Function specifications

Item				NX1□ CPU Unit
Tasks	Function	Function		I/O refreshing and the user program are executed in units that are called tasks. Tasks are used to specify execution conditions and execution priority.
		Periodically executed tasks		Maximum number of primary periodic tasks: 1 Maximum number of periodic tasks: 2
		Conditionally executed tasks		Maximum number of even tasks: 32 When active even task instruction is executed or when condition expression for variable is met.
	Setup	System service monitoring settings		Not supported
Programming	POUs (program organization units)	Programs		POUs that are assigned to tasks.
		Function blocks		POUs that are used to create objects with specific conditions.
		Functions		POUs that are used to create an object that determine unique outputs for the inputs, such as for data processing.
	Programming languages	Types		Ladder diagrams[*1] and structured text (ST).
	Namespaces			A concept that is used to group identifiers for POU definitions.
	Variables	External access of variables		Network variables (the function which allows access from the HMI, host computers or other controllers)
	Data types	Basic data types		BOOL, BYTE, WORD, DWORD, LWORD, INT, SINT, DINT, LINT, UINT, USINT, UDINT, ULINT, REAL, LREAL, TIME (durations), DATE, TIME_OF_DAY, DATE_AND_TIME and STRING (text strings)
		Derivative data types		Structures, unions, enumerations
		Structures	Function	A derivative data type that groups together data with different variable types. Number of members: 2,048 max. Nesting levels: 8 max.
			Member data types	Basic data types, structures, unions, enumerations, array variables
			Specifying member offsets	You can use member offsets to place structure members at any memory locations.
		Unions	Function	A derivative data type that groups together data with different variable types. Number of members: 4 max.
			Member data types	BOOL, BYTE, WORD, DWORD and LWORD.
		Enumerations	Function	A derivative data type that uses text strings called enumerators to express variable values.
	Data type attributes	Array specifications	Function	An array is a group of elements with the same data type. You specify the number (subscript) of the element from the first element to specify the element. Number of dimensions: 3 max. Number of elements: 65,535 max.
			Array specifications for FB instances	Supported.
		Range specifications		You can specify a range for a data type in advance. The data type can take only values that are in the specified range.
		Libraries		User libraries.
Motion control[*2]	Control modes			Position control, velocity control, torque control
	Axis types			Servo axes, virtual servo axes, encoder axes and virtual encoder axes
	Positions that can be managed			Command positions and actual positions
	Single-axis	Single-axis position contol	Absolute positioning	Positioning is performed for a target position that is specified with an absolute value.
			Relative positioning	Positioning is performed for a specified travel distance from the command current position.
			Interrupt feeding	Positioning is performed for a specified travel distance from the position where an interrupt input was received from an external input.
			Cyclic synchro-nous absolute positioning	A positioning command is output each control period in the position control mode.
		Single-axis velocity control	Velocity control	Velocity control is performed in position control mode.
			Cyclic synchronous velocity control	A velocity command is output each control period in the velocity control mode.
		Single-axis torque control	Torque control	The torque of the motor is controlled.
		Single-axis synchronized control	Starting cam operation	A cam motion is performed using the specified cam table.
			Ending cam operation	The cam motion for the axis that is specified with the input parameter is ended.
			Starting gear operation	A gear motion with the specified gear ratio is performed between a master axis and slave axis.
			Positioning gear operation	A gear motion with the specified gear ratio and sync position is performed between a master axis and slave axis.
			Ending gear operation	The specified gear motion or positioning gear motion is ended.
			Synchronous positioning	Positioning is performed in sync with a specified master axis.
			Master axis phase shift	The phase of a master axis in synchronized control is shifted.
			Combining axes	The command positions of two axes are added or subtracted and the result is output as the command position.
		Single-axis manual operation	Powering the servo	The servo in the servo drive is turned ON to enable axis motion.
			Jogging	An axis is jogged at a specified target velocity.

Item				NX1□ CPU Unit
Motion control*2	Single-axis	Auxiliary functions for single-axis control	Resetting axis errors	Axes errors are cleared.
			Homing	A motor is operated and the limit signals, home proximity signal, and home signal are used to define home.
			Homing with parameters	The parameters are specified, the motor is operated and the limit signals, home proximity signal and home signal are used to define home.
			High-speed homing	Positioning is performed for an absolute target position of 0 to return to home.
			Stopping	An axis is decelerated to a stop at the specified rate.
			Immediately stopping	An axis is stopped immediately.
			Override factors	The target velocity of an axis can be changed.
			Changing the current position	The command current position or actual current position of an axis can be changed to any position.
			Enabling external latches	The position of an axis is recorded when a trigger occurs.
			Disabling external latches	The current latch is disabled.
			Zone monitoring	You can monitor the command position or actual position of an axis to see when it is within a specified range (zone).
			Enabling digital cam switches	You can turn a digital output ON and OFF according to the position of an axis.
			Monitoring axis following error	You can monitor whether the difference between the command positions or actual positions of two specified axes exceeds a threshold value.
			Resetting the following error	The error between the command current position and actual current position is set to 0.
			Torque limit	The torque control function of the servo drive can be enabled or disabled and the torque limits can be set to control the output torque.
			Position compensation	The function which compensate the position for the axis in operation.
			Start velocity	You can set the initial velocity when axis motion starts.
	Axes groups	Multi-axes coordinated control	Absolute linear interpolation	Linear interpolation is performed to a specified absolute position.
			Relative linear interpolation	Linear interpolation is performed to a specified relative position.
			Circular 2D interpolation	Circular interpolation is performed for two axes.
			Axes group cyclic synchronous absolute positioning	A positioning command is output each control period in Position control mode.
		Auxiliary functions for multi-axes coordinated control	Resetting axes group errors	Axes group errors and axis errors are cleared.
			Enabling axes groups	Motion of an axes group is enabled.
			Disabling axes groups	Motion of an axes group is disabled.
			Stopping axes groups	All axes in interpolated motion are decelerated to a stop.
			Immediately stopping axes groups	All axes in interpolated motion are stopped immediately.
			Setting axes group override factors	The blended target velocity is changed during interpolated motion.
			Reading axes group positions	The command current positions and actual current positions of an axes group can be read.
			Changing the axes in a group	The composition axes parameter in the axes group parameters can be overwritten temporarily.
	Common items	Cams	Setting cam table properties	The end point index of the cam table that is specified in the input parameter is changed.
			Saving cam tables	The cam table that is specified with the input parameter is saved in non-volatile memory in the CPU unit.
			Generating cam tables	The cam table that is specified with the input parameter is generated from the cam property and cam mode.
		Parameters	Writing MC settings	Some of the axis parameters or axes group parameters are overwritten temporarily.
			Changing axis parameters	You can access and change the axis parameters from the user program.
	Auxiliary functions	Count modes		You can select either linear mode (finite length) or rotary mode (infinite length).
		Unit conversions		You can set the display unit for each axis according to the machine.
		Acceleration/deceleration control	Automatic acceleration/deceleration control	Jerk is set for the acceleration/deceleration curve for an axis motion or axes group motion.
			Changing the acceleration and deceleration rates	You can change the acceleration or deceleration rate even during acceleration or deceleration.
		In-position check		You can set an in-position range and in-position check time to confirm when positioning is completed.
		Stop method		You can set the stop method to the immediate stop input signal or limit input signal.

Item				NX1□ CPU Unit
Motion control[*2]	Auxiliary functions	Re-execution of motion control instructions		You can change the input variables for a motion control instruction during execution and execute the instruction again to change the target values during operation.
		Multi-execution of motion control instructions (buffer mode)		You can specify when to start execution and how to connect the velocities between operations when another motion control instruction is executed during operation.
		Continuous axes group motions (transition mode)		You can specify the transition mode for multi-execution of instructions for axes group operation.
		Monitoring functions	Software limits	Software limits are set for each axis.
			Following error	The error between the command current value and the actual current value is monitored for an axis.
			Velocity, acceleration/deceleration rate, torque, interpolation velocity and interpolation acceleration/deceleration rate	You can set and monitor warning values for each axis and each axes group.
		Absolute encoder support		You can use an OMRON 1S series servomotor or Accurax-G5 series servomotor with an absolute encoder to eliminate the need to perform homing at startup.
		Input signal logic inversion		You can inverse the logic of immediate stop input signal, positive limit input signal, negative limit input signal or home proximity input signal.
	External interface signals			The servo drive input signals listed below are used: Home signal, home proximity signal, positive limit signal, negative limit signal, immediate stop signal and interrupt input signal.
Unit (I/O) management	EtherCAT slaves	Number of slaves		16 max.
	CJ-series units	Number of units		Not supported
Communications	EtherNet/IP port	Communication protocol		TCP/IP, UDP/IP
		CIP communications service	Tag data links	Programless cyclic data exchange is performed with the devices on the EtherNet/IP network.
			Message communications	CIP commands are sent to or received from the devices on the EtherNet/IP network.
		TCP/IP applications	Socket services	Data is sent to and received from any node on Ethernet using the UDP or TCP protocol. Socket communications instructions are used.
			FTP client	Files are transferred via FTP from the CPU unit to computers or controllers at other Ethernet nodes. FTP client communications instructions are used.
			FTP server	Files can be read from or written to the SD memory card in the CPU unit from computers at other Ethernet nodes.
			Automatic clock adjustment	Clock information is read from the NTP server at the specified time or at specified interval after the power supply to the CPU unit is turned ON. The internal clock time in the CPU unit is updated with the read time.
			SNMP agent	Built-in EtherNet/IP port internal status information is provided to network management software that uses an SNMP manager.
	EtherCAT port	Supported services	Process data communications	A communication method to exchange control information in cyclic communications between the EtherCAT master and slaves. This communications method is defined by CoE.
			SDO communications	A communication method to exchange control information in noncyclic event communications between the EtherCAT master and slaves. This communications method is defined by CoE.
		Network scanning		Information is read from connected slave devices and the slave configuration is automatically generated.
		DC (distributed clock)		Time is synchronized by sharing the EtherCAT system time between all EtherCAT devices (including the master).
		Packet monitoring		The frames that are sent by the master and the frames that are received by the master can be saved. The data that is saved can be viewed with WireShark or other applications.
		Enable/disable settings for slaves		The slaves can be enabled or disabled as communications targets.
		Disconnecting/connecting slaves		Temporarily disconnects a slave from the EtherCAT network for maintenance, such as for replacement of the slave and then connects the slave again.
		Supported application protocol	CoE	SDO messages of the CAN application can be sent to slaves via EtherCAT.
	Serial communication	Protocol		Host link (FINS), no-protocol and Modbus-RTU master (when connected to the Serial communications option board)
	Communications instructions			The following instructions are supported: FTP client instructions, CIP communications instructions, socket communications instructions, SDO message instructions, no-protocol communications instructions and Modbus RTU protocol instructions.
Operation management	RUN output contacts			Not supported.
System management	Event logs	Function		Events are recorded in the logs.
		Number of events per event log		System event log: 576 max.[*3] Access event log: 528 max.[*4] User-defined event log: 512 max.
Debugging	Online editing			Programs, function blocks, functions and global variables can be changed online. More than one operator can change POUs individually via network.
	Forced refreshing	Forced refreshing		The user can force specific variables to TRUE or FALSE.
		Number of forced variables	For EtherCAT slaves	64 max.
			For CJ-series	Not supported.
	MC test Run			Motor operation and wiring can be checked from the Sysmac Studio.
	Synchronization			The project file in the Sysmac Studio and the data in the CPU unit can be made the same when online.
	Differentiation monitoring	Differentiation monitoring		You can monitor when a variable changes to TRUE or changes to FALSE.
		Number of contacts		8 max.

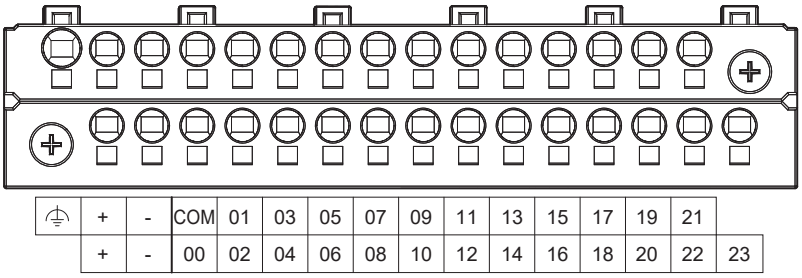
Item				NX1□ CPU Unit
Debugging	Data tracing	Types	Single triggered trace	When the trigger condition is met, the specified number of samples are taken and then tracing stops automatically.
			Continuous trace	Data tracing is executed continuously and the trace data is collected by the Sysmac Studio.
		Number of simultaneous data trace		2 max.
		Number of records		10,000 max.
		Sampling	Number of sampled variables	48 variables max.
		Timing of sampling		Sampling is performed for the specified task period, at the specified time or when a sampling instruction is executed.
		Triggered traces	Triggered traces	Trigger conditions are set to record data before and after an event.
			Trigger conditions	When BOOL variable changes to TRUE or FALSE. Comparison of non-BOOL variable with a constant. Comparison method: Equals (=), greater than (>), greater than or equals (≥), less than (<), less than or equals (≤), not equal (≠).
			Delay	Trigger position setting: A slider is used to set the percentage of sampling before and after the trigger condition is met.
	Simulation			The operation of the CPU unit is emulated in the Sysmac Studio.
Reliability	Self-diagnosis	Controller errors	Levels	Major faults, partial faults, minor faults, observation and information.
			Number of message languages	9 max. (Sysmac Studio) 2 max. (NS-series PT
		User-defined errors	Function	User-defined errors are registered in advance and then records are created by executing instructions.
			Levels	8 levels
			Number of message languages	9 max.
Security	Protecting software assets and preventing operating mistakes	CPU unit names and serial IDs		When going online to a CPU unit from the Sysmac Studio, the CPU unit name in the project is compared to the name of the CPU unit being connected to.
		Protection	User program transfer with no restoration information	You can prevent reading data in the CPU unit from the Sysmac Studio.
			CPU unit write protection	You can prevent writing data to the CPU unit from the Sysmac Studio or SD memory card.
			Overall project file protection	You can use passwords to protect .smc files from unauthorized opening on the Sysmac Studio.
			Data protection	You can use passwords to protect POUs on the Sysmac Studio.
		Verification of operation authority	Verification of operation authority	Online operations can be restricted by operation rights to prevent damage to equipment or injuries that may be caused by operating mistakes.
			Number of groups	5
		Verification of user program execution ID		The user program cannot be executed without entering a user program execution ID from the Sysmac Studio for the specific hardware (CPU unit).
SD memory card	Storage type			SD memory card, SDHC memory card
	Application	Automatic transfer from SD memory card		When the power supply to the controller is turned ON, the data that is stored in the autoload directory of the SD memory card is transferred to the controller.
		Program transfer from SD memory card		With the specification of the system-defined variable, you can transfer a program that is stored in the SD memory card to the controller.
		SD memory card operation instructions		You can access SD memory cards from instructions in the user program.
		File operations from the Sysmac Studio		You can perform file operations for Controller files in the SD memory card and read/write standard document files on the computer.
		SD memory card life expiration detection		Notification of the expiration of the life of the SD memory card is provided in a system-defined variable and event log.
Backup	SD memory card backup	Operating methods	CPU unit front panel DIP switch	Backup, verification and restoration operations are performed by manipulating the front-panel DIP switch on the CPU unit.
			Specification with system-defined variables	Backup and verification operations are performed by manipulating system-defined variables.
			SD memory card Window in Sysmac Studio	Backup and verification operations are performed from the SD memory card Window of the Sysmac Studio.
			Special instruction	The special instruction is used to backup data.
		Protection	Disabling backups to SD memory cards	Backing up data to a SD memory card is prohibited.
	Sysmac Studio controller backups			The Sysmac Studio is used to backup, restore and verify controller data.

*1. Inline ST is supported (Inline ST is ST that is written as an element in a ladder diagram).
*2. The NX1P2-9□ CPU unit doesn't support motion control.
*3. This is the total of 512 events for the CPU unit and 64 events for the NX unit.
*4. This is the total of 512 events for the CPU unit and 16 events for the NX unit.

Terminal block

Input terminal block

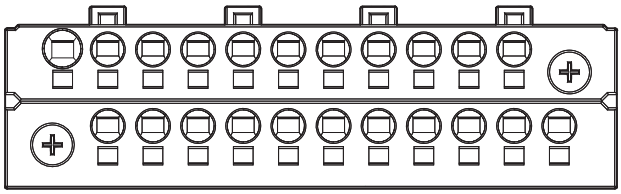
NX1P2-1□40DT□



⏚	+	-	COM	01	03	05	07	09	11	13	15	17	19	21
	+	-	00	02	04	06	08	10	12	14	16	18	20	22	23

Symbol	Name	Description
⏚	Functional ground terminal	Connect the ground wire to the terminal
+/-	Unit power supply terminals	These terminals are connected to the unit power supply The + and - terminals are internally connected to each other
COM	Common terminal	Common terminal for the input circuits
00 to 15	Input terminals	General-purpose input A
16 to 23		General-purpose input B

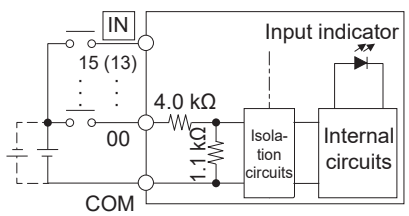
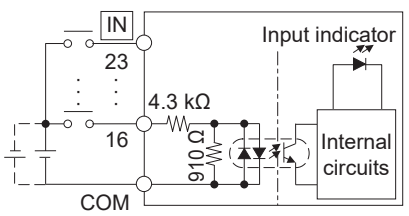
NX1P2-9024DT□



⏚	+	-	COM	01	03	05	07	09	11	13
	+	-	00	02	04	06	08	10	12	NC	NC

Symbol	Name	Description
⏚	Functional ground terminal	Connect the ground wire to the terminal
+/-	Unit power supply terminals	These terminals are connected to the unit power supply The + and - terminals are internally connected to each other
COM	Common terminal	Common terminal for the input circuits
00 to 13	Input terminals	General-purpose input A
NC	NC	Do not connect anything

Input specifications

Item	General-purpose input A NX1P2-1□40DT□: 00 to 15 NX1P2-9024DT□: 00 to 13	General-purpose input B NX1P2-1□40DT□: 16 to 23
Internal I/O common	For both NPN/PNP	
Input voltage	24 VDC (15 to 28.8 VDC)	
Input current	5.8 mA typical	5.3 mA typical
Input impedance	4.0 kΩ	4.3 kΩ
Connected sensor	Two-wire or three-wire sensors	
ON voltage	15 VDC min.	
OFF voltage/current	5 VDC max./1 mA max.	
ON/OFF response time*1	2.5 μs max.	1 ms max.
ON/OFF filter time*2	No filter, 0.25 ms, 0.5 ms, 1 ms (default), 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms	
Circuit configuration		

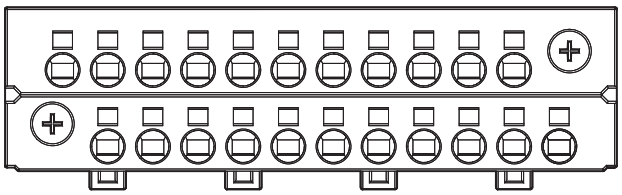
*1. These values are the fixed response time needed by the hardware. A value from 0 to 32 ms (default: 1 ms) that is set on the Support Software is added to these values.

*2. Set the filter time for every 4 points.

Output terminal block

The appearance of the terminal block is the same for all the NX1 CPU models.

NX1P2-1□40DT



NC	NC	00	02	04	06	NC	08	10	12	14	
	C0 (0V)	01	03	05	07	C1 (0V)	09	11	13	15	NC

Symbol	Name	Description
C0 (0 V), C1 (0 V)	Common terminal	Connected to the 0 V side of the I/O power supply C0 (0 V) and C1 (0 V) are independent from each other inside the CPU unit
00 to 15	Output terminals	NPN (sinking) type output
NC	NC	Do not connect anything

NX1P2-1□40DT1

NC	C0 (+V)	00	02	04	06	C1 (+V)	08	10	12	14	
	0V0	01	03	05	07	0V1	09	11	13	15	NC

Symbol	Name	Description
C0 (+V), C1 (+V)	Common terminal	Connected to the 24 V side of the I/O power supply C0 (+V) and C1 (+V) are independent from each other inside the CPU unit
0V0, 0V1	0 V terminal	Supplies 0 V for the internal circuits for driving 0V0 and 0V1 are independent from each other inside the CPU unit
00 to 15	Output terminals	PNP (sourcing) type output with the load short-circuit protection function
NC	NC	Do not connect anything

NX1P2-9024DT

NC	NC	00	02	04	06	08	NC	NC	NC	NC	
	C0 (0V)	01	03	05	07	09	NC	NC	NC	NC	NC

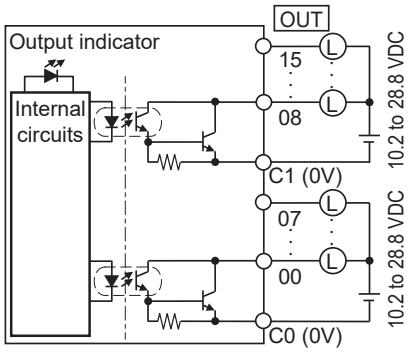
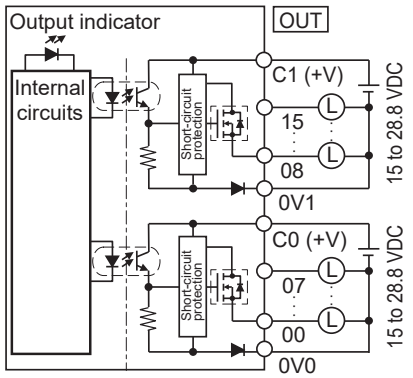
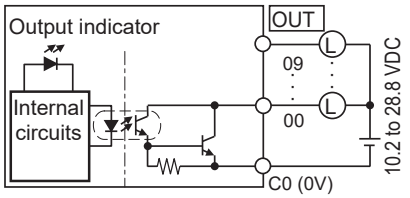
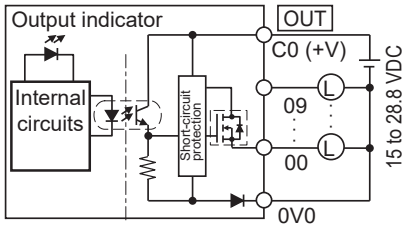
Symbol	Name	Description
C0 (0 V)	Common terminal	Connected to the 0 V side of the I/O power supply
00 to 09	Output terminals	NPN (sinking) type output
NC	NC	Do not connect anything

NX1P2-9024DT1

NC	C0 (+V)	00	02	04	06	08	NC	NC	NC	NC	
	0V0	01	03	05	07	09	NC	NC	NC	NC	NC

Symbol	Name	Description
C0 (+V)	Common terminal	Connected to the 24 V side of the I/O power supply
0V0	0 V terminal	Supplies 0 V for the internal circuits for driving
00 to 09	Output terminals	PNP (sourcing) type output with the load short-circuit protection function
NC	NC	Do not connect anything

Output specifications

Item	NX1P2-□□□□DT	NX1P2-□□□□DT1
Internal I/O common	NPN (sinking)	PNP (sourcing)
Maximum switching capacity	12 to 24 VDC (10.2 to 28.8 VDC), 300 mA per point	24 VDC (15 to 28.8 VDC), 300 mA per point
	NX1P2-1□40DT□: 1.8 A/common (3.6 A/unit) NX1P2-9024DT□: 2.4 A/common (2.4 A/unit)	
Minimum switching capacity	12 to 24 VDC (10.2 to 28.8 VDC), 1 mA	24 VDC (15 to 28.8 VDC), 1 mA
Leakage current	0.1 mA max.	
Residual voltage	1.5 V max.	
ON response time	0.1 ms max.	0.5 ms max.
OFF response time	0.8 ms max.	1.0 ms max.
Current consumption from I/O power supply*1	-	NX1P2-1□40DT1: 40 mA/common NX1P2-9024DT1: 50 mA/common
Load short-circuit protection	Not provided	Provided*2
Circuit configuration	NX1P2-1□40DT 	NX1P2-1□40DT1 
	NX1P2-9024DT 	NX1P2-9024DT1 

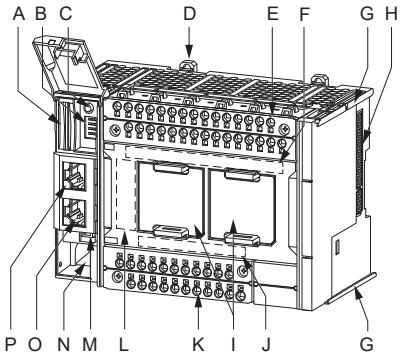
*1. The internally consumed current from I/O power supply. The current flows from the common terminal Cn (+V) to the 0Vn terminal. The current consumption of any external load is excluded.

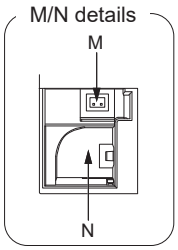
*2. The load short-circuit protection is provided for each point of the PNP (sourcing) type output terminal. It protects the output circuits when a load short circuit occurs.

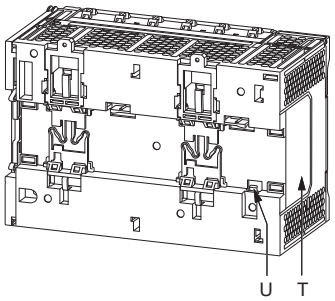
Nomenclature

NX1 CPU unit

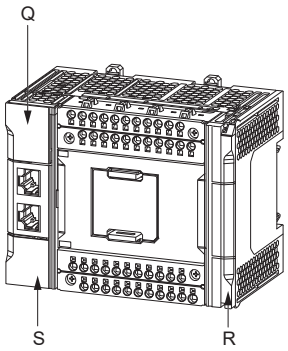
NX1P2-1□40DT□





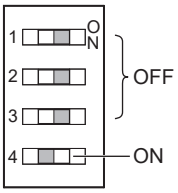


NX1P2-9024DT□



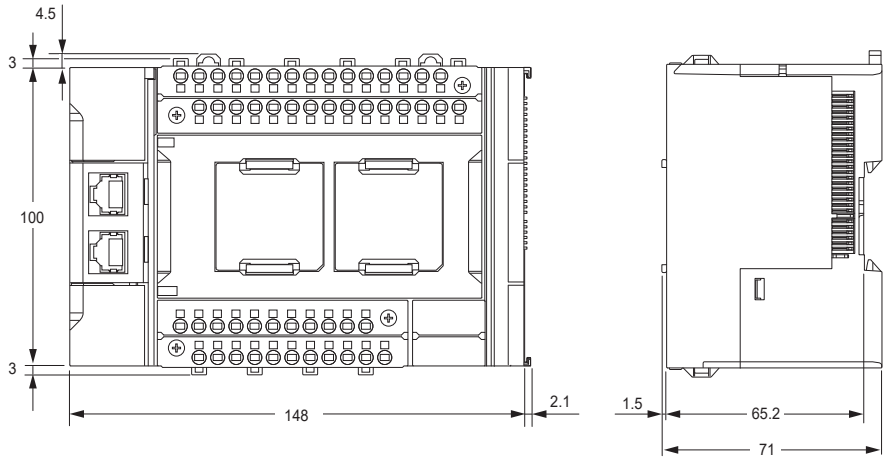
Symbol	Name	Description
A	SD memory card connector	Connects the SD memory card to the CPU unit.
B	DIP switch	Use in Safe Mode*1 or when backing up data. Normally, turn OFF all the pins.
C	SD memory card power supply switch	Turns OFF the power supply so that you can remove the SD memory card.
D	DIN track mounting hook	These hooks are used to mount the unit to a DIN track.
E	Input terminal block	This terminal block is used for wiring for the unit power supply, grounding and build-in input.
F	Input indicator	Shows the operation status of the built-in input.
G	Unit hookup guides	These guides are used to mount an NX unit or End cover.
H	NX bus connector	This connector is used to connect the CPU unit to the NX unit on the right of the CPU unit.
I	Option board slot 1 (left) Option board slot 2 (right)	Remove the covers of the slots and mount option boards. For the models with 24 built-in I/O points, only one slot is provided. Keep the removed covers in a safe place.
J	Output indicator	Shows the operation status of the built-in output.
K	Output terminal block	This terminal block is used to wire the build-in output.
L	CPU unit operation status indicator	Shows the operation status of the CPU unit.
M	Battery connector	Connector to mount the backup battery that is sold separately.
N	Battery slot	Used to mount the backup battery that is sold separately.
O	Built-in EtherCAT port	Connects the built-in EtherCAT with an Ethernet cable.
P	Built-in EtherNet/IP port	Connects the built-in EtherNet/IP with an Ethernet cable.
Q	SD memory card cover	Cover for the SD memory card and DIP switch. The cover swings upward.
R	End cover	Cover to protect the CPU unit and NX I/O units.
S	Battery cover	Cover for battery slot. Remove this cover when you mount/remove the battery.
T	ID information indication	Shows the ID information of the CPU unit.
U	DIN track contact plate	This plate is connected internally to the functional ground terminal on the terminal block.

*1. To use Safe Mode, set the DIP switch as shown in the below picture and then turn ON the power supply to the controller. If the power supply to the controller is turned ON with the CPU unit in Safe Mode, the CPU unit will start in PROGRAM mode. Use the Safe Mode if you do not want to execute the user program when the power supply is turned ON or if it is difficult to connect the Sysmac Studio.

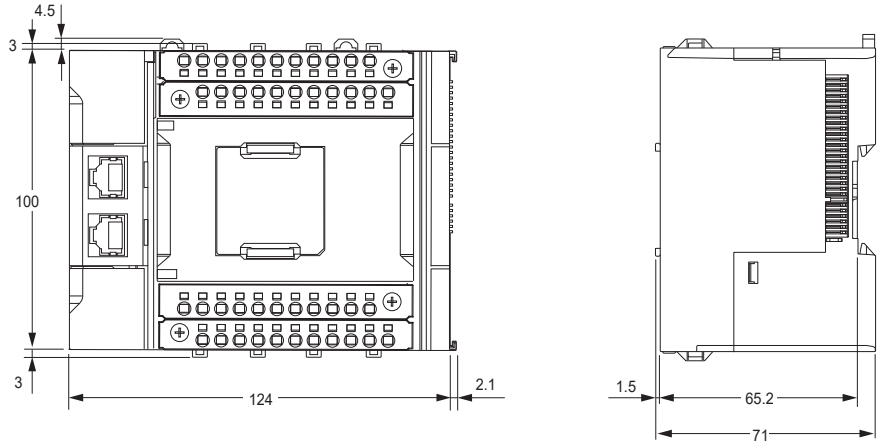


Dimensions

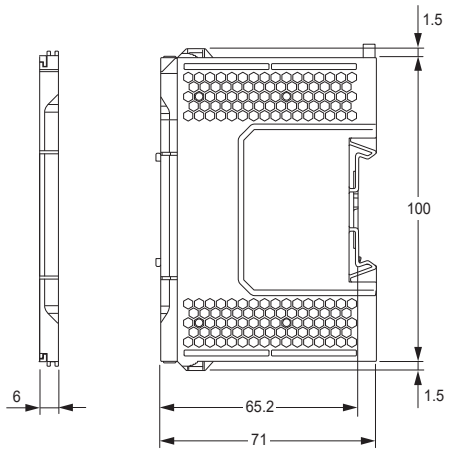
NX1 CPU unit (NX1P2-1□40DT□)



NX1 CPU unit (NX1P2-9024DT□)



End cover (NX-END02)



Ordering information

NX1 series CPU units

Type	Program capacity	Memory capacity for variables	Number of axes			Built-in I/O points			Model	Appearance
			Real axes	Motion control servo axes	Single-axis position control servo axes	I/O points	Input points	Output points		
NX1	1.5 MB	32 KB (retained during power interruptions) or 2 MB (not retained during power interruptions)	8 axes	4 axes	4 axes	40 points	24 points	16 points NPN transistor	NX1P2-1140DT	
								16 points PNP transistor*1	NX1P2-1140DT1	
			6 axes	2 axes				16 points NPN transistor	NX1P2-1040DT	
								16 points PNP transistor*1	NX1P2-1040DT1	
			4 axes	0 axes		24 points	14 points	10 points NPN transistor	NX1P2-9024DT	
								10 points PNP transistor*1	NX1P2-9024DT1	

*1. With the load short-circuit protection.

Note: The end cover unit NX-END02 is included with the CPU unit.

Option boards

Type	Specifications	Supported protocol	Model	Appearance
Serial communications	1 x RS-232C port Transmission distance: 15 m Connection type: Screwless push-in terminal block (9 terminals)	Host link, Modbus-RTU master and no-protocol	NX1W-CIF01	
	1 x RS-422A/485 port Transmission distance: 50 m Connection type: Screwless push-in terminal block (5 terminals)		NX1W-CIF11	
	1 x RS-422A/485 port (isolated) Transmission distance: 500 m Connection type: Screwless push-in terminal block (5 terminals)		NX1W-CIF12	
Analog I/O	2 x Analog input Voltage input: 0 to 10 V (Resolution: 1/4,000) Current input: 0 to 20 mA (1/2,000) Connection type: Screwless push-in terminal block (5 terminals)		NX1W-ADB21	
	2 x Analog output Voltage output: 0 to 10 V (Resolution: 1/4,000) Connection type: Screwless push-in terminal block (3 terminals)		NX1W-DAB21V	
	2 x Analog input / 2 x Analog output Voltage input: 0 to 10 V (Resolution: 1/4,000) Current input: 0 to 20 mA (1/2,000) Voltage output: 0 to 10 V (Resolution: 1/4,000) Connection type: Screwless push-in terminal block (8 terminals)		NX1W-MAB221	

NX I/O units (local and remote I/O)

Up to 8 local NX I/O units can be connected to an NX1 CPU unit. The NX-Safety units must be used in combination with the EtherCAT communication coupler unit.

EtherCAT communication coupler

Type	Protocol	Communications cycle in DC mode*1	Specifications	Connection	I/O power supply	Width	Model
Communication coupler	EtherCAT slave	125 to 10,000 μs	Up to 63 I/O units Max. 1024 bytes in + 1024 bytes out Supports distributed clock	2 RJ45 ports (in + out)	10.0 A max.	46 mm	NX-ECC203

*1. This depends on the specifications of the EtherCAT master and the unit configuration.

IO-Link master

Type	No. of ports	I/O refresh method	Connection type*1	Width	Model
IO-Link master	4	Free run	Screwless push-in (NX-TBA162)	12 mm	NX-ILM400

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Digital I/O

Type	Channels, signal type	Performance[*1], I/O refresh method	Connection type[*2]	Width	Model	NPN type[*3]
DC digital input	4 inputs, 3-wire connection	High-speed synchronous time stamp	Screwless push-in (NX-TBA122)	12 mm	NX-ID3444	NX-ID3344
		High-speed synchronous/free run	Screwless push-in (NX-TBA122)	12 mm	NX-ID3443	NX-ID3343
		Synchronous/free run	Screwless push-in (NX-TBA122)	12 mm	NX-ID3417	NX-ID3317
	8 inputs, 2-wire connection		Screwless push-in (NX-TBA162)	12 mm	NX-ID4442	NX-ID4342
	16 inputs, 1-wire connection		Screwless push-in (NX-TBA162)	12 mm	NX-ID5442	NX-ID5342
			M3 screw terminal block	30 mm	NX-ID5142-1	NX-ID5142-1
			1 x 20-pin MIL connector	30 mm	NX-ID5142-5	NX-ID5142-5
	32 inputs, 1-wire connection		1 x 40-pin MIL connector	30 mm	NX-ID6142-5	NX-ID6142-5
			1 x 40-pin Fujitsu connector	30 mm	NX-ID6142-6	NX-ID6142-6
AC digital input	4 inputs, 200-240 VAC, 50/60 Hz	Free run	Screwless push-in (NX-TBA082)	12 mm	NX-IA3117	-
DC digital output	2 outputs 0.5 A, 3-wire connection	High-speed synchronous time stamp	Screwless push-in (NX-TBA082)	12 mm	NX-OD2258	NX-OD2154
	4 outputs 0.5 A, 3-wire connection	High-speed synchronous/free run	Screwless push-in (NX-TBA122)	12 mm	NX-OD3257	NX-OD3153
		Synchronous/free run	Screwless push-in (NX-TBA122)	12 mm	NX-OD3256	NX-OD3121
	4 outputs 2 A, 3-wire connection		Screwless push-in (NX-TBA162)	12 mm	NX-OD3268	-
	8 outputs 0.5 A, 2-wire connection		Screwless push-in (NX-TBA162)	12 mm	NX-OD4256	NX-OD4121
	16 outputs 0.5 A, 1-wire connection		Screwless push-in (NX-TBA162)	12 mm	NX-OD5256	NX-OD5121
			M3 screw terminal block	30 mm	NX-OD5256-1	NX-OD5121-1
			1 x 20-pin MIL connector	30 mm	NX-OD5256-5	NX-OD5121-5
	32 outputs 0.5 A, 1-wire connection		1 x 40-pin MIL connector	30 mm	NX-OD6256-5	NX-OD6121-5
			1 x 40-pin Fujitsu connector	30 mm	-	NX-OD6121-6
Relay digital output	2 outputs, N.O., 2.0 A	Free run	Screwless push-in (NX-TBA082)	12 mm	NX-OC2633	-
	2 outputs, N.O. + N.C., 2.0 A		Screwless push-in (NX-TBA082)	12 mm	NX-OC2733	-
	8 outputs, N.O., 2.0 A		Screwless push-in (NX-TBA082 x 2)	24 mm	NX-OC4633	-
DC Digital I/O	16 inputs + 16 outputs, 1-wire connection + common	Synchronous/free run	2 x 20-pin MIL connector	30 mm	NX-MD6256-5	NX-MD6121-5
			2 x 24-pin Fujitsu connector	30 mm	-	NX-MD6121-6

*1. Digital I/O performance, ON/OFF delay:
High speed PNP/NPN input: 100 ns/100 ns
Standard PNP/NPN input: 0.02 ms/0.4 ms
AC input: 10 ms/40 ms
High speed PNP/NPN output: 300 ns/300 ns
Standard PNP output: 0.5 ms/1.0 ms
Standard NPN output: 0.1 ms/0.8 ms
Relay output: 15 ms/15 ms

*2. Units with Screwless push-in connections are supplied with the appropriate terminal connector. Units with MIL connectors are supplied without matching plugs.

*3. Model codes are for PNP type signals (positive switching, 0 V common). Most models are also available as NPN type (negative switching, 24 V common). Inputs of MIL connector versions can be used as NPN or PNP.

Analog I/O

Type	Signal type	Performance, I/O refresh method	Channels	Connection type[*1]	Width	Model
Analog input	4 to 20 mA single ended	1/8,000 resolution, 250 µs/channel Free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-AD2203
			4	Screwless push-in (NX-TBA122)	12 mm	NX-AD3203
			8	Screwless push-in (NX-TBA162)	12 mm	NX-AD4203
	4 to 20 mA differential	1/8,000 resolution, 250 µs/channel Free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-AD2204
			4	Screwless push-in (NX-TBA122)	12 mm	NX-AD3204
			8	Screwless push-in (NX-TBA162)	12 mm	NX-AD4204
		1/30,000 resolution, 10 µs/channel Synchronous/free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-AD2208
			4	Screwless push-in (NX-TBA122)	12 mm	NX-AD3208
			8	Screwless push-in (NX-TBA162)	12 mm	NX-AD4208
	±10 V single ended	1/8,000 resolution, 250 µs/channel Free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-AD2603
			4	Screwless push-in (NX-TBA122)	12 mm	NX-AD3603
			8	Screwless push-in (NX-TBA162)	12 mm	NX-AD4603
	±10 V differential	1/8,000 resolution, 250 µs/channel Free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-AD2604
			4	Screwless push-in (NX-TBA122)	12 mm	NX-AD3604
			8	Screwless push-in (NX-TBA162)	12 mm	NX-AD4604
		1/30,000 resolution, 10 µs/channel Synchronous/free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-AD2608
			4	Screwless push-in (NX-TBA122)	12 mm	NX-AD3608
			8	Screwless push-in (NX-TBA162)	12 mm	NX-AD4608
Analog output	4 to 20 mA	1/8,000 resolution, 250 µs/channel Free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-DA2203
			4	Screwless push-in (NX-TBA122)	12 mm	NX-DA3203
		1/30,000 resolution, 10 µs/channel Synchronous/free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-DA2205
			4	Screwless push-in (NX-TBA122)	12 mm	NX-DA3205
	±10 V	1/8,000 resolution, 250 µs/channel Free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-DA2603
			4	Screwless push-in (NX-TBA122)	12 mm	NX-DA3603
		1/30,000 resolution, 10 µs/channel Synchronous/free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-DA2605
			4	Screwless push-in (NX-TBA122)	12 mm	NX-DA3605

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Temperature input

Type	Signal type	Performance, I/O refresh method	Channels	Connection type*1	Width	Model
Temperature sensor input	Thermocouple type B/E/J/K/L/N/R/S/T/U/ WRe5-26/PLII	0.1°C resolution, 200 ms/unit Free run	2	Screwless push-in terminal block(s), with cold junction sensor, calibrated individually at the factory	12 mm	NX-TS2101
			4		24 mm	NX-TS3101
		0.01°C resolution, 10 ms/unit Free run	2		12 mm	NX-TS2102
			4		24 mm	NX-TS3102
		0.001°C resolution, 60 ms/unit Free run	2		12 mm	NX-TS2104
			4		24 mm	NX-TS3104
	RTD type Pt100 (3wire)/Pt1000/ Ni508.4	0.1°C resolution, 200 ms/unit Free run	2	Screwless push-in (NX-TBA162)	12 mm	NX-TS2201
			4	Screwless push-in (NX-TBA162 + NX-TBB162)	24 mm	NX-TS3201
		0.01°C resolution, 10 ms/unit Free run	2	Screwless push-in (NX-TBA162)	12 mm	NX-TS2202
			4	Screwless push-in (NX-TBA162 + NX-TBB162)	24 mm	NX-TS3202
		0.001°C resolution, 60 ms/unit Free run	2	Screwless push-in (NX-TBA162)	12 mm	NX-TS2204
			4	Screwless push-in (NX-TBA162 + NX-TBB162)	24 mm	NX-TS3204

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Heater burnout detection

Type	Channels, signal type	Control output	I/O refresh method	Connection type*1	Width	Model
Heater burnout detection	4 CT inputs 4 control outputs	NPN, 12 to 24 VDC 0.1 A/point, 0.4 A/unit	Free run	Screwless push-in (NX-TBA162)	12 mm	NX-HB3101
		PNP, 24 VDC 0.1 A/point, 0.4 A/unit		Screwless push-in (NX-TBA162)	12 mm	NX-HB3201

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Position interface

Type	Channels, signal type	I/O refresh method	Connection type*1	Width	Model	NPN type*2
Encoder input	1 SSI encoder, 2 MHz	Synchronous/free run	Screwless push-in (NX-TBA122)	12 mm	NX-ECS112	-
	2 SSI encoders, 2 MHz		Screwless push-in (NX-TBA122)	12 mm	NX-ECS212	-
	1 incremental encoder line driver 4 MHz + 3 digital inputs (1 μs)		Screwless push-in (NX-TBA122 + NX-TBB122)	24 mm	NX-EC0142	NX-EC0132
	1 incremental encoder open collector 500 kHz + 3 digital inputs (1 μs)		Screwless push-in (NX-TBA162)	12 mm	NX-EC0122	NX-EC0112
	2 incremental encoders open collector 500 kHz		Screwless push-in (NX-TBA122)	12 mm	NX-EC0222	NX-EC0212
Pulse output	1 pulse open collector 500 kHz + 2 digital inputs + 1 digital output	Synchronous	Screwless push-in (NX-TBA162)	12 mm	NX-PG0122	NX-PG0112
	2 pulse line driver 4 MHz + 5 digital inputs per channel + 3 digital outputs per channel		1 x 34-pin MIL connector	30 mm	NX-PG0242-5	NX-PG0232-5
	4 pulse line driver 4 MHz + 5 digital inputs per channel + 3 digital outputs per channel		2 x 34-pin MIL connector	30 mm	NX-PG0342-5	NX-PG0332-5

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector. Units with MIL connectors are supplied without matching plugs.
*2. Model codes are for PNP type signals (positive switching, 0 V common). Most models are also available as NPN type (negative switching, 24 V common). Inputs of MIL connector versions can be used as NPN or PNP.

Load cell input

Type	Specifications	I/O refresh method	Excitation voltage/Input range	Connection type*1	Width	Model
Load cell input	1 load cell input, 125 μs conversion cycle	Synchronous/free run	5 VDC ±10%/-5 to 5 mV/V	Screwless push-in (NX-TBC162)	12 mm	NX-RS1201

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Safety (the NX-Safety units must be used in combination with the EtherCAT communication coupler)

Type	Specifications	Performance, I/O refresh method	Connection type*1	Width	Model
Safety controller	FSoE protocol	For up to 1,024 safety I/O points	128 safety connections	30 mm	NX-SL3500
		For up to 256 safety I/O points	32 safety connections	30 mm	NX-SL3300
Safety input	4 inputs + 2 test outputs	Free run	Screwless push-in (NX-TBA082)	12 mm	NX-SIH400
	8 inputs + 2 test outputs		Screwless push-in (NX-TBA162)	12 mm	NX-SID800
Safety output	2 outputs, 2.0 A		Screwless push-in (NX-TBA082)	12 mm	NX-SOH200
	4 outputs, 0.5 A		Screwless push-in (NX-TBA082)	12 mm	NX-SOD400

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Communication interface

Type	Serial interface	No. of serial ports	Connection type*1	Width	Model
Communication interface	RS-232C	1	Screwless push-in (NX-TBC162)	12 mm	NX-CIF101
		2	D-Sub 9pin connector	30 mm	NX-CIF210
	RS-422A/485	1	Screwless push-in (NX-TBC162)	12 mm	NX-CIF105

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Power/System

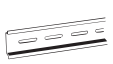
Type	Description	Connection type[*1]	Width	Model
NX bus power supply unit	24 VDC input, non-isolated	Screwless push-in (NX-TBC082)	12 mm	NX-PD1000
I/O power feed unit	For separation of groups, up to 4 A	Screwless push-in (NX-TBA082)	12 mm	NX-PF0630
	For separation of groups, up to 10 A	Screwless push-in (NX-TBA082)	12 mm	NX-PF0730
I/O power supply connection unit	16 × IOV	Screwless push-in (NX-TBA162)	12 mm	NX-PC0020
	16 × IOG	Screwless push-in (NX-TBA162)	12 mm	NX-PC0010
	8 × IOV + 8 × IOG	Screwless push-in (NX-TBA162)	12 mm	NX-PC0030
Shield connection unit	Grounding terminal, 16 points	Screwless push-in (NX-TBC162)	12 mm	NX-TBX01

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Recommended EtherCAT and EtherNet/IP communication cables

Refer to “Recommended EtherCAT and EtherNet/IP communication cables” in the NJ-series machine controller datasheet Cat. No. I180E-EN (www.industrial.omron.eu/en/products/downloads) for the recommended cables.

Accessories

Specifications			Model	Appearance
EtherCAT junction slaves	3 ports Power supply voltage: 20.4 to 28.8 VDC (24 VDC –15 to 20%) Current consumption: 0.08 A		GX-JC03	
	6 ports Power supply voltage: 20.4 to 28.8 VDC (24 VDC –15 to 20%) Current consumption: 0.17 A		GX-JC06	
Industrial switching hubs (for EtherNet/IP and Ethernet)	Quality of Service (QoS): EtherNet/IP control data priority. Failure detection: Broadcast storm and LSI error detection 10/100 BASE-TX, Auto-Negotiation Current consumption: 0.22 A	3 ports Power supply connector included	W4S1-03B	
		5 ports Power supply connector included	W4S1-05B	
		5 ports Power supply connector and connector for informing error included	W4S1-05C	
SD memory card	2 GB		HMC-SD291	
	4 GB		HMC-SD491	
DIN track	Length: 0.5 m; height: 7.3 mm		PFP-50N	
	Length: 1 m; height: 7.3 mm		PFP-100N	
	Length: 1 m; height: 16 mm		PFP-100N2	
End plate to secure the units on the DIN rail			PFP-M (2 pcs)	
Battery for NX/NY/NJ CPU unit			CJ1W-BAT01	
End cover	End cover for NX1 CPU unit (Provided with the CPU unit)		NX-END02	
	End cover for EtherCAT communication coupler unit (Provided with the EtherCAT communication coupler unit)		NX-END01	

Computer software

Specifications	Model
Sysmac Studio Lite Edition[*1] version 1.17 or higher	SYSMAC-LE□□□□[*2]

*1. Same functionality and supported devices than Sysmac Studio Standard Edition except for controller. The Lite Edition only supports the NJ1 and NX1 machine controllers.

*2. Refer to the Sysmac Studio datasheet (Cat. No. SysCat_I181E) for detailed information or contact your OMRON representative.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I179E-EN-01B In the interest of product improvement, specifications are subject to change without notice.

NX-□

NX series I/O

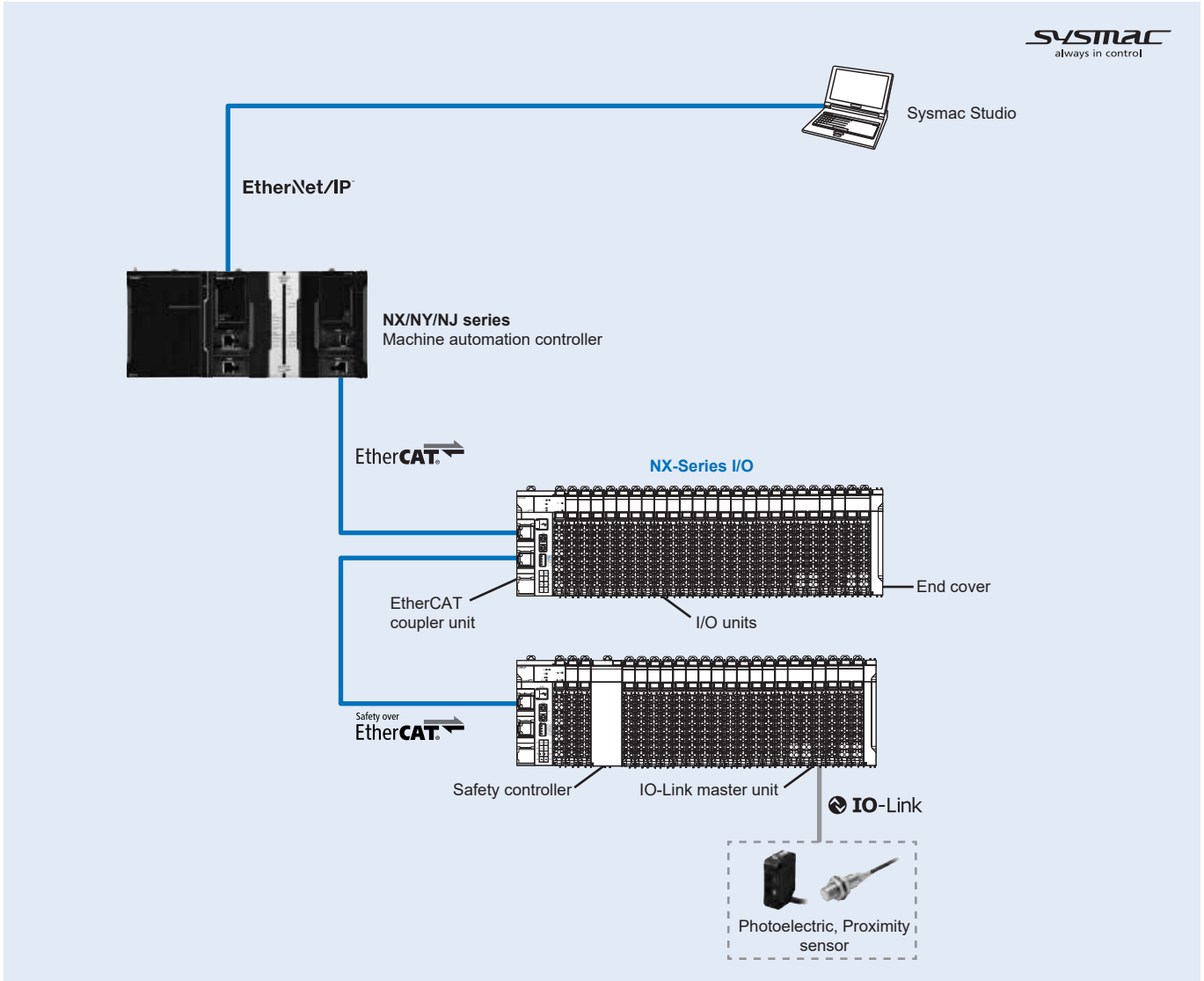


Speed and accuracy for machine performance

NX series I/O covers a full range of units, including standard and high-speed digital I/O's, analog I/O's, encoder inputs, pulse outputs and safety control.

- Standard, high-speed and Time Stamp I/O units
- Safety controller and safety I/O units can be integrated
- IO-Link master unit for sensors reducing machine downtime
- Detachable front connector with screwless push-in terminals for direct field wiring
- Digital I/O models with 20/40 pin "flatcable" connectors for fast connection to custom wiring looms
- High signal density: Up to 16 digital or 8 analog signals in 12 mm width

System configuration



Specifications

General specifications

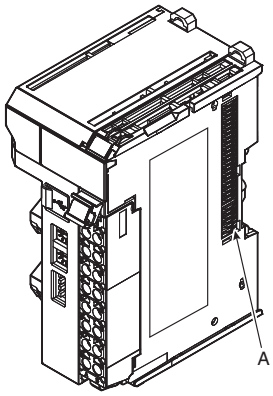
Item		Specifications
Enclosure		Mounted in a panel
Operating environment	Ambient operating temperature	0 to 55°C
	Ambient operating humidity	10% to 95% (with no condensation or icing)
	Atmosphere	Must be free from corrosive gases
	Ambient storage temperature	–25 to 70°C (with no condensation or icing)
	Altitude	2,000 m max.
	Pollution degree	2 or less: conforms to JIS B3502 and IEC 61131-2
	Noise immunity	2 kV on power supply line: conforms to IEC 61000-4-4.
	Overvoltage category	Category II: Conforms to JIS B3502 and IEC 61131-2
	EMC immunity level	Zone B
	Vibration resistance	Conforms to IEC 60068-2-6. 5 to 8.4 Hz with 3.5-mm amplitude, 8.4 to 150 Hz, acceleration of 9.8 m/s^2, 100 min each in X, Y and Z directions (10 sweeps of 10 min each = 100 min total)
	Shock resistance	Conforms to IEC 60068-2-27. 147 m/s^2, 3 times each in X, Y and Z directions
Applicable standards		cULus: Listed UL508 and ANSI/ISA 12.12.01 EC: EN 61131-2 and C-Tick, KC registration, NK, LR

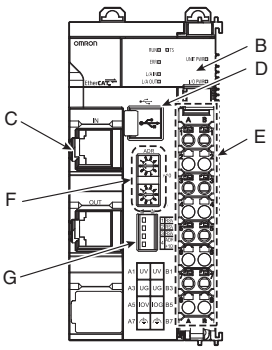
EtherCAT communication specifications

Item	EtherCAT
Physical layer	100BASE-TX (IEEE 802.3)
Modulation	Baseband
Link speed	100 Mbps
Topology	Depends on the specifications of the EtherCAT master
Transmission media	Category 5 or higher twisted-pair cable (recommended cable: double-shielded cable with foil and braiding, SF/UTP or S/FTP)
Transmission distance	Distance between nodes: 100 m or less

Nomenclature

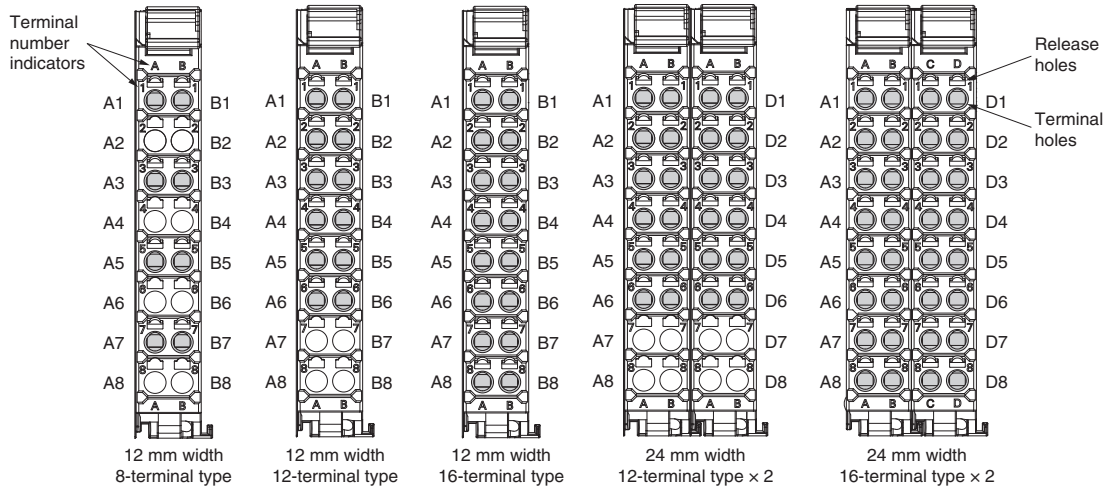
EtherCAT coupler unit





Symbol	Name	Function
A	NX bus connector	This connector is used to connect each unit.
B	Indicators	The indicators show the current operating status of the unit.
C	Communication ports	These ports are connected to the communication cables of the EtherCAT networks. There are two connectors, allowing daisy-chaining of communication units.
D	Peripheral USB port	This port is used to connect to the Sysmac Studio software.
E	Terminal block	The terminal block is used to connect external devices. The number of terminals depends on the type of unit.
F	Rotary switches	These rotary switches are used to set the node address. The address is set in decimal.
G	DIP switch	The DIP switch is used to set the 100s digit of the node address of the EtherCAT coupler unit.

Terminal block types



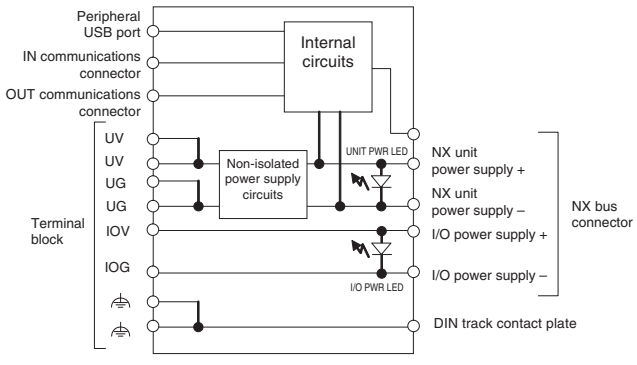
EtherCAT coupler unit

Item		Specifications
Model		**NX-ECC203**
Number of connectable NX units		63 units max.*1
Communications protocol		EtherCAT protocol
Send/receive PDO data sizes		Input: 1024 bytes max. (including input data, status and unused areas) Output: 1024 bytes max. (including output data and unused areas)
Mailbox data size		Input: 256 bytes / Output: 256 bytes
Mailbox		Emergency messages and SDO requests
Refreshing methods*2		Free-run refreshing Synchronous I/O refreshing Time Stamp refreshing Task period prioritized refreshing
Node address setting range		When the settable node address range for the built-in EtherCAT port is 1 to 512*3: Set on switches: 1 to 199 Set with Sysmac Studio: 1 to 512
		When the settable node address range for the built-in EtherCAT port is 1 to 192*3: Set on switches: 1 to 192 Set with Sysmac Studio: 1 to 192
I/O jitter performance		Inputs: 1 μs max. / Outputs: 1 μs max.
Communications cycle in DC mode		125 to 10,000 μs*4 *5 *6
Unit power supply	**Voltage**	24 VDC (20.4 to 28.8 VDC)
	Capacity	10 W max.
	Efficiency	70%
	Isolation method	No isolation between NX unit power supply and unit power supply terminals
	Unwired terminal current capacity	4 A max.
I/O power supply	**Voltage**	5 to 24 VDC (4.5 to 28.8 VDC)*7
	Maximum I/O current	10 A
	Terminal current capacity	10 A max.
Unit power consumption		1.25 W max.
Current consumption from I/O power supply		10 mA max. (for 24 VDC)
Dielectric strength		510 VAC for 1 min, leakage current: 5 mA max. (between isolated circuits)
Insulation resistance		100 VDC, 20 MΩ min. (between isolated circuits)
External connection terminals		Connector for EtherCAT communications: RJ45 × 2 (shielded) IN/OUT: EtherCAT input/output data
		Screwless push-in terminal (8 terminals) For power supply unit, I/O power supply and grounding. Removable.
		Peripheral USB port for Sysmac Studio connection: Physical layer: USB 2.0-compliant, B-type connector Transmission distance: 5 m max.
Terminal block type		Screwless push-in terminal 8 terminals (A + B with FG)
Dimensions (W x H x D)		46 × 100 × 71 mm
Weight		170 g max.

*1. Refer to the NX-safety control units user's manual (Cat.No. Z930) for the number of safety control units that can be connected.
*2. This function was added or improved for a version upgrade. Refer to the NX-series EtherCAT coupler unit user's manual (Cat.No. W519) for information on version upgrades.
*3. The range of node addresses that can be set depends on the model of the built-in EtherCAT port. For the node address ranges that can be set for a built-in EtherCAT port, refer to the user's manual for the built-in EtherCAT port on the connected CPU unit or Industrial PC.
*4. This depends on the specifications of the EtherCAT master. For example, the values are as follows when you are connected to the built-in EtherCAT port on an NJ5-series CPU unit: 500 μs, 1,000 μs, 2,000 μs and 4,000 μs. For the specifications of the built-in EtherCAT port, refer to the user's manual for the built-in EtherCAT port on the connected CPU unit or the Industrial PC.
*5. This depends on the unit configuration.
*6. There are restrictions in the communications cycles that you can set for some of the NX Units. If you use any of those NX units, set a communications cycle that will satisfy the specifications for the refresh cycles that can be executed by the NX unit. Refer to the appendix of the NX-series data reference manual (Cat. No. W525-E1-07 or later) to see if there are restrictions on any specific NX units. For information on the communications cycles that you can set, refer to the user's manuals for the NX units.
*7. Use an output voltage that is appropriate for the I/O circuits of the NX units and the connected external devices.

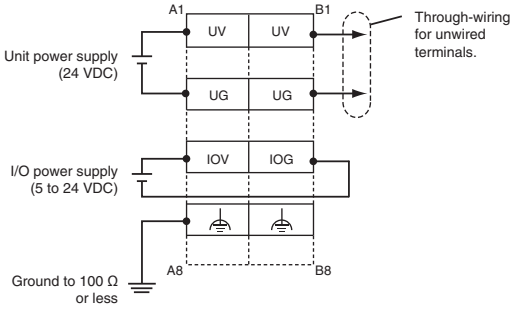
Circuit layout

NX-ECC203



Terminal wiring

NX-ECC203



Digital I/O unit

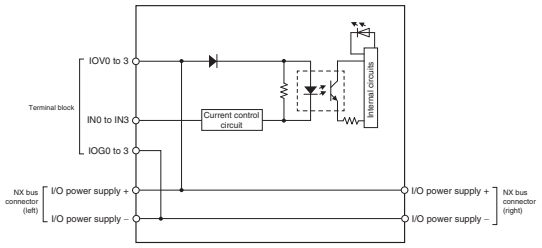
Digital input unit (24 VDC)

Item	Specifications							
Model	**NX-ID3317**	**NX-ID4342**	**NX-ID5342**	**NX-ID3343**	**NX-ID3417**	**NX-ID4442**	**NX-ID5442**	**NX-ID3443**
Name	DC input unit							
Internal I/O common	NPN				PNP			
Capacity	4 points	8 points	16 points	4 points	4 points	8 points	16 points	4 points
Rated input voltage	12 to 24 VDC (9 to 28.8 VDC)	24 VDC (15 to 28.8 VDC)			12 to 24 VDC (9 to 28.8 VDC)	24 VDC (15 to 28.8 VDC)		
Input current[*1]	6 mA	3.5 mA	2.5 mA	3.5 mA	6 mA	3.5 mA	2.5 mA	3.5 mA
ON voltage	9 VDC min.	15 VDC min.			9 VDC min.	15 VDC min.		
ON current	3 mA min.	3 mA min.	2 mA min.	3 mA min.	3 mA min.	3 mA min.	2 mA min.	3 mA min.
OFF voltage	2 VDC max.	5 VDC max.			2 VDC max.	5 VDC max.		
OFF current	1 mA max.		0.5 mA max.	1 mA max.	1 mA max.		0.5 mA max.	1 mA max.
ON/OFF response time	20 μs max./400 μs max.			100 ns max.	20 μs max./400 μs max.			100 ns max.
Input filter time	Default setting: 1 ms[*2]			Default setting: 8 μs[*3]	Default setting: 1 ms[*2]			Default setting: 8 μs[*3]
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.							
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)							
Isolation method	Photocoupler isolation			Digital isolator	Photocoupler isolation			Digital isolator
Unit power consumption	0.50 W max.	0.50 W max.	0.55 W max.	0.55 W max.	0.50 W max.	0.50 W max.	0.55 W max.	0.55 W max.
I/O power supply method	Supply from the NX bus							
I/O current consumption	No consumption			30 mA max.	No consumption			30 mA max.
Current capacity of I/O power supply terminal	0.1 A/terminal max.		Without I/O power supply terminals	0.1 A/terminal max.	0.1 A/terminal max.		Without I/O power supply terminals	0.1 A/terminal max.
I/O refreshing method	Switching synchronous I/O refreshing and free-run refreshing							
Terminal block type	Screwless push-in terminal 12 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)
Dimensions (W x H x D)	12 × 100 × 71 mm							
Weight	65 g max.							
Disconnection/ short-circuit detection	Not supported							
Protective function	Not supported							

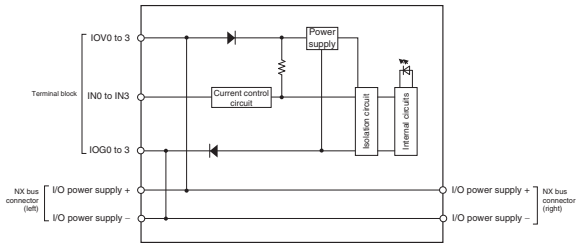
*1. Typical rated current at 24 VDC.
*2. Input filter time: No filter, 0.25, 0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256 ms.
*3. Input filter time: No filter, 1, 2, 4, 8, 16, 32, 64, 128, 256 μs.

Circuit layout

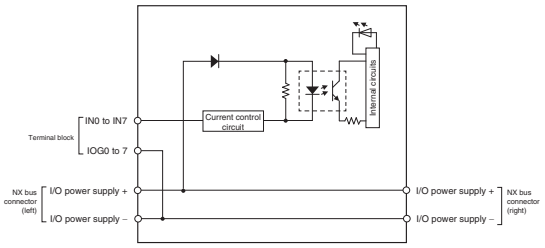
NX-ID3317



NX-ID3343

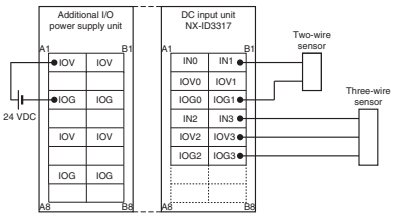


NX-ID4342

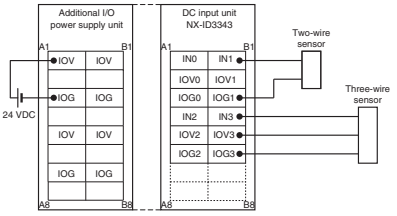


Terminal wiring

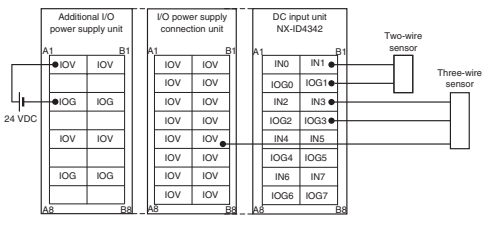
NX-ID3317



NX-ID3343

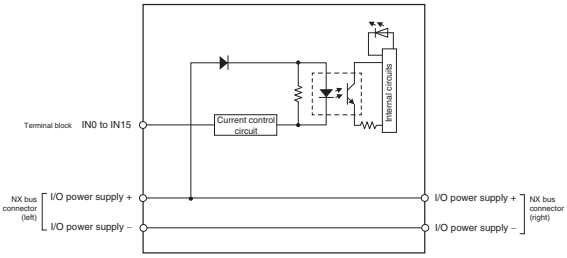


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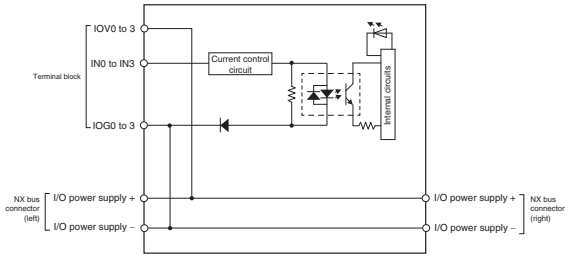


Circuit layout

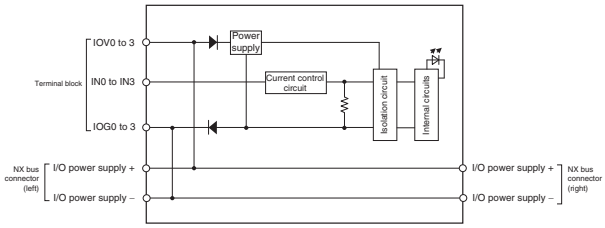
NX-ID5342



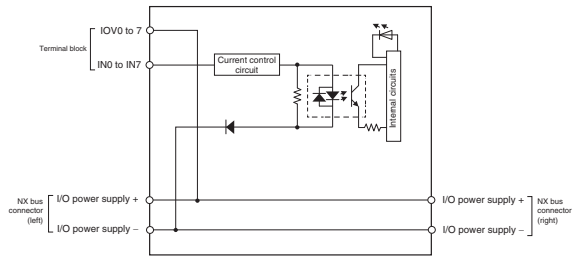
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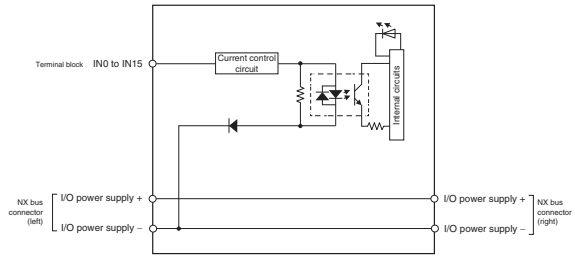
NX-ID3443



NX-ID4442

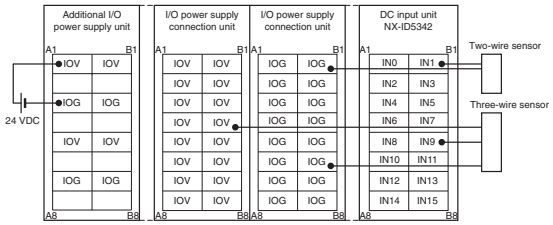


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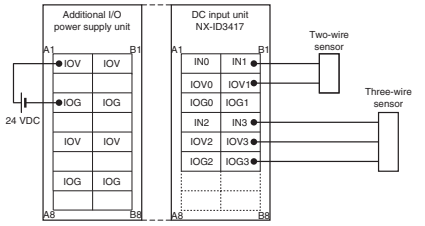


Terminal wiring

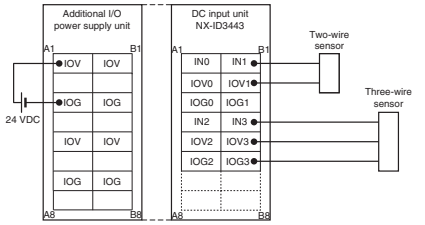
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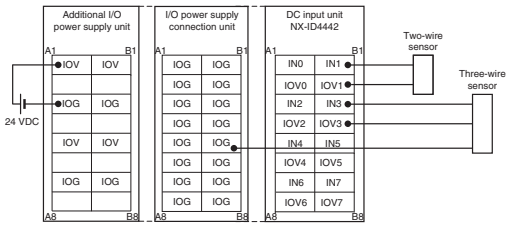
NX-ID3417



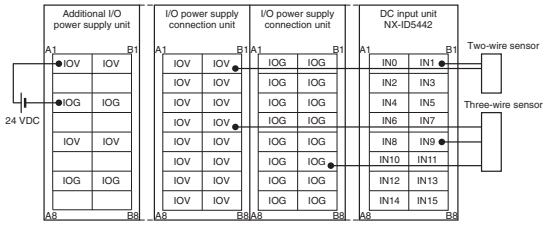
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NX-ID4442



NX-ID5442



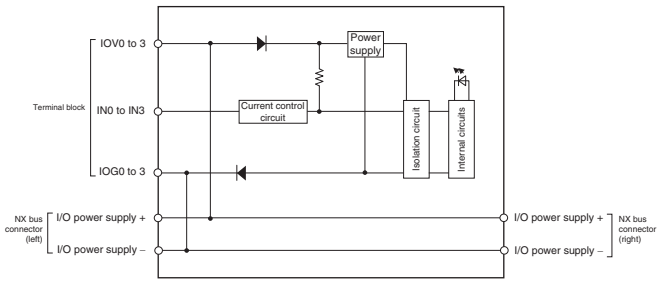
Digital input unit (with time stamp function) (24 VDC)

Item	Specifications	
Model	**NX-ID3344**	**NX-ID3444**
Name	DC input unit	
Internal I/O common	NPN	PNP
Capacity	4 points	4 points
Rated input voltage	24 VDC (15 to 28.8 VDC)	
Input current[*1]	3.5 mA	
ON voltage	15 VDC min.	
ON current	3 mA min.	
OFF voltage	5 VDC max.	
OFF current	1 mA max.	
ON/OFF response time	100 ns max.	
Input filter time	No filter	
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.	
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)	
Isolation method	Digital isolator	
Unit power consumption	0.55 W max.	
I/O power supply method	Supply from the NX bus	
I/O current consumption	30 mA max.	
Current capacity of I/O power supply terminal	0.1 A/terminal max.	
I/O refreshing method	Time stamp	
Terminal block type	Screwless push-in terminal 12 terminals (A + B)	
Dimensions (W x H x D)	12 × 100 × 71 mm	
Weight	65 g max.	
Disconnection/ short-circuit detection	Not supported	
Protective function	Not supported	

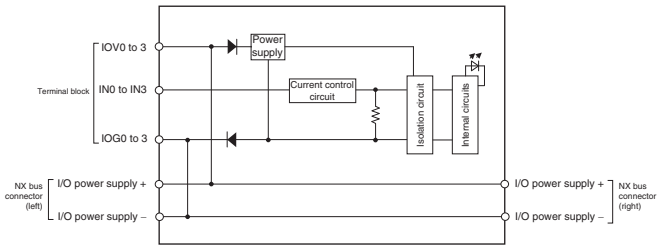
*1. Typical rated current at 24 VDC.

Circuit layout

NX-ID3344

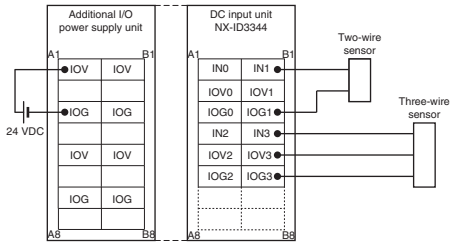


NX-ID3444

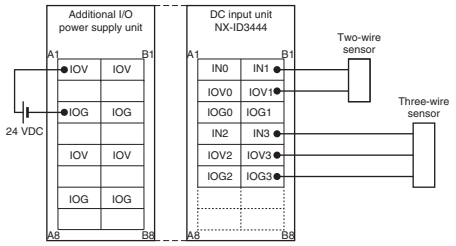


Terminal wiring

NX-ID3344



NX-ID3444



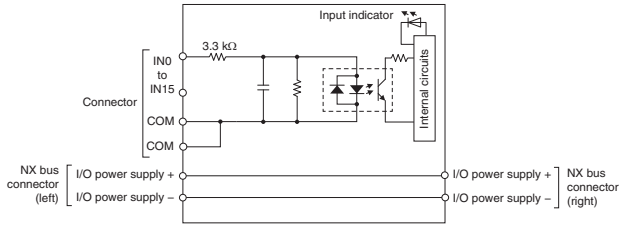
Digital input unit (with MIL connector) (24 VDC)

Item	Specifications	
Model	**NX-ID5142-5**	**NX-ID6142-5**
Name	DC input unit	
Internal I/O common	For both NPN/PNP	
Capacity	16 points	32 points
Rated input voltage	24 VDC (15 to 28.8 VDC)	24 VDC (19 to 28.8 VDC)
Input current[*1]	7 mA	4.1 mA
ON voltage	15 VDC min.	19 VDC min.
ON current	3 mA min.	
OFF voltage	5 VDC max.	
OFF current	1 mA max.	
ON/OFF response time	20 μs max./400 μs max	
Input filter time	No filter, 0.25 ms, 0.5 ms, 1 ms (default), 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms	
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.	
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)	
Isolation method	Photocoupler isolation	
Unit power consumption	0.55 W max.	0.60 W max.
I/O power supply method	Supply from external source	
I/O current consumption	No consumption	
Current capacity of I/O power supply terminal	Without I/O power supply terminals	
I/O refreshing method	Switching synchronous I/O refreshing and free-run refreshing	
Terminal block type	MIL connector 20 terminals	MIL connector 40 terminals
Dimensions (W x H x D)	30 × 100 × 71 mm	
Weight	85 g max.	90 g max.
Disconnection/ short-circuit detection	Not supported	
Protective function	Not supported	

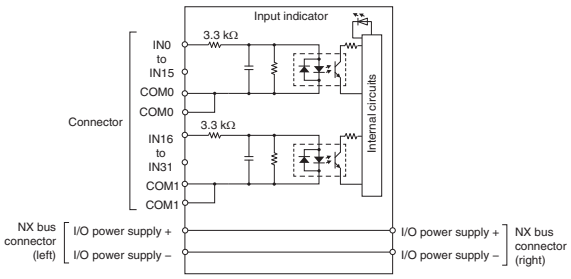
*1. Typical rated current at 24 VDC.

Circuit layout

NX-ID5142-5

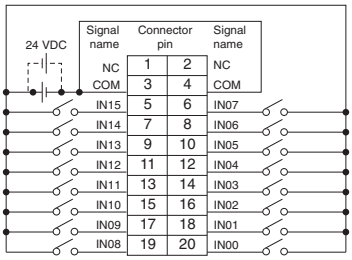


NX-ID6142-5



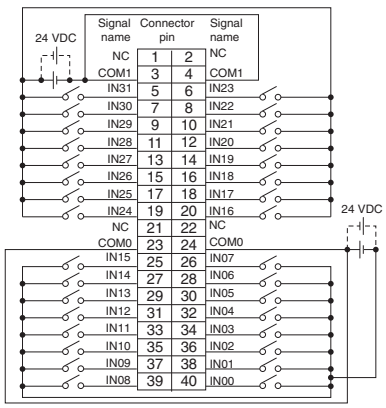
Terminal wiring

NX-ID5142-5



- The polarity of the input power supply can be connected in either direction.
- Be sure to wire both pins 3 and 4 (COM), and set the same polarity for both pins.

NX-ID6142-5



- The polarity of the input power supply can be connected in either direction.
- Be sure to wire both pins 23 and 24 (COM0), and set the same polarity for both pins.
- Be sure to wire both pins 3 and 4 (COM1), and set the same polarity for both pins.

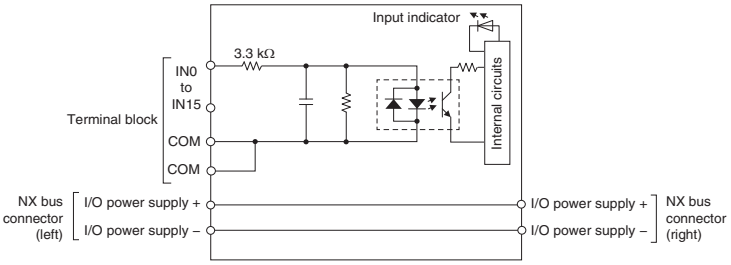
Digital input unit (with M3 screw terminal block) (24 VDC)

Item	Specifications
Model	**NX-ID5142-1**
Name	DC input unit
Internal I/O common	For both NPN/PNP
Capacity	16 points
Rated input voltage	24 VDC (15 to 28.8 VDC)
Input current[*1]	7 mA
ON voltage	15 VDC min.
ON current	3 mA min.
OFF voltage	5 VDC max.
OFF current	1 mA max.
ON/OFF response time	20 μs max./400 μs max
Input filter time	No filter, 0.25 ms, 0.5 ms, 1 ms (default), 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Isolation method	Photocoupler isolation
Unit power consumption	0.55 W max.
I/O power supply method	Supply from external source
I/O current consumption	No consumption
Current capacity of I/O power supply terminal	Without I/O power supply terminals
I/O refreshing method	Switching synchronous I/O refreshing and free-run refreshing
Terminal block type	M3 screw terminal block 18 terminals
Dimensions (W x H x D)	30 × 100 × 71 mm
Weight	125 g max.
Disconnection/ short-circuit detection	Not supported
Protective function	Not supported

*1. Typical rated current at 24 VDC.

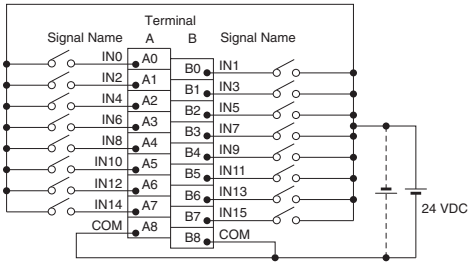
Circuit layout

NX-ID5142-1



Terminal wiring

NX-ID5142-1



• The polarity of the input power supply can be connected in either direction.

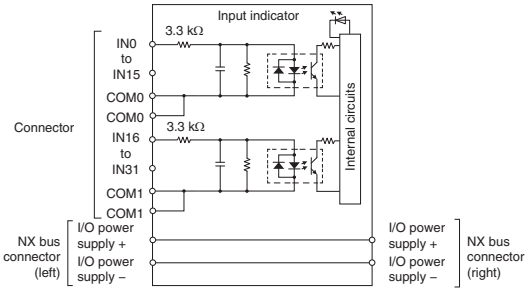
Digital input unit (with Fujitsu connector) (24 VDC)

Item	Specifications
Model	**NX-ID6142-6**
Name	DC input unit
Internal I/O common	For both NPN/PNP
Capacity	32 points
Rated input voltage	24 VDC (19 to 28.8 VDC)
Input current[*1]	4.1 mA
ON voltage	19 VDC min.
ON current	3 mA min.
OFF voltage	5 VDC max.
OFF current	1 mA max.
ON/OFF response time	20 μs max./400 μs max
Input filter time	No filter, 0.25 ms, 0.5 ms, 1 ms (default), 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Isolation method	Photocoupler isolation
Unit power consumption	0.55 W max.
I/O power supply method	Supply from external source
I/O current consumption	No consumption
Current capacity of I/O power supply terminal	Without I/O power supply terminals
I/O refreshing method	Switching synchronous I/O refreshing and free-run refreshing
Terminal block type	Fujitsu connector 40 terminals
Dimensions (W x H x D)	30 × 100 × 71 mm
Weight	90 g max.
Disconnection/ short-circuit detection	Not supported
Protective function	Not supported

*1. Typical rated current at 24 VDC.

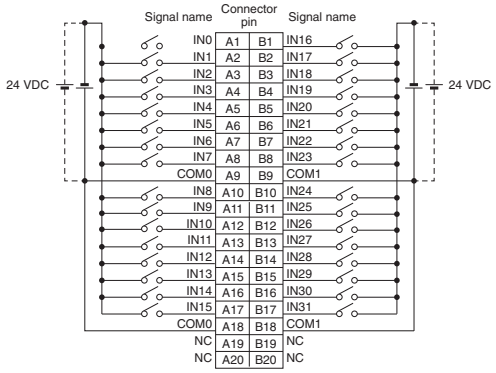
Circuit layout

NX-ID6142-6



Terminal wiring

NX-ID6142-6



- The polarity of the input power supply can be connected in either direction.
- Be sure to wire both pins A9 and A18 (COM0), and set the same polarity for both pins.
- Be sure to wire both pins B9 and B18 (COM1), and set the same polarity for both pins.

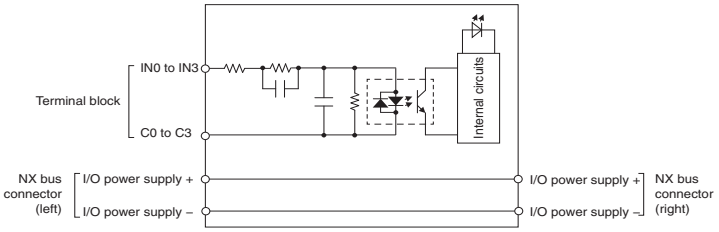
Digital input unit (230 VAC)

Item	Specifications
Model	**NX-IA3117**
Name	AC input unit
Internal I/O common	No polarity
Capacity	4 points, independent contacts
Rated input voltage	200 to 240 VAC, 50/60 Hz (170 to 264 VAC, ±3 Hz)
Input current	9 mA (at 200 VAC, 50 Hz) 11 mA (at 200 VAC, 60 Hz)
ON voltage	120 VAC min.
ON current	4 mA min.
OFF voltage	40 VAC max.
OFF current	2 mA max.
ON/OFF response time	10 ms max./40 ms max.
Input filter time	Default setting: 1 ms*1
Dielectric strength	Between each AC input circuit: AC3700V VAC for 1 min at a leakage current of 5 mA max. Between the external terminals and functional ground terminal: 2300 VAC for 1 min at a leakage current of 5 mA max. Between the external terminals and internal circuits: 2300 VAC for 1 min at a leakage current of 5 mA max. Between the internal circuit and the functional ground terminal: 510 VAC for 1 min at a leakage current of 5 mA max.
Insulation resistance	Between each AC input circuit: 20 MΩ min. (at 500 VDC) Between the external terminals and functional ground terminal: 20 MΩ min. (at 500 VDC) Between the external terminals and internal circuits: 20 MΩ min. (at 500 VDC) Between the internal circuit and the functional ground terminal: 20 MΩ min. (at 100 VDC)
Isolation method	Photocoupler isolation
Unit power consumption	0.5 W max.
I/O power supply method	Supply from external source
I/O current consumption	No consumption
Current capacity of I/O power supply terminal	Without I/O power supply terminals
I/O refreshing method	Free-run refreshing
Terminal block type	Screwless push-in terminal 8 terminals (A + B)
Dimensions (W x H x D)	12 × 100 × 71 mm
Weight	60 g max.
Disconnection/ short-circuit detection	Not supported
Protective function	Not supported

*1. Input filter time: No filter, 0.25, 0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256 ms.

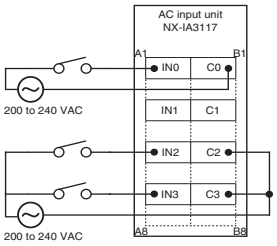
Circuit layout

NX-IA3117



Terminal wiring

NX-IA3117

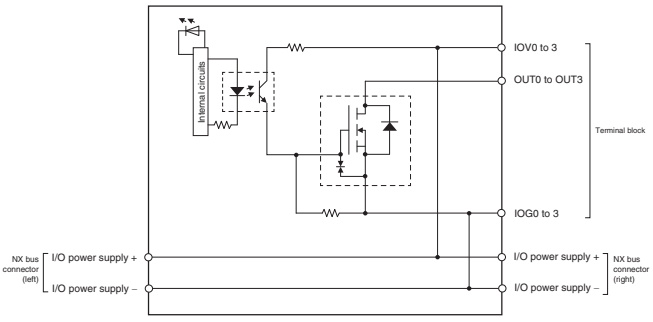


Digital output unit

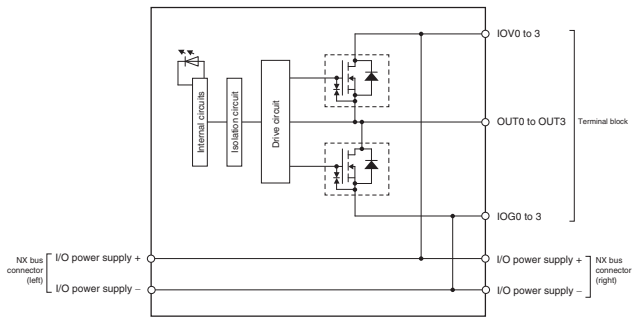
Item	Specifications								
Model	**NX-OD3121**	**NX-OD4121**	**NX-OD5121**	**NX-OD3153**	**NX-OD3256**	**NX-OD4256**	**NX-OD5256**	**NX-OD3268**	**NX-OD3257**
Name	Transistor output unit								
Internal I/O common	NPN				PNP				
Capacity	4 points	8 points	16 points	4 points	4 points	8 points	16 points	4 points	4 points
Rated voltage	12 to 24 VDC			24 VDC					
Operating load voltage	10.2 to 28.8 VDC			15 to 28.8 VDC					
Maximum value of load current	0.5 A/point, 2 A/NX unit	0.5 A/point, 4 A/NX unit		0.5 A/point, 2 A/NX unit	0.5 A/point, 2 A/NX unit	0.5 A/point, 4 A/NX unit		2 A/point, 8 A/NX unit	0.5 A/point, 2 A/NX unit
Maximum inrush current	4.0 A/point, 10 ms max.								
Leakage current	0.1 mA max.								
Residual voltage	1.5 V max.								
ON/OFF response time	0.1 ms max./0.8 ms max.			300 ns max.	0.5 ms max./1.0 ms max.				300 ns max.
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.								
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)								
Isolation method	Photocoupler isolation			Digital isolator	Photocoupler isolation				Digital isolator
Unit power consumption	0.55 W max.	0.55 W max.	0.65 W max.	0.50 W max.	0.55 W max.	0.65 W max.	0.70 W max.	0.50 W max.	0.50 W max.
I/O power supply method	Supply from the NX bus							Supply from external source	Supply from the NX bus
I/O current consumption	10 mA max.	10 mA max.	20 mA max.	30 mA max.	20 mA max.	30 mA max.	40 mA max.	20 mA max.	40 mA max.
Current capacity of I/O power supply terminal	0.5 A/terminal max.		Without I/O power supply terminals	0.5 A/terminal max.	0.5 A/terminal max.		Without I/O power supply terminals	IOV/IOG: 2 A/terminal max. COM/0V: 4A/terminal max.	0.5 A/terminal max.
I/O refreshing method	Switching synchronous I/O refreshing and free-run refreshing								
Terminal block type	Screwless push-in terminal 12 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)
Dimensions (W x H x D)	12 × 100 × 71 mm								
Weight	70 g max.								
Disconnection/ short-circuit detection	Not supported								
Protective function	Not supported				With load short-circuit protection				

Circuit layout

NX-OD3121



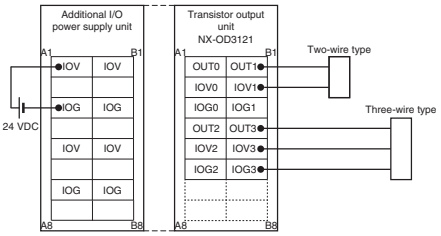
NX-OD3153



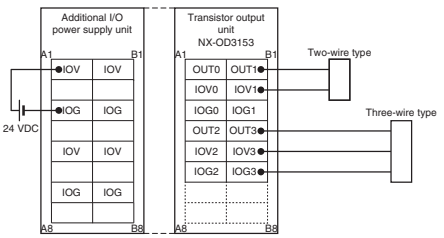
This unit uses a push-pull output circuit.

Terminal wiring

NX-OD3121

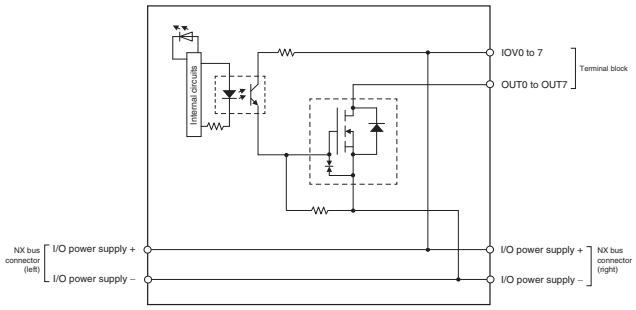


NX-OD3153

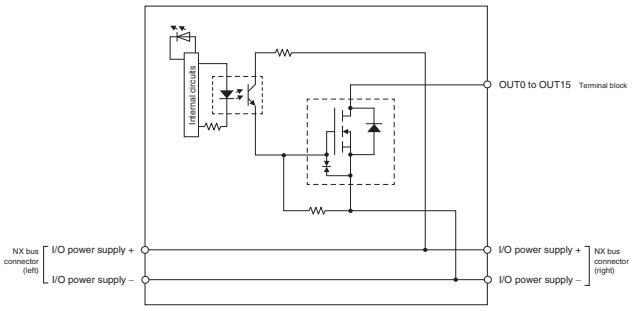


Circuit layout

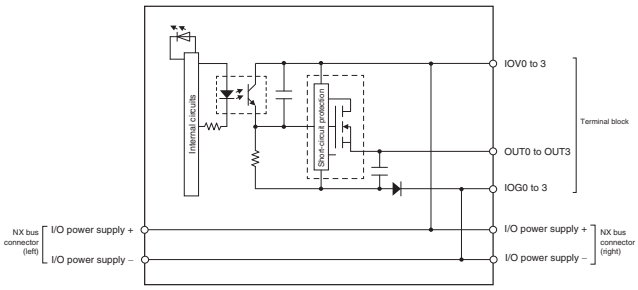
NX-OD4121



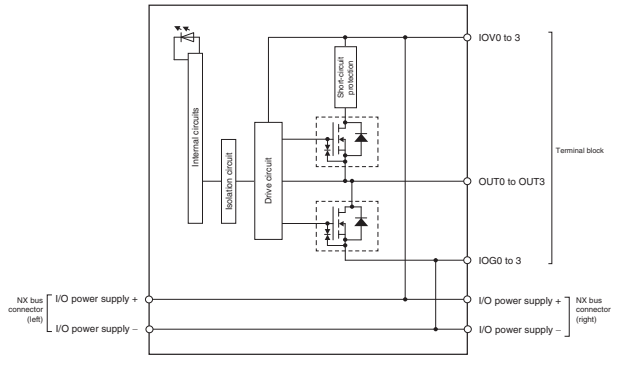
NX-OD5121



NX-OD3256

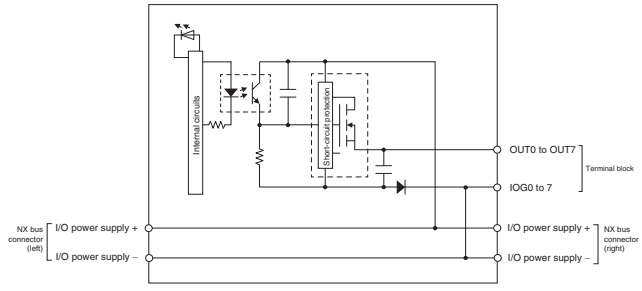


NX-OD3257



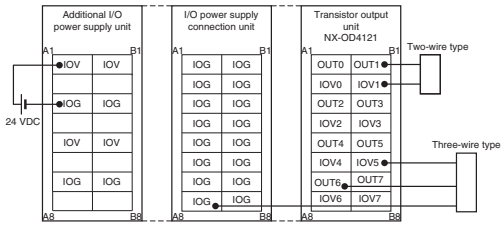
This unit uses a push-pull output circuit.

NX-OD4256

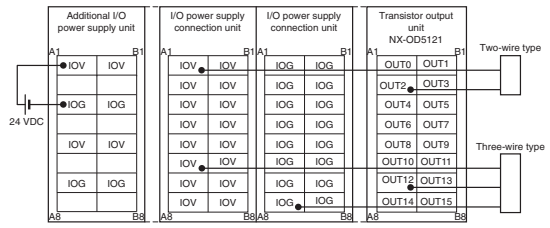


Terminal wiring

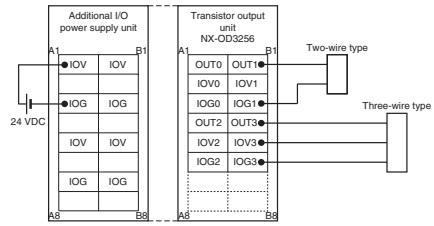
NX-OD4121



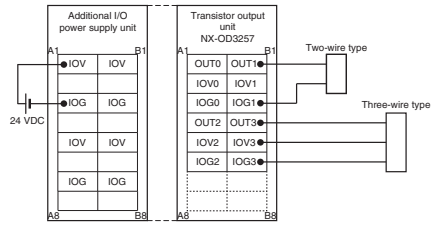
NX-OD5121



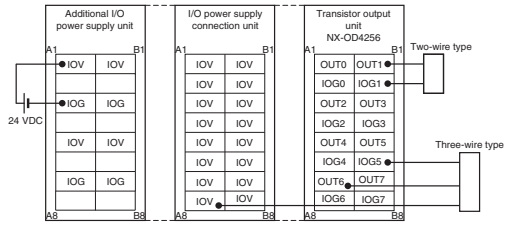
NX-OD3256



NX-OD3257

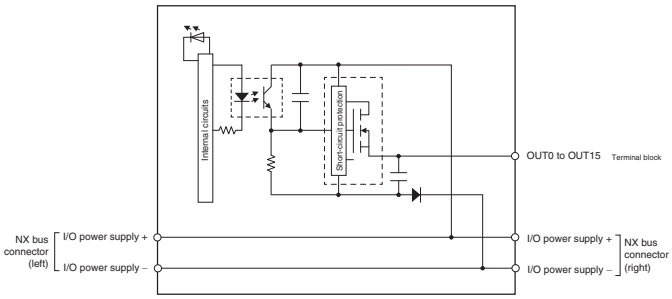


NX-OD4256

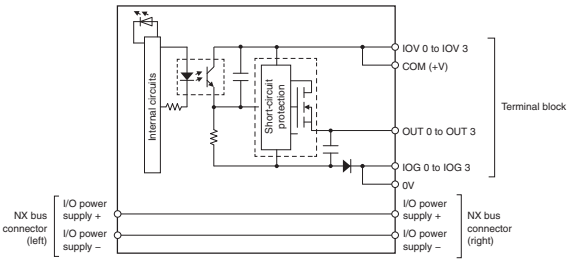


Circuit layout

NX-OD5256

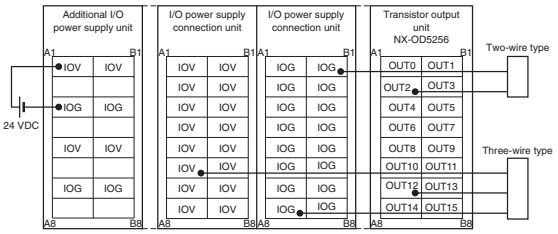


NX-OD3268

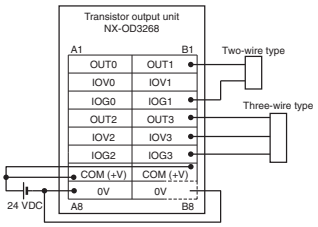


Terminal wiring

NX-OD5256



NX-OD3268



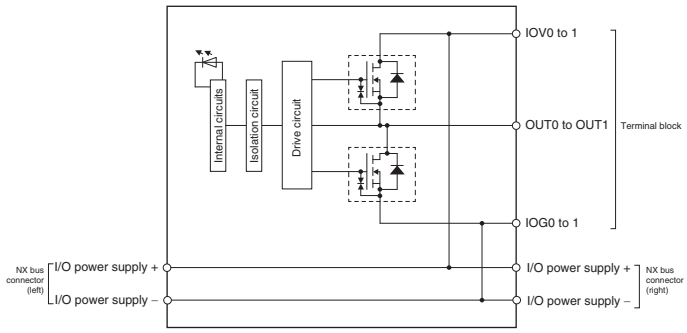
- 0V has 2 terminals, so be sure to wire both terminals.
- COM (+V) has 2 terminals, so be sure to to wire both terminals.

Digital output unit (with time stamp function)

Item	Specifications	
Model	**NX-OD2154**	**NX-OD2258**
Name	Transistor output unit	
Internal I/O common	NPN	PNP
Capacity	2 points	2 points
Rated voltage	24 VDC	
Operating load voltage	15 to 28.8 VDC	
Maximum value of load current	0.5 A/point, 1 A/NX unit	
Maximum inrush current	4.0 A/point, 10 ms max.	
Leakage current	0.1 mA max.	
Residual voltage	1.5 V max.	
ON/OFF response time	300 ns max.	
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.	
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)	
Isolation method	Digital isolator	
Unit power consumption	0.50 W max.	
I/O power supply method	Supply from the NX bus	
I/O current consumption	30 mA max.	40 mA max.
Current capacity of I/O power supply terminal	0.5 A/terminal max.	
I/O refreshing method	Time Stamp	
Terminal block type	Screwless push-in terminal 8 terminals (A + B)	
Dimensions (W x H x D)	12 × 100 × 71 mm	
Weight	70 g max.	
Disconnection/ short-circuit detection	Not supported	
Protective function	Not supported	With load short-circuit protection

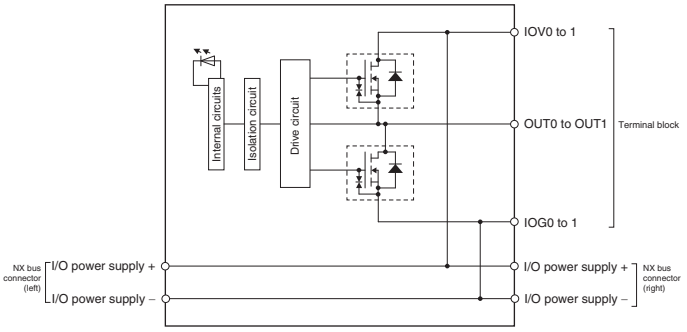
Circuit layout

NX-OD2154



This unit uses a push-pull output circuit.

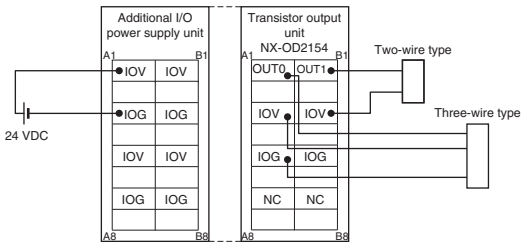
NX-OD2258



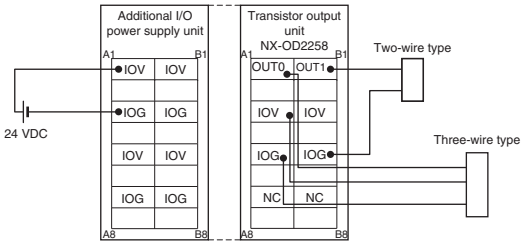
This unit uses a push-pull output circuit.

Terminal wiring

NX-OD2154



NX-OD2258

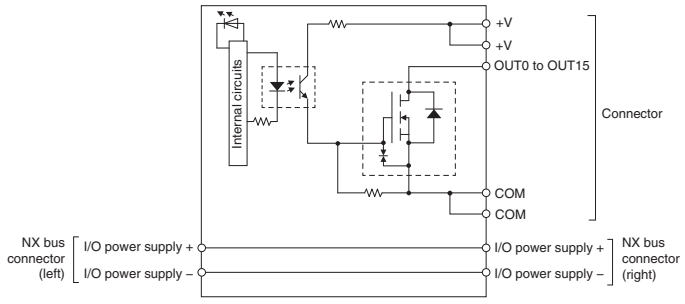


Digital output unit (with MIL connector)

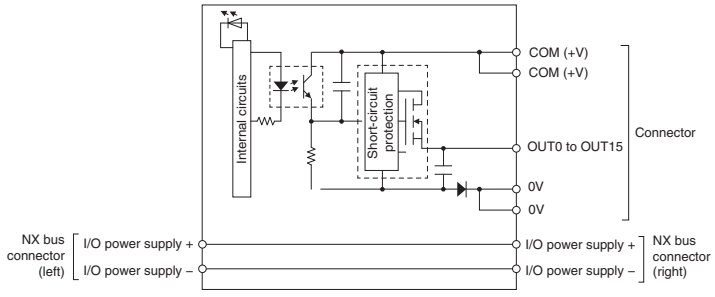
Item	Specifications			
Model	**NX-OD5121-5**	**NX-OD5256-5**	**NX-OD6121-5**	**NX-OD6256-5**
Name	Transistor output unit			
Internal I/O common	NPN	PNP	NPN	PNP
Capacity	16 points	16 points	32 points	32 points
Rated voltage	12 to 24 VDC	24 VDC	12 to 24 VDC	24 VDC
Operating load voltage	10.2 to 28.8 VDC	20.4 to 28.8 VDC	10.2 to 28.8 VDC	20.4 to 28.8 VDC
Maximum value of load current	0.5 A/point, 2 A/NX unit		0.5 A/point, 2 A/common, 4 A/NX unit	
Maximum inrush current	4.0 A/point, 10 ms max.			
Leakage current	0.1 mA max.			
Residual voltage	1.5 V max.			
ON/OFF response time	0.1 ms max./0.8 ms max.	0.5 ms max./1.0 ms max.	0.1 ms max./0.8 ms max.	0.5 ms max./1.0 ms max.
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.			
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)			
Isolation method	Photocoupler isolation			
Unit power consumption	0.60 W max.	0.70 W max.	0.80 W max.	1.0 W max.
I/O power supply method	Supply from external source			
I/O current consumption	30 mA max.	40 mA max.	50 mA max.	80 mA max.
Current capacity of I/O power supply terminal	Without I/O power supply terminals			
I/O refreshing method	Switching synchronous I/O refreshing and free-run refreshing			
Terminal block type	MIL connector 20 terminals		MIL connector 40 terminals	
Dimensions (W x H x D)	30 × 100 × 71 mm			
Weight	80 g max.	85 g max.	90 g max.	95 g max.
Disconnection/ short-circuit detection	Not supported			
Protective function	Not supported	With load short-circuit protection	Not supported	With load short-circuit protection

Circuit layout

NX-OD5121-5

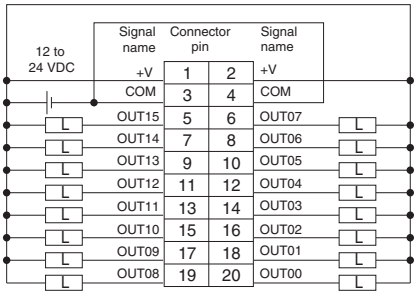


NX-OD5256-5



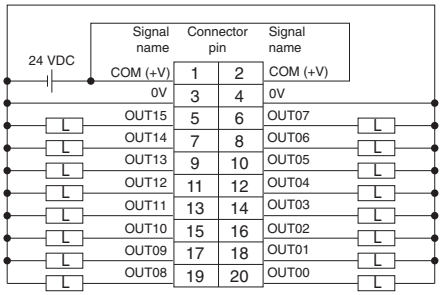
Terminal wiring

NX-OD5121-5



- Be sure to wire both pins 3 and 4 (COM).
- Be sure to wire both pins 1 and 2 (+V).

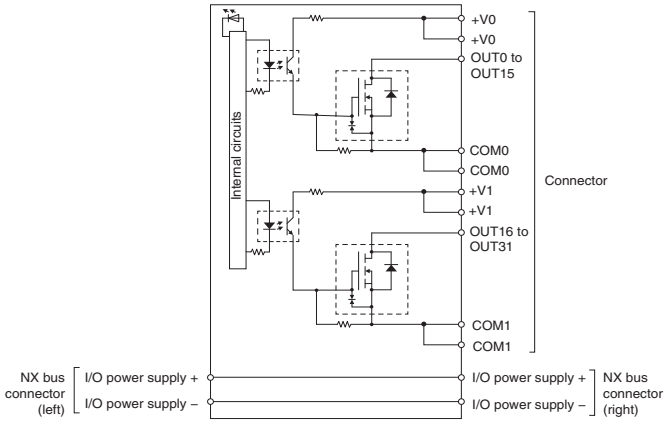
NX-OD5256-5



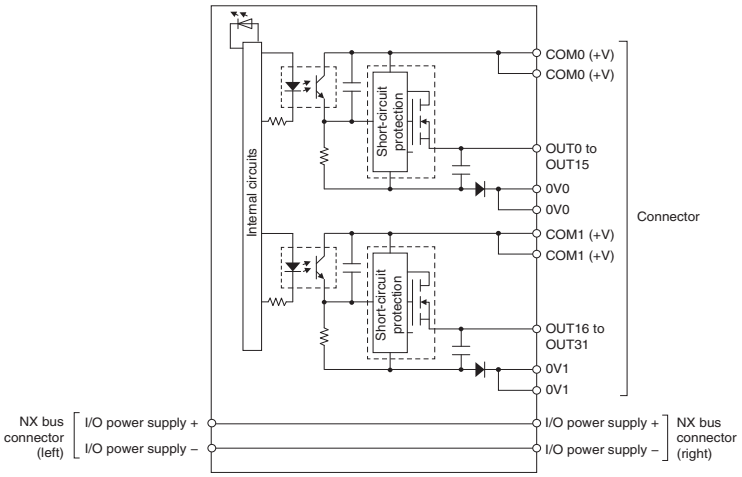
- Be sure to wire both pins 1 and 2 (COM (+V)).
- Be sure to wire both pins 3 and 4 (0V).

Circuit layout

NX-OD6121-5

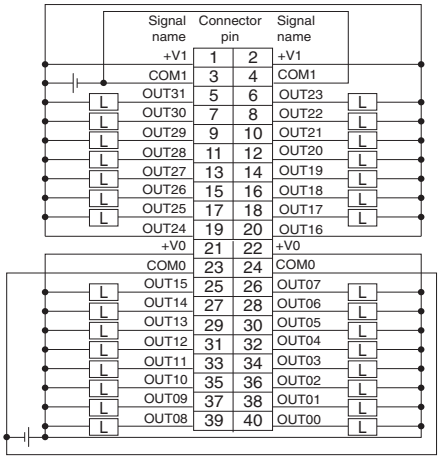


NX-OD6256-5



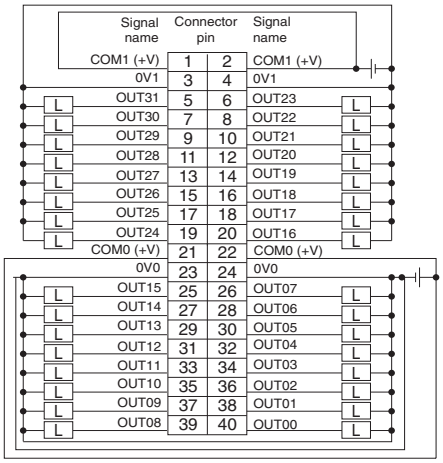
Terminal wiring

NX-OD6121-5



- Be sure to wire both pins 21 and 22 (+V0).
- Be sure to wire both pins 23 and 24 (COM0).
- Be sure to wire both pins 1 and 2 (+V1).
- Be sure to wire both pins 3 and 4 (COM1).

NX-OD6256-5



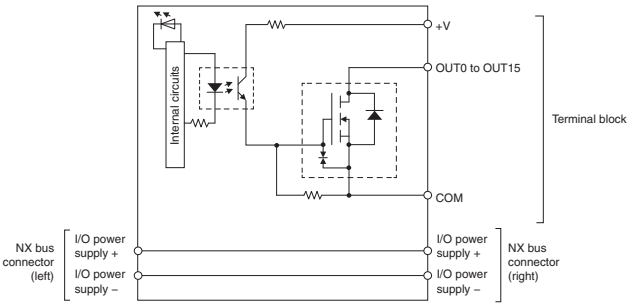
- Be sure to wire both pins 21 and 22 (COM0 (+V)).
- Be sure to wire both pins 1 and 2 (COM1 (+V)).
- Be sure to wire both pins 23 and 24 (0V0).
- Be sure to wire both pins 3 and 4 (0V1).

Digital output unit (with M3 screw terminal block)

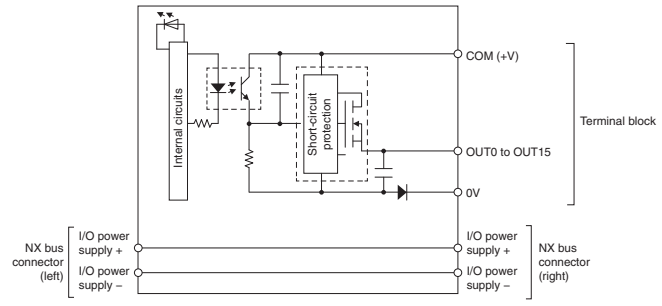
Item	Specifications	
Model	**NX-OD5121-1**	**NX-OD5256-1**
Name	Transistor output unit	
Internal I/O common	NPN	PNP
Capacity	16 points	16 points
Rated voltage	12 to 24 VDC	24 VDC
Operating load voltage	10.2 to 28.8 VDC	20.4 to 28.8 VDC
Maximum value of load current	0.5 A/point, 5 A/NX unit	
Maximum inrush current	4.0 A/point, 10 ms max.	
Leakage current	0.1 mA max.	
Residual voltage	1.5 V max.	
ON/OFF response time	0.1 ms max./0.8 ms max.	0.5 ms max./1.0 ms max.
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.	
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)	
Isolation method	Photocoupler isolation	
Unit power consumption	0.60 W max.	0.65 W max.
I/O power supply method	Supply from external source	
I/O current consumption	30 mA max.	
Current capacity of I/O power supply terminal	Without I/O power supply terminals	
I/O refreshing method	Switching synchronous I/O refreshing and free-run refreshing	
Terminal block type	M3 screw terminal block 18 terminals	
Dimensions (W x H x D)	30 × 100 × 71 mm	
Weight	125 g max.	
Disconnection/ short-circuit detection	Not supported	
Protective function	Not supported	With load short-circuit protection

Circuit layout

NX-OD5121-1

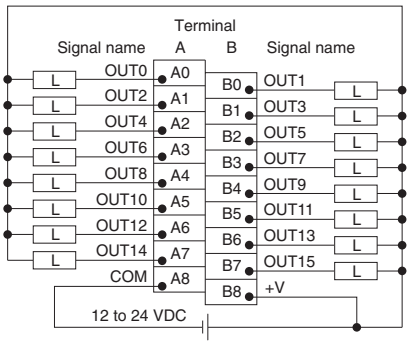


NX-OD5256-1

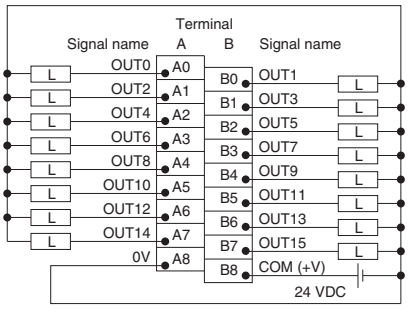


Terminal wiring

NX-OD5121-1



NX-OD5256-1

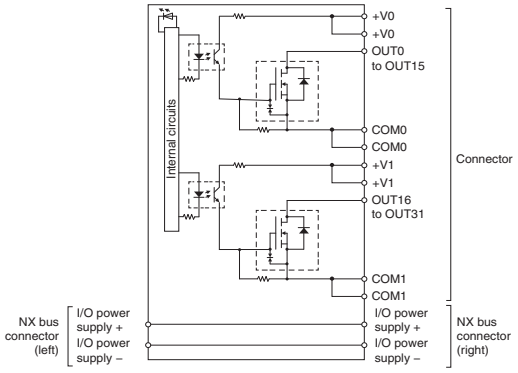


Digital output unit (with Fujitsu connector)

Item	Specifications
Model	**NX-OD6121-6**
Name	Transistor output unit
Internal I/O common	NPN
Capacity	32 points
Rated voltage	12 to 24 VDC
Operating load voltage	10.2 to 28.8 VDC
Maximum value of load current	0.5 A/point, 2 A/common, 4 A/NX unit
Maximum inrush current	4.0 A/point, 10 ms max.
Leakage current	0.1 mA max.
Residual voltage	1.5 V max.
ON/OFF response time	0.1 ms max./0.8 ms max.
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Isolation method	Photocoupler isolation
Unit power consumption	0.80 W max.
I/O power supply method	Supply from external source
I/O current consumption	50 mA max.
Current capacity of I/O power supply terminal	Without I/O power supply terminals
I/O refreshing method	Switching synchronous I/O refreshing and free-run refreshing
Terminal block type	Fujitsu connector 40 terminals
Dimensions (W x H x D)	30 × 100 × 71 mm
Weight	90 g max.
Disconnection/ short-circuit detection	Not supported
Protective function	Not supported

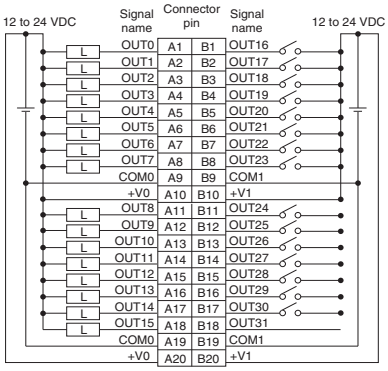
Circuit layout

NX-OD6121-6



Terminal wiring

NX-OD6121-6



- Be sure to wire both pins A9 and A19 (COM0).
- Be sure to wire both pins B9 and B19 (COM1).
- Be sure to wire both pins A10 and A20 (+V0).
- Be sure to wire both pins B10 and B20 (+V1).

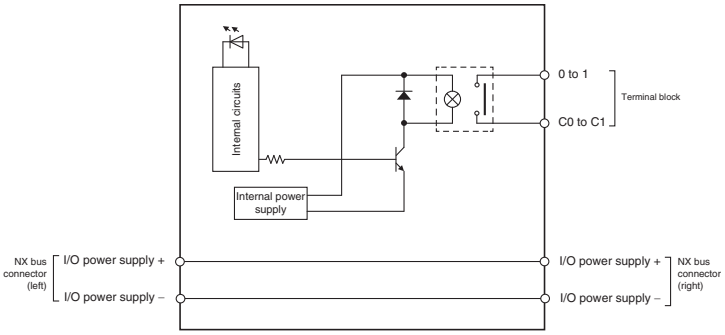
Relay output unit

Item	Specifications		
Model	**NX-OC2633**	**NX-OC2733**	**NX-OC4633**
Name	Relay output unit		
Relay type	N.O. contact	N.O. + N.C. contact	N.O. contact
Capacity	2 points, independent contacts		8 points, independent contacts
Max. switching capacity	250 VAC/2 A (cos Ø = 1), 250 VAC/2 A (cos Ø = 0.4), 24 VDC/2 A, 4 A/unit		250 VAC/2 A (cos Ø = 1), 250 VAC/2 A (cos Ø = 0.4), 24 VDC/2 A, 8 A/unit
Min. switching capacity	5 VDC, 1 mA		
ON/OFF response time	15 ms max.		
Relay service life	Electrical: 100,000 operations *1 Mechanical: 20,000,000 operations		
Dielectric strength	Between A1/B1 terminals and A3/B3 terminals: 2,300 VAC for 1 min at a leakage current of 5 mA max. Between the external terminals and GR terminal: 2,300 VAC for 1 min at a leakage current of 5 mA max. Between the external terminals and internal circuits: 2,300 VAC for 1 min at a leakage current of 5 mA max. Between the internal circuit and GR terminal: 510 VAC for 1 min at a leakage current of 5 mA max.	Between A1/3, B1/3 terminals and A5/7, B5/7 terminals: 2,300 VAC for 1 min at a leakage current of 5 mA max. Between the external terminals and functional ground terminal: 2,300 VAC for 1 min at a leakage current of 5 mA max. Between the external terminals and internal circuits: 2,300 VAC for 1 min at a leakage current of 5 mA max. Between the internal circuit and functional ground terminal: 510 VAC for 1 min at a leakage current of 5 mA max.	Between output bits: 2,300 VAC for 1 min at a leakage current of 5 mA max. Between the external terminals and the functional ground terminal: 2,300 VAC for 1 min at a leakage current of 5 mA max. Between the external terminals and internal circuits: 2,300 VAC for 1 min at a leakage current of 5 mA max. Between the internal circuit and functional ground terminal: 510 VAC for 1 min at a leakage current of 5 mA max.
Insulation resistance	Between A1/B1 terminals and A3/B3 terminals: 20 MΩ min. (500 VDC) Between the external terminals and internal circuits: 20 MΩ min. (500 VDC) Between the internal circuit and GR terminal: 20 MΩ min. (100 VDC) Between the external terminals and GR terminal: 20 MΩ min. (500 VDC)	Between A1/3, B1/3 terminals and A5/7, B5/7 terminals: 20 MΩ min. (500 VDC) Between the external terminals and functional ground terminal: 20 MΩ min. (500 VDC) Between the external terminals and internal circuits: 20 MΩ min. (500 VDC) Between the internal circuit and functional ground terminal: 20 MΩ min. (100 VDC)	Between output bits: 20 MΩ min. (500 VDC) Between the external terminals and the functional ground terminal: 20 MΩ min. (500 VDC) Between the external terminals and internal circuits: 20 MΩ min. (500 VDC) Between the internal circuit and functional ground terminal: 20 MΩ min. (100 VDC)
Vibration resistance	Conforms to IEC60068-2-6. 5 to 8.4 Hz with amplitude of 3.5 mm, 8.4 to 150 Hz, acceleration of 9.8 m/s^2, 100 min each in X, Y and Z directions (10 sweeps of 10 min each = 100 min total)		
Shock resistance	100 m/s^2, 3 times each in X, Y and Z directions		
Isolation method	Relay isolation		
Unit power consumption	0.80 W max.	0.95 W max.	1.65 W max.
I/O power supply method	Supply from external source		
I/O current consumption	No consumption		
Current capacity of I/O power supply terminal	Without I/O power supply terminals		
I/O refreshing method	Free-run refreshing		
Terminal block type	Screwless push-in terminal 8 terminals (A + B)		Screwless push-in terminal 8 terminals × 2 (A + B)
Dimensions (W x H x D)	12 × 100 × 71 mm		24 × 100 × 71 mm
Weight	65 g max.	70 g max.	140 g max.
Disconnection/ short-circuit detection	Not supported		
Protective function	Not supported		

*1. Electrical service life will vary depending on the current value. Refer to “NX-series digital I/O units user’s manual” for details.

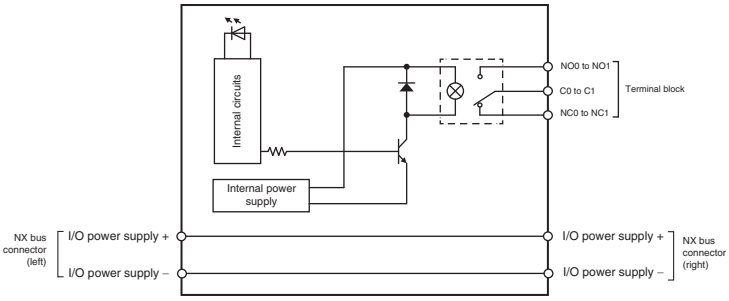
Circuit layout

NX-OC2633



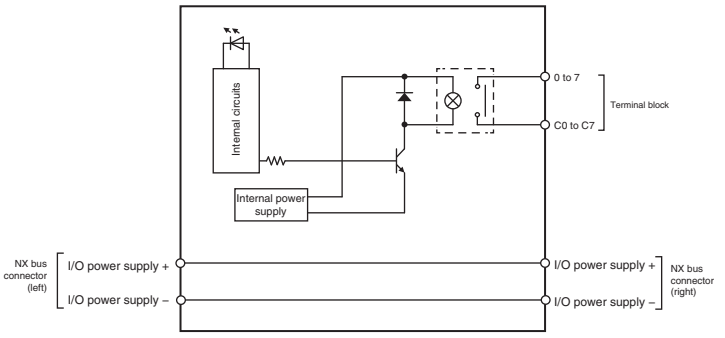
You cannot replace the relay.

NX-OC2733



NO0 and NO1 are normal open contacts, and NC0 and NC1 are normal close contacts.
You cannot replace the relay.

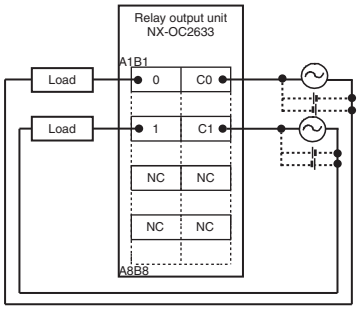
NX-OC4633



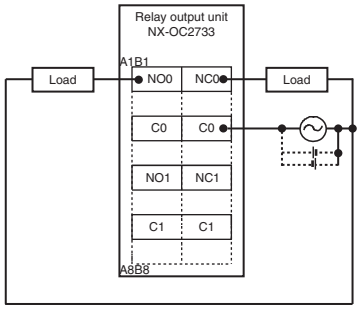
You cannot replace the relay.

Terminal wiring

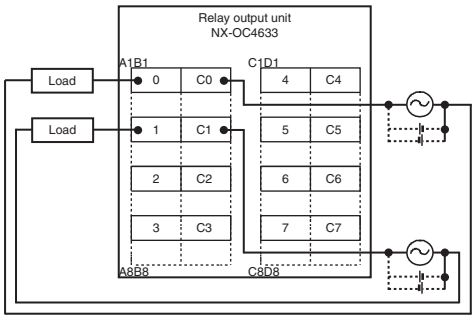
NX-OC2633



NX-OC2733



NX-OC4633



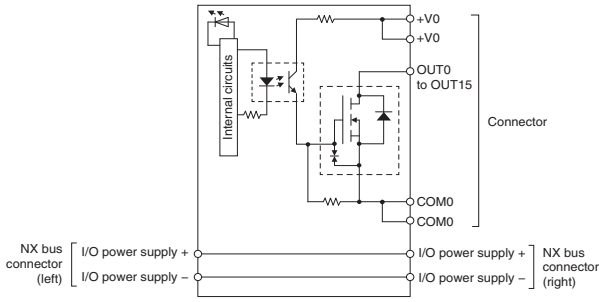
Digital I/O unit (with MIL connector)

Item		Specifications	
Model		NX-MD6121-5	NX-MD6256-5
Name		DC input/transistor output unit	
Capacity		16 inputs/16 outputs	
Output section (CN1)	Internal I/O common	NPN	PNP
	Rated voltage	12 to 24 VDC	24 VDC
	Operating load voltage	10.2 to 28.8 VDC	20.4 to 28.8 VDC
	Maximum value of load current	0.5 A/point, 2 A/NX unit	
	Maximum inrush current	4.0 A/point, 10 ms max.	
	Leakage current	0.1 mA max.	
	Residual voltage	1.5 V max.	
	ON/OFF response time	0.1 ms max./0.8 ms max.	0.5 ms max./1.0 ms max.
Input section (CN2)	Internal I/O common	For both NPN/PNP	
	Rated input voltage	24 VDC (15 to 28.8 VDC)	
	Input current*1	7 mA	
	ON voltage	15 VDC min.	
	ON current	3 mA min.	
	OFF voltage	5 VDC max.	
	OFF current	1 mA max.	
	ON/OFF response time	20 μs max./400 μs max	
	Input filter time	No filter, 0.25 ms, 0.5 ms, 1 ms (default), 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms	
Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.	
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)	
Isolation method		Photocoupler isolation	
Unit power consumption		0.70 W max.	0.75 W max.
I/O power supply method		Supply from external source	
I/O current consumption		30 mA max.	40 mA max.
Current capacity of I/O power supply terminal		Without I/O power supply terminals	
I/O refreshing method		Switching synchronous I/O refreshing and free-run refreshing	
Terminal block type		2 MIL connectors 20 terminals	
Dimensions (W x H x D)		30 × 100 × 71 mm	
Weight		105 g max.	110 g max.
Disconnection/short-circuit detection		Not supported	
Protective function		Not supported	With load short-circuit protection

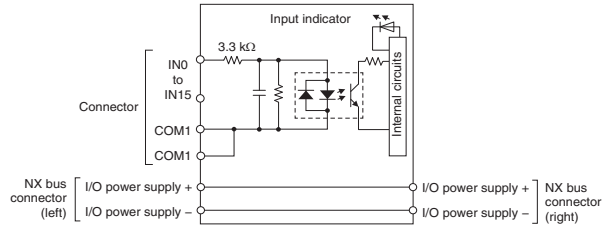
*1. Typical rated current at 24 VDC.

Circuit layout

NX-MD6121-5
CN1 (left) output circuit

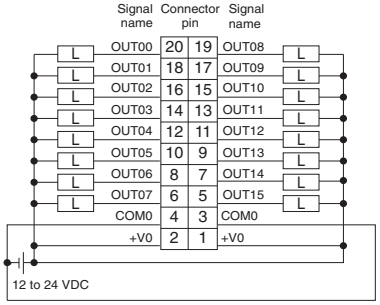


CN2 (right) input circuit



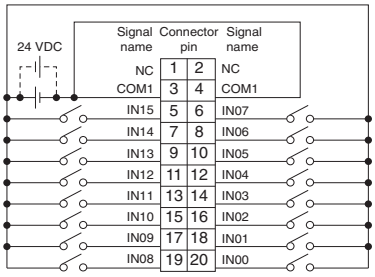
Terminal wiring

NX-MD6121-5
CN1 (left) output terminal



- Be sure to wire both pins 3 and 4 (COM0) of CN1.
- Be sure to wire both pins 1 and 2 (+V0) of CN1.

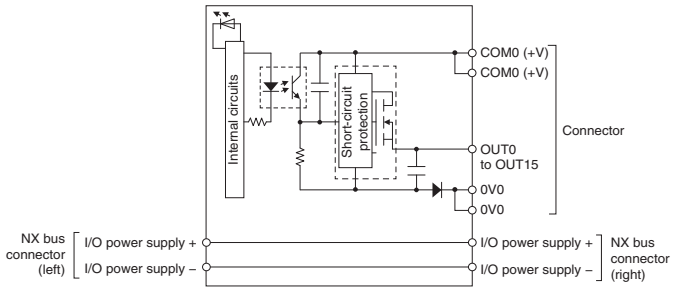
CN2 (right) input terminal



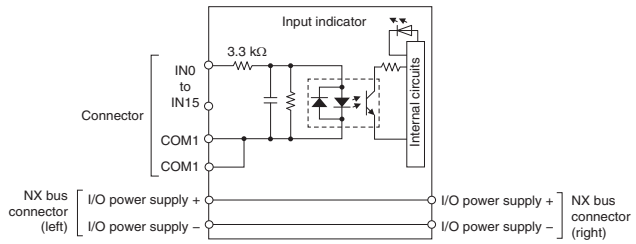
- The polarity of the input power supply of CN2 can be connected in either direction.
- Be sure to wire both pins 3 and 4 (COM1) of CN2, and set the same polarity for both pins.

Circuit layout

NX-MD6256-5
CN1 (left) output circuit

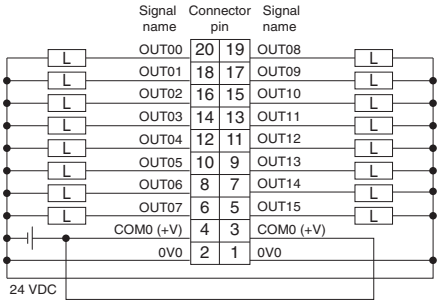


CN2 (right) input circuit



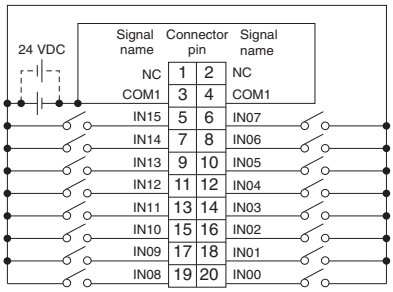
Terminal wiring

NX-MD6256-5
CN1 (left) output terminal



- Be sure to wire both pins 3 and 4 (COM0 (+V)) of CN1.
- Be sure to wire both pins 1 and 2 (0V0) of CN1.

CN2 (right) input terminal



- The polarity of the input power supply of CN2 can be connected in either direction.
- Be sure to wire both pins 3 and 4 (COM1) of CN2, and set the same polarity for both pins.

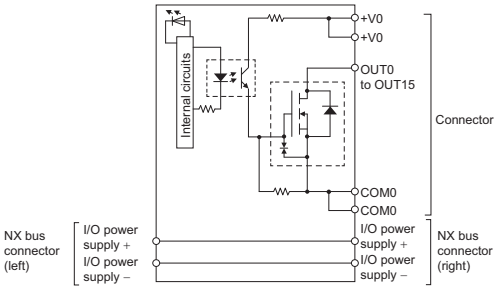
Digital I/O unit (with Fujitsu connector)

Item		Specifications
Model		**NX-MD6121-6**
Name		DC input/transistor output unit
Capacity		16 inputs/16 outputs
Output section (CN1)	**Internal I/O common**	NPN
	Rated voltage	12 to 24 VDC
	Operating load voltage	10.2 to 28.8 VDC
	Maximum value of load current	0.5 A/point, 2 A/NX unit
	Maximum inrush current	4.0 A/point, 10 ms max.
	Leakage current	0.1 mA max.
	Residual voltage	1.5 V max.
	ON/OFF response time	0.1 ms max./0.8 ms max.
Input section (CN2)	**Internal I/O common**	For both NPN/PNP
	Rated input voltage	24 VDC (15 to 28.8 VDC)
	Input current[*1]	7 mA
	ON voltage	15 VDC min.
	ON current	3 mA min.
	OFF voltage	5 VDC max.
	OFF current	1 mA max.
	ON/OFF response time	20 μs max./400 μs max
	Input filter time	No filter, 0.25 ms, 0.5 ms, 1 ms (default), 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms
Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)
Isolation method		Photocoupler isolation
Unit power consumption		0.70 W max.
I/O power supply method		Supply from external source
I/O current consumption		30 mA max.
Current capacity of I/O power supply terminal		Without I/O power supply terminals
I/O refreshing method		Switching synchronous I/O refreshing and free-run refreshing
Terminal block type		2 Fujitsu connectors 24 terminals
Dimensions (W x H x D)		30 × 100 × 71 mm
Weight		95 g max.
Disconnection/short-circuit detection		Not supported
Protective function		Not supported

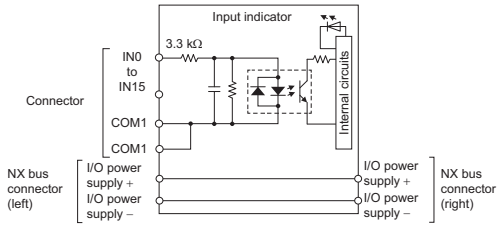
*1. Typical rated current at 24 VDC.

Circuit layout

NX-MD6121-6
CN1 (left) output circuit

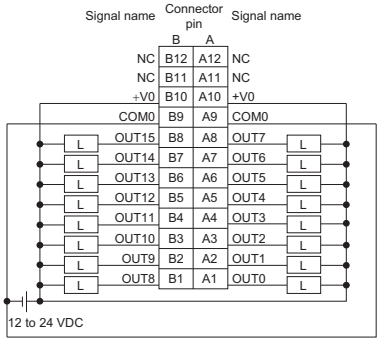


CN2 (right) input circuit



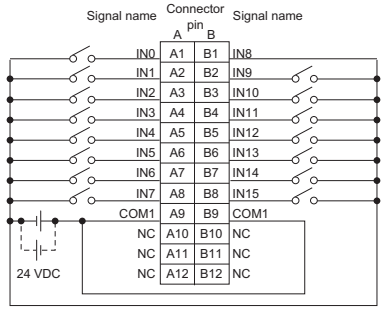
Terminal wiring

NX-MD6121-6
CN1 (left) output terminal



- Be sure to wire both pins A9 and B9 (COM0) of CN1.
- Be sure to wire both pins A10 and B10 (+V0) of CN1.

CN2 (right) input terminal



- The polarity of the input power supply of CN2 can be connected in either direction.
- Be sure to wire both pins A9 and B9 (COM1) of CN2, and set the same polarity for both pins.

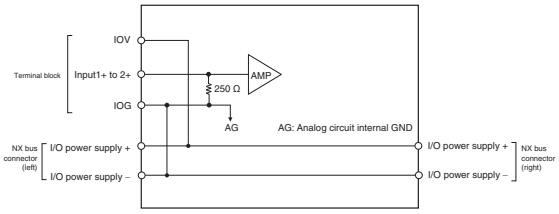
Analog I/O unit

Current input unit

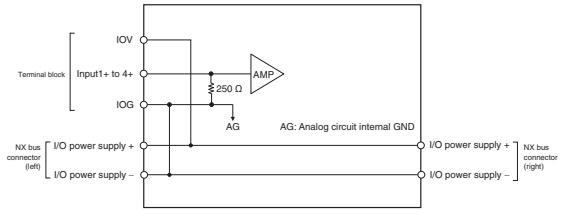
Item		Specifications								
Model		**NX-AD2203**	**NX-AD3203**	**NX-AD4203**	**NX-AD2204**	**NX-AD3204**	**NX-AD4204**	**NX-AD2208**	**NX-AD3208**	**NX-AD4208**
Name		Current input unit								
Input range		4 to 20 mA								
Input method		Single-ended input			Differential input					
Capacity		2 points	4 points	8 points	2 points	4 points	8 points	2 points	4 points	8 points
Input conversion range		–5% to 105% (full scale)								
Absolute maximum rating		±30 mA								
Input impedance		250 Ω min.	250 Ω min.	85 Ω min.	250 Ω min.	250 Ω min.	85 Ω min.	250 Ω min.	250 Ω min.	85 Ω min.
Resolution		1/8,000 (full scale)						1/30,000 (full scale)		
Overall accuracy	**25°C**	±0.2% (full scale)						±0.1% (full scale)		
	0 to 55°C	±0.4% (full scale)						±0.2% (full scale)		
Conversion time		250 μs/point						10 μs/point		
Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.								
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)								
Isolation method		Between the input and the NX bus: Power = Transformer, Signal = Digital isolator (no isolation between inputs)								
Unit power consumption		0.90 W max.	0.90 W max.	1.05 W max.	0.90 W max.	0.90 W max.	1.05 W max.	0.90 W max.	0.95 W max.	1.10 W max.
I/O power supply method		Supply from the NX bus			No supply					
I/O current consumption		No consumption								
Current capacity of I/O power supply terminal		0.1 A/terminal max.			Without I/O power supply terminals					
I/O refreshing method		Free-run refreshing						Switching synchronous I/O refreshing and free-run refreshing		
Terminal block type		Screwless push-in terminal 8 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 8 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 8 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)
Dimensions (W x H x D)		12 × 100 × 71 mm								
Weight		70 g max.								
Input disconnection detection		Supported								

Circuit layout

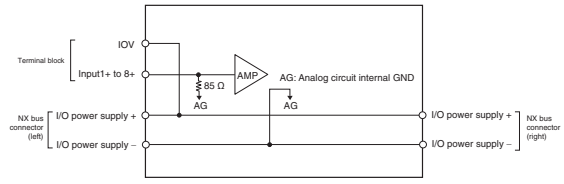
NX-AD2203



NX-AD3203

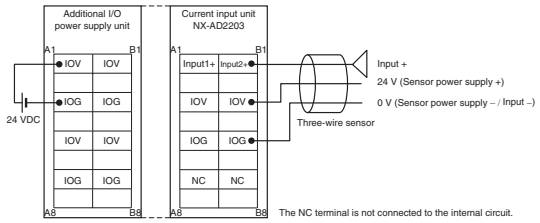


NX-AD4203

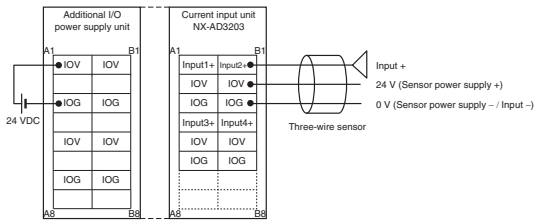


Terminal wiring

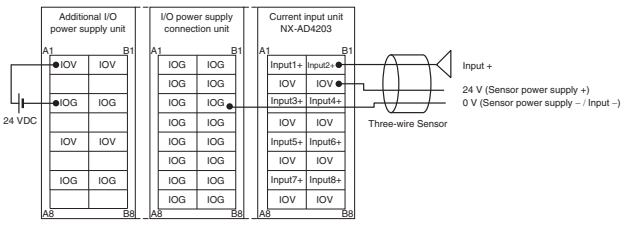
NX-AD2203



NX-AD3203

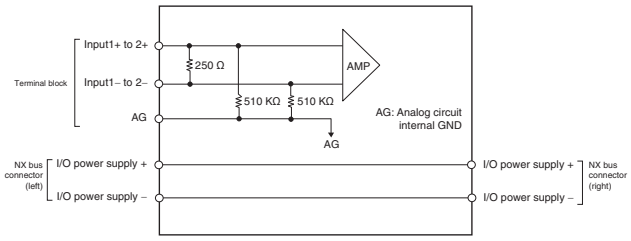


NX-AD4203

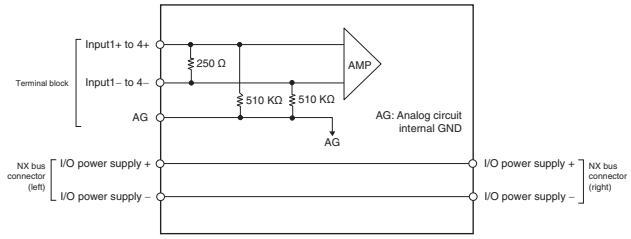


Circuit layout

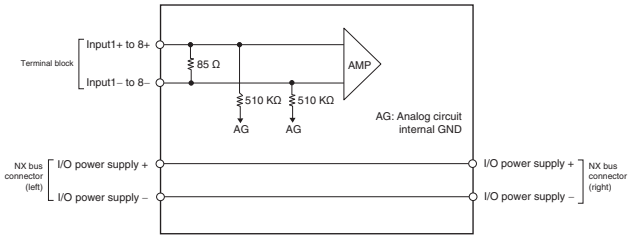
NX-AD2204/NX-AD2208



NX-AD3204/NX-AD3208

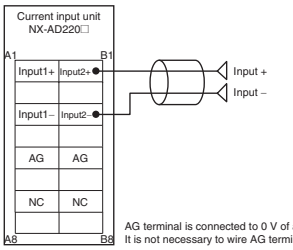


NX-AD4204/NX-AD4208



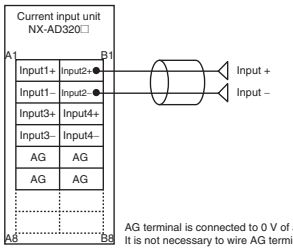
Terminal wiring

NX-AD2204/NX-AD2208



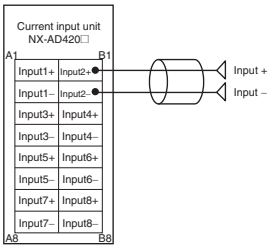
AG terminal is connected to 0 V of analog circuit inside the unit. It is not necessary to wire AG terminal normally.

NX-AD3204/NX-AD3208



AG terminal is connected to 0 V of analog circuit inside the unit. It is not necessary to wire AG terminal normally.

NX-AD4204/NX-AD4208

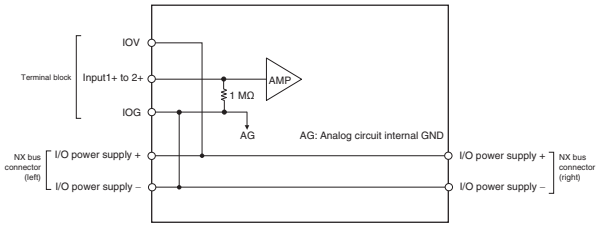


Voltage input unit

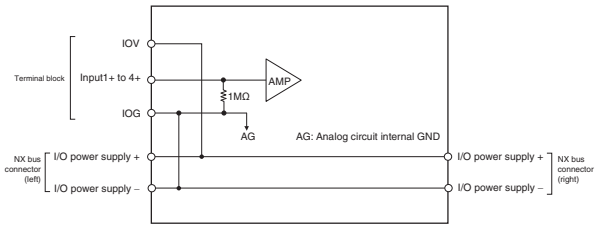
Item		Specifications								
Model		NX-AD2603	NX-AD3603	NX-AD4603	NX-AD2604	NX-AD3604	NX-AD4604	NX-AD2608	NX-AD3608	NX-AD4608
Name		Voltage input unit								
Input range		–10 to 10 V								
Input method		Single-ended input			Differential input					
Capacity		2 points	4 points	8 points	2 points	4 points	8 points	2 points	4 points	8 points
Input conversion range		–5% to 105% (full scale)								
Absolute maximum rating		±15 V								
Input impedance		1 MΩ min.								
Resolution		1/8,000 (full scale)						1/30,000 (full scale)		
Overall accuracy	25°C	±0.2% (full scale)						±0.1% (full scale)		
	0 to 55°C	±0.4% (full scale)						±0.2% (full scale)		
Conversion time		250 μs/point						10 μs/point		
Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.								
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)								
Isolation method		Between the input and the NX bus: Power = Transformer, Signal = Digital isolator (no isolation between inputs)								
Unit power consumption		1.05 W max.	1.10 W max.	1.15 W max.	1.05 W max.	1.10 W max.	1.15 W max.	1.05 W max.	1.10 W max.	1.15 W max.
I/O power supply method		Supply from the NX bus			No supply					
I/O current consumption		No consumption								
Current capacity of I/O power supply terminal		0.1 A/terminal max.			Without I/O power supply terminals					
I/O refreshing method		Free-run refreshing						Switching synchronous I/O refreshing and free-run refreshing		
Terminal block type		Screwless push-in terminal 8 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 8 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 8 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)	Screwless push-in terminal 16 terminals (A + B)
Dimensions (W x H x D)		12 × 100 × 71 mm								
Weight		70 g max.								
Input disconnection detection		Not supported								

Circuit layout

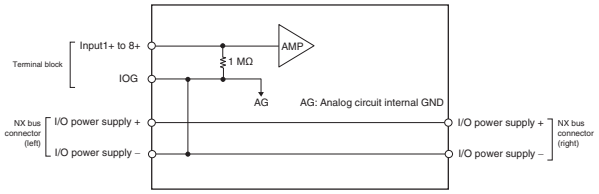
NX-AD2603



NX-AD3603

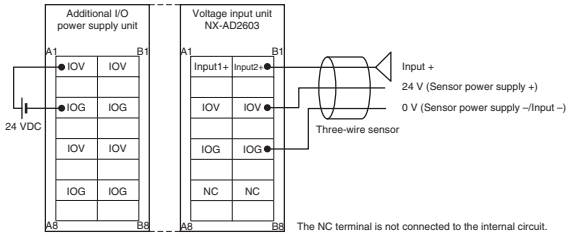


NX-AD4603

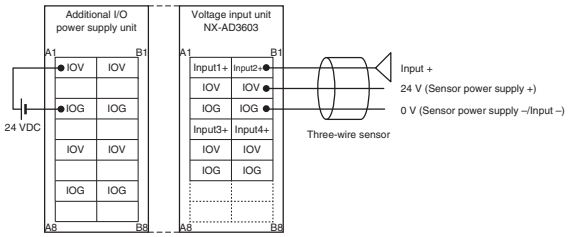


Terminal wiring

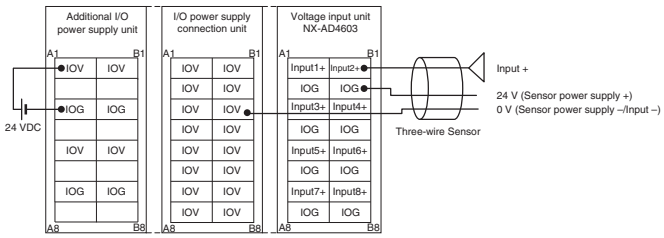
NX-AD2603



NX-AD3603

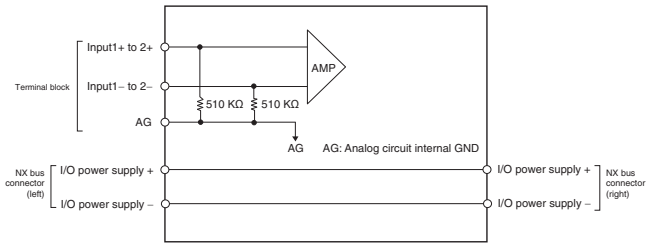


NX-AD4603

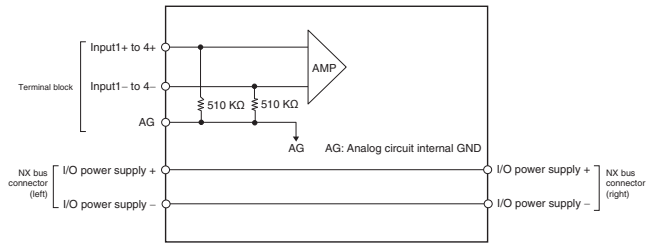


Circuit layout

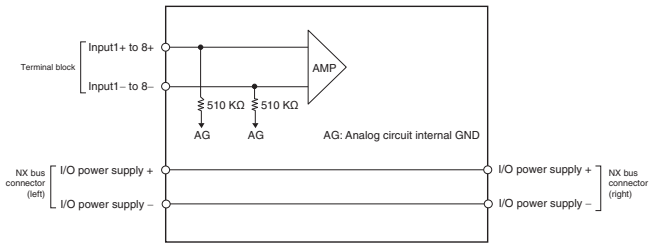
NX-AD2604/NX-AD2608



NX-AD3604/NX-AD3608

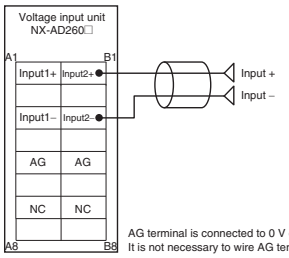


NX-AD4604/NX-AD4608



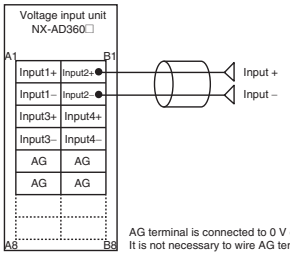
Terminal wiring

NX-AD2604/NX-AD2608



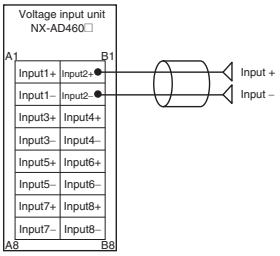
AG terminal is connected to 0 V of analog circuit inside the unit. It is not necessary to wire AG terminal normally.

NX-AD3604/NX-AD3608



AG terminal is connected to 0 V of analog circuit inside the unit. It is not necessary to wire AG terminal normally.

NX-AD4604/NX-AD4608

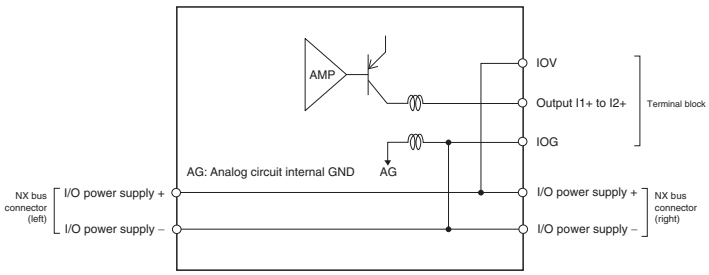


Current output unit

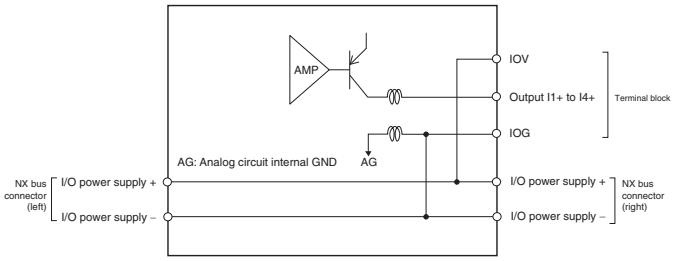
Item		Specifications			
Model		NX-DA2203	NX-DA3203	NX-DA2205	NX-DA3205
Name		Current output unit			
Output range		4 to 20 mA			
Capacity		2 points	4 points	2 points	4 points
Output conversion range		–5% to 105% (full scale)			
Allowable load resistance		600 Ω min.	350 Ω min.	600 Ω min.	350 Ω min.
Resolution		1/8,000 (full scale)		1/30,000 (full scale)	
Overall accuracy	25°C	±0.3% (full scale)		±0.1% (full scale)	
	0 to 55°C	±0.6% (full scale)		±0.3% (full scale)	
Conversion time		250 μs/point		10 μs/point	
Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.			
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)			
Isolation method		Between the input and the NX bus: Power = Transformer, Signal = Digital isolator (no isolation between inputs)			
Unit power consumption		1.75 W max.	1.80 W max.	1.75 W max.	1.80 W max.
I/O power supply method		Supply from the NX bus			
I/O current consumption		No consumption			
Current capacity of I/O power supply terminal		0.1 A/terminal max.			
I/O refreshing method		Free-run refreshing		Switching synchronous I/O refreshing and free-run refreshing	
Terminal block type		Screwless push-in terminal 8 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)	Screwless push-in terminal 8 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)
Dimensions (W x H x D)		12 × 100 × 71 mm			
Weight		70 g max.			

Circuit layout

NX-DA2203/DA2205

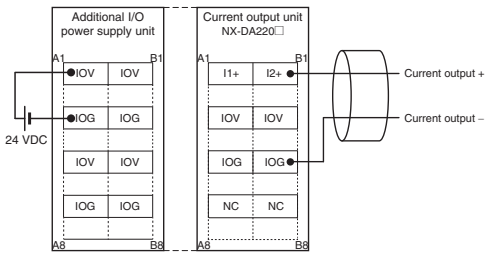


NX-DA3203/DA3205

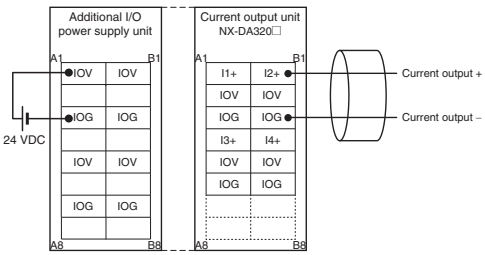


Terminal wiring

NX-DA2203/DA2205



NX-DA3203/DA3205

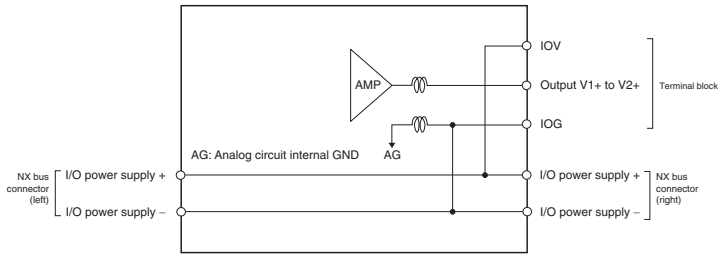


Voltage output unit

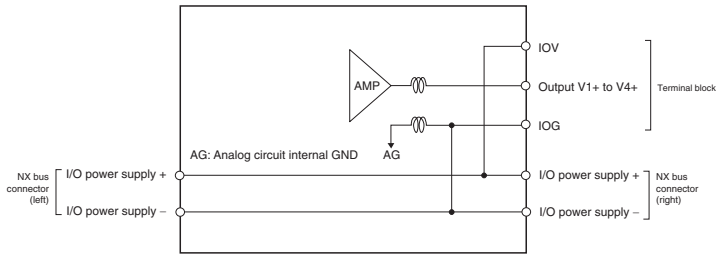
Item		Specifications			
Model		**NX-DA2603**	**NX-DA3603**	**NX-DA2605**	**NX-DA3605**
Name		Voltage output unit			
Output range		–10 to 10 V			
Capacity		2 points	4 points	2 points	4 points
Output conversion range		–5% to 105% (full scale)			
Allowable load resistance		5 kΩ min.			
Output impedance		0.5 Ω max.			
Resolution		1/8,000 (full scale)		1/30,000 (full scale)	
Overall accuracy	**25°C**	±0.3% (full scale)		±0.1% (full scale)	
	0 to 55°C	±0.5% (full scale)		±0.3% (full scale)	
Conversion time		250 μs/point		10 μs/point	
Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.			
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)			
Isolation method		Between the input and the NX bus: Power = Transformer, Signal = Digital isolator (no isolation between inputs)			
Unit power consumption		1.10 W max.	1.25 W max.	1.10 W max.	1.25 W max.
I/O power supply method		Supply from the NX bus			
I/O current consumption		No consumption			
Current capacity of I/O power supply terminal		0.1 A/terminal max.			
I/O refreshing method		Free-run refreshing		Switching synchronous I/O refreshing and free-run refreshing	
Terminal block type		Screwless push-in terminal 8 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)	Screwless push-in terminal 8 terminals (A + B)	Screwless push-in terminal 12 terminals (A + B)
Dimensions (W x H x D)		12 × 100 × 71 mm			
Weight		70 g max.			

Circuit layout

NX-DA2603/DA2605

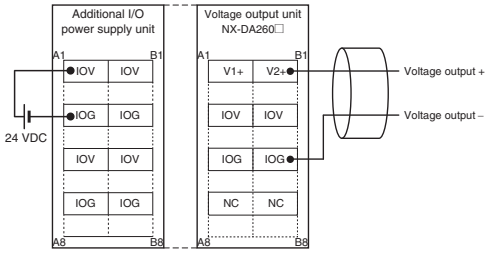


NX-DA3603/DA3605

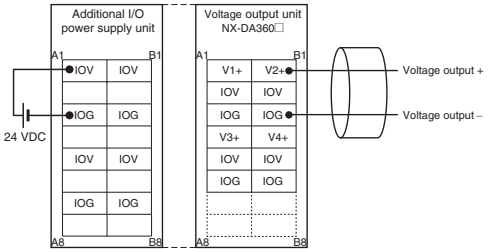


Terminal wiring

NX-DA2603/DA2605



NX-DA3603/DA3605



Temperature input unit

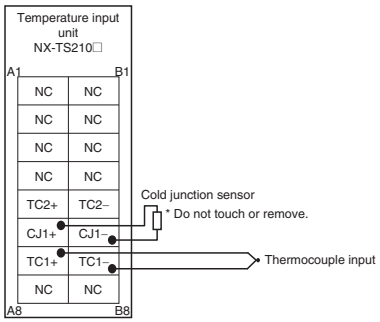
Thermocouple input unit

Item		Specifications					
Model		**NX-TS2101**	**NX-TS3101**	**NX-TS2102**	**NX-TS3102**	**NX-TS2104**	**NX-TS3104**
Name		Thermocouple type					
Capacity		2 points	4 points	2 points	4 points	2 points	4 points
Temperature sensor		K, J, T, E, L, U, N, R, S, B, WRe5-26, PLII		K, J, T, E, L, U, N, R, S, WRe5-26, PLII			
Input conversion range		±20°C of the input range					
Input detection current		Approx. 0.1 μA					
Input impedance		20 KΩ min.					
Absolute maximum rating		±130 mV					
Resolution		0.1°C max.*1		0.01°C max.		0.001°C max.	
Warm-up period		30 minutes		45 minutes			
Reference accuracy and temperature coefficient	**Conversion time**	250 ms		10 ms		60 ms	
	Temperature range	K, N (–200 to 1,300°C) J (–200 to 1,200°C) T (–200 to 400°C) E (–200 to 1,000°C) L (–200 to 900°C) U (–200 to 600°C) R, S (–50 to 1,700°C) B (0 to 1,800°C) WRe5-26 (0 to 2,300°C) PLII (0 to 1,300°C)		K, N (–200 to 1,300°C) K (-20 to 600°C, high resolution) J (–200 to 1,200°C) J (–20 to 600°C, high resolution) T (–200 to 400°C) E (–200 to 1,000°C) L (–200 to 900°C) U (–200 to 600°C) R, S (–50 to 1,700°C) WRe5-26 (0 to 2,300°C) PLII (0 to 1,300°C)			
	Accuracy*2	K/J/E/L/N/R/S/PLII (±0.1%) T (±0.2%) U (±0.15%) WRe5-26 (±0.05%)		T (±0.22%) R/S (±0.19%) N (±0.11%) U (±0.09%) K/J/E/L/WRe5-26/PLII (±0.05%)			
Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.					
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)					
Isolation method		Between the input and the NX bus: Power = Transformer Signal = Photocoupler Between inputs: Power = Transformer, Signal = Photocoupler		Between the input and the NX bus: Power = Transformer, Signal = Digital isolator Between inputs: Power = Transformer Signal = Digital isolator			
Unit power consumption		0.90 W max.	1.30 W max.	0.80 W max.	1.10 W max.	0.80 W max.	1.10 W max.
I/O power supply method		No supply					
I/O current consumption		No consumption					
Current capacity of I/O power supply terminal		Without I/O power supply terminals					
I/O refreshing method		Free-run refreshing					
Terminal block type		Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 16 terminals x 2 [(A + B) & (C + D)]	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 16 terminals x 2 [(A + B) & (C + D)]	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 16 terminals x 2 [(A + B) & (C + D)]
Dimensions (W x H x D)		12 × 100 × 71 mm	24 × 100 × 71 mm	12 × 100 × 71 mm	24 × 100 × 71 mm	12 × 100 × 71 mm	24 × 100 × 71 mm
Weight		70 g max.	140 g max.	70 g max.	140 g max.	70 g max.	140 g max.

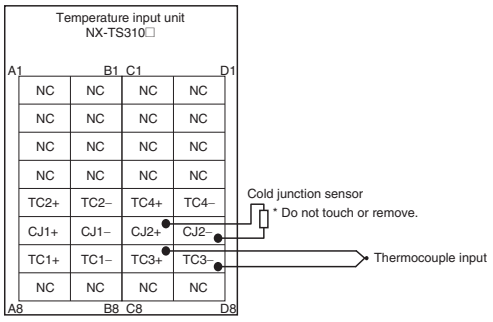
*1. The resolution is 0.2°C max. when the input type is R, S or W.
*2. Accuracy for temperature inputs as percentage of process value and typical value 25°C ambient temperature (refer to the user's manual for detailed information).

Terminal wiring

NX-TS2101/TS2102/TS2104



NX-TS3101/TS3102/TS3104



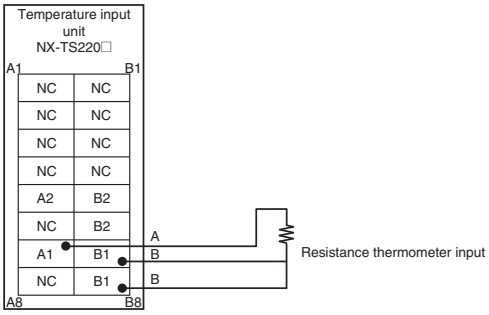
Resistance thermometer input unit

Item		Specifications					
Model		**NX-TS2201**	**NX-TS3201**	**NX-TS2202**	**NX-TS3202**	**NX-TS2204**	**NX-TS3204**
Name		Resistance thermometer type					
Capacity		2 points	4 points	2 points	4 points	2 points	4 points
Temperature sensor		Pt100 (three-wire)/Pt1000 (three-wire)		Pt100 (three-wire)		Pt100 (three-wire)/Pt1000 (three-wire)	
Input conversion range		±20°C of the input range					
Input detection current		Approx. 0.25 mA					
Resolution		0.1°C max.		0.01°C max.		0.001°C max.	
Effect of conductor resistance		0.06°C/Ω max. (also 20 Ω max.)					
Warm-up period		10 minutes		30 minutes			
Reference accuracy and temperature coefficient	**Conversion time**	250 ms		10 ms		60 ms	
	Temperature range	–200 to 850°C					
	Accuracy[*1]	±0.1%		±0.05%			
Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.					
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)					
Isolation method		Between the input and the NX bus: Power = Transformer Signal = Photocoupler Between inputs: Power = Transformer Signal = Photocoupler		Between the input and the NX bus: Power = Transformer Signal = Digital isolator Between inputs: Power = Transformer Signal = Digital isolator			
Unit power consumption		0.90 W max.	1.30 W max.	0.75 W max.	1.05 W max.	0.75 W max.	1.05 W max.
I/O power supply method		No supply					
I/O current consumption		No consumption					
Current capacity of I/O power supply terminal		Without I/O power supply terminals					
I/O refreshing method		Free-run refreshing					
Terminal block type		Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 16 terminals x 2 [(A + B) & (C + D)]	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 16 terminals x 2 [(A + B) & (C + D)]	Screwless push-in terminal 16 terminals (A + B)	Screwless push-in terminal 16 terminals x 2 [(A + B) & (C + D)]
Dimensions (W x H x D)		12 × 100 × 71 mm	24 × 100 × 71 mm	12 × 100 × 71 mm	24 × 100 × 71 mm	12 × 100 × 71 mm	24 × 100 × 71 mm
Weight		70 g max.	140 g max.	70 g max.	130 g max.	70 g max.	130 g max.

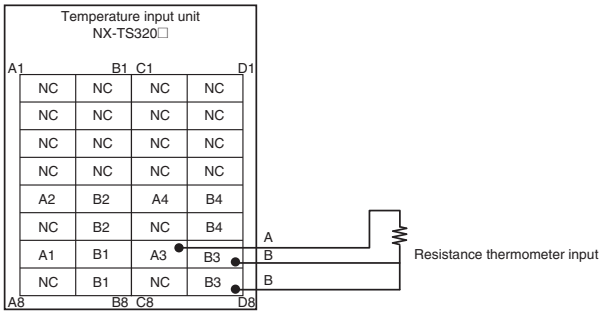
*1. Accuracy for temperature inputs as percentage of process value and typical value 25°C ambient temperature (refer to the user's manual for detailed information).

Terminal wiring

NX-TS2201/TS2202/TS2204



NX-TS3201/TS3202/TS3204

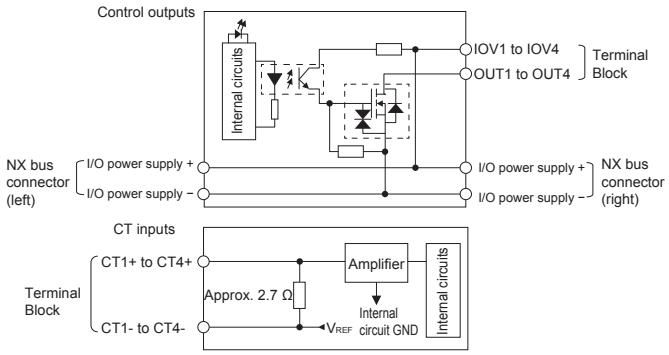


Heater burnout detection unit

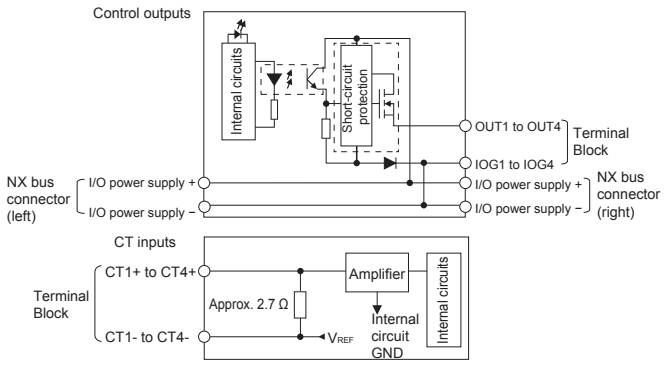
Item		Specifications	
Model		**NX-HB3101**	**NX-HB3201**
Name		Heater burnout detection unit	
Number of points		4 CT inputs and 4 control outputs	
CT inputs specifications	**CT input current range**	0 to 0.125 A	
	Input resistance	2.7 Ω approx.	
	Connectable CTs	E54-CT1 and E54-CT3	
	Max. heater current	50 A AC	
	Resolution	0.1 A	
	Overall accuracy (25°C)	± 5% (full scale) ± 1 digit	
	Influence of temperature (0 to 55°C)	± 2% (full scale) ± 1 digit	
	Conversion time	10 ms	
Control output specifications	**Internal I/O common**	NPN	PNP
	Control period	50 to 100,000 ms	
	Manipulated variable	0 to 100%	
	Resolution	1 ms	
	Rated voltage	12 to 24 VDC (10.2 to 28.8 VDC)	24 VDC (15 to 28.8 VDC)
	Max. load current	0.1 A/point, 0.4 A/unit	
	Max. inrush current	1.0 A/point max., 10 ms	
	Leakage current	0.1 mA max.	
	Residual voltage	1.5 V max.	
	Disconnection/short-circuit detection	None	
	Protective functions	None	Provided
Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.	
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)	
Isolation method		Between control output and internal circuit: Photocoupler isolation No isolation between internal circuits and CT inputs	
Unit power consumption		0.75 W max.	
I/O power supply source		Supplied from the NX bus	
Current consumption from I/O power supply		20 mA max.	
Current capacity of I/O power supply terminal		IOV: 0.1 A max. per terminal	
I/O refreshing method		Free-run refreshing	
Terminal block type		Screwless push-in terminal 16 terminals (A + B)	
Dimensions (W x H x D)		12 × 100 × 71 mm	
Weight		70 g	

Circuit layout

NX-HB3101

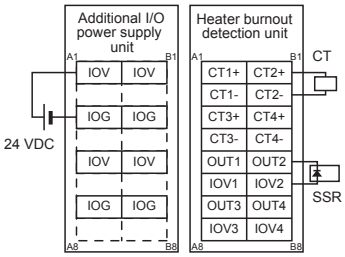


NX-HB3201

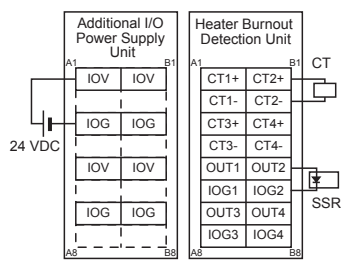


Terminal wiring

NX-HB3101



NX-HB3201



Position interface unit

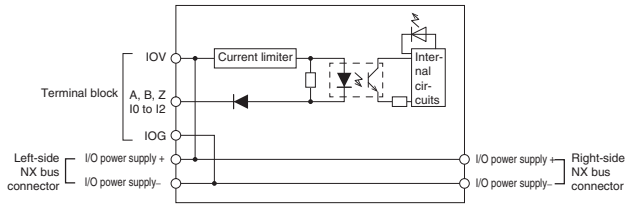
Incremental encoder input unit

Item			Specifications					
Model			**NX-EC0112**	**NX-EC0122**	**NX-EC0212**	**NX-EC0222**	**NX-EC0132**	**NX-EC0142**
Name			Incremental encoder input unit					
Number of channels			1 channel		2 channels		1 channel	
Input signals			Counter: Phases A, B and Z External inputs: 3		Counter: Phases A, B and Z External inputs: None		Counter: Phases A, B and Z External inputs: 3	
Input form	**Type**		NPN type 500 kHz	PNP type 500 kHz	NPN type 500 kHz	PNP type 500 kHz	Line driver, 4 MHz	
	Specifications	**Voltage**	20.4 to 28.8 VDC (24 VDC +20%/–15%) ON voltage: 19.6 VDC min./3 mA min. OFF voltage: 4.0 VDC max./1 mA max.				EIA standard RS-422-A line driver levels Impedance: 120 Ω ±5% Level input voltage: V_{IT+}: 0.1 V min. V_{IT-}: 0.1 V min. Hysteresis voltage: Vhys (V_{IT+} - V_{IT-}): 60 Mv	
		Current	4.2 mA (24 VDC)					
		5 V power supply for encoder	–				Output voltage: 5 VDC ±5% Output current: 500 mA max.	
		Maximum response frequency	Phases A and B: Single-phase 500 kHz (phase difference pulse input × 4: 125 kHz), Phase Z: 125 kHz				Phases A and B: Single-phase 4 MHz (phase differential pulse input × 4: 1 MHz), Phase Z: 1 MHz	
Counting units			Pulses					
Pulse input method			Phase difference pulse (multiplication × 2/4), pulse + direction inputs or up and down pulse inputs					
Counter range			–2,147,483,648 to 2,147,483,647 pulses					
Counter functions	**Type**		Ring counter or linear counter					
	Controls		Gate control, counter reset and counter preset					
	Latch function		Two external input latches and one internal latch					
	Measurements		Pulse rate measurement and pulse period measurement					
External input specifications	**Input voltage**		20.4 to 28.8 VDC (24 VDC +20%/–15%)		–		20.4 to 28.8 VDC (24 VDC +20%/–15%)	
	Input current		4.6 mA (24 VDC)		–		3.5 mA (24 VDC)	
	ON voltage/ON current		15 VDC min./3 mA min.		–		15 VDC min./3 mA min.	
	OFF voltage/OFF current		4.0 VDC max./1 mA max.		–		5.0 VDC max./1 mA max.	
	ON/OFF response time		1 μs max./2 μs max.		–		1 μs max./1 μs max.	
	Internal I/O common		NPN	PNP	–		NPN	PNP
Dielectric strength			510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.					
Insulation resistance			20 MΩ min. between isolated circuits (at 100 VDC)					
Isolation method			Photocoupler isolation				Digital isolator	
Unit power consumption			0.85 W max.	0.95 W max.	0.85 W max.	0.95 W max.	0.95 W max.	1.05 W max.
I/O power supply source			Supplied from the NX bus. 20.4 to 28.8 VDC (24 VDC +20%/–15%)					
Current consumption from I/O power supply			None				30 mA	
Current capacity of I/O power supply terminal			0.3 A max. per terminal for encoder supply section and 0.1 A max. per terminal for other sections		0.3 A max. per terminal		0.1 A max. per terminal	
I/O refreshing method			Free-run refreshing or synchronous I/O refreshing*1					
Terminal block type			Screwless push-in terminal 16 terminals (A + B)		Screwless push-in terminal 12 terminals (A + B)		Screwless push-in terminal 12 terminals x 2 [(A + B) x 2]	
Dimensions (W x H x D)			12 × 100 × 71 mm				24 × 100 × 71 mm	
Weight			70 g				130 g	
Failure detection			None					
Protection			None					

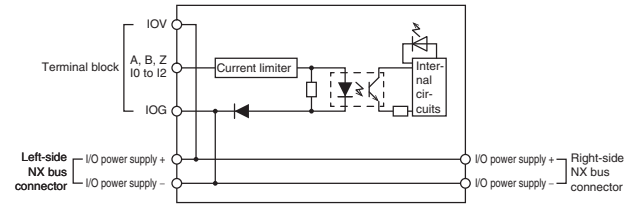
*1. The I/O refreshing method is automatically set according to the connected communication unit and CPU unit.

Circuit layout

NX-EC0112

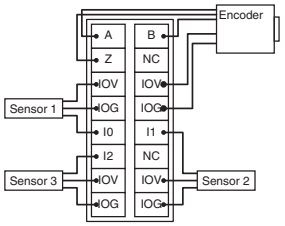


NX-EC0122

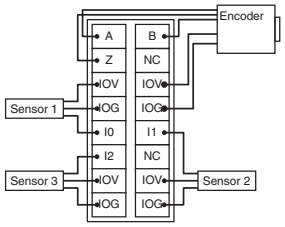


Terminal wiring

NX-EC0112

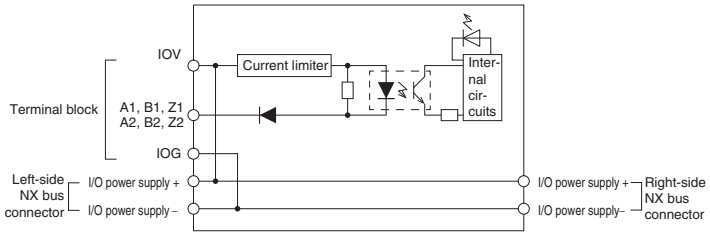


NX-EC0122

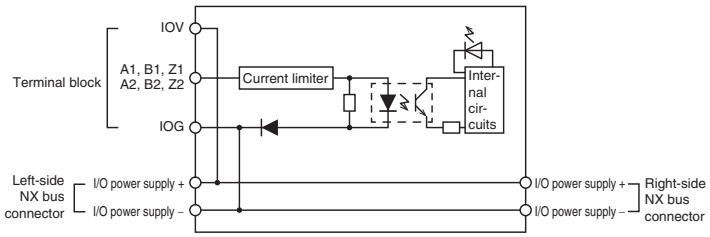


Circuit layout

NX-EC0212

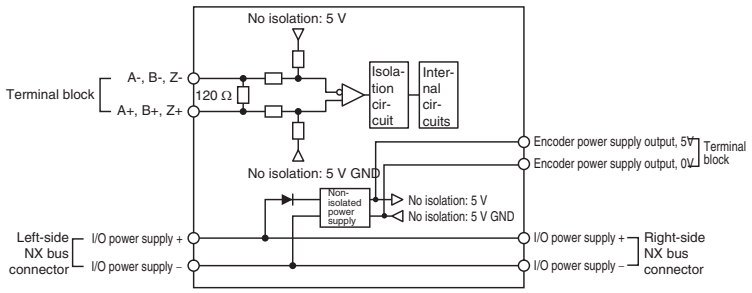


NX-EC0222

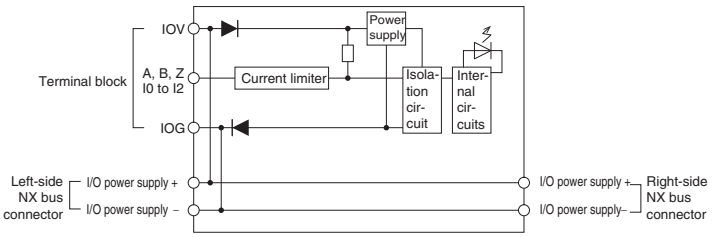


NX-EC0132/EC0142

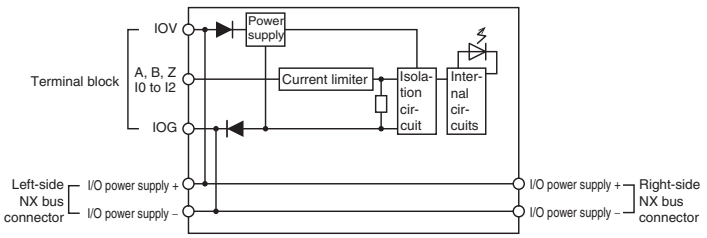
Encoder Input (NX-EC0132/EC0142)



External Inputs (NX-EC0132)

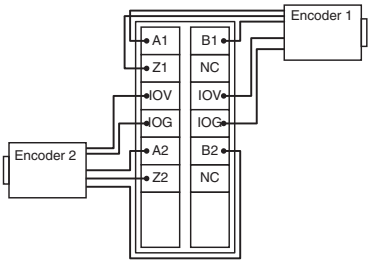


External Inputs (NX-EC0142)

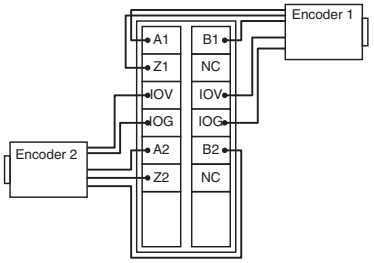


Terminal wiring

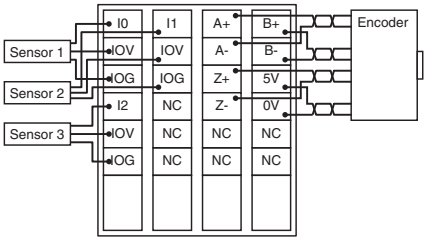
NX-EC0212



NX-EC0222



NX-EC0132/EC0142



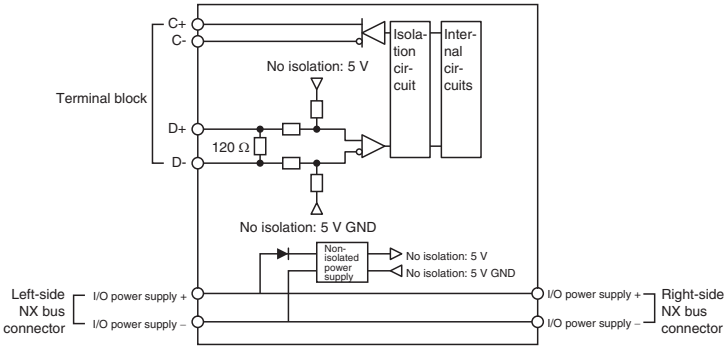
SSI input unit

Item	Specifications	
Model	**NX-ECS112**	**NX-ECS212**
Name	SSI input unit	
Number of channels	1 channel	2 channels
Input signals	External inputs: 2 data input (D+, D–) External outputs: 2 clock output (C+, C–)	
I/O interface	Synchronous serial interface (SSI), 2 MHz	
Clock output	EIA standard RS-422-A line driver levels	
Data input	EIA standard RS-422-A line receiver levels	
Maximum data length	32 bits (the single-turn, multi-turn and status data length can be set)	
Coding method	No conversion, binary code or gray code	
Baud rate	100 kHz, 200 kHz, 300 kHz, 400 kHz, 500 kHz, 1.0 MHz, 1.5 MHz or 2.0 MHz	
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.	
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)	
Isolation method	Digital isolator	
Unit power consumption	0.85 W max.	0.90 W max.
I/O power supply source	Supplied from the NX bus. 20.4 to 28.8 VDC (24 VDC +20%/–15%)	
Current consumption from I/O power supply	20 mA	30 mA
Current capacity of I/O power supply terminal	0.3 A max. per terminal	
I/O refreshing method	Free-run refreshing or synchronous I/O refreshing*1	
Terminal block type	Screwless push-in terminal 12 terminals (C + D)	Screwless push-in terminal 12 terminals (C + D)
Dimensions (W x H x D)	12 x 100 x 71 mm	
Weight	65 g	
Maximum transmission distance*2	100 kHz (400 m), 200 kHz (190 m), 300 kHz (120 m), 400 kHz (80 m), 500 kHz (60 m), 1.0 MHz (25 m), 1.5 MHz (10 m) or 2.0 MHz (5 m)	
Failure detection	None	
Protection	None	

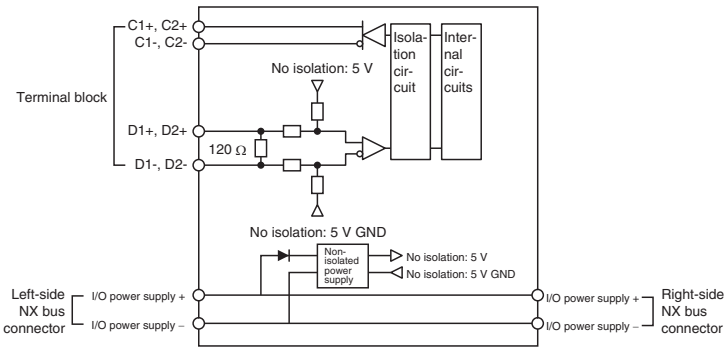
*1. The I/O refreshing method is automatically set according to the connected communication unit and CPU unit.
*2. The maximum transmission distance for an SSI input unit depends on the baud rate due to the delay that can result from the responsiveness of the connected encoder and cable impedance. The maximum transmission distance is only a guideline. Review the specifications for the cables and encoders in the system and evaluate the operation of the equipment before use.

Circuit layout

NX-ECS112

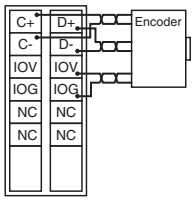


NX-ECS212

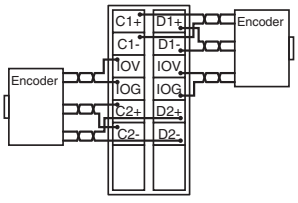


Terminal wiring

NX-ECS112



NX-ECS212



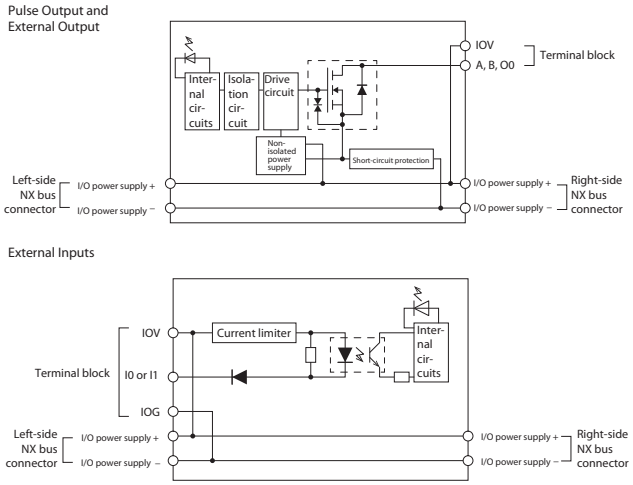
Pulse output unit

Item		Specifications					
Model		**NX-PG0112**	**NX-PG0122**	**NX-PG0232-5**	**NX-PG0242-5**	**NX-PG0332-5**	**NX-PG0342-5**
Name		Pulse output unit					
Number of axes		1 axis		2 axis		4 axis	
I/O signals		External inputs: 2 general-purpose inputs / External outputs: 3 (forward direction pulse, reverse direction pulse and a general-purpose outputs)		Inputs: 5 per axis. External inputs*1 Outputs: 5 per axis (forward direction pulse, reverse direction pulse and 3 external outputs per channel*2)			
Control method		Open-loop control through pulse train output		Open-loop control through pulse string output			
Controlled drive		Servo drive with a pulse train input or a stepper motor drive		Servo drive with a pulse string input or a stepper motor drive			
Pulse output form		Open collector output		Line driver output			
Control unit		Pulses					
Maximum pulse output speed		500 kpps		4 Mpps			
Pulse output method		Forward/reverse direction pulse outputs or pulse + direction outputs		Forward/reverse direction pulse outputs, pulse + direction outputs or phase differential pulse output multiplication x1/2/4			
Position control range		–2,147,483,648 to 2,147,483,647 pulses					
Velocity control range		1 to 500,000 pps		1 to 4,000,000 pps			
Positioning*3	**Single-axis position control**	Absolute positioning, relative positioning and interrupt feeding					
	Single-axis velocity control	Velocity control (velocity feeding in position control mode)					
	Single-axis synchronized control	Cam operation and gear operation					
	Single-axis manual operation	Jogging					
	Auxiliary function for single-axis control	Homing, stopping and override changes					
External input specifications	**Input voltage**	20.4 to 28.8 VDC (24 VDC +20%/–15%)		21.6 to 26.4 VDC (24 VDC +10%/–10%)			
	Input current	4.6 mA (24 VDC)					
	ON voltage/ON current	15 VDC min./3 mA min.					
	OFF voltage/OFF current	4.0 VDC max./1 mA max.					
	ON/OFF response time	1 μs max./2 μs max.		External inputs 0 and 1: 1 μs max./2 μs max. External inputs 2 to 4: 20 μs max./400 μs max.			
	Internal I/O common processing	NPN	PNP	NPN	PNP	NPN	PNP
Line receiver inputs specifications	**Input voltage**	-		EIA standard RS-422-A line driver levels			
	High/Low level input voltage			V_{IT+}: 0.1 V min./V_{IT-}: -0.1 V max.			
	Input impedance			120 Ω ±5%			
	Hysteresis voltage			Vhys (V_{IT+}-V_{IT-}): 60 mV			
External output specifications	**Rated voltage**	24 VDC (15 to 28.8 VDC)					
	Maximum load current	30 mA					
	ON/OFF response time	5 μs max./5 μs max.		External output 0: 5 μs max./5 μs max. External output 1 and 2: 0.5 ms max./1 ms max.	External output 0: 5 μs max./200 μs max. External output 1 and 2: 0.5 ms max./1 ms max.	External output 0: 5 μs max./5 μs max. External output 1 and 2: 0.5 ms max./1 ms max.	External output 0: 5 μs max./200 μs max. External output 1 and 2: 0.5 ms max./1 ms max.
	Internal I/O common processing	NPN	PNP	NPN	PNP	NPN	PNP
	Residual voltage	1.0 V max.					
	Leakage current	0.1 mA					
Line driver output specifications	**Output voltage**	-		RS-422-A line driver level (equivalent to AM26C31)			
	Maximum load current			20 mA			
	Maximum output frequency			4 Mpps			
Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.					
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)					
Isolation method		External inputs: Photocoupler isolation External outputs: Digital isolator					
Unit power consumption		0.8 W max.	0.9 W max.	1.20 W max.		1.30 W max.	
I/O power supply source		Supplied from the NX bus. 20.4 to 28.8 VDC (24 VDC +20%/–15%)		Supplied from external source. 20.4 to 28.8 VDC (24 VDC +20%/–15%)			
Current consumption from I/O power supply		20 mA		50 mA		50 mA/CN max.	
Current capacity of I/O power supply terminal		0.1 A max. per terminal		Without I/O power supply terminal			
Cable length		3 m max.		Line driver outputs: 10 m max. Other I/O: 3 m max.			
I/O refreshing method		Synchronous I/O refreshing*4					
Terminal block type		Screwless push-in terminal 16 terminals (A + B)		MIL connector 34 terminals		2 MIL connectors 34 terminals	
Dimensions (W x H x D)		12 × 100 × 71 mm		30 × 100 × 71 mm			
Weight		70 g		110 g		150 g	
Failure detection		None					
Protection		None					

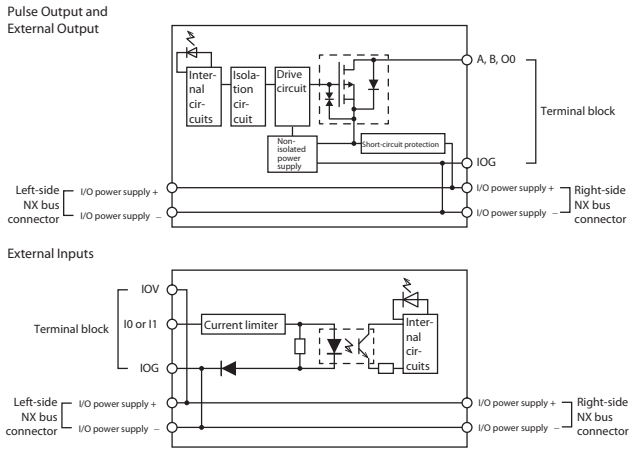
*1. You can use the external input 0 as a latch input.
*2. You can use the external output 0 as an error counter reset output.
*3. These functions are supported when you also use the MC function module in the NJ-series CPU unit. Refer to the NJ-series CPU unit motion control user's manual (Cat.No. W507) for details. A pulse output unit only outputs pulses during the control period based on commands received at a fixed period. Target position calculations (distribution calculations) for acceleration/deceleration control or for each control period must be performed on the controller that is connected as the host.
*4. The I/O refreshing method is automatically set according to the connected communication unit and CPU unit.

Circuit layout

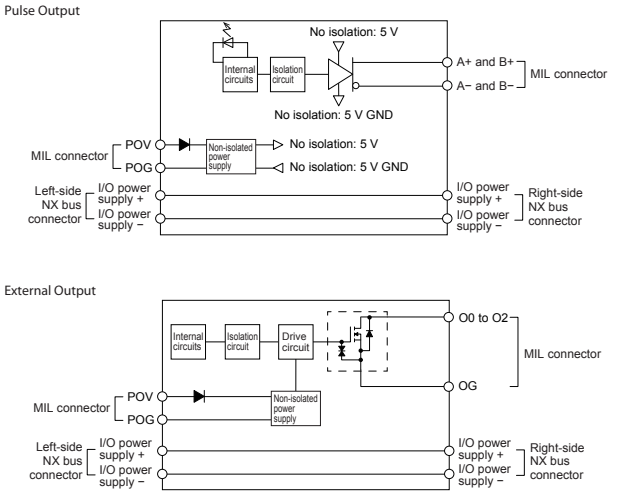
NX-PG0112



NX-PG0122

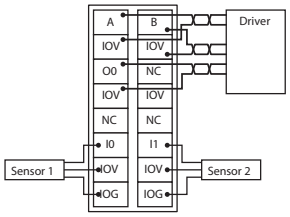


NX-PG0232-5/PG0332-5

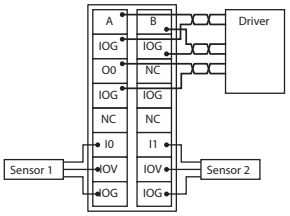


Terminal wiring

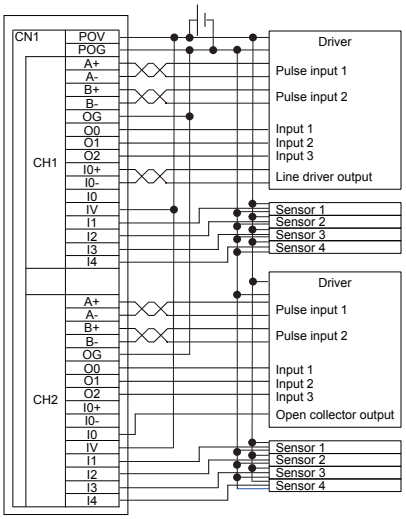
NX-PG0112



NX-PG0122

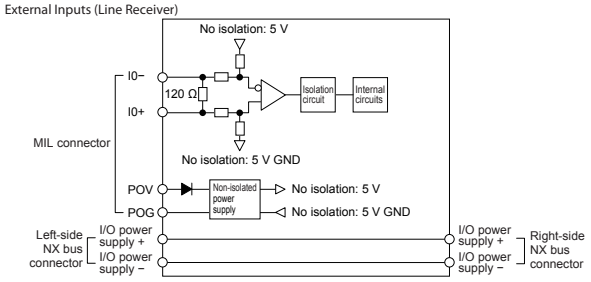


NX-PG0232-5/PG0332-5

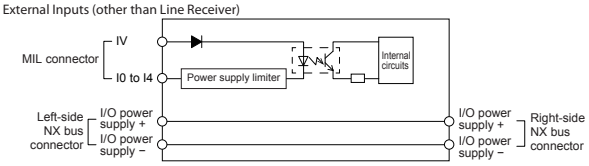


Circuit layout

External Inputs (Line Receiver)



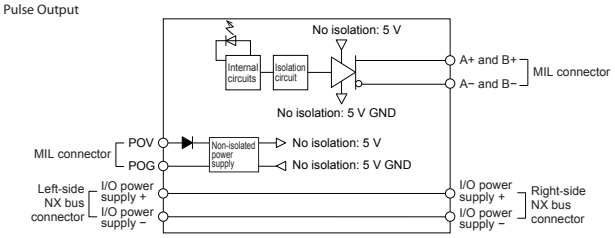
External Inputs (other than Line Receiver)



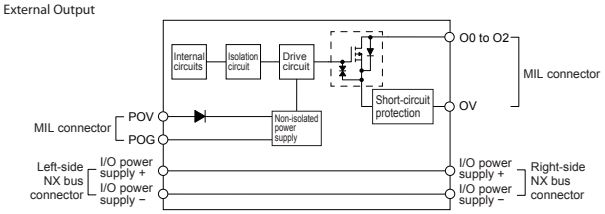
Terminal wiring

NX-PG0242-5/PG0342-5

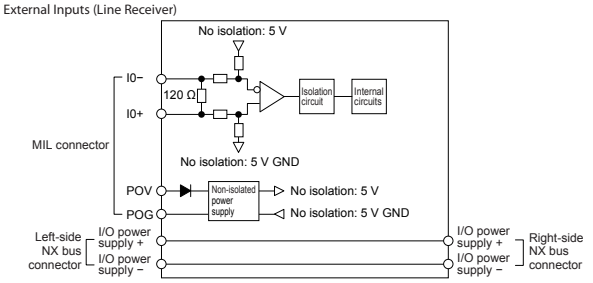
Pulse Output



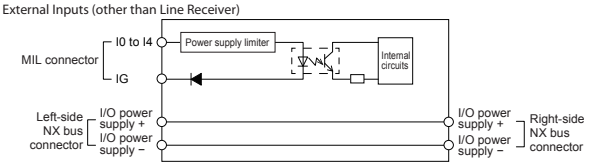
External Output



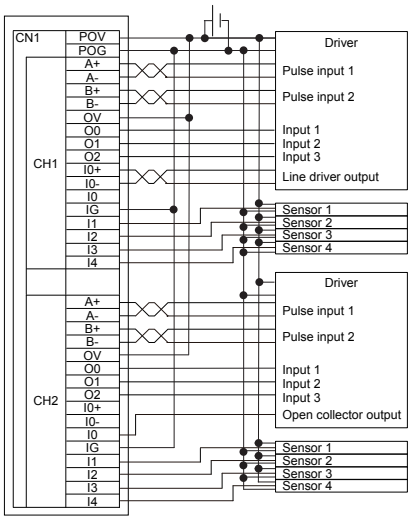
External Inputs (Line Receiver)



External Inputs (other than Line Receiver)



NX-PG0242-5/PG0342-5



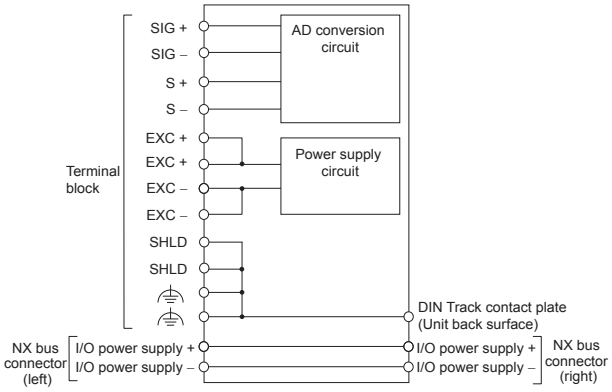
Load cell input unit

Item		Specifications
Model		**NX-RS1201**
Name		Load cell input unit
Number of inputs		1 input
Input range		-5.0 to 5.0 mV/V
Input conversion range		-5.5 to 5.5 mV/V
Load cell excitation voltage		5 VDC ±10%, output current: 60 mA max.
Zero point adjustment range		-5.0 to 5.0 mV/V
Gain point adjustment range		-5.0 to 5.0 mV/V
Accuracy[*1]	**Nonlinearity**	±0.01% (full scale)[*2]
	Zero drift	±0.1 μV/°C RTI
	Gain drift	±10 ppm/°C
A/D converter resolution		24 bits
Conversion cycle		125 μs
Warm-up period		30 minutes
Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)
Isolation method		Between the input and the NX bus: Power = Transformer, Signal = Digital isolator
Unit power consumption		1.70 W max.
I/O power supply source		No supply
Current consumption from I/O power supply		No consumption
Current capacity of I/O power supply terminal		Without I/O power supply terminals
I/O refreshing method		Free-run refreshing or synchronous I/O refreshing[*3]
Terminal block type		Screwless push-in terminal 16 terminals (A + B with FG)
Dimensions (W x H x D)		12 × 100 × 71 mm
Weight		70 g max.

*1. Accuracy when the load cell and the load cell input unit are connected with the 6-wire connection.
*2. The value for when the load cell unit is used in the following conditions: Full scale: 0.0 to 5.0 mV/V or -5.0 to 0.0 mV/V. Ambient temperature: 25°C. Setting of digital filtering: Default.
*3. The I/O refreshing method is automatically set according to the connected communication unit and CPU unit.

Circuit layout

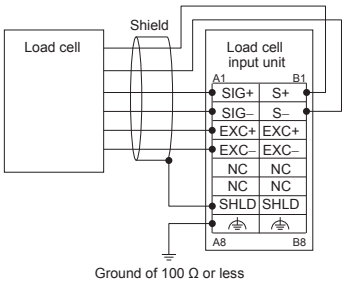
NX-RS1201



Terminal wiring

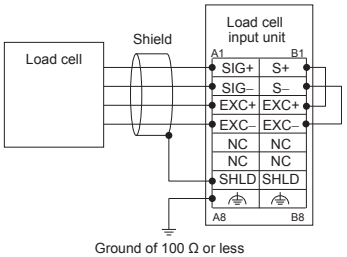
NX-RS1201

Diagram of the 6-wire connection between the Unit and a load cell.



Ground of 100 Ω or less

Diagram of the 4-wire connection between the Unit and a load cell.



Ground of 100 Ω or less

Communication interface unit

Item		Specifications		
Model		**NX-CIF101**	**NX-CIF210**	**NX-CIF105**
Name		Communication interface unit		
Communication ports		RS-232C		RS-422A/485
Number of ports		1	2	1
Communication specifications	**Communication method**	Full duplex		Half duplex for two-wire connection Full duplex for four-wire connection
	Signal lines[*1]	-		Two lines or four lines
	Baud rate [bps][*1]	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 or 230400		
	Data length [bits][*1]	7 or 8		
	Parity[*1]	Even, odd or none		
	Start bits/Stop bits [bits][*1]	Always 1/1 or 2		
	Flow control[*1]	None, RS/CS flow control or Xon/Xoff control		None or Xon/Xoff control
	Flow control target[*1]	Send/receive, send only or receive only		
	Initial RS signal value[*1*2]	ON or OFF		
	Number of characters to determine the end[*1*3]	0 to 10,000 (in increments of 0.1 character) 0: The end is not detected		
	Max. communication distance	15 m[*4]		1200 m[*5]
	Connection configuration	1:1		1:N (max. value of N is 32) You can change between two-wire and four-wire connections
PDO data size [bytes][*1]		Inputs or outputs: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76 or 80		
Transmission buffering enable/disable setting[*1]		Enabled or disabled		
Functions to back up data		Provided[*6]		
Terminating resistance setting		-		Possible
Isolation method		No-isolation		Power supply: Transformer and photocoupler Signals: Digital isolators
Unit power consumption		0.9 W max.		1.45 W max.
I/O refreshing method		Free-run refreshing		
Terminal block type		Screwless push-in terminal 16 terminals (A + B with FG)	D-Sub 9pin connector	Screwless push-in terminal 16 terminals (A + B with FG)
Dimensions (W x H x D)		12 × 100 × 71 mm	30 × 100 × 71 mm	12 × 100 × 71 mm
Weight		66 g max.	91 g max.	69 g max.

*1. Setting is possible in the unit operation settings of the Sysmac Studio software.
*2. This is the value of the RS signal when the port enters the operational state or immediately after the port is restarted. The initial value is disabled when RS/CS flow control is set. It is also disable for the NX-CIF105.
*3. This setting is provided for communication protocols that assume the end of the data if data is not received for a specific period of time. For example, if the number of characters to determine the end is set to 35, the end of the data will be assumed if data is not received for the time required to receive 3.5 characters.
*4. If the baud rate is set to higher than 19,200 bps, refer to the manual for the remote communications device.
*5. The maximum total cable length for multidrop connections is 1200 m.
*6. The settings that are backed up are saved in memory in the communication coupler unit, not in the communication interface unit.

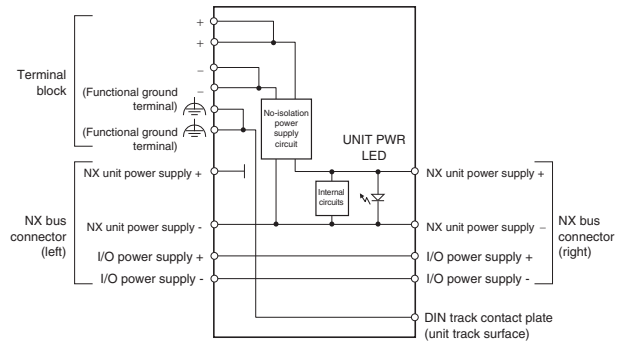
Power unit

NX bus power supply unit

Item	Specifications
Model	**NX-PD1000**
Name	NX bus power supply unit
Power supply voltage	24 VDC (20.4 to 28.8 VDC)
NX unit power supply capacity	10 W max. (refer to installation orientation and restrictions for details)
NX unit power supply efficiency	70%
Unwired terminal current capacity	4 A max. (including the current of through wiring)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Isolation method	No-isolation
Unit power consumption	0.45 W max.
I/O current consumption	No consumption
Terminal block type	Screwless push-in terminal 8 terminals (A + B with FG)
Dimensions (W x H x D)	12 × 100 × 71 mm
Weight	65 g max.

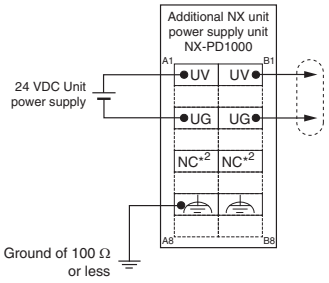
Circuit layout

NX-PD1000



Terminal wiring

NX-PD1000



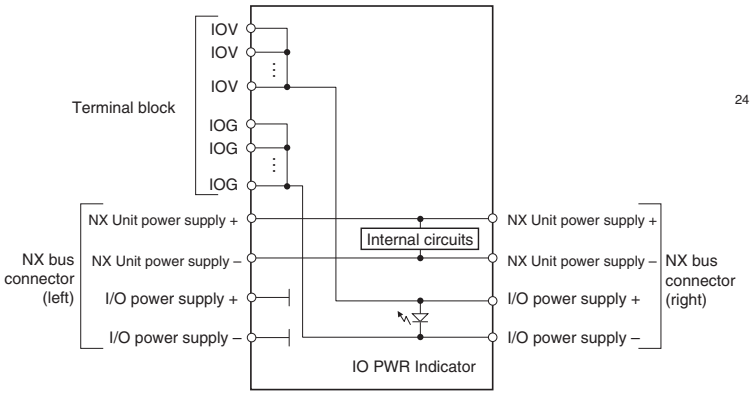
I/O power feed unit

Item	Specifications	
Model	**NX-PF0630**	**NX-PF0730**
Name	Additional I/O power supply unit	
Power supply voltage	5 to 24 VDC (4.5 to 28.8 VDC)*1	
I/O power supply maximum current	4 A	10 A
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.	
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)	
Isolation method	No-isolation	
Unit power consumption	0.45 W max.	
I/O current consumption	10 mA max.	
Current capacity of I/O power supply terminal	4 A max.	10 A max.
Terminal block type	Screwless push-in terminal 8 terminals (A + B)	
Dimensions (W x H x D)	12 × 100 × 71 mm	
Weight	65 g max.	

*1. Use an output voltage that is appropriate for the I/O circuits of the NX units and the connected external devices.

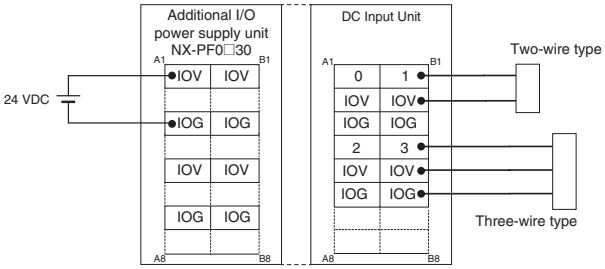
Circuit layout

NX-PF0630/PF0730



Terminal wiring

NX-PF0630/PF0730

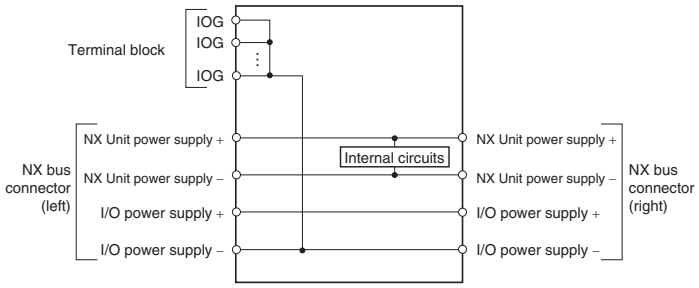


I/O power supply connection unit

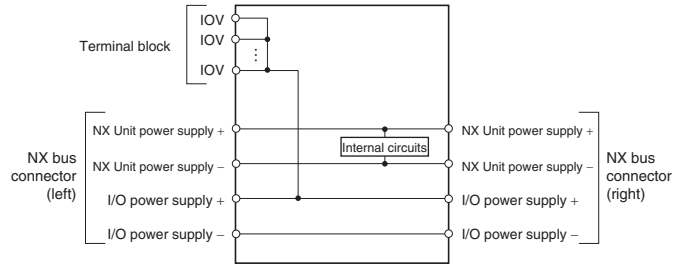
Item	Specifications		
Model	**NX-PC0010**	**NX-PC0020**	**NX-PC0030**
Name	I/O power supply connection unit		
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.		
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)		
Isolation method	No-isolation		
Unit power consumption	0.45 W max.		
I/O current consumption	No consumption		
Current capacity of I/O power supply terminal	4 A/terminal max.		
Terminal block type	Screwless push-in terminal 16 terminals (A + B)		
Number of I/O power supply terminals	IOG: 16 terminals	IOV: 16 terminals	IOG: 8 terminals IOV: 8 terminals
Dimensions (W x H x D)	12 × 100 × 71 mm		
Weight	65 g max.		

Circuit layout

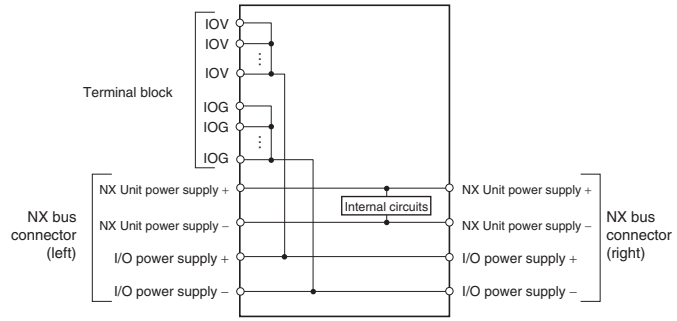
NX-PC0010



NX-PC0020

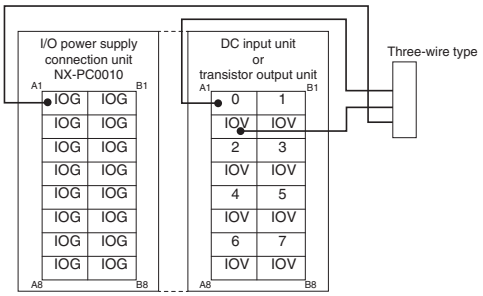


NX-PC0030

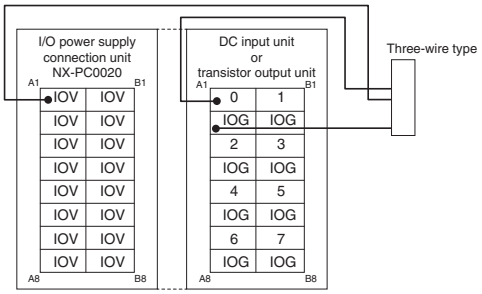


Terminal wiring

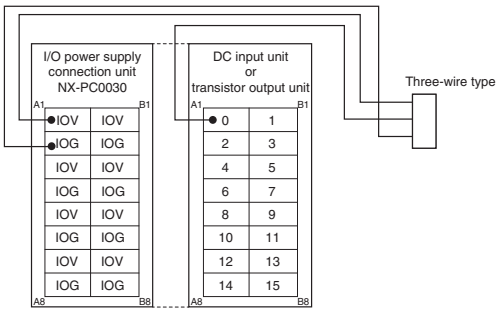
NX-PC0010



NX-PC0020



NX-PC0030



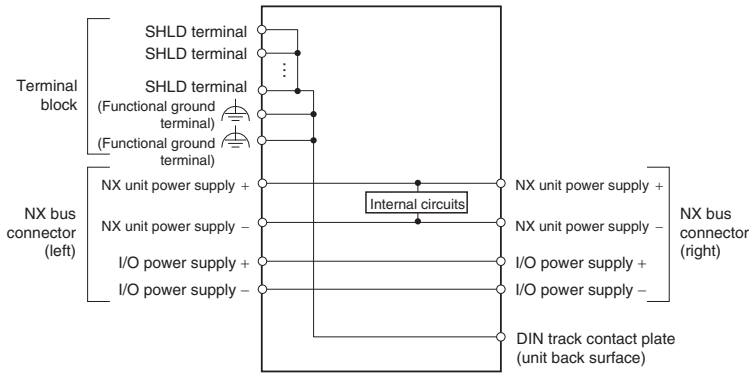
System unit

Shield connection unit (grounding terminal)

Item	Specifications
Model	**NX-TBX01**
Name	Shield connection unit
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Isolation method	Isolation between the SHLD functional ground terminal and internal circuit: no-isolation
Unit power consumption	0.45 W max.
I/O current consumption	No consumption
Terminal block type	Screwless push-in terminal 16 terminals (A + B with FG)
Number of shield terminals	14 terminals (the following two terminals are Functional Ground terminals)
Dimensions (W x H x D)	12 × 100 × 71 mm
Weight	65 g max.

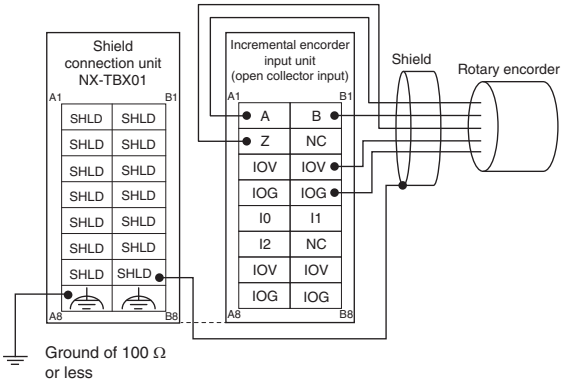
Circuit layout

NX-TBX01



Terminal wiring

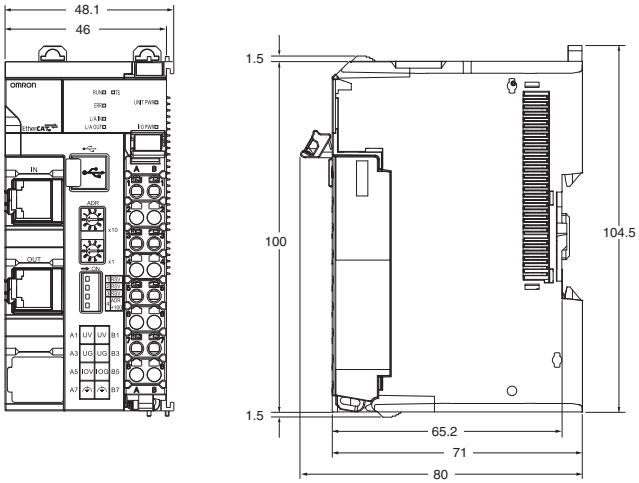
NX-TBX01



Dimensions

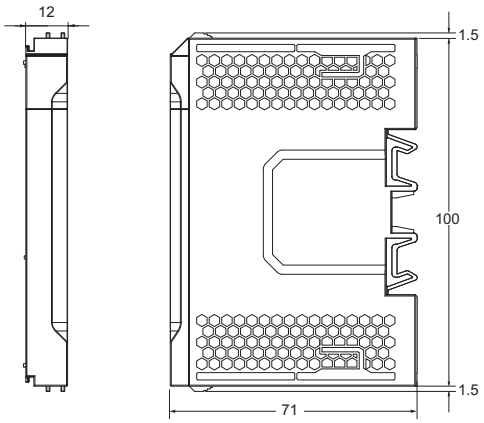
EtherCAT coupler unit

NX-ECC20□



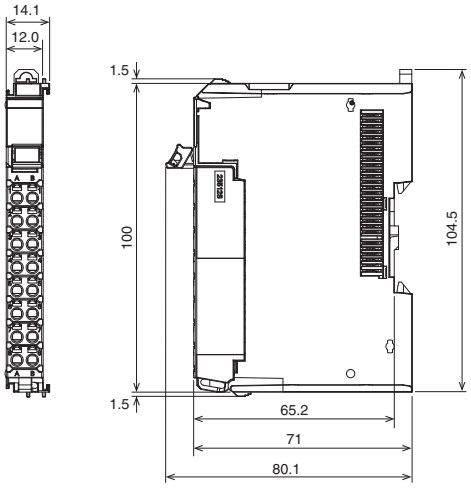
End cover unit

NX-END01

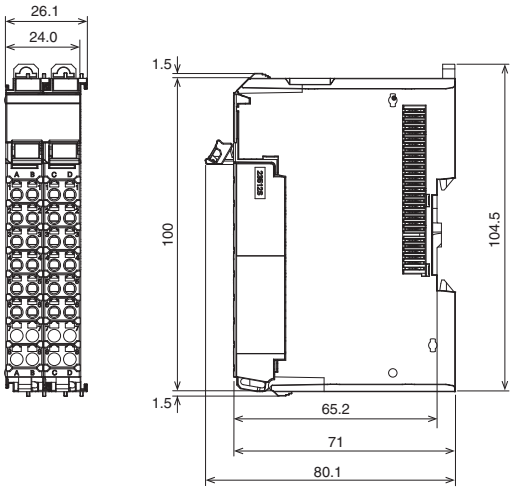


I/O unit with screwless push-in terminal

12 mm width

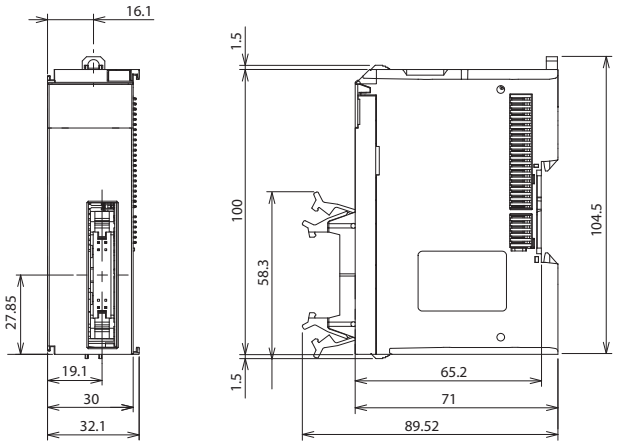


24 mm width

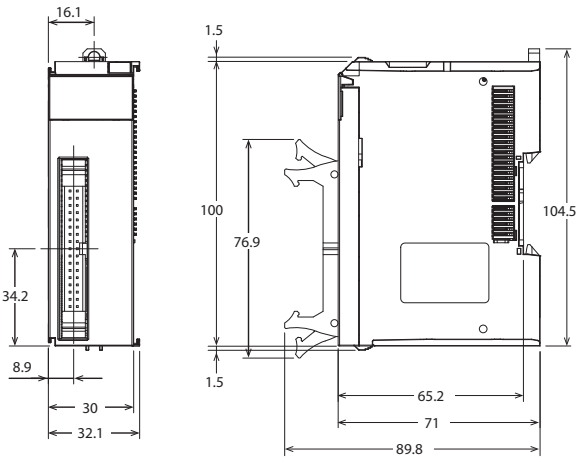


I/O unit with MIL connector

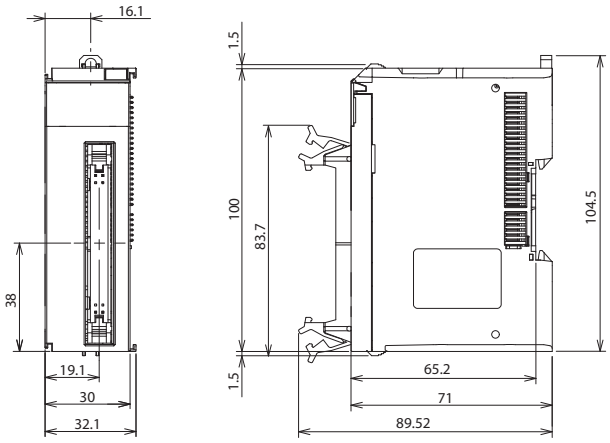
1 connector with 20 terminals



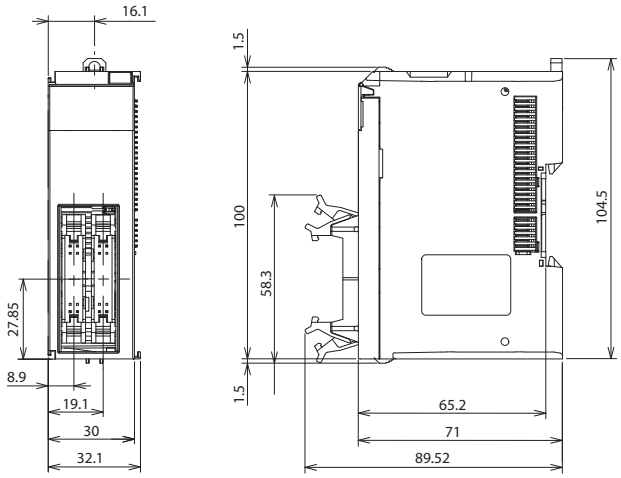
1 connector with 34 terminals



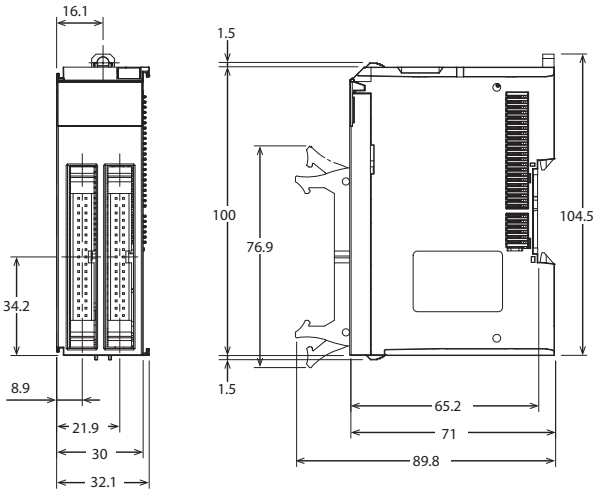
1 connector with 40 terminals



2 connectors with 20 terminals

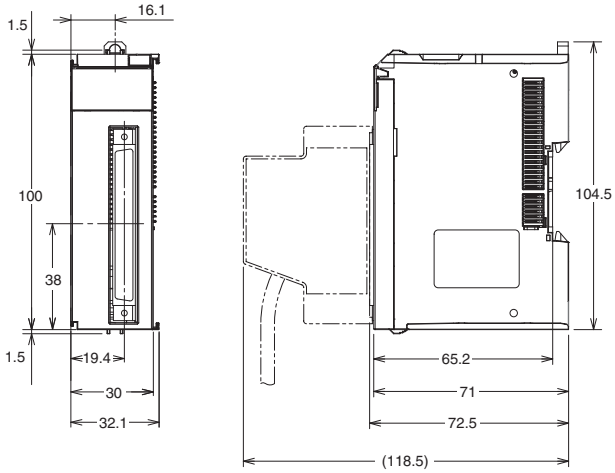


2 connectors with 34 terminals

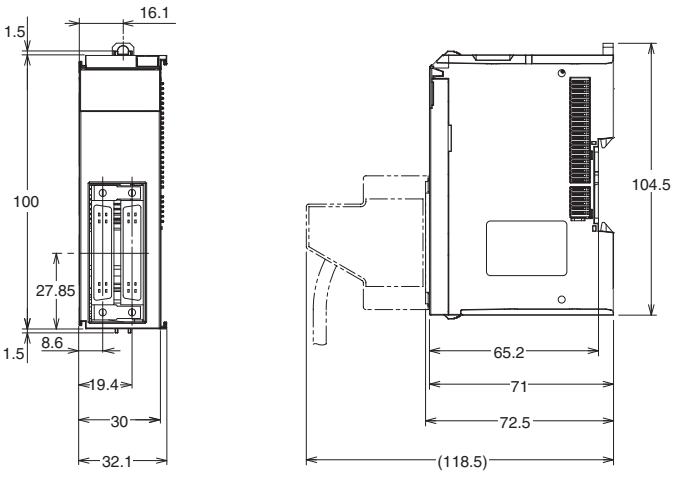


I/O unit with Fujitsu connector

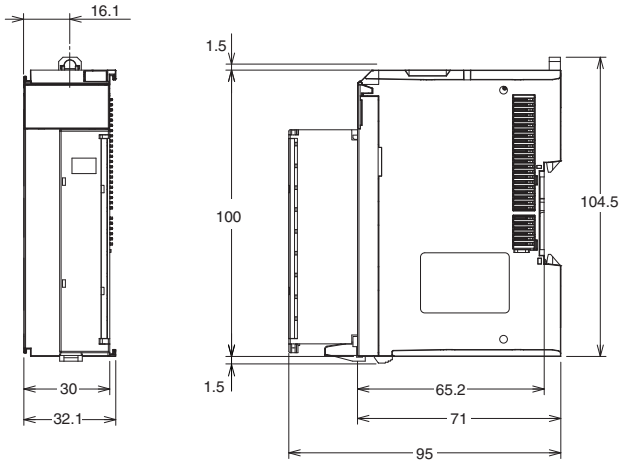
1 connector with 40 terminals



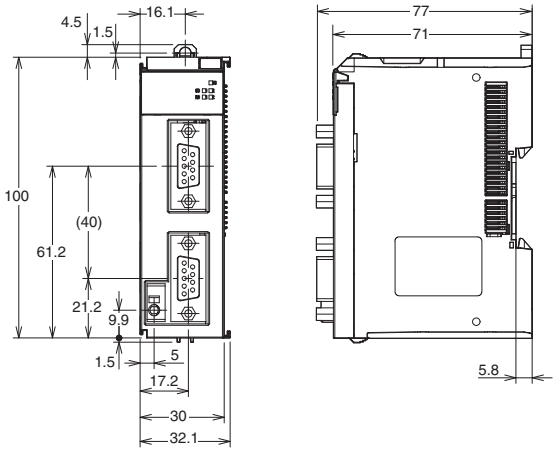
2 connectors with 24 terminals



I/O unit with M3 screw terminal block



I/O unit with D-Sub connector



Ordering information

EtherCAT coupler unit

Type	Protocol	Communications cycle in DC mode*1	Specifications	Connection	I/O power supply	Width	Model
Communication coupler	EtherCAT slave	125 to 10,000 μs	Up to 63 I/O units Max. 1024 bytes in + 1024 bytes out Supports distributed clock	2 RJ45 ports (in + out)	10.0 A max.	46 mm	NX-ECC203

*1. This depends on the specifications of the EtherCAT master and the unit configuration.

IO-Link master unit

Type	No. of ports	I/O refresh method	Connection type*1	Width	Model
IO-Link master	4	Free run	Screwless push-in (NX-TBA162)	12 mm	NX-ILM400

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Note: For more detailed information about IO-Link master unit, refer to “IO-Link master datasheet (I191E-EN)”.

I/O unit

Digital I/O

Type	Channels, signal type	Performance*1, I/O refresh method	Connection type*2	Width	Model	NPN type*3
DC digital input	4 inputs, 3-wire connection	High-speed synchronous time stamp	Screwless push-in (NX-TBA122)	12 mm	NX-ID3444	NX-ID3344
		High-speed synchronous/free run	Screwless push-in (NX-TBA122)	12 mm	NX-ID3443	NX-ID3343
		Synchronous/free run	Screwless push-in (NX-TBA122)	12 mm	NX-ID3417	NX-ID3317
	8 inputs, 2-wire connection		Screwless push-in (NX-TBA162)	12 mm	NX-ID4442	NX-ID4342
	16 inputs, 1-wire connection		Screwless push-in (NX-TBA162)	12 mm	NX-ID5442	NX-ID5342
			M3 screw terminal block	30 mm	NX-ID5142-1	NX-ID5142-1
			1 x 20-pin MIL connector	30 mm	NX-ID5142-5	NX-ID5142-5
	32 inputs, 1-wire connection		1 x 40-pin MIL connector	30 mm	NX-ID6142-5	NX-ID6142-5
			1 x 40-pin Fujitsu connector	30 mm	NX-ID6142-6	NX-ID6142-6
AC digital input	4 inputs, 200-240 VAC, 50/60 Hz	Free run	Screwless push-in (NX-TBA082)	12 mm	NX-IA3117	-
DC digital output	2 outputs 0.5 A, 3-wire connection	High-speed synchronous time stamp	Screwless push-in (NX-TBA082)	12 mm	NX-OD2258	NX-OD2154
	4 outputs 0.5 A, 3-wire connection	High-speed synchronous/free run	Screwless push-in (NX-TBA122)	12 mm	NX-OD3257	NX-OD3153
		Synchronous/free run	Screwless push-in (NX-TBA122)	12 mm	NX-OD3256	NX-OD3121
	4 outputs 2 A, 3-wire connection		Screwless push-in (NX-TBA162)	12 mm	NX-OD3268	-
	8 outputs 0.5 A, 2-wire connection		Screwless push-in (NX-TBA162)	12 mm	NX-OD4256	NX-OD4121
	16 outputs 0.5 A, 1-wire connection		Screwless push-in (NX-TBA162)	12 mm	NX-OD5256	NX-OD5121
			M3 screw terminal block	30 mm	NX-OD5256-1	NX-OD5121-1
			1 x 20-pin MIL connector	30 mm	NX-OD5256-5	NX-OD5121-5
	32 outputs 0.5 A, 1-wire connection		1 x 40-pin MIL connector	30 mm	NX-OD6256-5	NX-OD6121-5
			1 x 40-pin Fujitsu connector	30 mm	-	NX-OD6121-6
Relay digital output	2 outputs, N.O., 2.0 A	Free run	Screwless push-in (NX-TBA082)	12 mm	NX-OC2633	-
	2 outputs, N.O. + N.C., 2.0 A		Screwless push-in (NX-TBA082)	12 mm	NX-OC2733	-
	8 outputs, N.O., 2.0 A		Screwless push-in (NX-TBA082 × 2)	24 mm	NX-OC4633	-
DC Digital I/O	16 inputs + 16 outputs, 1-wire connection + common	Synchronous/free run	2 x 20-pin MIL connector	30 mm	NX-MD6256-5	NX-MD6121-5
			2 x 24-pin Fujitsu connector	30 mm	-	NX-MD6121-6

*1. Digital I/O performance, ON/OFF delay:
High speed PNP/NPN input: 100 ns/100 ns
Standard PNP/NPN input: 0.02 ms/0.4 ms
AC input: 10 ms/40 ms
High speed PNP/NPN output: 300 ns/300 ns
Standard PNP output: 0.5 ms/1.0 ms
Standard NPN output: 0.1 ms/0.8 ms
Relay output: 15 ms/15 ms
*2. Units with Screwless push-in connections are supplied with the appropriate terminal connector. Units with MIL connectors are supplied without matching plugs.
*3. Model codes are for PNP type signals (positive switching, 0 V common). Most models are also available as NPN type (negative switching, 24 V common). Inputs of MIL connector versions can be used as NPN or PNP.

Analog I/O

Type	Signal type	Performance, I/O refresh method	Channels	Connection type*1	Width	Model
Analog input	4 to 20 mA single ended	1/8,000 resolution, 250 μs/channel Free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-AD2203
			4	Screwless push-in (NX-TBA122)	12 mm	NX-AD3203
			8	Screwless push-in (NX-TBA162)	12 mm	NX-AD4203
	4 to 20 mA differential	1/8,000 resolution, 250 μs/channel Free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-AD2204
			4	Screwless push-in (NX-TBA122)	12 mm	NX-AD3204
			8	Screwless push-in (NX-TBA162)	12 mm	NX-AD4204
		1/30,000 resolution, 10 μs/channel Synchronous/free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-AD2208
			4	Screwless push-in (NX-TBA122)	12 mm	NX-AD3208
			8	Screwless push-in (NX-TBA162)	12 mm	NX-AD4208
	±10 V single ended	1/8,000 resolution, 250 μs/channel Free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-AD2603
			4	Screwless push-in (NX-TBA122)	12 mm	NX-AD3603
			8	Screwless push-in (NX-TBA162)	12 mm	NX-AD4603
	±10 V differential	1/8,000 resolution, 250 μs/channel Free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-AD2604
			4	Screwless push-in (NX-TBA122)	12 mm	NX-AD3604
			8	Screwless push-in (NX-TBA162)	12 mm	NX-AD4604
		1/30,000 resolution, 10 μs/channel Synchronous/free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-AD2608
			4	Screwless push-in (NX-TBA122)	12 mm	NX-AD3608
			8	Screwless push-in (NX-TBA162)	12 mm	NX-AD4608
Analog output	4 to 20 mA	1/8,000 resolution, 250 μs/channel Free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-DA2203
			4	Screwless push-in (NX-TBA122)	12 mm	NX-DA3203
		1/30,000 resolution, 10 μs/channel Synchronous/free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-DA2205
			4	Screwless push-in (NX-TBA122)	12 mm	NX-DA3205
	±10 V	1/8,000 resolution, 250 μs/channel Free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-DA2603
			4	Screwless push-in (NX-TBA122)	12 mm	NX-DA3603
		1/30,000 resolution, 10 μs/channel Synchronous/free run	2	Screwless push-in (NX-TBA082)	12 mm	NX-DA2605
			4	Screwless push-in (NX-TBA122)	12 mm	NX-DA3605

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Temperature input

Type	Signal type	Performance, I/O refresh method	Channels	Connection type*1	Width	Model
Temperature sensor input	Thermocouple type B/E/J/K/L/N/R/S/T/U/ WRe5-26/PLII	0.1°C resolution, 200 ms/unit Free run	2	Screwless push-in terminal block(s), with cold junction sensor, calibrated individually at the factory	12 mm	NX-TS2101
			4		24 mm	NX-TS3101
		0.01°C resolution, 10 ms/unit Free run	2		12 mm	NX-TS2102
			4		24 mm	NX-TS3102
		0.001°C resolution, 60 ms/unit Free run	2		12 mm	NX-TS2104
			4		24 mm	NX-TS3104
	RTD type Pt100 (3wire)/Pt1000/ Ni508.4	0.1°C resolution, 200 ms/unit Free run	2	Screwless push-in (NX-TBA162)	12 mm	NX-TS2201
			4	Screwless push-in (NX-TBA162 + NX-TBB162)	24 mm	NX-TS3201
		0.01°C resolution, 10 ms/unit Free run	2	Screwless push-in (NX-TBA162)	12 mm	NX-TS2202
			4	Screwless push-in (NX-TBA162 + NX-TBB162)	24 mm	NX-TS3202
		0.001°C resolution, 60 ms/unit Free run	2	Screwless push-in (NX-TBA162)	12 mm	NX-TS2204
			4	Screwless push-in (NX-TBA162 + NX-TBB162)	24 mm	NX-TS3204

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Heater burnout detection

Type	Channels, signal type	Control output	I/O refresh method	Connection type*1	Width	Model
Heater burnout detection	4 CT inputs 4 control outputs	NPN, 12 to 24 VDC 0.1 A/point, 0.4 A/unit	Free run	Screwless push-in (NX-TBA162)	12 mm	NX-HB3101
		PNP, 24 VDC 0.1 A/point, 0.4 A/unit		Screwless push-in (NX-TBA162)	12 mm	NX-HB3201

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Position interface

Type	Channels, signal type	I/O refresh method	Connection type*1	Width	Model	NPN type*2
Encoder input	1 SSI encoder, 2 MHz	Synchronous/free run	Screwless push-in (NX-TBA122)	12 mm	NX-ECS112	-
	2 SSI encoders, 2 MHz		Screwless push-in (NX-TBA122)	12 mm	NX-ECS212	-
	1 incremental encoder line driver 4 MHz + 3 digital inputs (1 μs)		Screwless push-in (NX-TBA122 + NX-TBB122)	24 mm	NX-EC0142	NX-EC0132
	1 incremental encoder open collector 500 kHz + 3 digital inputs (1 μs)		Screwless push-in (NX-TBA162)	12 mm	NX-EC0122	NX-EC0112
	2 incremental encoders open collector 500 kHz		Screwless push-in (NX-TBA122)	12 mm	NX-EC0222	NX-EC0212
Pulse output	1 pulse open collector 500 kHz + 2 digital inputs + 1 digital output	Synchronous	Screwless push-in (NX-TBA162)	12 mm	NX-PG0122	NX-PG0112
	2 pulse line driver 4 MHz + 5 digital inputs per channel + 3 digital outputs per channel		1 x 34-pin MIL connector	30 mm	NX-PG0242-5	NX-PG0232-5
	4 pulse line driver 4 MHz + 5 digital inputs per channel + 3 digital outputs per channel		2 x 34-pin MIL connector	30 mm	NX-PG0342-5	NX-PG0332-5

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector. Units with MIL connectors are supplied without matching plugs.
*2. Model codes are for PNP type signals (positive switching, 0 V common). Most models are also available as NPN type (negative switching, 24 V common). Inputs of MIL connector versions can be used as NPN or PNP.

Load cell input

Type	Specifications	I/O refresh method	Excitation voltage/Input range	Connection type*1	Width	Model
Load cell input	1 load cell input, 125 μs conversion cycle	Synchronous/free run	5 VDC ±10%/-5 to 5 mV/V	Screwless push-in (NX-TBC162)	12 mm	NX-RS1201

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Safety

Type	Specifications	Performance, I/O refresh method	Connection type*1	Width	Model
Safety controller	FSoE protocol	For up to 1,024 safety I/O points	128 safety connections	30 mm	NX-SL3500
		For up to 256 safety I/O points	32 safety connections	30 mm	NX-SL3300
Safety input	4 inputs + 2 test outputs	Free run	Screwless push-in (NX-TBA082)	12 mm	NX-SIH400
	8 inputs + 2 test outputs		Screwless push-in (NX-TBA162)	12 mm	NX-SID800
Safety output	2 outputs, 2.0 A		Screwless push-in (NX-TBA082)	12 mm	NX-SOH200
	4 outputs, 0.5 A		Screwless push-in (NX-TBA082)	12 mm	NX-SOD400

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.
Note: For more detailed information about safety units, refer to “NX integrated safety datasheet (I183E-EN)” and “NX safety standalone datasheet (I185E-EN)”.

Communication interface unit

Type	Serial interface	No. of serial ports	Connection type*1	Width	Model
Communication interface	RS-232C	1	Screwless push-in (NX-TBC162)	12 mm	NX-CIF101
		2	D-Sub 9pin connector	30 mm	NX-CIF210
	RS-422A/485	1	Screwless push-in (NX-TBC162)	12 mm	NX-CIF105

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Power/System unit

Type	Description	Connection type*1	Width	Model
NX bus power supply unit	24 VDC input, non-isolated	Screwless push-in (NX-TBC082)	12 mm	NX-PD1000
I/O power feed unit	For separation of groups, up to 4 A	Screwless push-in (NX-TBA082)	12 mm	NX-PF0630
	For separation of groups, up to 10 A	Screwless push-in (NX-TBA082)	12 mm	NX-PF0730
I/O power supply connection unit	16 × IOV	Screwless push-in (NX-TBA162)	12 mm	NX-PC0020
	16 × IOG	Screwless push-in (NX-TBA162)	12 mm	NX-PC0010
	8 × IOV + 8 × IOG	Screwless push-in (NX-TBA162)	12 mm	NX-PC0030
Shield connection unit	Grounding terminal, 16 points	Screwless push-in (NX-TBC162)	12 mm	NX-TBX01

*1. Units with Screwless push-in connections are supplied with the appropriate terminal connector.

Accessories

Type	Description	Connection type	Width	Model
End cover	Included with communication coupler	-	12 mm	NX-END01
Terminal block (replacement front connector)	With 8 wiring terminals (A + B)	Screwless push-in	12 mm	NX-TBA082
	With 8 wiring terminals (A + B with FG)		12 mm	NX-TBC082
	With 12 wiring terminals (A + B)		12 mm	NX-TBA122
	With 12 wiring terminals (C + D)		12 mm	NX-TBB122
	With 16 wiring terminals (A + B)		12 mm	NX-TBA162
	With 16 wiring terminals (C + D)		12 mm	NX-TBB162
	With 16 wiring terminals (A + B with FG)		12 mm	NX-TBC162
DIN rail insulation spacers	Set of 3 pcs	-	-	NX-AUX01
Terminal block coding pins	For 10 units (Terminal block: 30 pins, unit: 30 pins)	-	-	NX-AUX02
End plate	To secure the units on the DIN track	-	-	PFP-M

Machine controller

Name	Description	Firmware version	Model
IPC machine controller	Industrial box PC type	1.12 or higher	NY512-□
	Industrial panel PC type		NY532-□
NX7 series	CPU unit	1.13 or higher	NX701-□
	Power supply unit	–	NX-PA9001 (220 VAC)
			NX-PD7001 (24 VDC)
NJ series	CPU unit	1.13 or higher	NJ501-□
			NJ301-□
			NJ101-□
	Power supply unit	–	NJ-PA3001 (220 VAC)
			NJ-PD3001 (24 VDC)
NX1 series	CPU unit	1.13 or higher	NX1P2-□

Note: Please contact your OMRON sales representative for the compatibility between previous machine controller firmware versions and NX I/O units.

Computer software

Specifications	Model
Sysmac Studio version 1.17 or higher*1	SYSMAC-SE2□□□

*1. Please contact your OMRON representative for compatibility between the Sysmac Studio version 1.16 or lower and NX I/O units.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat.No. SysCat_I182E-EN-05B In the interest of product improvement, specifications are subject to change without notice.

GX-□

GX series I/O

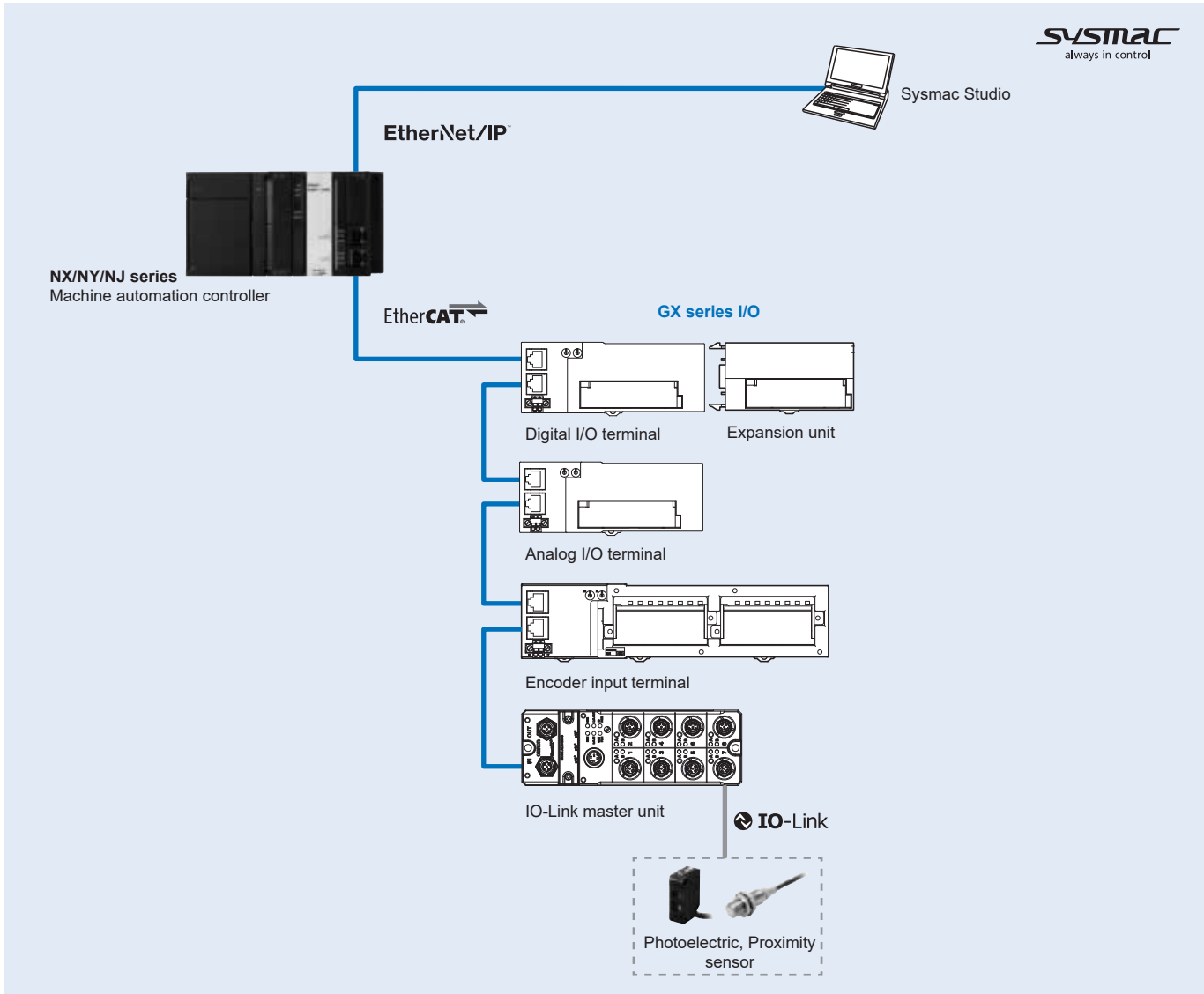


High-speed remote I/O terminals

The GX-Series I/O units provide an extensive line-up of digital I/O terminals, analogue I/O terminals and encoder input terminals.

- IO-Link master unit for sensors reducing machine downtime
- Easy set-up: automatic and manual address setting
- Digital I/O terminals with high-speed input functionality, ON/OFF delay of 200 µs max.
- Digital input filters prevent malfunction when status is unstable due to chattering or noise
- Removable I/O terminal for easy maintenance
- Expandable digital I/Os

System configuration



Specifications

General specifications

GX-Series	Specifications
Unit power supply voltage	24 VDC –15% to +10% (20.4 to 26.4 VDC)
I/O power supply voltage	24 VDC –15% to +10% (20.4 to 26.4 VDC)
Noise resistance	Conforms to IEC 61000-4-4, 2 kV (power line)
Vibration resistance	Malfunction 10 to 60 Hz with amplitude of 0.7 mm, 60 to 150 Hz and 50 m/s^2 in X, Y and Z directions for 80 minutes <Relay Output Unit GX-OC1601 only> 10 to 55 Hz with double-amplitude of 0.7 mm
Impact resistance	150 m/s^2 with amplitude of 0.7 mm <Relay Output Unit GX-OC1601 only> 100 m/s^2 (3 times each in 6 directions on 3 axes)
Dielectric strength	600 VAC (between isolated circuits)
Isolation resistance	20 MΩ or more (between isolated circuits)
Ambient operating temperature	–10 to 55ºC
Operating humidity	25% to 85% (with no condensation)
Operating atmosphere	No corrosive gases
Storage temperature	–25 to 65ºC
Storage humidity	25% to 85% (with no condensation)
Terminal block screws tightening torque*1	M3 wiring screws: 0.5 Nm M3 terminal block mounting screws: 0.5 Nm
Mounting method	35-mm DIN track mounting

*1 Applicable only to 2-tier terminal block and 3-tier terminal block type slaves.

EtherCAT communications specifications

Item	Specifications
Communication protocol	Dedicated protocol for EtherCAT
Modulation	Base band
Baud rate	100 Mbps
Physical layer	100BASE-TX (IEEE802.3)
Connectors	RJ45 shielded connector × 2 CN IN: EtherCAT input CN OUT: EtherCAT output
Communications media	Category 5 or higher (cable with double, aluminum tape and braided shielding is recommended.)
Communications distance	Distance between nodes (slaves): 100 m max.
Noise resistance	Conforms to IEC 61000-4-4, 1 kV or higher
Node address setting method	Set with decimal rotary switch or Sysmac Studio
Node address range	1 to 99: Set with rotary switch 1 to 65535: Set with Sysmac Studio
LED display	PWR × 1 L/A IN (Link/Activity IN) × 1 L/A OUT (Link/Activity OUT) × 1 RUN × 1 ERR × 1
Process data	Fixed PDO mapping
PDO size/mode	2 bits to 256 bytes
Mailbox	Emergency messages, SDO requests, SDO responses and SDO information
SYNCHRONIZATION mode	Digital I/O slave unit and analog I/O slave unit: Free Run mode (asynchronous) Encoder input slave unit: DC mode 1

Digital I/O

16-point input (1-wire connection)

Item	Specifications	
	GX-ID1611	GX-ID1621
Input capacity	16 points	
Internal I/O common	NPN	PNP
ON voltage	15 VDC min. (between each input terminal and the V terminal)	15 VDC min. (between each input terminal and the G terminal)
OFF voltage	5 VDC max. (between each input terminal and the V terminal)	5 VDC max. (between each input terminal and the G terminal)
OFF current	1.0 mA max.	
Input current	6.0 mA max./input (at 24 VDC) 3.0 mA max./input (at 17 VDC)	
ON delay	0.1 ms max.	
OFF delay	0.2 ms max.	
Input filter value	Without filter, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, 32 ms (Default setting: 1 ms)	
Number of circuits per common	16 points/common	
Input indicators	LED display (yellow)	
Isolation method	Photocoupler isolation	
I/O power supply method	Supply by I/O power supply	
Unit power supply current consumption	90 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
I/O power supply current consumption	5 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
Weight	180 g max.	
Expansion functions	Enabled	
Short-circuit protection function	No	

Note: For the I/O power supply current value to V and G terminals, refer to GX Series Operation Manual (Cat. No. W488).

16-point output (1-wire connection)

Item	Specifications	
	GX-OD1611	GX-OD1621
Output capacity	16 points	
Rated current (ON current)	0.5 A/output, 4.0 A/common	
Internal I/O common	NPN	PNP
Residual voltage	1.2 V max. (0.5 VDC, between each output terminal and the G terminal)	1.2 V max. (0.5 VDC, between each output terminal and the V terminal)
Leakage current	0.1 mA max.	
ON delay	0.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	16 points/common	
Output indicators	LED display (yellow)	
Isolation method	Photocoupler isolation	
I/O power supply method	Supply by I/O power supply	
Unit power supply current consumption	90 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
I/O power supply current consumption	5 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
Weight	180 g max.	
Expansion functions	Enabled	
Output handling for communications errors	Select either hold or clear	
Short-circuit protection function	No	

Note: For the I/O power supply current value to V and G terminals, refer to GX Series Operation Manual (Cat. No. W488).

16 relay outputs

Item	Specifications
	GX-OC1601
Output capacity	16 points
Mounted relays	NY-5W-K-IE (Fujitsu Component) (See Note)
Rated load	Resistance load 250 VAC, 2 A/output, common 8 A 30 VDC, 2 A/output, common 8 A
Rated ON current	3 A/output
Maximum contact voltage	250 VAC, 125 VDC
Maximum contact current	3 A/output
Maximum switching capacity	750 VAAC, 90 WDC
Minimum applicable load (reference value)	5 VDC, 1 mA
Mechanical service life	20,000,000 operations min.
Electrical service life	100,000 operations min.
Number of circuits per common	16 points/common
Output indicators	LED display (yellow)
Isolation method	Relay isolation
I/O power supply method	The relay drive power is supplied from the unit power supply.
Unit power supply current consumption	210 mA max. (for 20.4 to 26.4 VDC power supply voltage)
Weight	290 g max.
Expansion functions	Enabled
Output handling for communications errors	Select either hold or clear
Short-circuit protection function	No

Note: For the specification of individual relay, refer to the datasheet of published by manufacturers.

8-point input and 8-point output (1-wire connection)

Item	Specifications	
	GX-MD1611	GX-MD1621
General Specifications		
Internal I/O common	NPN	PNP
I/O indicators	LED display (yellow)	
Unit power supply current consumption	80 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
Weight	190 g max.	
Expansion functions	No	
Short-circuit protective function	No	
Input Section		
Input capacity	8 points	
ON voltage	15 VDC min. (between each input terminal and the V terminal)	15 VDC min. (between each input terminal and the G terminal)
OFF voltage	5 VDC max. (between each input terminal and the V terminal)	5 VDC max. (between each input terminal and the G terminal)
OFF current	1.0 mA max.	
Input current	6.0 mA max./input (at 24 VDC) 3.0 mA max./input (at 17 VDC)	
ON delay	0.1 ms max.	
OFF delay	0.2 ms max.	
Input filter value	Without filter, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, 32 ms (Default setting: 1 ms)	
Number of circuits per common	8 points/common	
Isolation method	Photocoupler isolation	
I/O power supply method	Supply by I/O power supply	
I/O power supply current consumption	5 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
Output Section		
Output capacity	8 points	
Rated output current	0.5 A/output, 2.0 A/common	
Residual voltage	1.2 V max. (0.5 VDC, between each output terminal and the G terminal)	1.2 V max. (0.5 VDC, between each output terminal and the V terminal)
Leakage current	0.1 mA max.	
ON delay	0.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	8 points/common	
Isolation method	Photocoupler isolation	
I/O power supply method	Supply by I/O power supply	
I/O power supply current consumption	5 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
Output handling for communications errors	Select either hold or clear	

Note: For the I/O power supply current value to V and G terminals, refer to GX Series Operation Manual (Cat. No. W488).

16-point input (3-wire connection)

Item	Specifications	
	GX-ID1612	GX-ID1622
Input capacity	16 points	
Internal I/O common	NPN	PNP
ON voltage	15 VDC min. (between each input terminal and the V terminal)	15 VDC min. (between each input terminal and the G terminal)
OFF voltage	5 VDC max. (between each input terminal and the V terminal)	5 VDC max. (between each input terminal and the G terminal)
OFF current	1.0 mA max.	
Input current	6.0 mA max./input (at 24 VDC) 3.0 mA max./input (at 17 VDC)	
ON delay	0.1 ms max.	
OFF delay	0.2 ms max.	
Input filter value	Without filter, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, 32 ms (Default setting: 1 ms)	
Number of circuits per common	8 points/common	
Input indicators	LED display (yellow)	
Isolation method	Photocoupler isolation	
I/O power supply method	Supply by I/O power supply	
Input device supply current	100 mA/point	
Unit power supply current consumption	90 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
I/O power supply current consumption	5 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
Weight	370 g max.	
Expansion functions	No	
Short-circuit protection function	No	

Note: For the I/O power supply current value to V and G terminals, refer to GX Series Operation Manual (Cat. No. W488).

16-point output (3-wire connection)

Item	Specifications	
	GX-OD1612	GX-OD1622
Output capacity	16 points	
Rated current (ON current)	0.5 A/output, 4.0 A/common	
Internal I/O common	NPN	PNP
Residual voltage	1.2 V max. (0.5 VDC, between each output terminal and the G terminal)	1.2 V max. (0.5 VDC, between each output terminal and the V terminal)
Leakage current	0.1 mA max.	
ON delay	0.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	8 points/common	
Output indicators	LED display (yellow)	
Isolation method	Photocoupler isolation	
I/O power supply method	Supply by I/O power supply	
Output device supply current	100 mA/point	
Unit power supply current consumption	90 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
I/O power supply current consumption	5 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
Weight	370 g max.	
Expansion functions	No	
Output handling for communications errors	Select either hold or clear	
Short-circuit protection function	No	

Note: For the I/O power supply current value to V and G terminals, refer to GX Series Operation Manual (Cat. No. W488).

8-point input and 8-point output (3-wire connection)

Item	Specifications	
	GX-MD1612	GX-MD1622
General Specifications		
Internal I/O common	NPN	PNP
I/O indicators	LED display (yellow)	
Unit power supply current consumption	90 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
Weight	370 g max.	
Expansion functions	No	
Short-circuit protective function	No	
Input Section		
Input capacity	8 points	
ON voltage	15 VDC min. (between each input terminal and the V terminal)	15 VDC min. (between each input terminal and the G terminal)
OFF voltage	5 VDC max. (between each input terminal and the V terminal)	5 VDC max. (between each input terminal and the G terminal)
OFF current	1.0 mA max.	
Input current	6.0 mA max./input (at 24-VDC) 3.0 mA max./input (at 17-VDC)	
ON delay	0.1 ms max.	
OFF delay	0.2 ms max.	
Input filter value	Without filter, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, 32 ms (Default setting: 1 ms)	
Number of circuits per common	8 points/common	
Isolation method	Photocoupler isolation	
I/O power supply method	Supply by I/O power supply	
Input device supply current	100 mA/point	
I/O power supply current consumption	5 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
Output Section		
Output capacity	8 points	
Rated output current	0.5 A/output, 2.0 A/common	
Residual voltage	1.2 V max. (0.5 VDC, between each output terminal and the G terminal)	1.2 V max. (0.5 VDC, between each output terminal and the V terminal)
Leakage current	0.1 mA max.	
ON delay	0.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	8 points/common	
Isolation method	Photocoupler isolation	
I/O power supply method	Supply by I/O power supply	
Output device supply current	100 mA/point	
I/O power supply current consumption	5 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
Output handling for communications errors	Select either hold or clear	

Note: For the I/O power supply current value to V and G terminals, refer to GX Series Operation Manual (Cat. No. W488).

Analog I/O

Analogue input

Item		Specifications	
		GX-AD0471	
		Voltage input	Current input
Input capacity		4 points (possible to set number of enabled channels)	
Input range		0 to 5 V 1 to 5 V 0 to 10 V –10 to +10 V	4 to 20 mA
Input range setting method		Input range switch: Common to input CH1/CH2, common to input CH3/CH4 SDO communication: Possible to set input CH1 to CH4 individually	
Maximum signal input		±15 V	±30 mA
Input Impedance		1 MΩ min.	Approx. 250 Ω
Resolution		1/8000 (full scale)	
Overall accuracy	25°C	±0.3% FS	±0.4% FS
	–10 to 55°C	±0.6% FS	±0.8% FS
Analog conversion cycle		500 μs/input when 4 points are used: 2 ms max.	
A/D converted data		Other than ±10 V: 0000 to 1F40 Hex full scale (0 to 8000) ±10 V: F060 to 0FA0 Hex full scale (–4000 to +4000) A/D conversion range: ±5% FS of the above data ranges.	
Isolation method		Photocoupler isolation (between input and communications lines) No isolation between input signals	
Unit power supply current consumption		120 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
Weight		180 g max.	
Accessories		Four short-circuit metal fixtures (for current input)*1	

*1 Short-circuit metal fixtures are used for current input only, but store in a safe place when using for voltage inputs as well.

Analogue output

Item		Specifications	
		GX-DA0271	
		Voltage output	Current output
Output capacity		2 points (possible to set number of enabled channels)	
Output range		0 to 5 V 1 to 5 V 0 to 10 V –10 to +10 V	4 to 20 mA
Output range setting method		Output range switch, SDO communication: Possible to set outputs CH1 and CH2 separately	
External output allowable load resistance		5 KΩ min.	600 Ω max.
Resolution		1/8000 (full scale)	
Overall accuracy	25°C	±0.4% FS	
	–10 to 55°C	±0.8% FS	
Analog conversion cycle		500 μs/input when 2 points are used: 1 ms max.	
D/A converted data		Other than ±10 V: 0000 to 1F40 Hex full scale (0 to 8000) ±10 V: F060 to 0FA0 Hex full scale (–4000 to +4000) D/A conversion range: ±5% FS of the above data ranges.	
Isolation method		Photocoupler isolation (between output and communications lines) No isolation between output signals	
Unit power supply current consumption		150 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
Weight		190 g max.	

Encoder input

Open collector input

Item	Specifications			
	GX-EC0211			
Terminal specifications				
Counter point	2 points			
Input signal	Counter phase A Counter phase B Counter phase Z Latch input (A/B) Counter reset input			
Counter enabled status display	LED display (green)			
Input indicators	LED display (yellow)			
Unit power supply current consumption	130 mA max. (for 20.4 to 26.4 VDC power supply voltage)			
Weight	390 g max.			
Pulse input specifications				
	Counter phase A/B		**Counter phase Z**	
Input voltage	20.4 to 26.4 VDC (24 VDC –15 to +10%)	4.5 to 5.5 VDC (5 VDC ±5%)	20.4 to 26.4 VDC (24 VDC –15 to +10%)	4.5 to 5.5 VDC (5 VDC ±5%)
Input current	8.4 mA (at 24 VDC)	8.6 mA (at 5 VDC)	8.4 mA (at 24 VDC)	8.6 mA (at 5 VDC)
ON voltage	19.6 V min.	4.5 V min.	18.6 V min.	4.5 V min.
OFF voltage	4 V max.	1.5 V max.	4 V max.	1.5 V max.
Input restriction resistance	2.7 KΩ	430 Ω	2.7 KΩ	430 Ω
Maximum response frequency	Single phase 500 kHz (phase difference Multiplication × 4, 125 kHz)		125 kHz	
Filter switching	NA		NA	
Latch/reset input specifications				
	Latch input (A/B)		**Reset input**	
Internal I/O common	NPN			
Input voltage	20.4 to 26.4 VDC (24 VDC –15 to +10%)		20.4 to 26.4 VDC (24 VDC –15 to +10%)	
Input impedance	4.0 KΩ		3.3 KΩ	
Input current	5.5 mA (at 24 VDC)		7 mA (at 24 VDC)	
ON voltage/ON current	17.4 VDC min./3 mA min.		14.4 VDC min./3 mA min.	
OFF voltage/OFF current	5 VDC max./1 mA max.		5 VDC max./1 mA max.	
ON response time	3 μs max.		15 μs max.	
OFF response time	3 μs max.		90 μs max.	

Line driver input

Item	Specifications	
	GX-EC0241	
Terminal specifications		
Counter point	2 points	
Input signal	Counter phase A Counter phase B Counter phase Z Latch input (A/B) Counter reset input	
Counter enabled status display	LED display (green)	
Input indicators	LED display (yellow)	
Unit power supply current consumption	100 mA max. (for 20.4 to 26.4 VDC power supply voltage)	
Weight	390 g max.	
Pulse input specifications		
	Counter phase A/B	**Counter phase Z**
Input voltage	EIA standard RS-422-A line driver level	
Input impedance	120 Ω ±5%	
gH level input voltage	0.1 V	
gL level input voltage	–0.1 V	
Hysteresis voltage	60 mV	
Maximum response frequency	Single phase 4 MHz (phase difference Multiplication × 4, 1 MHz)	1 MHz
Filter switching	NA	
Latch/reset input specifications		
	Latch input (A/B)	**Reset input**
Internal I/O common	PNP	
Input voltage	20.4 to 26.4 VDC (24 VDC –15 to +10%)	20.4 to 26.4 VDC (24 VDC –15 to +10%)
Input impedance	4.0 KΩ	3.3 KΩ
Input current	5.5 mA (at 24 VDC)	7 mA (at 24 VDC)
ON voltage/ON current	17.4 VDC min./3 mA min.	14.4 VDC min./3 mA min.
OFF voltage/OFF current	5 VDC max./1 mA max.	5 VDC max./1 mA max.
ON response time	3 μs max.	15 μs max.
OFF response time	3 μs max.	90 μs max.

Expansion units

8-point input

Item	Specifications	
	XWT-ID08	XWT-ID08-1
Internal I/O common	NPN	PNP
I/O capacity	8 inputs	
ON voltage	15 VDC min. (between each input terminal and the V terminal)	15 VDC min. (between each input terminal and the G terminal)
OFF voltage	5 VDC max. (between each input terminal and the V terminal)	5 VDC max. (between each input terminal and the G terminal)
OFF current	1.0 mA max.	
Input current	At 24 VDC: 6.0 mA max./input At 17 VDC: 3.0 mA max./input	
ON delay	1.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	8 inputs/common	
Communications power supply current consumption	5 mA	
Weight	80 g max.	

16-point input

Item	Specifications	
	XWT-ID16	XWT-ID16-1
Internal I/O common	NPN	PNP
I/O capacity	16 inputs	
ON voltage	15 VDC min. (between each input terminal and the V terminal)	15 VDC min. (between each input terminal and the G terminal)
OFF voltage	5 VDC max. (between each input terminal and the V terminal)	5 VDC max. (between each input terminal and the G terminal)
OFF current	1.0 mA max.	
Input current	At 24 VDC: 6.0 mA max./input At 17 VDC: 3.0 mA max./input	
ON delay	1.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	16 inputs/common	
Communications power supply current consumption	10 mA	
Weight	120 g max.	

8-point output

Item	Specifications	
	XWT-OD08	XWT-OD08-1
Internal I/O common	NPN	PNP
I/O capacity	8 outputs	
Rated output current	0.5 A/output, 2.0 A/common	
Residual voltage	1.2 V max. (0.5 A DC, between each output terminal and the G terminal)	1.2 V max. (0.5 A DC, between each output terminal and the V terminal)
Leakage current	0.1 mA max.	
ON delay	0.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	8 outputs/common	
Communications power supply current consumption	5 mA	
Weight	80 g max.	

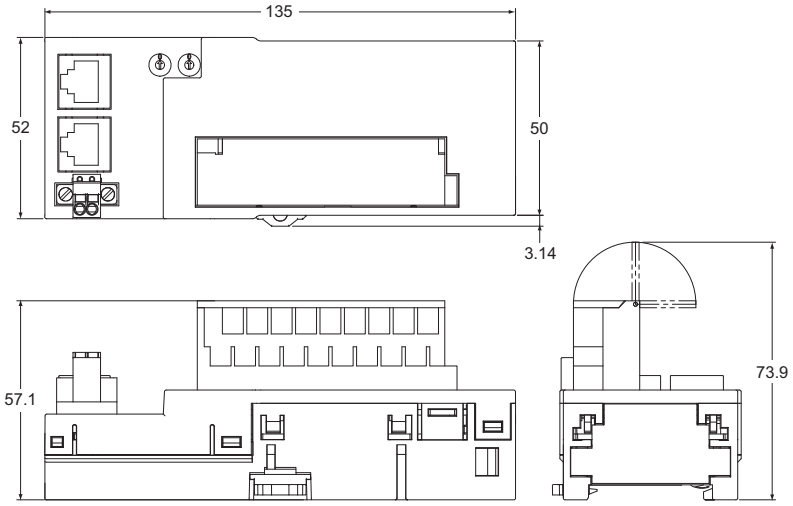
16-point output-point

Item	Specifications	
	XWT-OD16	XWT-OD16-1
Internal I/O common	NPN	PNP
I/O capacity	16 outputs	
Rated output current	0.5 A/output, 4.0 A/common	
Residual voltage	1.2 V max. (0.5 A DC, between each output terminal and the G terminal)	1.2 V max. (0.5 A DC, between each output terminal and the V terminal)
Leakage current	0.1 mA max.	
ON delay	0.5 ms max.	
OFF delay	1.5 ms max.	
Number of circuits per common	16 outputs/common	
Communications power supply current consumption	10 mA	
Weight	120 g max.	

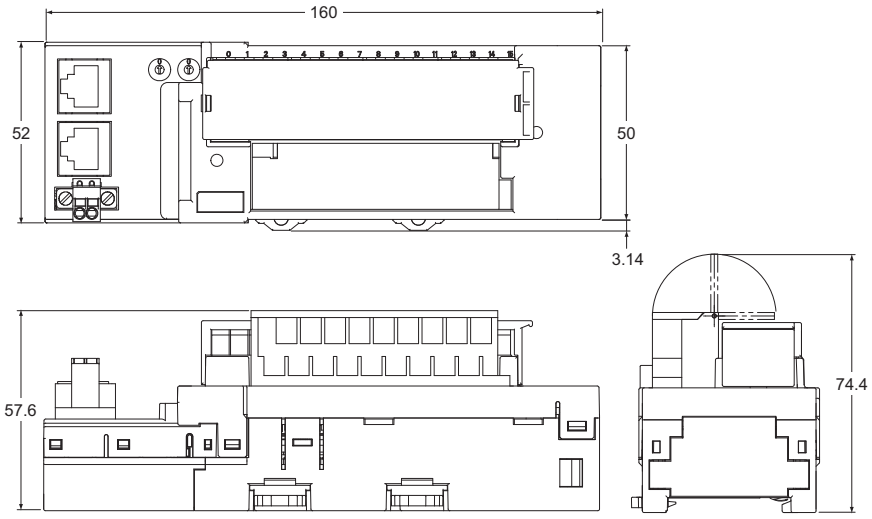
Dimensions

Digital I/O

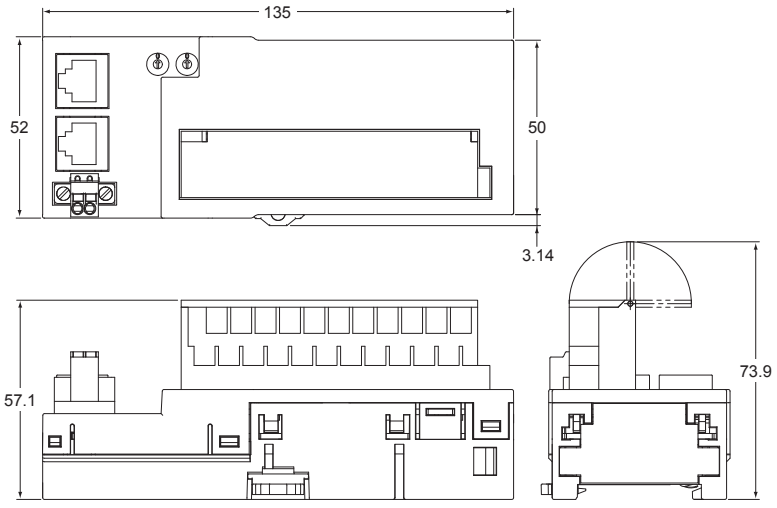
GX-ID1611/ID1621, GX-OD1611/OD1621



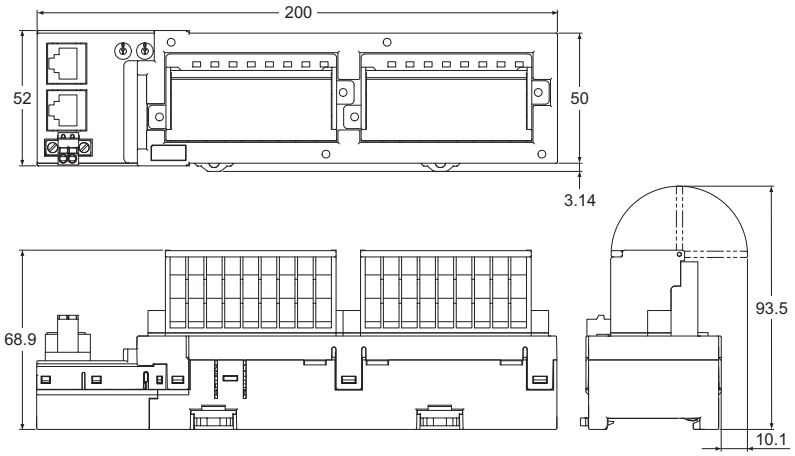
GX-OC1601



GX-MD1611/MD1621

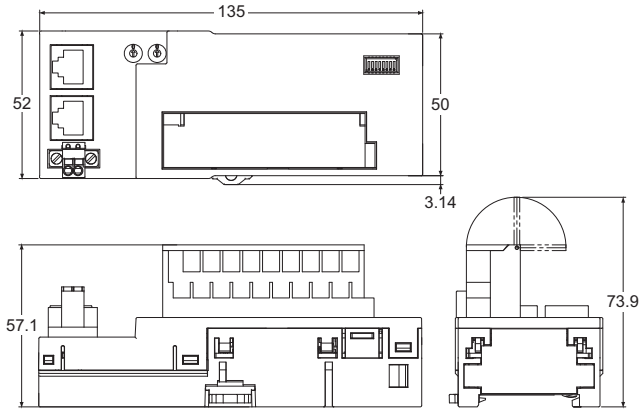


GX-ID1612/ID1622, GX-OD1612/OD1622, GX-MD1612/MD1622



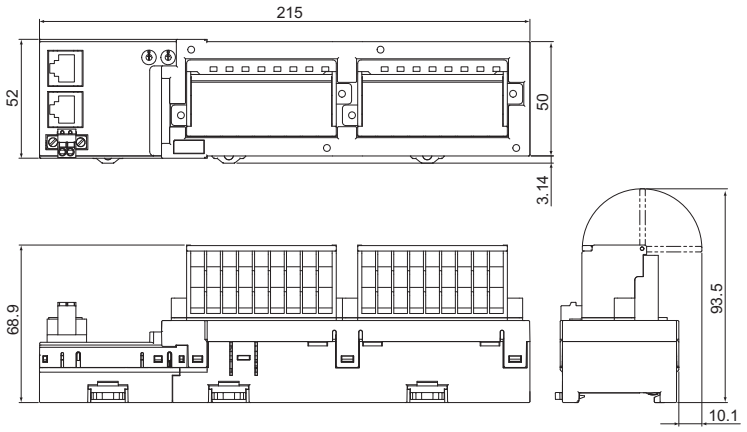
Analog I/O

GX-AD0471/DA0271



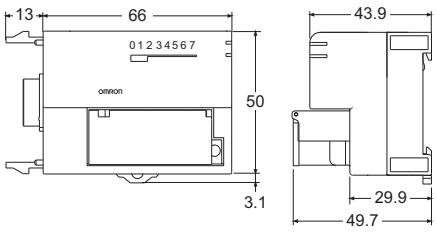
Encoder input

GX-EC0211/EC0241

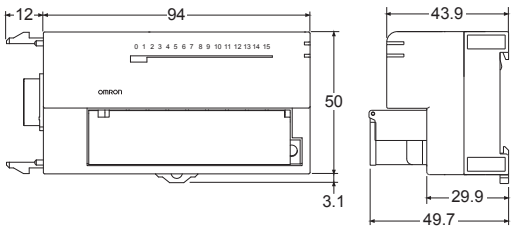


Expansion units

XWT-ID08/ID08-1, XWT-OD08/OD08-1



XWT-ID16/ID16-1, XWT-OD16/OD16-1



Ordering information

IO-Link master unit

Description	Specifications	Model
8-port IO-Link master unit	M12 Smartclick connector, IP67 protection degree	GX-ILM08C

Note: For more detailed information about IO-Link master unit, refer to “IO-Link master datasheet (I191E-EN)”.

Digital I/O

Description	Specifications	Model
16-point NPN input	24 VDC, 6 mA, 1-wire connection, expandable with one XWT unit	GX-ID1611
16-point PNP input	24 VDC, 6 mA, 1-wire connection, expandable with one XWT unit	GX-ID1621
16-point NPN output	24 VDC, 500 mA, 1-wire connection, expandable with one XWT unit	GX-OD1611
16-point PNP output	24 VDC, 500 mA, 1-wire connection, expandable with one XWT unit	GX-OD1621
8-point input and 8-point output, NPN	24 VDC, 6 mA input, 500 mA output, 1-wire connection	GX-MD1611
8-point input and 8-point output, PNP	24 VDC, 6 mA input, 500 mA output, 1-wire connection	GX-MD1621
16-point NPN input	24 VDC, 6 mA, 3-wire connection	GX-ID1612
16-point PNP input	24 VDC, 6 mA, 3-wire connection	GX-ID1622
16-point NPN output	24 VDC, 500 mA, 3-wire connection	GX-OD1612
16-point PNP output	24 VDC, 500 mA, 3-wire connection	GX-OD1622
8-point input and 8-point output, NPN	24 VDC, 6 mA input, 500 mA output, 3-wire connection	GX-MD1612
8-point input and 8-point output, PNP	24 VDC, 6 mA input, 500 mA output, 3-wire connection	GX-MD1622
16-point relay output	250 VAC, 2 A, 1-wire connection, expandable with one XWT unit	GX-OC1601

Analog I/O

Description	Specifications	Model
4-channel analogue input, current/voltage	10 V, 0 to 10 V, 0 to 5 V, 1 to 5 V, 4 to 20 mA	GX-AD0471
2-channel analogue output, current/voltage	10 V, 0 to 10 V, 0 to 5 V, 1 to 5 V, 4 to 20 mA	GX-DA0271

Encoder input

Description	Specifications	Model
2 encoder open collector inputs	500 kHz Open collector input	GX-EC0211
2 encoder line-driver inputs	4 MHz Line driver input	GX-EC0241

Expansion units

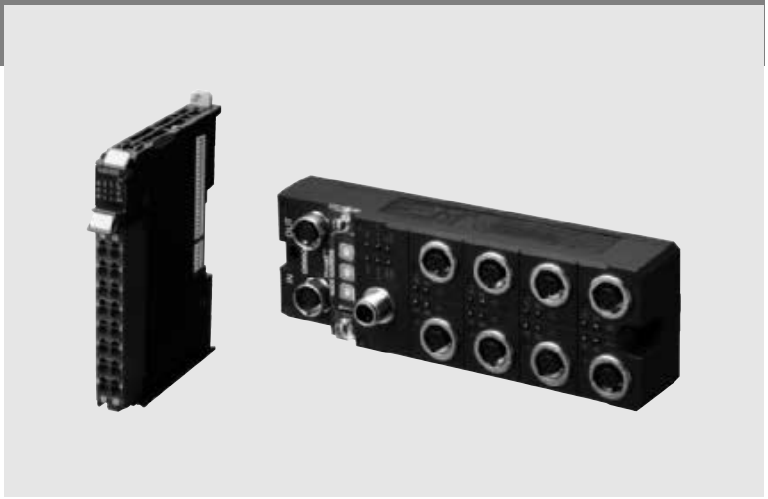
Description	Specifications	Model
8-point NPN input expansion unit	24 VDC, 6 mA	XWT-ID08
8-point PNP input expansion unit	24 VDC, 6 mA	XWT-ID08-1
8-point NPN output expansion unit	24 VDC, 500 mA	XWT-OD08
8-point PNP output expansion unit	24 VDC, 500 mA	XWT-OD08-1
16-point NPN input expansion unit	24 VDC, 6 mA	XWT-ID16
16-point PNP input expansion unit	24 VDC, 6 mA	XWT-ID16-1
16-point NPN output expansion unit	24 VDC, 500 mA	XWT-OD16
16-point PNP output expansion unit	24 VDC, 500 mA	XWT-OD16-1

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_P21E-EN-02 In the interest of product improvement, specifications are subject to change without notice.

GX-ILM□, NX-ILM□

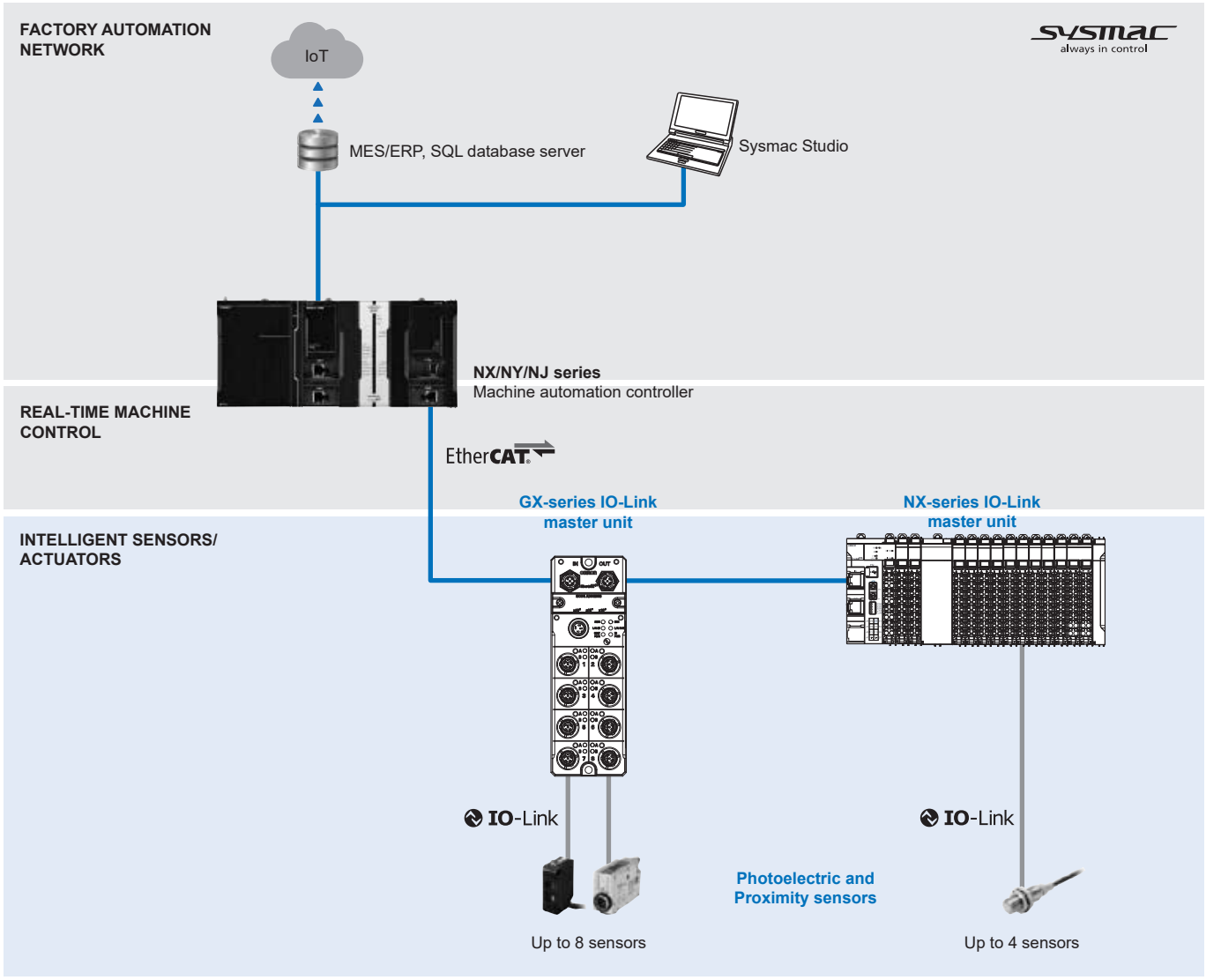
IO-Link



IO-Link makes communication down to the sensor level visible

- Machine downtime can be reduced
- Abnormality detection for shortest recovery
- Condition monitoring for predictive maintenance
- Individual identification for reduction of man hours
- Master unit with screw-less terminal block or with IP67 protection class for watery and dusty environments
- Up to 8 sensors can be connected with one IO-Link master unit
- Photoelectric and Proximity sensors

System configuration



Specifications

NX-series IO-Link master unit

Model		NX-ILM400
Product family		NX-series
Number of ports		4
Communication specifications	Protocol	IO-Link protocol
	Baud rate	COM1: 4.8 kbps / COM2: 38.4 kbps / COM3: 230.4 kbps
	Topology	1:1
	Compliant standards	• IO-Link Interface and System Specification Version 1.12 • IO-Link Test Specification Version 1.12
Power supply to devices in IO-Link mode or SIO (DI) mode	Rated voltage	24 VDC (20.4 to 28.8 VDC)
	Max. load current	0.2 A/port
	Short-circuit protection	Provided
Digital inputs (in SIO (DI) mode)	Internal I/O common	PNP
	Rated voltage	24 VDC (20.4 to 28.8 VDC)
	Input current	5 mA typical (at 24 VDC)
	ON voltage/ON current	15 VDC min, 2 mA min.
	OFF voltage	5 VDC max.
	Input filter time	No filter, 0.25 ms, 0.5 ms, 1 ms (default), 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms
Digital outputs (in SIO (DO) mode)	Internal I/O common	PNP
	Output type	Push-pull
	Rated voltage	24 VDC (20.4 to 28.8 VDC)
	Max. load current	0.1 A/port
	Short-circuit protection	Provided
	Leakage current	0.1 mA max.
	Residual voltage	1.5 V max.
Digital inputs for pin 2 (in IO-Link mode)	Internal I/O common	PNP
	Rated voltage	24 VDC (20.4 to 28.8 VDC)
	Input current	2 mA typical (at 24 VDC)
	ON voltage/ON current	15 VDC min, 2 mA min.
	OFF voltage	5 VDC max.
	Input filter time	No filter, 0.25 ms, 0.5 ms, 1 ms (default), 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms
Cable specifications	Cable type	Unshielded
	Max. length	20 m
	Electrostatic capacity between lines	3 nF max.
	Loop resistance	6 Ω max.
Operating environment	Ambient operating temperature	0 to 55°C
	Ambient storage temperature	–25 to 70°C (with no condensation or icing)
	Ambient operating/storage humidity	10 to 95% (with no condensation or icing)
	Operating atmosphere	No corrosive gases
	Noise immunity	2 kV on power supply line. Conforms to IEC 61000-4-4
	Overvoltage category	Conforms to JIS B3502 and IEC 61131-2
	EMC immunity level	Zone B
	Vibration resistance	Conforms to IEC 60068-2-6 5 to 8.4 Hz with amplitude of 3.5 mm, 8.4 to 150 Hz, acceleration of 9.8 m/s^2 100 min each in X, Y and Z directions (10 sweeps of 10 min each = 100 min total)
	Shock resistance	Conforms to IEC 60028-2-27 147 m/s^2, 3 times each in X, Y and Z directions
	Degree of protection	IP20
	Pollution degree	2 or less: Conforms to JIS B3502 and IEC 61131-2
Dielectric strength		510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
Insulation resistance		20 MΩ min. between isolated circuits (at 100 VDC)
Isolation method		Photocoupler isolation
Unit power consumption		0.80 W
I/O power supply method		Supply from the NX bus
I/O current consumption		50 mA
I/O refreshing method		Free-run refreshing
Terminal block type		Screwless push-in terminal 16 terminals (A + B)
Dimensions (W × H × D)		12 × 100 × 71 mm
Weight		67 g
Applicable standards		UL 61010-2-201, ANSI/ISA 12.12.01, EU: EN 61131-2, RCM, KC and IO-Link conformance
Protective function		Load short-circuit protection

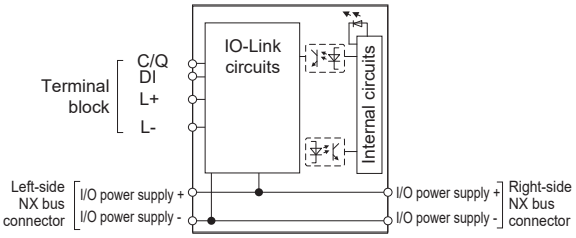
GX-series IO-Link master unit

Model		GX-ILM08C
Product family		GX-series
Number of ports		8
Communication specifications	Protocol	IO-Link protocol
	Baud rate	COM1: 4.8 kbps / COM2: 38.4 kbps / COM3: 230.4 kbps
	Topology	1:1
	Compliant standards	• IO-Link Interface and System Specification Version 1.12 • IO-Link Test Specification Version 1.12
Power supply to devices in IO-Link mode or SIO (DI) mode	Rated voltage	24 VDC (20.4 to 26.4 VDC)
	Max. load current	0.2 A/port
	Short-circuit protection	Provided
Digital inputs (in SIO (DI) mode)	Internal I/O common	PNP
	Rated voltage	24 VDC (20.4 to 26.4 VDC)
	Input current	5 mA typical (at 24 VDC)
	ON voltage/ON current	15 VDC min, 5 mA min.
	OFF voltage	5 VDC max.
	Input filter time	No filter, 0.25 ms, 0.5 ms, 1 ms (default), 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms
Digital outputs (in SIO (DO) mode)	Internal I/O common	PNP
	Output type	Push-pull
	Rated voltage	24 VDC (20.4 to 26.4 VDC)
	Max. load current	0.3 A/port
	Short-circuit protection	Provided
	Leakage current	0.1 mA max.
	Residual voltage	1.5 V max.
Digital inputs for pin 2 (in IO-Link mode)	Internal I/O common	PNP
	Rated voltage	24 VDC (20.4 to 26.4 VDC)
	Input current	2 mA typical (at 24 VDC)
	ON voltage/ON current	15 VDC min, 2 mA min.
	OFF voltage	5 VDC max.
	Input filter time	No filter, 0.25 ms, 0.5 ms, 1 ms (default), 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms
Cable specifications	Cable type	Unshielded
	Max. length	20 m
	Electrostatic capacity between lines	3 nF max.
	Loop resistance	6 Ω max.
Operating environment	Ambient operating temperature	–10 to 55°C
	Ambient storage temperature	–25 to 65°C
	Ambient operating/storage humidity	25 to 85% (with no condensation)
	Operating atmosphere	No corrosive gases
	Noise immunity	2 kV on power supply line. Conforms to IEC 61000-4-4
	Vibration resistance	Malfunction: 10 to 60 Hz with amplitude of 0.7 mm, 60 to 150 Hz and 50 m/s^2 for 80 min each in X, Y and Z directions
	Shock resistance	150 m/s^2 with amplitude of 0.7 mm
	Degree of protection	IP67
Dielectric strength		600 VAC between isolated circuits
Insulation resistance		20 MΩ min. between isolated circuits
Isolation method		Photocoupler isolation
Unit power consumption		60 mA
I/O power supply method		Supplied from the power supply connector
I/O current consumption		100 mA
Mounting		M5 screw mounting
Mounting strength		100 N
Communications connector strength		30 N
Connectors		EtherCAT communications connectors: M12 (D-coding, female) × 2 Power supply connector: M12 (A-coding, male) × 1 I/O connectors: M12 (A-coding, female) × 8[*1]
Screw tightening torque[*2]		Round connectors (communications connector, power supply and I/O): 0.39 to 0.49 N·m M5 (unit mounted from the front): 1.47 to 1.96 N·m Cover for node address setting switches: 0.4 to 0.6 N·m
Dimensions (W × H × D)		175 × 33 × 60 mm[*3]
Weight		430 g
Applicable standards		EU: EN 61131-2, RCM, KC, IO-Link conformance and EtherCAT conformance
Protective function		Load short-circuit protection

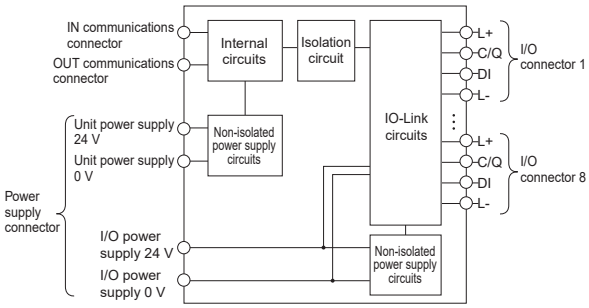
[*1] Confirms to Class A when used as an IO-Link connector.
[*2] For Smartclick connectors, insert the connector all the way and turn it approx. 1/8 of a turn. Torque management is not required.
[*3] The height is 49.1 mm when the connectors are included.

Circuit layout

NX-ILM400

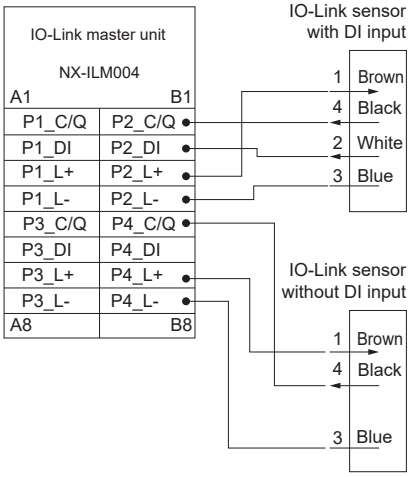


GX-ILM08C



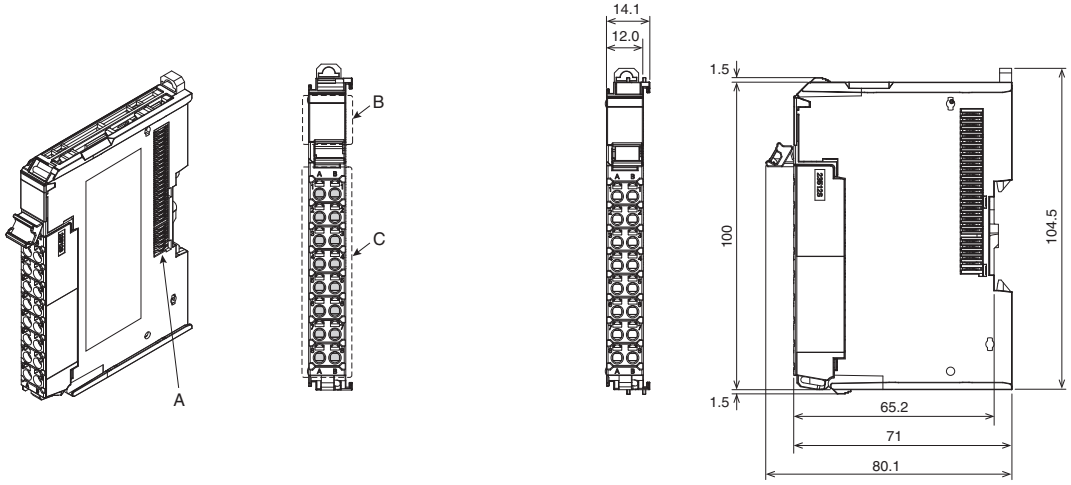
Terminal wiring

NX-ILM400



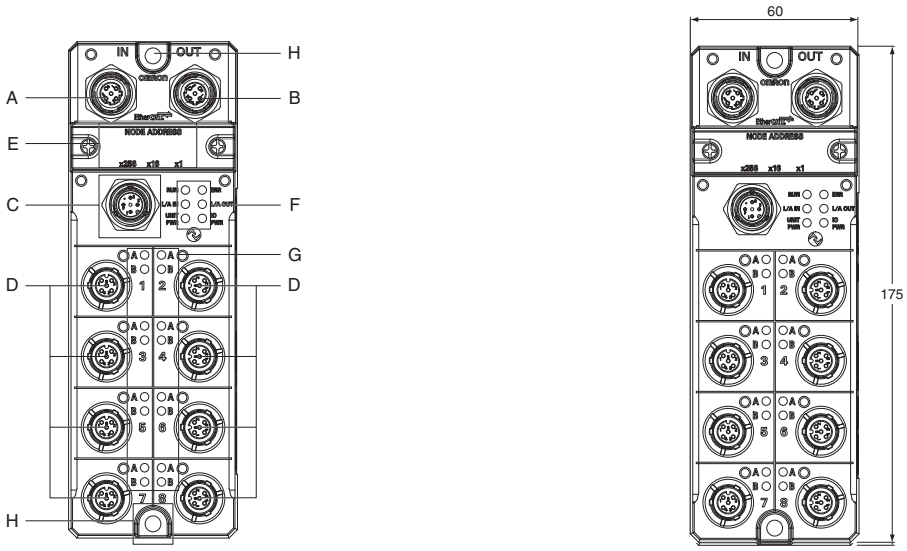
Nomenclature/Dimensions

NX-ILM400



Symbol	Name	Description
A	NX bus connector	This connector is used to connect each unit.
B	Indicators	The indicators show the current operating status of the unit.
C	Terminal block	The terminal block is used to connect external devices. The number of terminals depends on the type of unit.

GX-ILM08C



Symbol	Name	Description
A	EtherCAT communications connector, IN	EtherCAT cable connection: IN side M12 connector (D-coding, female)
B	EtherCAT communications connector, OUT	EtherCAT cable connection: OUT side M12 connector (D-coding, female)
C	Power supply connector	Connects to power supply unit and I/O power supply cable M12 connector (A-coding, male)
D	I/O connectors	Connect to IO-Link sensor cables (IO-Link connector type: Class A) M12 connectors (A-coding, female)
E	Node address setting switches	Used to set the EtherCAT node address.
F	Status indicators	Indicate the current status of the EtherCAT slave unit. (RUN, ERR, L/A IN, L/A OUT, UNIT PWR and I/O PWR)
G	I/O indicators	Indicate the I/O status (C/E and C/Q).
H	Mounting holes	Used to mount the unit with M5 screws.

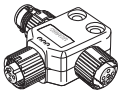
Ordering information

IO-Link master unit

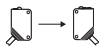
Item	IO-Link ports	Connection type	Degree of protection	Model	Appearance
NX-series IO-Link master unit*1	4	Screwless push-in (NX-TBA162)	IP20	NX-ILM400	
GX-series IO-Link master unit	8	M12 Smartclick connector	IP67	GX-ILM08C	

*1 EtherCAT communication coupler unit NX-ECC2□□ is necessary for the system configuration.

Accessories

Applicable models	Item	Specifications		Model
NX-ILM400	Terminal block coding pins	Pins for 10 units (terminal block: 30 pins, unit: 30 pins)		NX-AUX02
	Terminal block (replacement front connector)	16 wiring terminals (A + B)		NX-TBA162
	End cover	Included with communication coupler		NX-END01
GX-ILM08C	Power supply T-joint connector	Connector used when branching a GX-series IO-Link master unit power supply. 		XS5R-D427-5
	Waterproof cover for M12 connectors (female). When you use this waterproof cover, you can maintain the IP67 protective structure. Can be mounted on an EtherCAT connector or I/O connector	M12 threaded waterproof cover, Screw-type connector, material: brass/nickel plated 		XS2Z-22
		M12 Smartclick waterproof cover, Smartclick connector, material: PBT 		XS5Z-11
	Torque wrench	Tool for tightening M12 threaded connectors 		XY2F-0004
	EtherCAT communication cables (Cable with connectors on both ends, Rugged type, Shield strengthening cable, AWG22, 2-pair cable, Color: Black, Manufacturer: OMRON)	Smartclick connector M12 straight/M12 straight 	0.5 m	XS5W-T421-BM2-SS
			1 m	XS5W-T421-CM2-SS
			2 m	XS5W-T421-DM2-SS
			3 m	XS5W-T421-EM2-SS
			5 m	XS5W-T421-GM2-SS
			10 m	XS5W-T421-JM2-SS
		Smartclick connector M12 straight/RJ45 straight 	0.5 m	XS5W-T421-BMC-SS
			1 m	XS5W-T421-CMC-SS
			2 m	XS5W-T421-DMC-SS
			3 m	XS5W-T421-EMC-SS
			5 m	XS5W-T421-GMC-SS
			10 m	XS5W-T421-JMC-SS
	Power cables (Socket on one cable side)	Smartclick connector M12 straight 	1 m	XS5F-D421-C80-F
			2 m	XS5F-D421-D80-F
			3 m	XS5F-D421-E80-F
			5 m	XS5F-D421-G80-F
			10 m	XS5F-D421-J80-F

Photoelectric sensor

Sensing method		Sensing distance	Connection method	Baud rate	Model (PNP)	Appearance
Through-beam (emitter + receiver)*1		15 m	Pre-wired (2 m)	COM2	E3Z-T81-IL2 2M	
			Pre-wired M12 connector		E3Z-T81-M1TJ-IL2 0.3M	
			Standard M8 connector		E3Z-T86-IL2	
			Pre-wired (2 m)	COM3	E3Z-T81-IL3 2M	
			Pre-wired M12 connector		E3Z-T81-M1TJ-IL3 0.3M	
			Standard M8 connector		E3Z-T86-IL3	
Retro-reflective with MSR function*2		4 m*3	Pre-wired (2 m)	COM2	E3Z-R81-IL2 2M	
			Pre-wired M12 connector		E3Z-R81-M1TJ-IL2 0.3M	
			Standard M8 connector		E3Z-R86-IL2	
			Pre-wired (2 m)	COM3	E3Z-R81-IL3 2M	
			Pre-wired M12 connector		E3Z-R81-M1TJ-IL3 0.3M	
			Standard M8 connector		E3Z-R86-IL3	
Diffusive-reflective		1 m	Pre-wired (2 m)	COM2	E3Z-D82-IL2 2M	
			Pre-wired M12 connector		E3Z-D82-M1TJ-IL2 0.3M	
			Standard M8 connector		E3Z-D87-IL2	
			Pre-wired (2 m)	COM3	E3Z-D82-IL3 2M	
			Pre-wired M12 connector		E3Z-D82-M1TJ-IL3 0.3M	
			Standard M8 connector		E3Z-D87-IL3	
		90 mm (narrow beam)	Pre-wired (2 m)	COM2	E3Z-L81-IL2 2M	
			Pre-wired M12 connector		E3Z-L81-M1TJ-IL2 0.3M	
			Standard M8 connector		E3Z-L86-IL2	
			Pre-wired (2 m)	COM3	E3Z-L81-IL3 2M	
			Pre-wired M12 connector		E3Z-L81-M1TJ-IL3 0.3M	
			Standard M8 connector		E3Z-L86-IL3	

*1 Through-beam sensors are normally sold in sets that include both the emitter and receiver. Refer to “IO-Link catalogue (Y212-E1)” for separate items.
*2 The reflector is sold separately. Select the reflector model most suited to the application.
*3 The sensing distance specified is possible when the E39-R1S is used. The minimum required distance between the sensor and reflector is 100 mm.

Slit (Not provided with through-beam sensors. Order a slit separately if required)

Slit width	Sensing distance E3Z-T□□	Min. detectable object (reference value)	Model*1
0.5 mm dia.	50 mm	0.2 mm dia.	E39-S65A
1 mm dia.	200 mm	0.4 mm dia.	E39-S65B
2 mm dia.	800 mm	0.7 mm dia.	E39-S65C
0.5 × 10 mm	1 m	0.2 mm dia.	E39-S65D
1 × 10 mm	2.2 m	0.5 mm dia.	E39-S65E
2 × 10 mm	5 m	0.8 mm dia.	E39-S65F

*1 One set contains slits for emitter and receiver.

Reflector (Required for retro-reflective sensors. Not provided with the sensor. Order a reflector separately)

Item	Sensing distance E3Z-R□□*1		Model
	Rated value	Reference value	
Reflector	3 m (100 mm)	–	E39-R1
	4 m (100 mm)	–	E39-R1S
	–	5 m (100 mm)	E39-R2
	–	2.5 m (100 mm)	E39-R9
	–	3.5 m (100 mm)	E39-R10
Fog preventive coating	–	3 m (100 mm)	E39-R1K
Small reflector	–	1.5 m (50 mm)	E39-R3
Reflector tape	–	700 mm (150 mm)	E39-RS1
	–	1.1 m (150 mm)	E39-RS2
	–	1.4 m (150 mm)	E39-RS3

*1 Values in the parentheses indicate the minimum required distance between the sensor and reflector.

Mounting brackets (Not provided with sensors. Order a mounting bracket separately if required)

Item	Material	Model	Appearance
Mounting brackets	SUS304	E39-L153[*1]	
		E39-L104[*1]	
Horizontal mounting brackets		E39-L43[*2]	
Horizontal protective cover bracket		E39-L142[*2]	
Rear mounting bracket		E39-L44	
Metal protective cover bracket		E39-L98[*2]	
Sensor adjuster (for left to right adjustment) Easily mounted to the aluminum frame rails of conveyors and easily adjusted.		E39-L150	
		E39-L151	
Compact protective cover bracket (for E3Z only)		E39-L144[*2]	

[*1] Cannot be used for standard connector models with mounting surface on the bottom. In that case, use pre-wired connector models.
[*2] Cannot be used for standard connector models.

Sensor I/O connectors for photoelectric sensors (Models with connectors and pre-wired connectors: A connector is not provided with the sensor. Order a connector separately)

Size	Type	Appearance	Cable lenght	Model
M12	Socket on one cable side	Smartclick connector Straight[*1]	2 m	XS5F-D421-D80-F
			5 m	XS5F-D421-G80-F
		Smartclick connector L-shape[*1*2]	2 m	XS5F-D422-D80-F
			5 m	XS5F-D422-G80-F
	Socket and plug on cable ends[*3]	Smartclick connector Straight/Straight[*1]	2 m	XS5W-D421-D81-F
			5 m	XS5W-D421-G81-F
		Smartclick connector L-shape/L-shape[*1*2]	2 m	XS5W-D422-D81-F
			5 m	XS5W-D422-G81-F
M8	Socket on one cable side	Straight[*1]	2 m	XS3F-M421-402-A
			5 m	XS3F-M421-405-A
		L-shape[*1*2]	2 m	XS3F-M422-402-A
			5 m	XS3F-M422-405-A
M8 socket/M12 plug	Socket and plug on cable ends	Smartclick connector M8-M12 conversion cable[*1]	0.2 m	XS3W-M42C-4C2-A

[*1] The connectors will not rotate after they are connected.
[*2] The cable is fixed at an angle of 180º from the sensor emitter/receiver surface.
[*3] Straight type/L-shape type combinations are also available.

Color mark photoelectric sensor

Sensing method		Sensing distance	Connection method	Output	Baud rate	Model	Appearance
Diffusive-reflective (mark detection)		10 ±3 mm	M12 connector	Push-pull	COM2	E3S-DCP21-IL2	
					COM3	E3S-DCP21-IL3	

Sensor I/O connectors for color mark photoelectric sensor (Required for a sensor with a connector. Connectors are not provided with the sensors. Order a connector separately)

Size	Type	Appearance	Cable lenght	Model
M12	Socket on one cable side	Straight[*1]	2 m	XS2F-D421-D80-F
			5 m	XS2F-D421-G80-F
		L-shape[*1*2]	2 m	XS2F-D422-D80-F
			5 m	XS2F-D422-G80-F
	Socket and plug on cable ends[*3]	Smartclick connector Straight/Straight[*1]	2 m	XS5W-D421-D81-F
			5 m	XS5W-D421-G81-F
		Smartclick connector L-shape/L-shape[*1*2]	2 m	XS5W-D422-D81-F
			5 m	XS5W-D422-G81-F

[*1] The connectors will not rotate after they are connected.
[*2] The cable is fixed at an angle of 180º from the sensor emitter/receiver surface.
[*3] Straight type/L-shape type combinations are also available.

Standard proximity sensor (DC 3-wire)

Size		Sensing distance	Connection method	Cable material	Operating mode	Baud rate	Model (PNP)	Appearance
Shielded	M12	3 mm	Pre-wired models (2 m)	PVC (oil-re-sistant)	NO/NC switching	COM2	E2E-X3B4-IL2 2M	
						COM3	E2E-X3B4-IL3 2M	
			M12 pre-wired Smartclick connector models (0.3 m)			COM2	E2E-X3B4-M1TJ-IL2 0.3M	
						COM3	E2E-X3B4-M1TJ-IL3 0.3M	
	M18	7 mm	Pre-wired models (2 m)			COM2	E2E-X7B4-IL2 2M	
						COM3	E2E-X7B4-IL3 2M	
			M12 pre-wired Smartclick connector models (0.3 m)			COM2	E2E-X7B4-M1TJ-IL2 0.3M	
						COM3	E2E-X7B4-M1TJ-IL3 0.3M	
	M30	10 mm	Pre-wired models (2 m)			COM2	E2E-X10B4-IL2 2M	
						COM3	E2E-X10B4-IL3 2M	
			M12 pre-wired Smartclick connector models (0.3 m)			COM2	E2E-X10B4-M1TJ-IL2 0.3M	
						COM3	E2E-X10B4-M1TJ-IL3 0.3M	

Spatter-resistant proximity sensor (DC 3-wire)

Size		Sensing distance	Connection method	Cable material	Operating mode	Baud rate	Model	Appearance
Shielded	M12	3 mm	Pre-wired models (2 m)	PVC	NO/NC switching	COM2	E2EQ-X3B4-IL2 2M	
						COM3	E2EQ-X3B4-IL3 2M	
			M12 pre-wired Smartclick connector models (0.3 m)			COM2	E2EQ-X3B4-M1TJ-IL2 0.3M	
						COM3	E2EQ-X3B4-M1TJ-IL3 0.3M	
	M18	7 mm	Pre-wired models (2 m)			COM2	E2EQ-X7B4-IL2 2M	
						COM3	E2EQ-X7B4-IL3 2M	
			M12 pre-wired Smartclick connector models (0.3 m)			COM2	E2EQ-X7B4-M1TJ-IL2 0.3M	
						COM3	E2EQ-X7B4-M1TJ-IL3 0.3M	
	M30	10 mm	Pre-wired models (2 m)			COM2	E2EQ-X10B4-IL2 2M	
						COM3	E2EQ-X10B4-IL3 2M	
			M12 pre-wired Smartclick connector models (0.3 m)			COM2	E2EQ-X10B4-M1TJ-IL2 0.3M	
						COM3	E2EQ-X10B4-M1TJ-IL3 0.3M	

Sensor I/O connectors for standard and spatter-resistant proximity sensors (Models with pre-wired connectors: A connector is not provided with the sensor. Order a connector separately)

Size	Type	Appearance	Cable lenght	Model
M12	Socket on one cable side	Smartclick connector Straight[*1]	2 m	XS5F-D421-D80-F
			5 m	XS5F-D421-G80-F
		Smartclick connector L-shape[*1*2]	2 m	XS5F-D422-D80-F
			5 m	XS5F-D422-G80-F
	Socket and plug on cable ends[*3]	Smartclick connector Straight/Straight[*1]	2 m	XS5W-D421-D81-F
			5 m	XS5W-D421-G81-F
		Smartclick connector L-shape/L-shape[*1*2]	2 m	XS5W-D422-D81-F
			5 m	XS5W-D422-G81-F

[*1] The connectors will not rotate after they are connected.
[*2] The cable is fixed at an angle of 180º from the sensor emitter/receiver surface.
[*3] Straight type/L-shape type combinations are also available.

Computer software

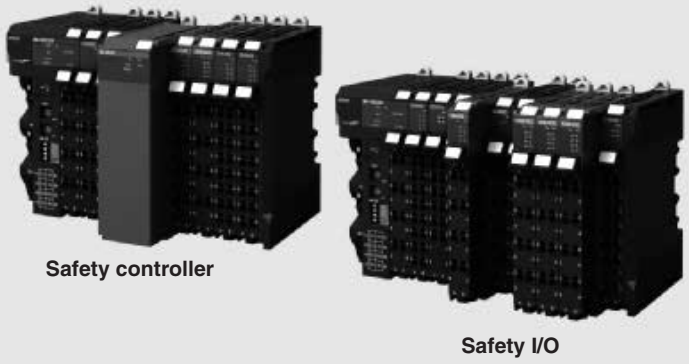
Item	Model
Sysmac Studio version 1.16 or higher	SYSMAC-SE2□□□

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I191E-EN-01A In the interest of product improvement, specifications are subject to change without notice.

NX-S□

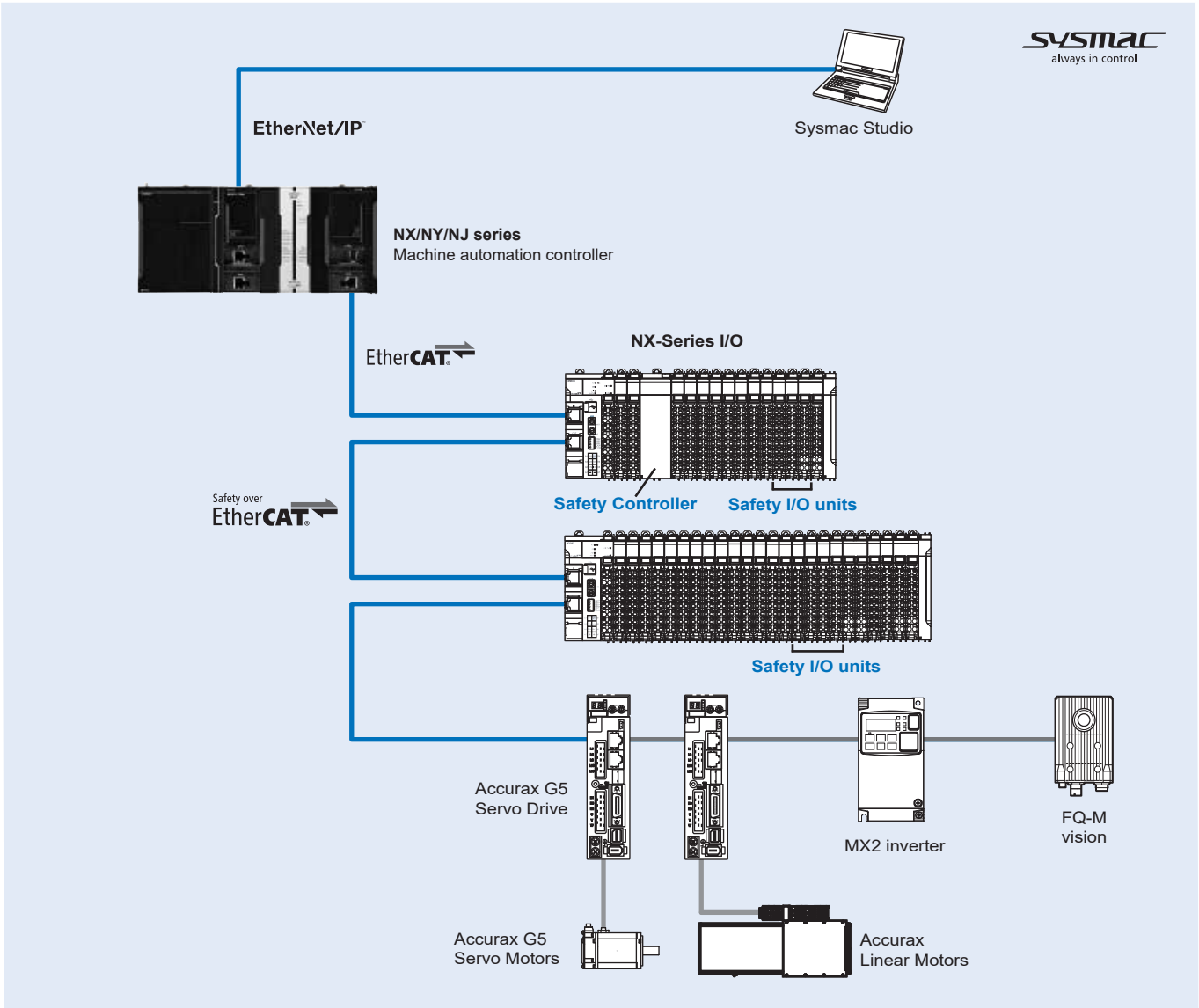
NX integrated safety



Integrated safety into machine automation

- The safety controller meets Category 4, PLe according to the ISO 13849-1 and SIL3 according to the IEC 61508
- Flexible system lets you freely mix safety controller and safety I/O units with standard NX I/O
- High connectivity I/O units for direct connection to a variety of devices
- Scalable CPUs for 32 or 128 safety connections
- Up to 8 safety input points per unit
- Safety function blocks conforming with IEC 61131-3 standard programming
- PLCopen function blocks for safety
- Integration in one software, Sysmac Studio

System configuration



Specifications

Regulations and standards

Certification body	Standards	
TÜV Rheinland[*1]	EN ISO 13849-1: 2008 + AC: 2009 EN ISO 13849-2: 2012 IEC 61508 parts 1-7: 2010 EN 62061: 2005 EN 61131-2: 2007 EN ISO 13850: 2008 EN 60204-1: 2006 + A1: 2009 + AC: 2010	EN 61000-6-2: 2005 EN 61000-6-4: 2007 NFPA 79: 2012 ANSI RIA 15.06-1999 ANSI B11.19-2010 UL1998 IEC 61326-3-1: 2008
UL	cULus: Listed (UL508) and ANSI/ISA 12.12.01	

*1. Certification was received for applications in which OMRON FSoE devices are connected to each other.

The NX-series Safety Control Units allow you to build a safety control system that meets the following standards.

- Requirements for SIL 3 (Safety Integrity Level 3) in IEC 61508, EN 62061, Safety Standard for Safety Instrumented Systems (Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems)
- Requirements for PLe (Performance Level e) and for safety category 4 in EN ISO13849-1

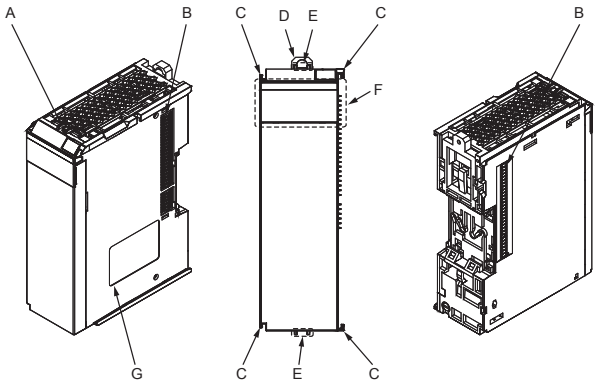
The NX-series Safety Control Units are also registered for C-Tick and KC compliance.

General specifications

Item		Specifications
Enclosure		Mounted in a panel
Grounding method		Ground to 100 Ω or less
Operating environment	**Ambient operating temperature**	0 to 55°C
	Ambient operating humidity	10% to 95% (with no condensation or icing)
	Atmosphere	No corrosive gases
	Ambient storage temperature	–25 to 70°C (with no condensation or icing)
	Altitude	2,000 m max.
	Pollution degree	2 or less: Conforms to JIS B3502 and IEC 61131-2
	Noise immunity	Compliant with IEC 61131-2 2 kV on power supply line (compliant with IEC 61000-4-4)
	Insulation class	Class III (SELV)
	Overvoltage category	Category II: Conforms to JIS B3502 and IEC 61131-2
	EMC immunity level	Zone B
	Vibration resistance	Compliant with IEC 60068-2-6 5 to 8.4 Hz, 3.5-mm amplitude, 8.4 to 150 Hz, acceleration: 9.8 m/s^2 for 100 minutes each in X, Y and Z directions (time coefficient: 10 minutes x coefficient factor 10 = total time 100 min.)
	Shock resistance	Compliant with IEC 60068-2-27 147 m/s^2, 3 times each in X, Y and Z directions
	Insulation resistance	20 MΩ between isolated circuits (at 100 VDC)
	Dielectric strength	510 VAC for 1 min between isolated circuits, leakage current: 5 mA max.
Installation method		DIN track (IEC 60715 TH35-7.5/TH35-15)
Applicable standards		EN ISO 13849-1, 13849-2: 2008 PLe/Safety Category 4 IEC 61508: 2010 SIL 3, EN 62061: 2005 SIL CL3 UL 1988 cULus: listed (UL508), ANSI/ISA 12.12.01 EC: EN 61131-2, C-Tick, KC: KC Registration

Nomenclature

Safety controller unit



Symbol	Name	Function
A	Marker installation location	These are where markers are attached. OMRON markers are attached when the unit is shipped. You can also attach commercially available markers.
B	NX bus connector	This is the NX-series bus connector. It is used to connect an NX-series safety I/O unit or other NX unit.
C	Unit hookup guide	This guide is used to connect the unit to another unit.
D	DIN track mounting hooks	These hooks are used for installation on a DIN track.
E	Unit pull out tabs	Place your fingers on these tabs to pull out the unit.
F	Indicators	The indicators show the current operating status of the NX unit and signal I/O status. The number of indicators depend on the NX unit.
G	Unit specifications	The specifications of the NX unit are given here.

Safety controller unit

Item	Specifications	
Model	**NX-SL3300**	**NX-SL3500**
Name	Safety CPU unit	
Maximum number of safety I/O points	256 points	1024 points
Program capacity	512 KB	2048 KB
Number of safety master connections	32	128
External connection terminals	None	
Unit power consumption	0.90 W max.	
I/O power supply system	Not supplied	
I/O current consumption	No consumption	
Current capacity of I/O power supply terminal	No I/O power supply terminals	
I/O refreshing method	Free-run refreshing	
Dimensions (W × H × D)	30 × 100 × 71 mm	
Weight	75 g max.	

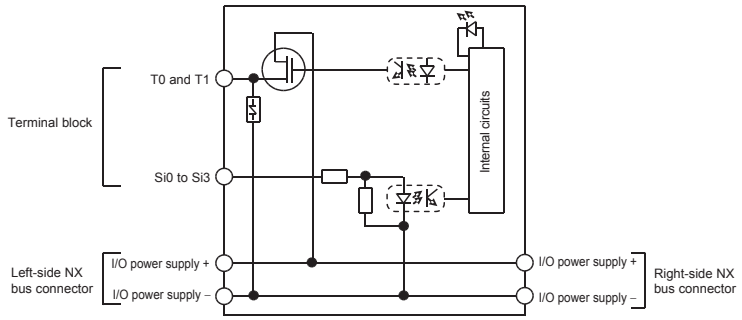
Safety I/O unit

Safety input unit

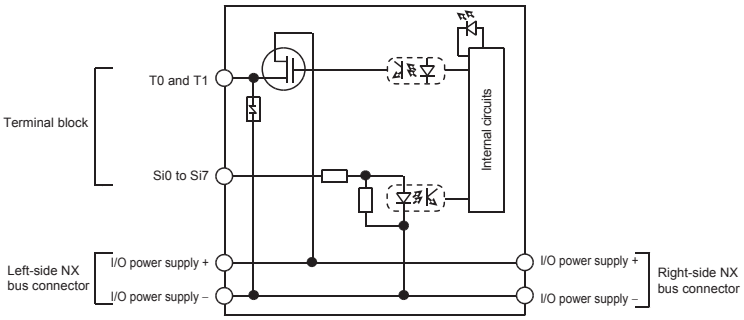
Item	Specifications	
Model	**NX-SIH400**	**NX-SID800**
Name	Advanced safety input unit	Safety input unit
Number of safety inputs	4 points	8 points
Number of test outputs	2 points	
Internal I/O common	Sinking (PNP)	
Rated input voltage	24 VDC	
OMRON special safety input devices	Can be connected	Cannot be connected
Number of safety slave connections	1	
Safety input current	4.5 mA	3.0 mA
Safety input ON voltage	11 VDC min.	15 VDC min.
Safety input OFF voltage/OFF current	5 VDC max., 1 mA max.	
Test output type	Sourcing outputs (PNP)	
Rated current of test outputs	25 mA max.	50 mA max.
Residual ON voltage of test outputs	1.2 V max.	
Leakage current of test outputs	0.1 mA max.	
Dielectric strength	510 VAC for 1 min between isolated circuits, leakage current: 5 mA max.	
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)	
Isolation method	Photocoupler isolation	
Unit power consumption	0.70 W max.	0.75 W max.
I/O power supply system	Power supplied through the NX bus	
I/O current consumption	20 mA max.	
Current capacity of I/O power supply terminal	No applicable terminals	
I/O refreshing method	Free-run refreshing	
Terminal block type	Screwless push-in terminals 8 terminals (A + B)	Screwless push-in terminals 16 terminals (A + B)
Dimensions (W × H × D)	12 × 100 × 71 mm	
Weight	70 g max.	
Maximum cable length	Devices with mechanical contacts: 400 m, other devices: 100 m	
Protective functions	Overvoltage protection circuit and ground fault detection (test outputs)	

Circuit layout

NX-SIH400

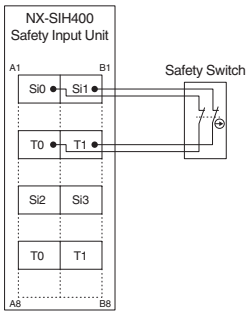


NX-SID800

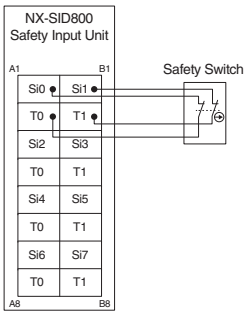


Terminal wiring

NX-SIH400



NX-SID800

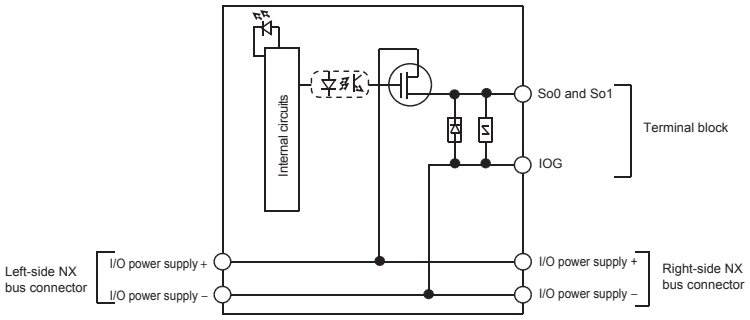


Safety output unit

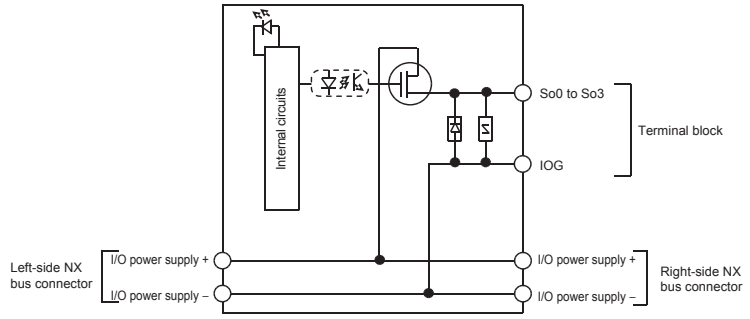
Item	Specifications	
Model	**NX-SOH200**	**NX-SOD400**
Name	High-current safety output unit	Safety output unit
Number of safety outputs	2 points	4 points
Internal I/O common	Sourcing outputs (PNP)	
Maximum load current	2.0 A/point, 4.0 A/unit at 40ºC, 2.5 A/unit at 55ºC The maximum load current depends on the installation orientation and ambient temperature.	0.5 A/point and 2.0 A/unit
Rated voltage	24 VDC	
Number of safety slave connections	1	
Safety output ON residual voltage	1.2 V max.	
Safety output OFF residual voltage	2 V max.	
Safety output leakage current	0.1 mA max.	
Dielectric strength	510 VAC for 1 min between isolated circuits, leakage current: 5 mA max.	
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)	
Isolation method	Photocoupler isolation	
Unit power consumption	0.70 W max.	0.75 W max.
I/O power supply system	Power supplied through the NX bus	
I/O current consumption	40 mA max.	60 mA max.
Current capacity of I/O power supply terminal	IOG: 2 A max./terminal	IOG (A3 and B3): 2 A max./terminal, IOG (A7 and B7): 0.5 A max./terminal
I/O refreshing method	Free-run refreshing	
Terminal block type	Screwless push-in terminals 8 terminals (A + B)	
Dimensions (W × H × D)	12 × 100 × 71 mm	
Weight	65 g max.	
Maximum cable length	100 m	
Protective functions	Overvoltage protection circuit and ground fault detection	

Circuit layout

NX-SOH200

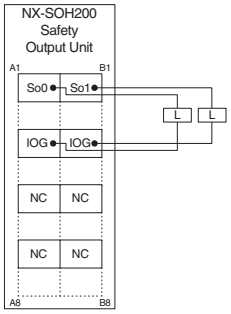


NX-SOD400

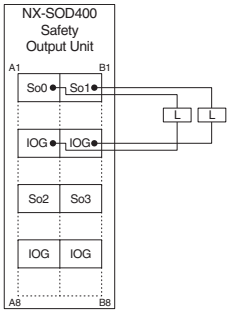


Terminal wiring

NX-SOH200



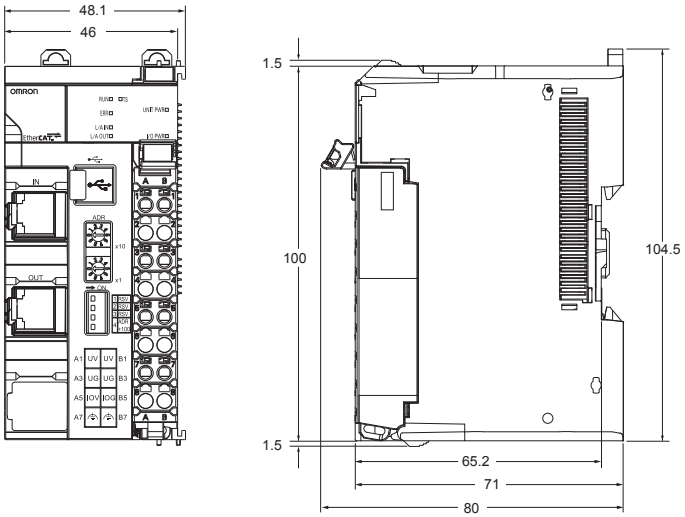
NX-SOD400



Dimensions

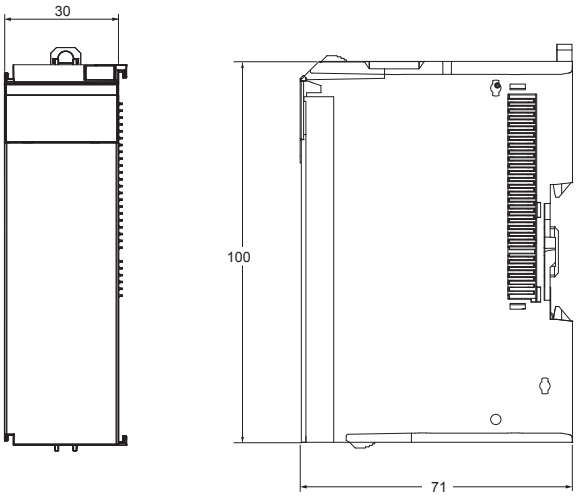
EtherCAT coupler unit

NX-ECC20□



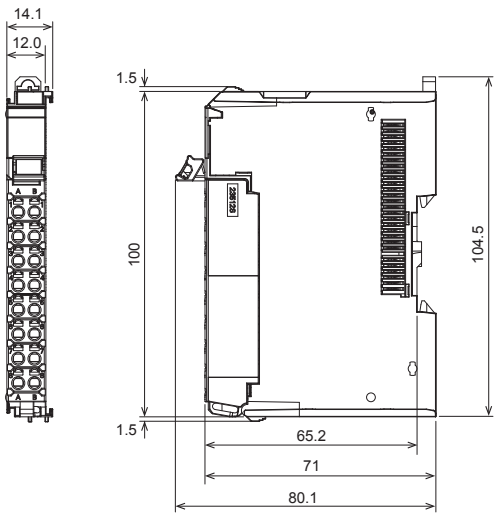
Safety controller unit

NX-SL3300/SL3500



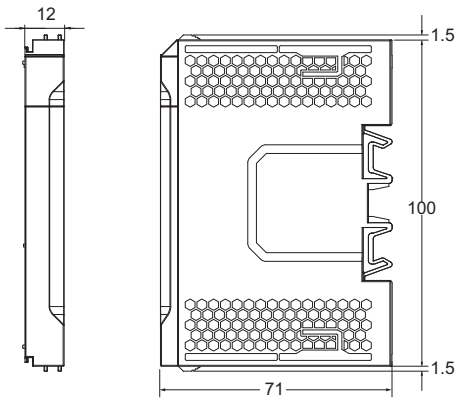
Safety I/O unit

12 mm width



End cover unit (included with the EtherCAT coupler unit)

NX-END01



Ordering information

EtherCAT coupler unit

Type	Protocol	Communications cycle in DC mode*1	Specifications	Connection	I/O power supply	Width	Model
Communication coupler	EtherCAT slave	125 to 10,000 µs	Up to 63 I/O units Max. 1024 bytes in and 1024 bytes out Supports distributed clock	2 RJ45 ports (in and out)	10.0 A max.	46 mm	NX-ECC203

*1. This depends on the specifications of the EtherCAT master and the unit configuraton.

Safety controller unit

Type	Safety master connections	Safety I/O points	Program capacity	Width	Model
Safety CPU	32	256 points max.	512 KB	30 mm	NX-SL3300
	128	1024 points max.	2048 KB	30 mm	NX-SL3500

Safety I/O unit

Safety input unit

Type	Signal type	Safety slave connections	Safety inputs	Test outputs	Width	Model
Safety input	PNP type	1	4 points	2 points	12 mm	NX-SIH400
			8 points	2 points	12 mm	NX-SID800

Safety output unit

Type	Signal type	Safety slave connections	Safety outputs	Width	Model
Safety output	PNP type	1	2 points	12 mm	NX-SOH200
			4 points	12 mm	NX-SOD400

System unit

Type	Specifications	Width	Model
End cover	Included with communication coupler	12 mm	NX-END01

Accessories

Name	Specifications	Model
Terminal block coding pins	For 10 units (Terminal block: 30 pins, unit: 30 pins)	NX-AUX02
Terminal block	Replacement front connector with 8 wiring terminals (A + B)	NX-TBA082
	Replacement front connector with 16 wiring terminals (A + B)	NX-TBA162

Computer software

Name	Model
Sysmac Studio version 1.13 or higher*1	SYSMAC-SE2□□□

*1. Please contact your OMRON representative for compatibility between the Sysmac Studio version 1.12 or lower and NX I/O units.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat.No.SysCat_I183E-EN-02B In the interest of product improvement, specifications are subject to change without notice.

R88D-1SN□□□-ECT

1S servo drive



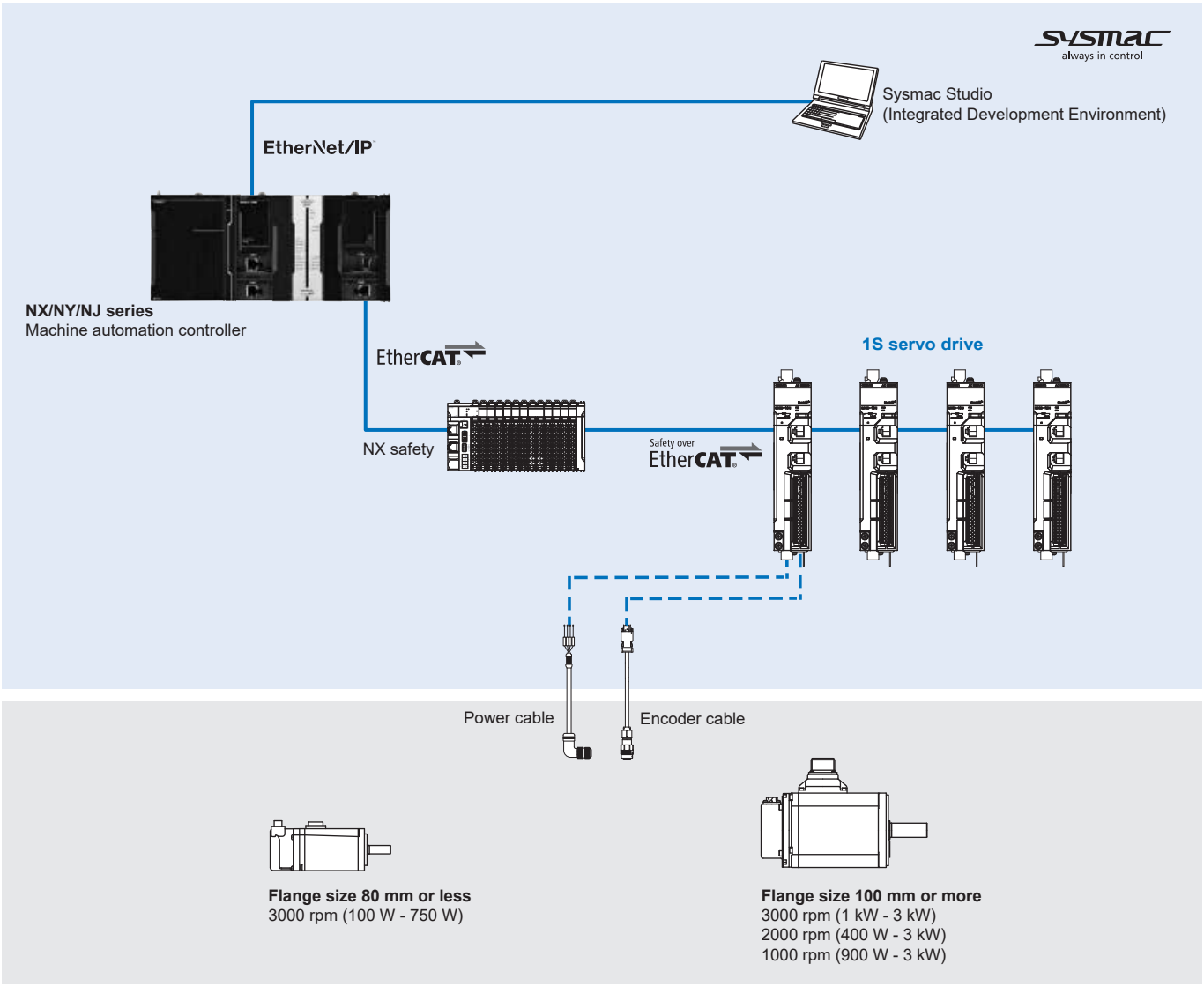
Sysmac general purpose servo

- 23-bit resolution encoder
- Fast and secure screw-less push-in in all connectors
- Pluggable connectors for easy pre-wiring and system maintenance
- Direct wiring of I/O signals
- Embedded relay for direct motor brake control
- Improved loop control for overshoot and quick setting time
- Safety function built-in:
  Network Safe Torque Off: PLd (EN ISO 13849-1), SIL2 (IEC 61508)
  Hardwired Safe Torque Off: PLe (EN ISO 13849-1), SIL3 (IEC 61508)

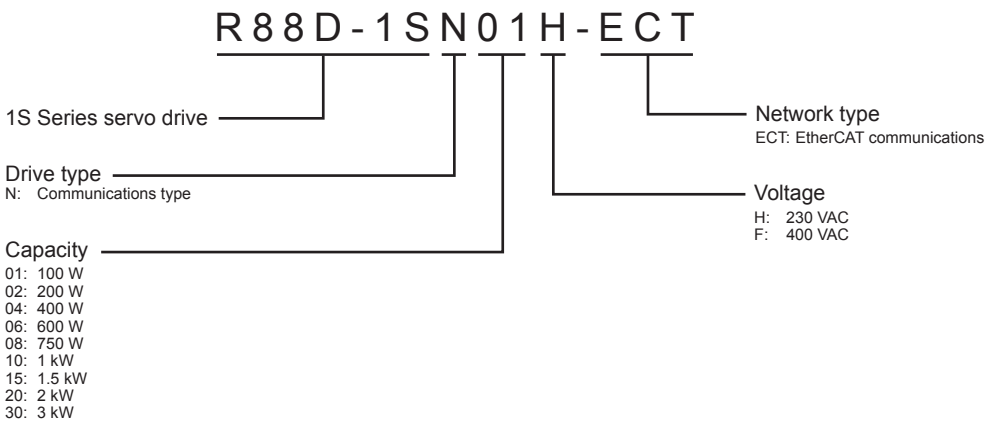
Ratings

- 230 VAC single-phase: 100 W to 1.5 kW
- 400 VAC three-phase: 600 W to 3 kW

System configuration



Type designation



Specifications

Single-phase, 230 V

Servo drive model				R88D-1SN01H-ECT	R88D-1SN02H-ECT	R88D-1SN04H-ECT	R88D-1SN08H-ECT	R88D-1SN15H-ECT
Applicable servo motor			3000 r/min	R88M-1M10030T	R88M-1M20030T	R88M-1M40030T	R88M-1M75030T	R88M-1L1K030T R88M-1L1K530T
			2000 r/min	-	-	-	-	R88M-1M1K020T R88M-1M1K520T
			1000 r/min	-	-	-	-	R88M-1M90010T
Max. applicable motor capacity			W	100	200	400	750	1500
Input	Control circuit	Power supply voltage	V	24 VDC (21.6 to 26.4 V)				
	Main circuit	Power supply voltage	V	Single-phase 200 to 240 VAC (170 to 252 V)				
		Frequency	Hz	50/60 Hz (47.5 to 63 Hz)				
	Rated input current	Single-phase	Arms	1.8	2.7	4.6	7.3	15.7
Output	Rated output current		Arms	0.8	1.5	2.5	4.6	9.7
	Max. current		Arms	3.1	5.6	9.1	16.9	28.4
Basic	Ambient operating/storage temperature			0 to 55°C/-20 to 65°C				
	Ambient operating/storage humidity			90% RH or less (without condensation)				
	Atmosphere			Must be free from corrosive gases				
	Altitude			1000 m or less				
	Vibration resistance (max.)			5.88 m/s^2, 10 to 60 Hz (continuous operation at resonance point is not allowed)				
	Degree of protection			IP20 (Built into IP54 panel)				
Weight			kg	1.2	1.2	1.5	2.0	3.4

Three-phase, 400 V

Servo drive model				R88D-1SN06F-ECT	R88D-1SN10F-ECT	R88D-1SN15F-ECT	R88D-1SN20F-ECT	R88D-1SN30F-ECT
Applicable servo motor			3000 r/min	-	R88M-1L75030C R88M-1L1K030C	R88M-1L1K530C	R88M-1L2K030C	R88M-1L3K030C
			2000 r/min	R88M-1M40020C R88M-1M60020C	R88M-1M1K020C	R88M-1M1K520C	R88M-1M2K020C	R88M-1M3K020C
			1000 r/min	-	R88M-1M90010C	-	R88M-1M2K010C	R88M-1M3K010C
Max. applicable motor capacity			W	600	1000	1500	2000	3000
Input	Control circuit	Power supply voltage	V	24 VDC (21.6 to 26.4 V)				
	Main circuit	Power supply voltage	V	Three-phase 380 to 480 VAC (323 to 504 V)				
		Frequency	Hz	50/60 Hz (47.5 to 63 Hz)				
	Rated input current	Three-phase	Arms	2.4	3.1	4.3	6.5	8.4
Output	Rated output current		Arms	1.8	4.1	4.7	7.8	11.3
	Max. current		Arms	5.5	9.6	14.1	19.8	28.3
Basic	Ambient operating/storage temperature			0 to 55°C/-20 to 65°C				
	Ambient operating/storage humidity			90% RH or less (without condensation)				
	Atmosphere			Must be free from corrosive gases				
	Altitude			1000 m or less				
	Vibration resistance (max.)			5.88 m/s^2, 10 to 60 Hz (continuous operation at resonance point is not allowed)				
	Degree of protection			IP20 (Built into IP54 panel)				
Weight			kg	3.4	3.4	3.4	3.4	3.4

I/O specifications

Control I/O and safety connector (CN1)

Pin No.	Signal name	Function	Pin No.	Signal name	Function	
1	EDM+P	EDM+ output with short-circuit protection	21	EDM-	EDM- output	A monitor signal is output to detect a safety function failure. The Pin No. 22 is reserved.
2	EDM+	EDM+ output without short-circuit protection	22	SFA	Reserved	
3	SF1+	SF1+ input	23	SF1+	SF1+ input	Inputs 1 and 2 for operating the STO function, which are two independent circuits. This input turns OFF the power transistor drive signals in the servo drive to cut off the current output to the motor.
4	SF1-	SF1- input	24	SF1-	SF1- input	
5	SF2+	SF2+ input	25	SF2+	SF2+ input	
6	SF2-	SF2- input	26	SF2-	SF2- input	
7	SFB	Reserved	27	NC	NC	Reserved. Do not connect.
8	/ERR+	Error output	28	/ERR-	Error output common	If the servo drive detects an abnormality, it outputs an error (/ALM) and turns OFF the power drive circuit.
9	OUT1+	General-purpose output 1	29	OUT1-	General-purpose output 1 common	Output functions: Error output (ERR), Servo ready completed output (READY), Positioning completion output 1/2 (INP1/INP2), Motor rotation speed detection output (TGON), Torque limit output (TLMT), Zero speed detection output (ZSP), Speed conformity output (VCMP), Warning output 1/2 (WARN1/WARN2), Speed limiting output (VLIMIT), Error clear attribute output (ERR-ATB), Remote output 1/2/3 (R-OUT1/R-OUT2/R-OUT3), Zone notification output 1/2 (ZONE1/ZONE2), Position command status output (PCMD), Distribution completed output (DEN).
10	OUT2+	General-purpose output 2	30	OUT2-	General-purpose output 2 common	
11	OUT3+	General-purpose output 3	31	OUT3-	General-purpose output 3 common	
12	IN1	General-purpose input 1	32	IN2	General-purpose input 2	Input functions: Positive drive prohibition input (POT), Negative drive prohibition input (NOT), Error stop input (ESTP), External latch input 1/2 (EXT1/EXT2), Home proximity input (DEC), Positive torque limit input (PCL), Negative torque limit input (NCL), Monitor input 1/2/3/4/5/6/7/8 (MON1/MON2/MON3/MON4/MON5/MON6/MON7/MON8), Main circuit power supply ON/OFF input (PRDY).
13	IN3	General-purpose input 3	33	IN4	General-purpose input 4	
14	IN5	General-purpose input 5	34	IN6	General-purpose input 6	
15	IN7	General-purpose input 7 (high-speed input)	35	IN8	General-purpose input 8 (high-speed input)	
16	GND	Encoder GND	36	Common	12 to 24 VDC power supply	GND for encoder / Common for inputs.
17	A+	Encoder phase A+ output	37	A-	Encoder phase A- output	Encoder signal output. Line Drive output. EIARS422A compliant (load resistance: 120 Ω). Max. output frequency: 4 Mpps (when multiplied by 4).
18	B+	Encoder phase B+ output	38	B-	Encoder phase B- output	
19	Z+	Encoder phase Z+ output	39	Z-	Encoder phase Z- output	
20	FG	FG	40	FG	FG	Frame ground.

Encoder connector (CN2)

Pin No.	Signal name	Function	
1	E5V	Encoder power supply voltage	Encoder power supply voltage.
2	E0V	Encoder power supply GND	
3	NC	Not used	Not used.
4	NC	Not used	
5	PS+	Encoder+ phase-S I/O	Encoder phase-S I/O.
6	PS-	Encoder- phase-S I/O	
Shell	FG	Frame ground	Frame ground.

USB connector (CN7)

Pin No.	Signal name	Function	
1	VBUS	USB signal terminal	Used for computer communications.
2	D-		
3	D+		
4	Reserved	Reserved	Reserved. Do not connect.
5	GND	Signal ground	Signal ground.

Brake interlock connector (CN12)

Pin No.	Signal name	Function	
1	0V_BKIR	24 V power supply for brake -	24 V power supply for brake.
2	+24V_BKIR	24 V power supply for brake +	
3	BKIR-	Brake output -	Brake output.
4	BKIR+	Brake output +	

I/O specifications (specific for 230 V, 100 W to 750 W models)

Main circuit connector (CNA)

Pin No.	Signal name	Function	
1	L1	Main circuit power supply input	Input for the main circuit power supply voltage. Single-phase 200 to 240 VAC (170 to 252 V), 50/60 Hz*1
2	L2		
3	L3		
4	B3	External regeneration resistor connection terminals	If regenerative energy is high, an external regeneration resistor is connected so that the regenerative energy can be absorbed. When an internal regeneration resistor is used: B1 and B2 are open, B2 and B3 are short-circuited*2. When an external regeneration resistor is used: The external regeneration resistor is connected between B1 and B2, B2 and B3 are open.
5	B2		
6	P/B1		
7	N1	DC reactor connection terminals	When the DC reactor is not used, short-circuit N1 and N2. When the DC reactor is used, connect the DC reactor between N1 and N2.
8	N2		
9	N3		
10	+24V	Control circuit power supply input	Input for the control power supply voltage. 24 VDC ±10% (21.6 to 26.4 V) Measured current value: 600 mA
11	0V		

*1 When the single-phase input is used, connect between any two phases out of the following: L1, L2 and L3.
*2 B2 and B3 shall be short-circuited in the factory setting.

Motor connector (CNC)

Pin No.	Signal name	Function	
1	U	Motor connection terminals	These are the connection terminals to the servo motor.
2	V		
3	W		

I/O specifications (specific for 230 V, 1.5 kW model / 400 V, 600 W to 3 kW models)

Connector for main circuit power supply and external regeneration resistor (CNA)

Pin No.	Signal name	Function	
1	B1	External regeneration resistor connection terminals	If regenerative energy is high, an external regeneration resistor is connected so that the regenerative energy can be absorbed. When an internal regeneration resistor is used: B1 and B2 are open, B2 and B3 are short-circuited*1. When an external regeneration resistor is used: The external regeneration resistor is connected between B1 and B2, B2 and B3 are open.
2	B2		
3	B3		
4	L3	Main circuit power supply input	Input for the main circuit power supply voltage. Single-phase 200 to 240 VAC (170 to 252 V), 50/60 Hz*2 Three-phase 380 to 480 VAC (323 to 504 V), 50/60 Hz
5	L2		
6	L1		

*1 B2 and B3 shall be short-circuited in the factory setting.
*2 When the single-phase input is used, connect between any two phases out of the following: L1, L2 and L3.

DC bus connector (CNB)

Pin No.	Signal name	Function	
1	N3	DC reactor connection terminals	When the DC reactor is not used, short-circuit N1 and N2. When the DC reactor is used, connect the DC reactor between N1 and N2.
2	N2		
3	N1		
4	P		

Motor connector (CNC)

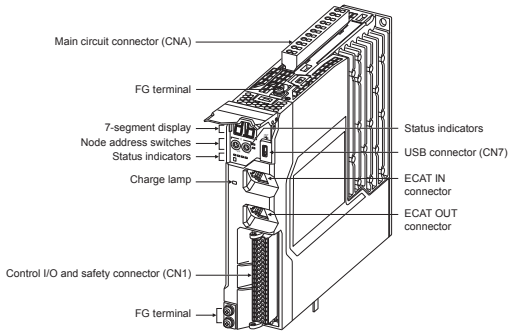
Pin No.	Signal name	Function	
1	W	Motor connection terminals	These are the connection terminals to the servo motor.
2	V		
3	U		
4	FG		

Control power supply connector (CND)

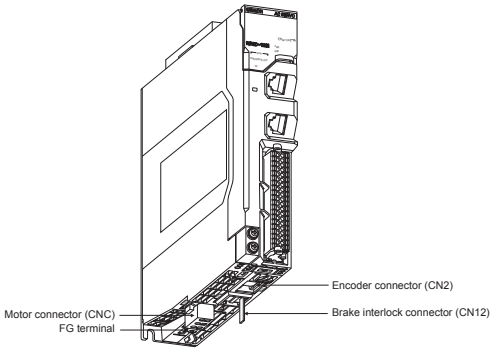
Pin No.	Signal name	Function	
1	+24V	Control circuit power supply input	Input for the control power supply voltage. 24 VDC ±10% (21.6 to 26.4 V) Measured current value: 900 mA
2	0V		
3	NC	-	

Nomenclature

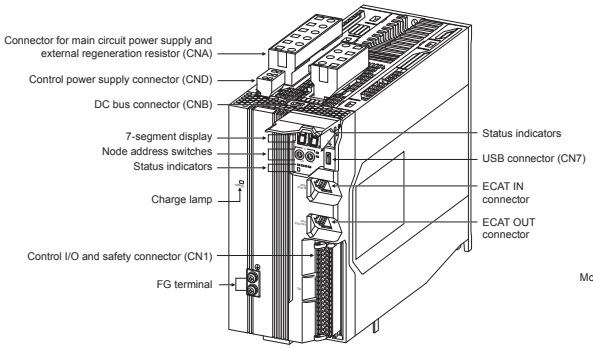
■ TOP VIEW
(230 V, 100 W to 750 W models)



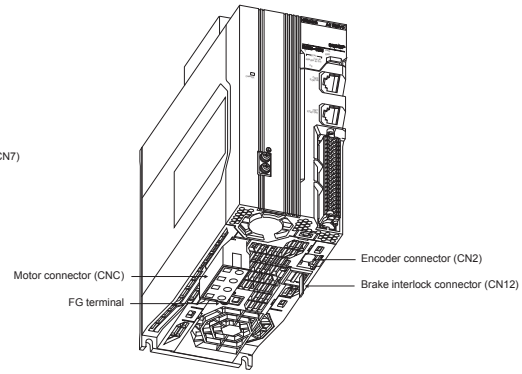
■ BOTTOM VIEW
(230 V, 100 W to 750 W models)



■ TOP VIEW
(230 V, 1.5 kW model)
(400 V, 600 W to 3 kW models)



■ BOTTOM VIEW
(230 V, 1.5 kW model)
(400 V, 600 W to 3 kW models)



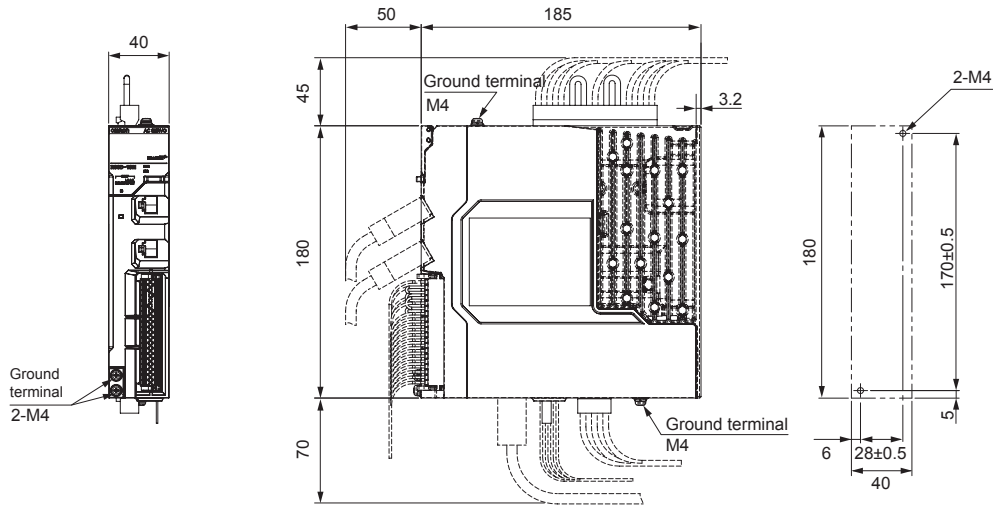
Name	Description
Status indicators	The following seven indicators are mounted: PWR (Green): Displays the status of the control power supply. ERR (Red): Displays the servo drive error status. ECAT-RUN (Green) and ECAT-ERR (Red): Displays the EtherCAT communications status. ECAT-L/A IN (Green) and ECAT-L/A OUT (Green): Lights or flashes according to the status of a link in the EtherCAT physical layer. FS (Red/Green): Displays the FSoE communications status.
7-segment display	A 2-digit 7-segment display shows error numbers, the servo drive status and other information.
Node address switches	Two selector switches (0 to F hex) are used to set the EtherCAT node address.
Charge lamp	Lights when the main circuit power supply is turned ON.
EtherCAT communications connectors	These connectors (ECAT IN and ECAT OUT) are for EtherCAT communications.
Control I/O and safety connector (CN1)	Used for command input signals, I/O signals and the safety device connector. The short-circuit wire is installed on the safety signals before shipment.
Encoder connector (CN2)	Connector for the encoder installed in the servo motor.
USB connector (CN7)	USB-Micro B communications connector for the computer. This connector enables USB 2.0 Full Speed (12 Mbps) communications.
Brake interlock connector (CN12)	Used for brake interlock signals.
Main circuit connector (CNA)*1	Connector for the main circuit power supply input, control power supply input, external regeneration resistor and DC reactor.
Connector for main circuit power supply and external regeneration resistor (CNA)*2	Connector for the main circuit power supply input and external regeneration resistor.
DC bus connector (CNB)	Connector for a DC reactor.
Motor connector (CNC)	Connector for the power line to U, V and W phases of the servo motor.
Control power supply connector (CND)	Connector for control power supply input.
FG terminals	Terminals for FG connection.

*1 Specific connector for 230 V, 100 W to 750 W models.
*2 Specific connector for 230 V, 1.5 kW model and 400 V, 600 W to 3 kW models.

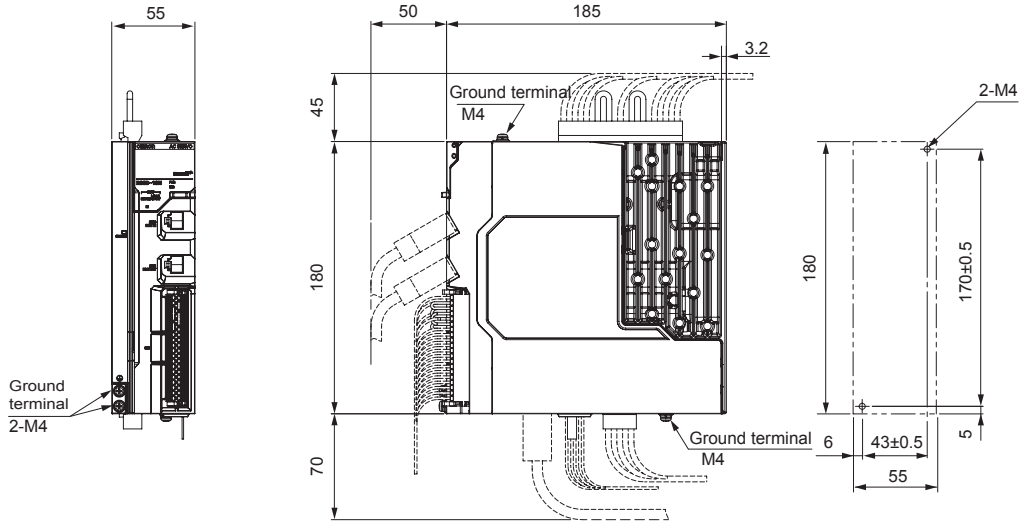
Dimensions

Servo drives

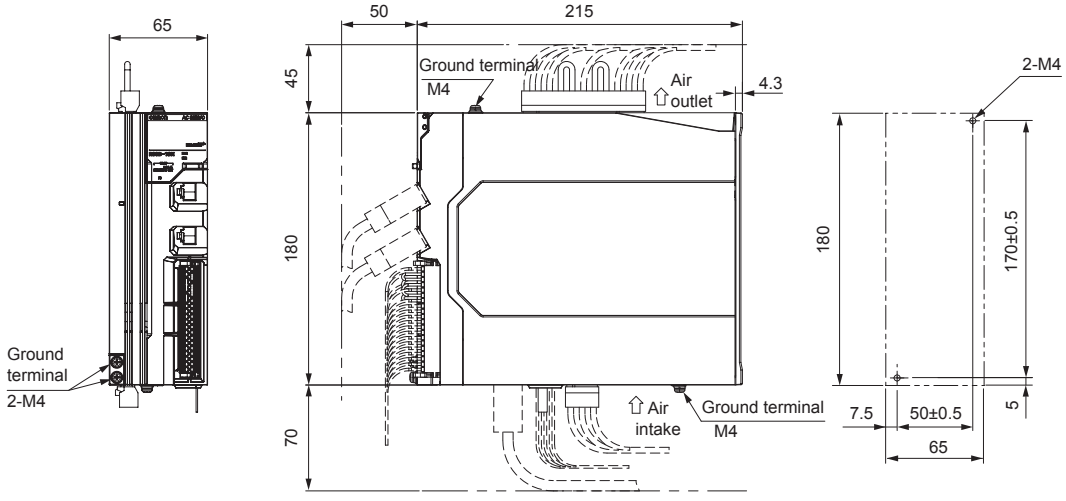
R88D-1SN01H-ECT/02H-ECT (230 V, 100 W to 200 W)



R88D-1SN04H-ECT (230 V, 400 W)

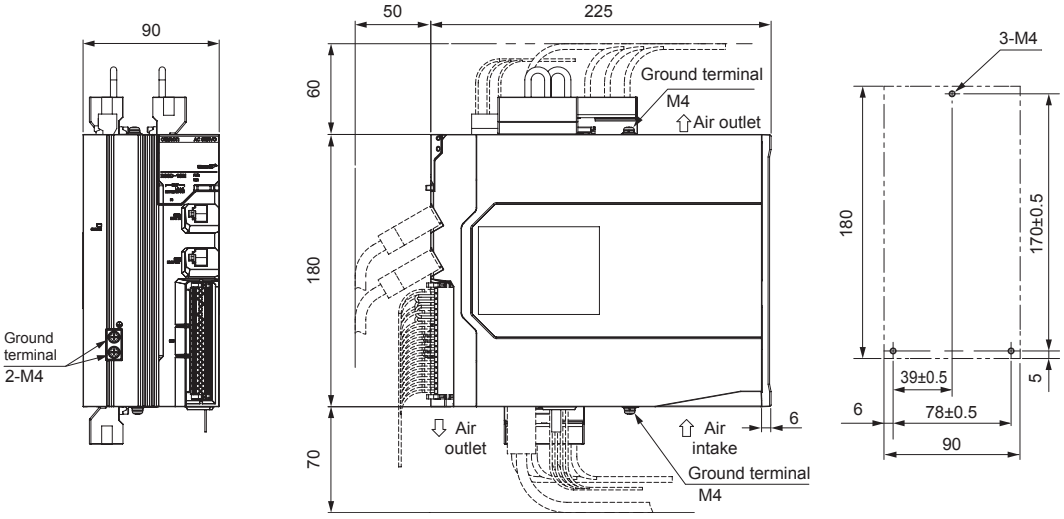


R88D-1SN08H-ECT (230 V, 750 W)

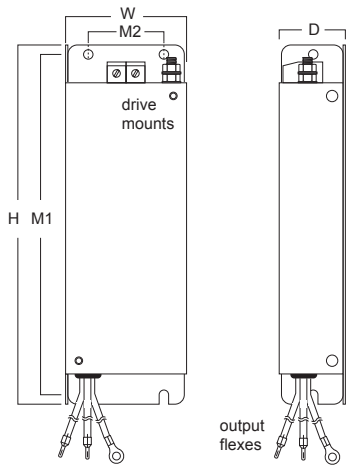


R88D-1SN15H-ECT (230 V, 1.5 kW)

R88D-1SN06F-ECT/10F-ECT/15F-ECT/20F-ECT/30F-ECT (400 V, 600 W to 3 kW)



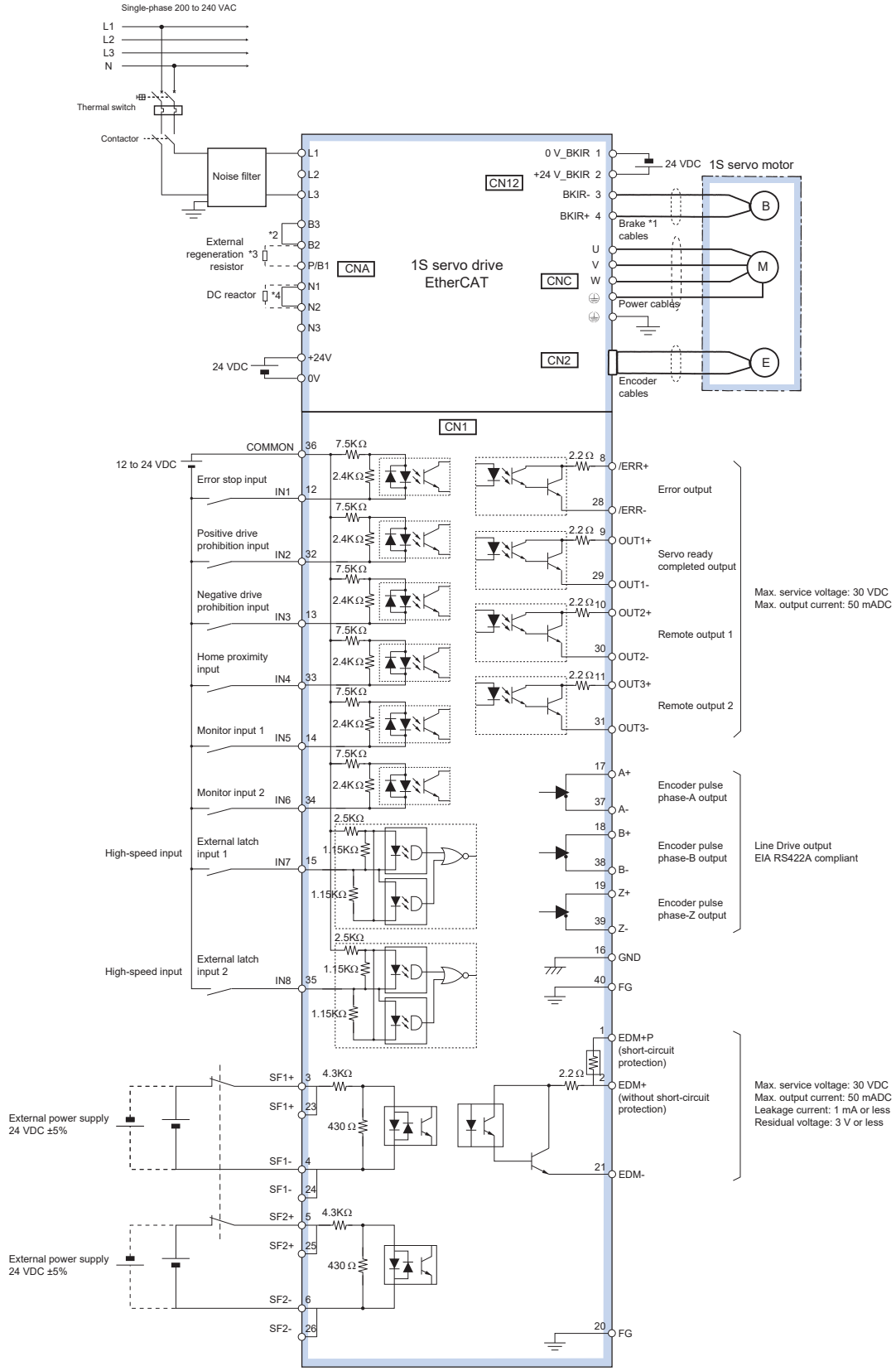
Filters



Filter model	External dimensions			Mount dimensions	
	H	W	D	M1	M2
R88A-FI1S103-SE	220	40	35	210	20
R88A-FI1S105-SE		55			30
R88A-FI1S108-SE		65			40
R88A-FI1S116-SE		90	45		60
R88A-FI1S309-SE					

Installation

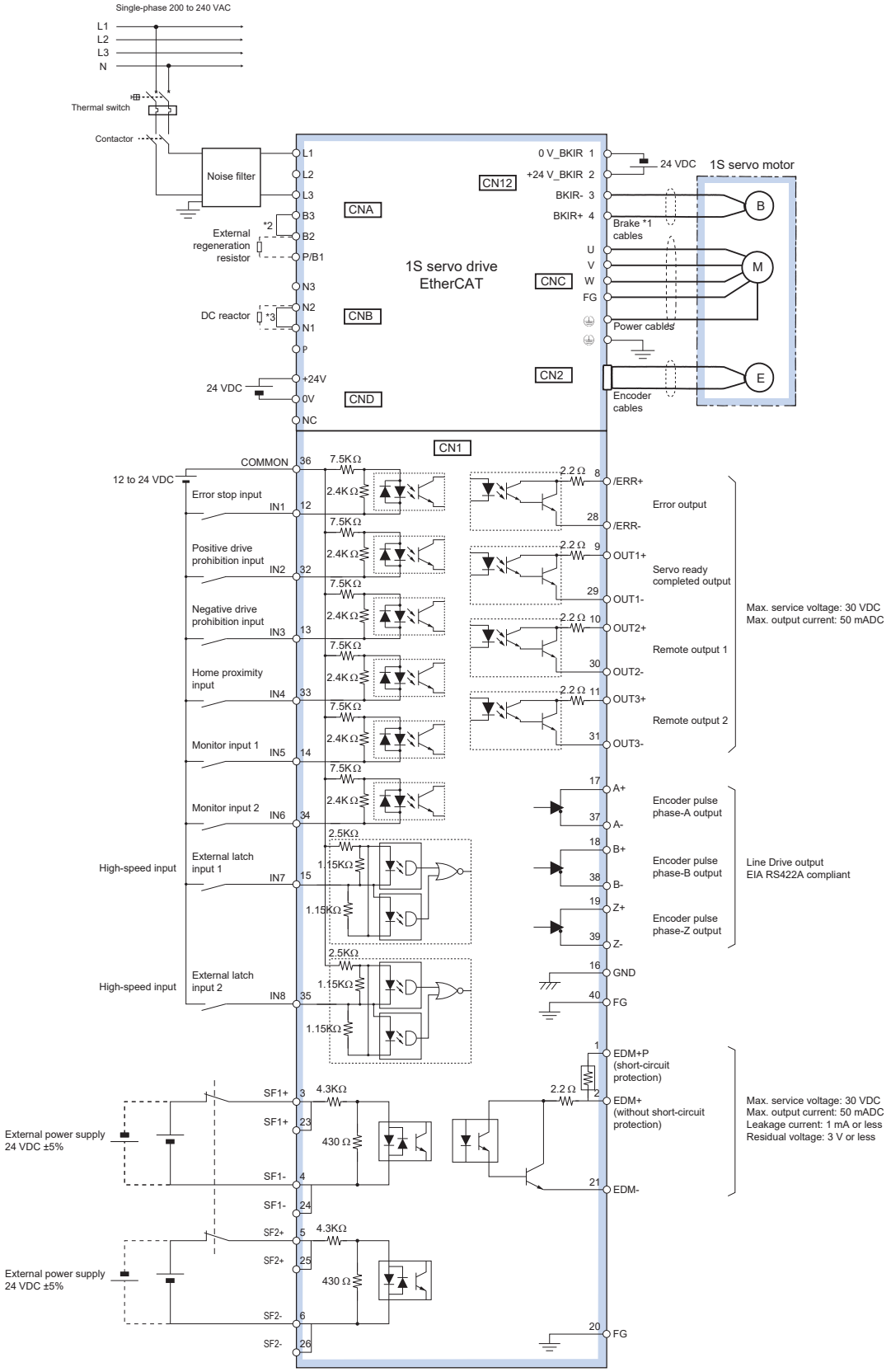
Single-phase, 230 VAC (100 W to 750 W models)



*1. There is no polarity on the brake.
*2. For 750 W servo drive, B2 and B3 are short-circuited. If the internal regenerative resistor is insufficient, remove the wire between B2 and B3 and connect an external regenerative resistor between B1 and B2.
*3. There is no internal regeneration resistor for 100 to 400 W models. When the amount of regeneration is large, connect the necessary regeneration resistor between B1 and B2.
*4. To use a DC reactor, remove the short-circuit wire and connect the DC reactor between N1 and N2.

Note: The input functions of pins 12 to 15 and 32 to 35, and output functions of pins 9 to 11 and 29 to 31, can be changed via parameter settings.

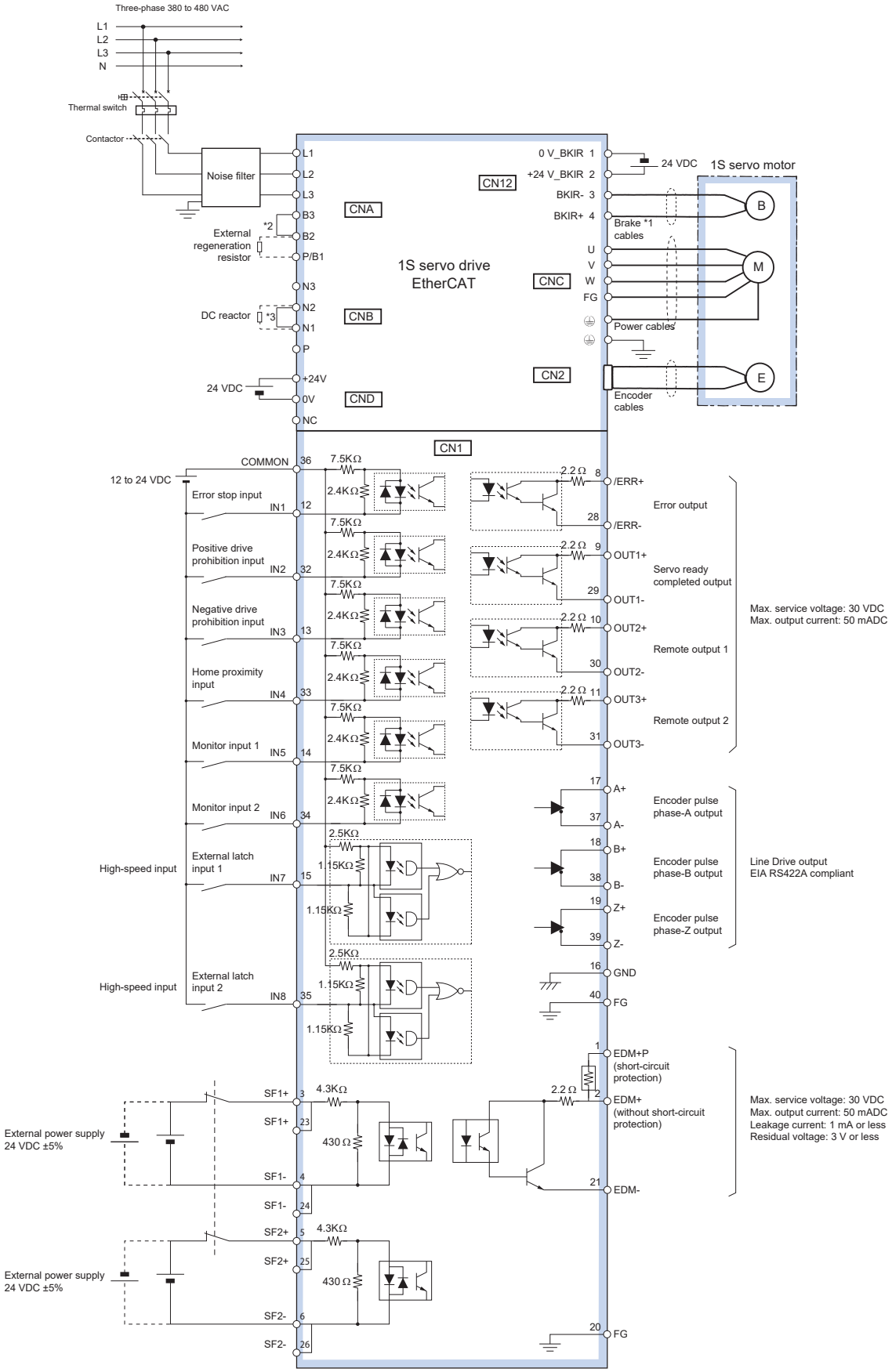
Single-phase, 230 VAC (1.5 kW model)



*1. There is no polarity on the brake.
*2. B2 and B3 are short-circuited. If the internal regenerative resistor is insufficient, remove the wire between B2 and B3 and connect an external regenerative resistor between B1 and B2.
*3. To use a DC reactor, remove the short-circuit wire and connect the DC reactor between N1 and N2.

Note: The input functions of pins 12 to 15 and 32 to 35, and output functions of pins 9 to 11 and 29 to 31, can be changed via parameter settings.

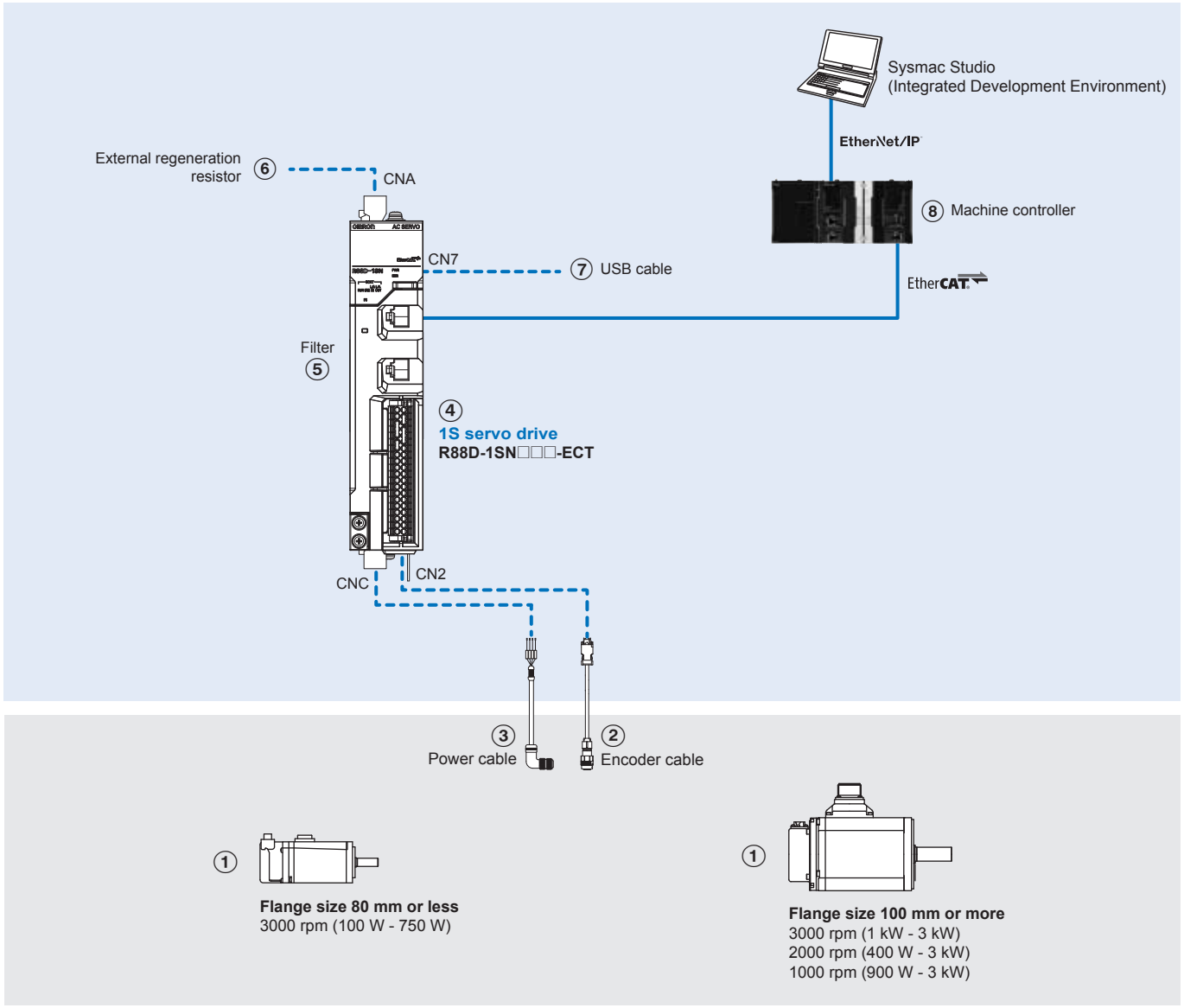
Three-phase, 400 VAC



*1. There is no polarity on the brake.
*2. B2 and B3 are short-circuited. If the internal regenerative resistor is insufficient, remove the wire between B2 and B3 and connect an external regenerative resistor between B1 and B2.
*3. To use a DC reactor, remove the short-circuit wire and connect the DC reactor between N1 and N2.

Note: The input functions of pins 12 to 15 and 32 to 35, and output functions of pins 9 to 11 and 29 to 31, can be changed via parameter settings.

Ordering information



Servo motors, power & encoder cables

①②③ Refer to the 1S servo motor chapter for servo motor, motor cables or connectors selection.

Servo drives

Symbol	Specifications		Compatible 1S servo motor	Model
④	Single-phase 230 VAC	100 W	R88M-1M10030T-□	R88D-1SN01H-ECT
		200 W	R88M-1M20030T-□	R88D-1SN02H-ECT
		400 W	R88M-1M40030T-□	R88D-1SN04H-ECT
		750 W	R88M-1M75030T-□	R88D-1SN08H-ECT
		1.5 kW	R88M-1L1K030T-□	R88D-1SN15H-ECT
			R88M-1L1K530T-□	
			R88M-1M1K020T-□	
			R88M-1M1K520T-□	
			R88M-1M90010T-□	
	Three-phase 400 VAC	600 W	R88M-1M40020C-□	R88D-1SN06F-ECT
			R88M-1M60020C-□	
		1 kW	R88M-1L75030C-□	R88D-1SN10F-ECT
			R88M-1L1K030C-□	
			R88M-1M1K020C-□	
			R88M-1M90010C-□	
		1.5 kW	R88M-1L1K530C-□	R88D-1SN15F-ECT
			R88M-1M1K520C-□	
		2 kW	R88M-1L2K030C-□	R88D-1SN20F-ECT
			R88M-1M2K020C-□	
			R88M-1M2K010C-□	
		3 kW	R88M-1L3K030C-□	R88D-1SN30F-ECT
			R88M-1M3K020C-□	
			R88M-1M3K010C-□	

Filters

Symbol	Applicable 1S servo drive	Manufacturer	Rated current	Leakage current	Rated voltage	Model
⑤	R88D-1SN01H-ECT, R88D-1SN02H-ECT	Schaffner EMC Co. Ltd.	3 A	7.83 mA	250 VAC	R88A-FI1S103-SE
	R88D-1SN04H-ECT		5 A			R88A-FI1S105-SE
	R88D-1SN08H-ECT		8 A			R88A-FI1S108-SE
	R88D-1SN15H-ECT		16 A			R88A-FI1S116-SE
	R88D-1SN06F-ECT, R88D-1SN10F-ECT, R88D-1SN15F-ECT, R88D-1SN20F-ECT, R88D-1SN30F-ECT		9 A	1.2 mA	400 VAC	R88A-FI1S309-SE

External regeneration resistor

Symbol	Resistance value	Regeneration absorption for 120°C temperature rise	Nominal capacity	Model
⑥	25 Ω	24 W	120 W	R88A-RR12025
	20 Ω	60 W	300 W	R88A-RR30020
	25 Ω			R88A-RR30025
	33 Ω			R88A-RR30033

⑦ **USB cable**

Use a commercially available USB cable that is double-shielded, gold-plated and supports USB 2.0. The Micro B type USB cable can be used.

Machine controller

Symbol	Name		Model
⑧	IPC machine controller	Industrial box PC type	NY512-□
		Industrial panel PC type	NY532-□
	NX7 series	CPU unit	NX701-□
		Power supply unit	NX-PA9001 (220 VAC)
			NX-PD7001 (24 VDC)
	NJ series	CPU unit	NJ501-□
			NJ301-□
			NJ101-□
		Power supply unit	NJ-PA3001 (220 VAC)
			NJ-PD3001 (24 VDC)
	NX1 series	CPU unit	NX1P2-□

Servo drive connectors (spare parts)

Applicable servo drive	Specifications	Model
R88D-1SN(01H/02H/04H/08H)-ECT	Main circuit connector (CNA)	R88A-CN102P
	Motor connector (CNC)	R88A-CN101A
R88D-1SN15H-ECT R88D-1SN(06F/10F/15F/20F/30F)-ECT	Connector for main circuit power supply and external regeneration resistor (CNA)	R88A-CN103P
	DC bus connector (CNB)	R88A-CN104P
	Motor connector (CNC)	R88A-CN102A
	Control power supply connector (CND)	R88A-CN101P
Common to all models	Control I/O and safety connector (CN1)	R88A-CN101C
	Encoder connector (CN2)	R88A-CN101R
	Brake interlock connector (CN12)	R88A-CN101B

Cable clamp (spare parts)

Applicable 1S power cable	Model
230 V, 100 W to 750 W models	R88A-SC011S-E
230 V, 1.5 kW model 400 V, 600 W to 3 kW models	R88A-SC021S-E

Computer software

Specifications	Model
Sysmac Studio version 1.16 or higher	SYSMAC-SE2□□□

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I188E-EN-01D In the interest of product improvement, specifications are subject to change without notice.

R88M-1□

1S servo motor



Simplified machine design and maintenance

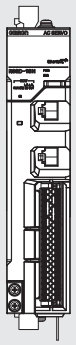
- 23-bit resolution encoder
- Compact and small motor size
- Multi-turn encoder design without mechanics: 16-bit, 65536 turns
- Battery-free absolute multi-turn encoder
- Pre-assembled motor cables
- Designed for easy EMC compliance

Ratings

- 230 VAC from 100 W to 1.5 kW (rated torque from 0.318 to 8.59 Nm)
- 400 VAC from 400 W to 3 kW (rated torque from 1.91 to 28.7 Nm)

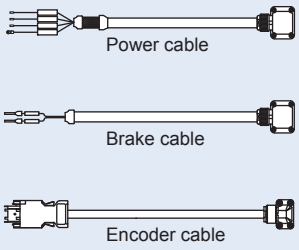
System configuration

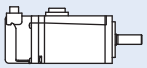
(Refer to servo drive chapter)



1S servo drive

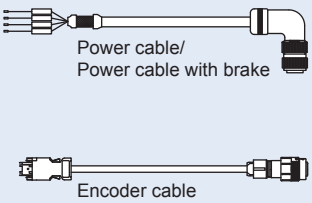
1S servo motor (Flange size 80 mm or less)

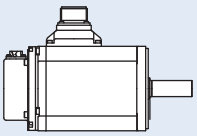




3000 rpm (100 W - 750 W)

1S servo motor (Flange size 100 mm or more)





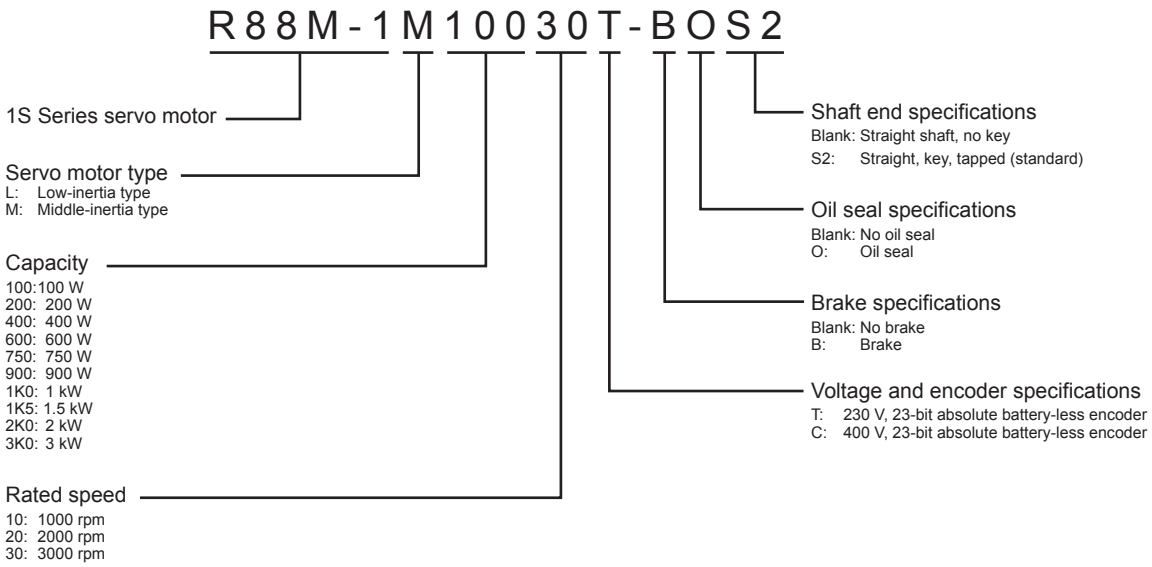
3000 rpm (1 kW - 3 kW)
2000 rpm (400 W - 3 kW)
1000 rpm (900 W - 3 kW)

Servo motor / Servo drive combination

1S servo motor						1S servo drive
Appearance	Speed	Voltage	Rated torque	Capacity	Model	
 	3000 min^{-1}	230 V	0.318 Nm	100 W	R88M-1M10030T-□	R88D-1SN01H-ECT
			0.637 Nm	200 W	R88M-1M20030T-□	R88D-1SN02H-ECT
			1.27 Nm	400 W	R88M-1M40030T-□	R88D-1SN04H-ECT
			2.39 Nm	750 W	R88M-1M75030T-□	R88D-1SN08H-ECT
			3.18 Nm	1 kW	R88M-1L1K030T-□	R88D-1SN15H-ECT
			4.77 Nm	1.5 kW	R88M-1L1K530T-□	R88D-1SN15H-ECT
		400 V	2.39 Nm	750 W	R88M-1L75030C-□	R88D-1SN10F-ECT
			3.18 Nm	1 kW	R88M-1L1K030C-□	R88D-1SN10F-ECT
			4.77 Nm	1.5 kW	R88M-1L1K530C-□	R88D-1SN15F-ECT
			6.37 Nm	2 kW	R88M-1L2K030C-□	R88D-1SN20F-ECT
			9.55 Nm	3 kW	R88M-1L3K030C-□	R88D-1SN30F-ECT
	2000 min^{-1}	230 V	4.77 Nm	1 kW	R88M-1M1K020T-□	R88D-1SN15H-ECT
			7.16 Nm	1.5 kW	R88M-1M1K520T-□	R88D-1SN15H-ECT
		400 V	1.91 Nm	400 W	R88M-1M40020C-□	R88D-1SN06F-ECT
			2.86 Nm	600 W	R88M-1M60020C-□	R88D-1SN06F-ECT
			4.77 Nm	1 kW	R88M-1M1K020C-□	R88D-1SN10F-ECT
			7.16 Nm	1.5 kW	R88M-1M1K520C-□	R88D-1SN15F-ECT
			9.55 Nm	2 kW	R88M-1M2K020C-□	R88D-1SN20F-ECT
			14.3 Nm	3 kW	R88M-1M3K020C-□	R88D-1SN30F-ECT
	1000 min^{-1}	230 V	8.59 Nm	900 W	R88M-1M90010T-□	R88D-1SN15H-ECT
		400 V	8.59 Nm	900 W	R88M-1M90010C-□	R88D-1SN10F-ECT
			19.1 Nm	2 kW	R88M-1M2K010C-□	R88D-1SN20F-ECT
			28.7 Nm	3 kW	R88M-1M3K010C-□	R88D-1SN30F-ECT

Note: For servo motor and cable part numbers, refer to ordering information at the end of this chapter.
Note: Refer to the servo drive chapter for drive options selection and detailed specifications.

Type designation



Specifications

3000 r/min servo motors, 230 V

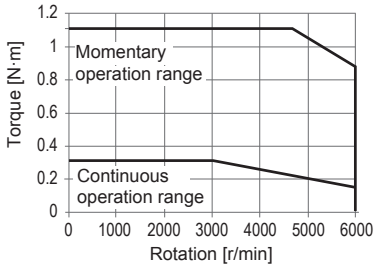
Ratings and specifications

Voltage		230 V					
Servo motor model: R88M-1□	23-bit absolute encoder	M10030T-□	M20030T-□	M40030T-□	M75030T-□	L1K030T-□	L1K530T-□
Rated output	W	100	200	400	750	1000	1500
Rated torque	Nm	0.318	0.637	1.27	2.39	3.18	4.77
Instantaneous peak torque	Nm	1.11	2.2	4.5	8.4	9.55	14.3
Rated current	A (rms)	0.84	1.5	2.5	4.6	5.2	8.8
Instantaneous max. current	A (rms)	3.1	5.6	9.1	16.9	16.9	28.4
Rated speed	min^{-1}	3000					
Max. speed	min^{-1}	6000				5000	
Torque constant	N·m/A	0.42	0.48	0.56	0.59	0.67	0.58
Rotor moment of inertia	$kg·m^2x10^{-4}$ (without brake)	0.089	0.2232	0.4452	1.8242	2.1042	2.1042
	$kg·m^2x10^{-4}$ (with brake)	0.0968	0.2832	0.5052	2.0742	2.5542	2.5542
Electrical time constant	ms	0.83	2.4	2.6	3.3	5.9	6.1
Allowable radial load	N	68	245		490		
Allowable thrust load	N	58	88		196		
Weight	kg (without brake)	0.52	1.0	1.4	2.9	5.7	
	kg (with brake)	0.77	1.3	1.9	3.9	7.4	
Brake specifications: Excitation voltage[*1]		24 VDC ±10%					
Brake specifications: Holding brake moment of inertia J	$kg·m^2x10^{-4}$	0.0078	0.06		0.25	0.45	
Brake specifications: Current consumption (at 20°C)	A	0.27	0.32		0.37	0.70	
Brake specifications: Static friction torque	Nm (minimum)	0.32	1.37		2.55	9.3	
Basic specifications: Insulation class		Type F					
Basic specifications: Ambient operating/storage temperature		0 to 40°C/-20 to 65°C					
Basic specifications: Ambient operating/storage humidity		20 to 90% (non-condensing)					
Basic specifications: Atmosphere		No corrosive gases					
Basic specifications: Insulation resistance		10 MΩ min. at 500 VDC between the power terminals and FG terminal					
Basic specifications: Vibration resistance		Vibration acceleration of 49 m/s^2					
Basic specifications: Impact resistance		Acceleration of 98 m/s^2 max. 3 times each in X, Y and Z directions					
Basic specifications: Enclosure		IP67 (except for through-shaft parts when connectors are inserted)					

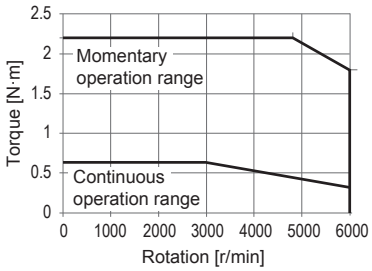
[*1] This is a non-excitable brake (it is released when excitation voltage is applied).

Torque-speed characteristics

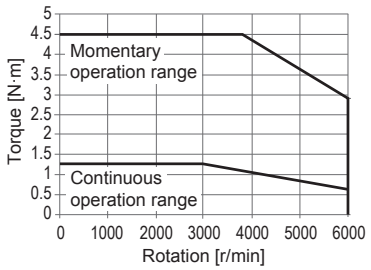
R88M-1M10030T (230 V, 100 W)



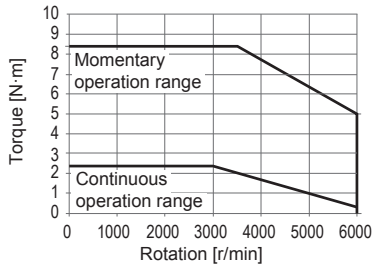
R88M-1M20030T (230 V, 200 W)



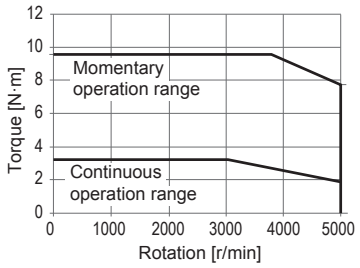
R88M-1M40030T (230 V, 400 W)



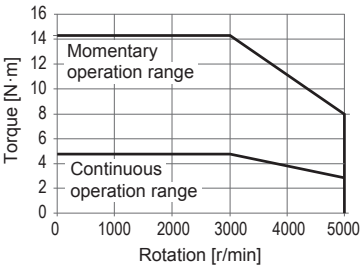
R88M-1M75030T (230 V, 750 W)



R88M-1L1K030T (230 V, 1 kW)



R88M-1L1K530T (230 V, 1.5 kW)



3000 r/min servo motors, 400 V

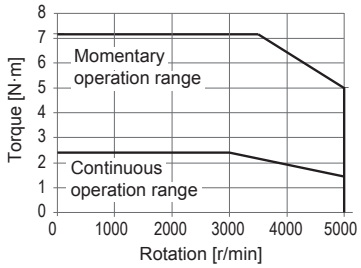
Ratings and specifications

Voltage			400 V				
Servo motor model: R88M-1□		23-bit absolute encoder	L75030C-□	L1K030C-□	L1K530C-□	L2K030C-□	L3K030C-□
Rated output		W	750	1000	1500	2000	3000
Rated torque		Nm	2.39	3.18	4.77	6.37	9.55
Instantaneous peak torque		Nm	7.16	9.55	14.3	19.1	28.7
Rated current		A (rms)	3.0	3.0	4.5	6.3	8.2
Instantaneous max. current		A (rms)	9.6	9.6	14.1	19.8	27.7
Rated speed		min^{-1}	3000				
Max. speed		min^{-1}	5000				
Torque constant		N·m/A	0.91	1.17	1.17	1.15	1.23
Rotor moment of inertia		$kg·m^2x10^{-4}$ (without brake)	1.3042	2.1042	2.1042	2.4042	6.8122
		$kg·m^2x10^{-4}$ (with brake)	1.7542	2.5542	2.5542	2.8542	7.3122
Electrical time constant		ms	4.3	5.9	5.9	6.3	11.0
Allowable radial load		N	490				
Allowable thrust load		N	196				
Weight		kg (without brake)	4.1	5.7		6.4	11.5
		kg (with brake)	5.8	7.4		8.1	12.5
Brake specifications	Excitation voltage*1		24 VDC ±10%				
	Holding brake moment of inertia J	$kg·m^2x10^{-4}$	0.45				0.50
	Current consumption (at 20°C)	A	0.70				0.66
	Static friction torque	Nm (minimum)	9.3				12.0
Basic specifications	Insulation class		Type F				
	Ambient operating/storage temperature		0 to 40°C/-20 to 65°C				
	Ambient operating/storage humidity		20 to 90% (non-condensing)				
	Atmosphere		No corrosive gases				
	Insulation resistance		10 MΩ min. at 500 VDC between the power terminals and FG terminal				
	Vibration resistance		Vibration acceleration of 49 m/s^2				
	Impact resistance		Acceleration of 98 m/s^2 max. 3 times each in X, Y and Z directions				
	Enclosure		IP67 (except for through-shaft parts when connectors are inserted)				

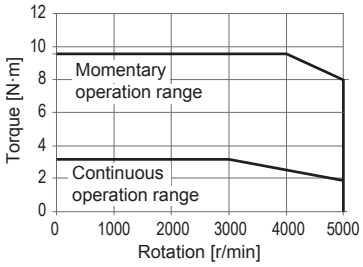
*1 This is a non-excitable brake (it is released when excitation voltage is applied).

Torque-speed characteristics

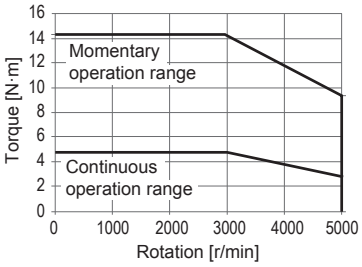
R88M-1L75030C (400 V, 750 W)



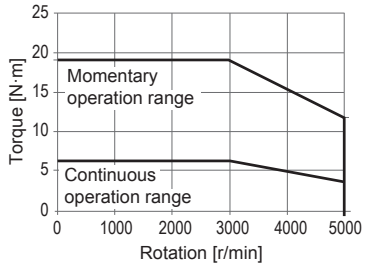
R88M-1L1K030C (400 V, 1 kW)



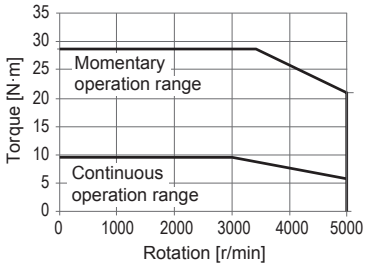
R88M-1L1K530C (400 V, 1.5 kW)



R88M-1L2K030C (400 V, 2 kW)



R88M-1L3K030C (400 V, 3 kW)



2000 r/min servo motors, 230 V/400 V

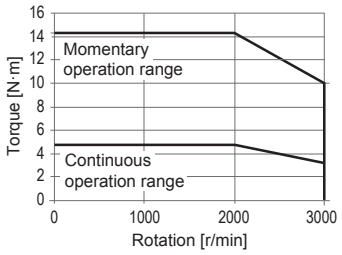
Ratings and specifications

Voltage			230 V		400 V					
Servo motor model: R88M-1□		23-bit absolute encoder	M1K020T-□	M1K520T-□	M40020C-□	M60020C-□	M1K020C-□	M1K520C-□	M2K020C-□	M3K020C-□
Rated output		W	1000	1500	400	600	1000	1500	2000	3000
Rated torque		Nm	4.77	7.16	1.91	2.86	4.77	7.16	9.55	14.3
Instantaneous peak torque		Nm	14.3	21.5	5.73	8.59	14.3	21.5	28.7	43.0
Rated current		A (rms)	5.2	8.6	1.1	1.6	2.9	4.1	5.7	8.6
Instantaneous max. current		A (rms)	16.9	28.4	3.9	5.5	9.4	13.5	19.8	28.3
Rated speed		min^{-1}	2000							
Max. speed		min^{-1}	3000							
Torque constant		N·m/A	0.93	0.83	1.75	1.84	1.69	1.75	1.75	1.74
Rotor moment of inertia		$kg·m^2x10^{-4}$ (without brake)	6.0042	9.0042	2.5042	3.9042	6.0042	9.0042	12.2042	15.3122
		$kg·m^2x10^{-4}$ (with brake)	6.5042	9.5042	2.8472	4.2472	6.5042	9.5042	12.7042	17.4122
Electrical time constant		ms	13.0	15.0	6.8	7.8	13.0	13.0	14.0	20.0
Allowable radial load		N	490							784
Allowable thrust load		N	196							343
Weight		kg (without brake)	6.6	8.5	3.9	4.7	6.6	8.5	10.0	12.0
		kg (with brake)	8.6	10.5	4.8	5.8	8.6	10.5	12.0	15.0
Brake specifications	Excitation voltage[*1]		24 VDC ±10%							
	Holding brake moment of inertia J	$kg·m^2x10^{-4}$	0.5		0.343		0.5			2.1
	Current consumption (at 20°C)	A	0.51		0.3		0.51		0.66	0.6
	Static friction torque	Nm (minimum)	9.0		3.92		9.0		12.0	16.0
Basic specifications	Insulation class		Type F							
	Ambient operating/storage temperature		0 to 40°C/-20 to 65°C							
	Ambient operating/storage humidity		20 to 90% (non-condensing)							
	Atmosphere		No corrosive gases							
	Insulation resistance		10 MΩ min. at 500 VDC between the power terminals and FG terminal							
	Vibration resistance		Vibration acceleration of 49 m/s^2							
	Impact resistance		Acceleration of 98 m/s^2 max. 3 times each in X, Y and Z directions							
	Enclosure		IP67 (except for through-shaft parts when connectors are inserted)							

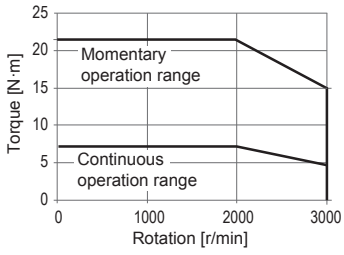
[*1] This is a non-excitable brake (it is released when excitation voltage is applied).

Torque-speed characteristics

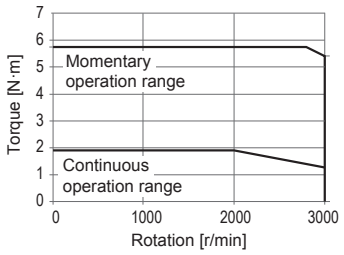
R88M-1M1K020T (230 V, 1 kW)



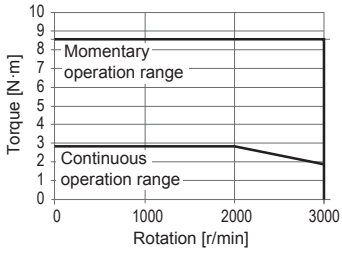
R88M-1M1K520T (230 V, 1.5 kW)



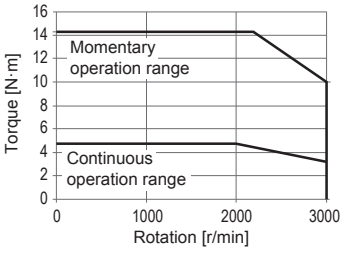
R88M-1M40020C (400 V, 400 W)



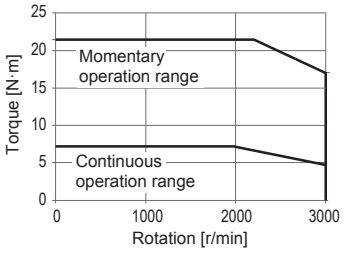
R88M-1M60020C (400 V, 600 W)



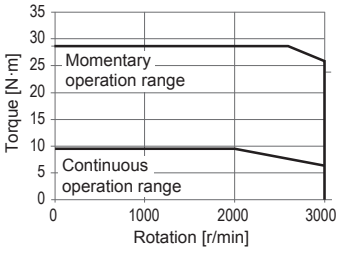
R88M-1M1K020C (400 V, 1 kW)



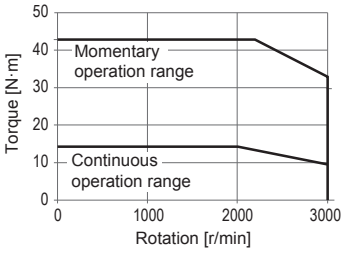
R88M-1M1K520C (400 V, 1.5 kW)



R88M-1M2K020C (400 V, 2 kW)



R88M-1M3K020C (400 V, 3 kW)



1000 r/min servo motors, 230 V/400 V

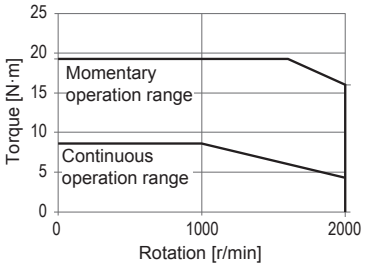
Ratings and specifications

Voltage			230 V	400 V		
Servo motor model: R88M-1□		23-bit absolute encoder	M90010T-□	M90010C-□	M2K010C-□	M3K010C-□
Rated output		W	900	900	2000	3000
Rated torque		Nm	8.59	8.59	19.1	28.7
Instantaneous peak torque		Nm	19.3	19.3	47.7	71.7
Rated current		A (rms)	6.7	3.6	7.1	10.6
Instantaneous max. current		A (rms)	16.9	9.0	19.5	27.7
Rated speed		min^{-1}	1000			
Max. speed		min^{-1}	2000			
Torque constant		N·m/A	1.28	2.41	3.00	2.97
Rotor moment of inertia		$kg·m^2x10^{-4}$ (without brake)	9.0042	9.0042	40.0122	68.0122
		$kg·m^2x10^{-4}$ (with brake)	9.5042	9.5042	45.1122	73.1122
Electrical time constant		ms	15.0	13.0	16.0	19.0
Allowable radial load		N	686		1176	1470
Allowable thrust load		N	196		490	
Weight		kg (without brake)	8.5		18.0	28.0
		kg (with brake)	10.5		22.0	33.0
Brake specifications	Excitation voltage*1		24 VDC ±10%			
	Holding brake moment of inertia J	$kg·m^2x10^{-4}$	0.5		5.1	
	Current consumption (at 20°C)	A	0.51		1.2	1.0
	Static friction torque	Nm (minimum)	9.0		22.0	42.0
Basic specifications	Insulation class		Type F			
	Ambient operating/storage temperature		0 to 40°C/-20 to 65°C			
	Ambient operating/storage humidity		20 to 90% (non-condensing)			
	Atmosphere		No corrosive gases			
	Insulation resistance		10 MΩ min. at 500 VDC between the power terminals and FG terminal			
	Vibration resistance		Vibration acceleration of 49 m/s^2			
	Impact resistance		Acceleration of 98 m/s^2 max. 3 times each in X, Y and Z directions			
	Enclosure		IP67 (except for through-shaft parts when connectors are inserted)			

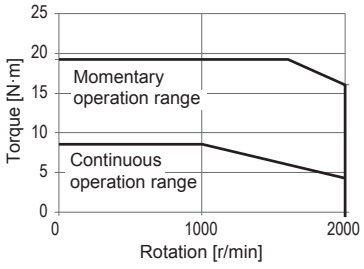
*1 This is a non-excitable brake (it is released when excitation voltage is applied).

Torque-speed characteristics

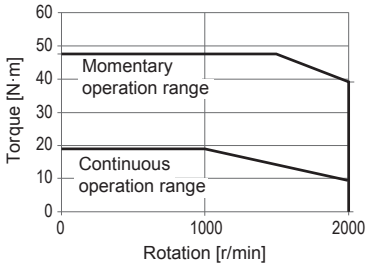
R88M-1M90010T (230 V, 900 W)



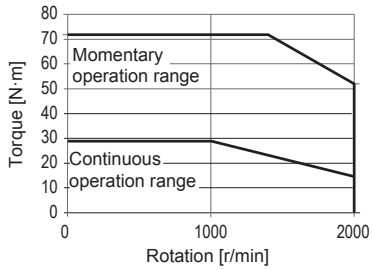
R88M-1M90010C (400 V, 900 W)



R88M-1M2K010C (400 V, 2 kW)



R88M-1M3K010C (400 V, 3 kW)



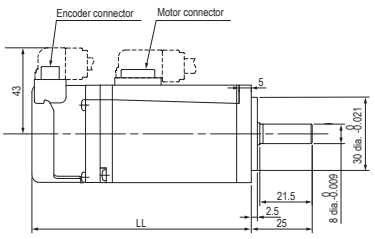
Dimensions

Servo motors

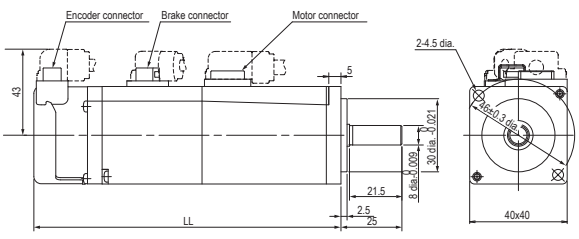
Type 3000 r/min motors (230 V, 100 W)

Dimensions (mm)	Without brake	With brake	Approx. mass (kg)	
Model: R88M-1□	LL	LL	Without brake	With brake
M10030T-□S2	90	126	0.52	0.77

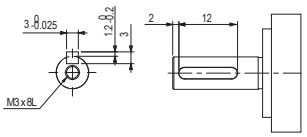
Models without brake



Models with brake



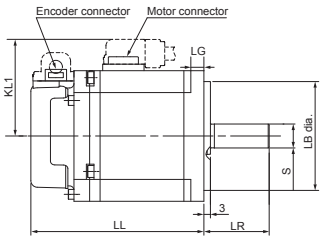
Shaft end



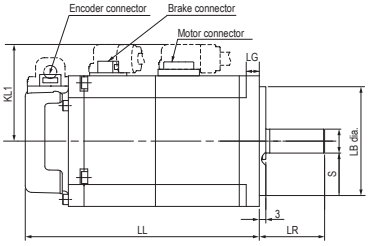
Type 3000 r/min motors (230 V, 200 W to 750 W)

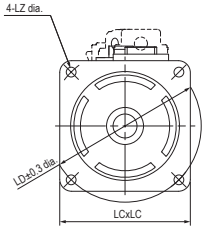
Dimensions (mm)	Without brake		With brake		LR	Flange surface					Shaft end							Approx. mass (kg)	
Model: R88M-1□	LL	KL1	LL	KL1		LB	LC	LD	LG	LZ	S	QA	QK	W	U	T	Tap x depth	Without brake	With brake
M20030T-□S2	79.5	52.6	107.5	52.6	30	50 dia. 0 -0.025	60	70	6	4.5	11 dia. 0 -0.011	2	20	4 0 -0.03	1.5 0 -0.2	4	M4 x 10L	1.0	1.3
M40030T-□S2	105.5		133.5								14 dia. 0 -0.011			5 0 -0.03	2 0 -0.2	5	M5 x 12L	1.4	1.9
M75030T-□S2	117.3	63.2	153	63.2	35	70 dia. 0 -0.03	80	90	8	6	19 dia. 0 -0.013	3	24	6 0 -0.03	2.5 0 -0.2	6		2.9	3.9

Models without brake

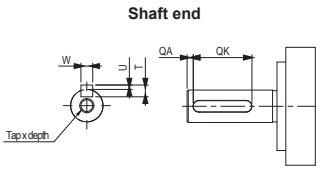


Models with brake





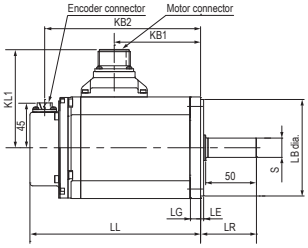
Shaft end



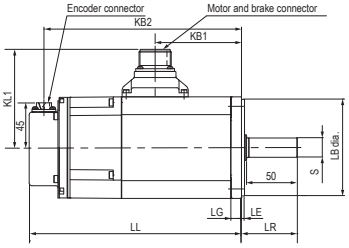
Type 3000 r/min motors (230 V, 1 kW to 1.5 kW / 400 V, 750 W to 3 kW)

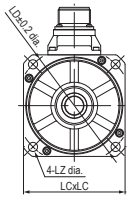
Dimensions (mm)	Without brake				With brake				LR	Flange surface						Shaft end							Approx. mass (kg)	
Model: R88M-1□	LL	KB1	KB2	KL1	LL	KB1	KB2	KL1		LB	LC	LD	LE	LG	LZ	S	QA	QK	W	U	T	Tap x depth	Without brake	With brake
L1K030T-□S2	168	85	153	97	209	85	194	97	55	95 dia. 0 -0.035	100	115	3	10	9	19 dia. 0 -0.013	3	42	6 0 -0.03	2.5 0 -0.2	6	M5 x 12L	5.7	7.4
L1K530T-□S2																								
L75030C-□S2	139	56	124		180	56	165	104															4.1	5.8
L1K030C-□S2	168	85	153		209	85	194																5.7	7.4
L1K530C-□S2																								
L2K030C-□S2	179	96	164		220	96	205																6.4	8.1
L3K030C-□S2	184	112	169	116	230	112	215	119		110 dia. 0 -0.035	130	145	4	12	9	22 dia. 0 -0.013			8 0 -0.036	3 0 -0.4	7		11.5	12.5

Models without brake

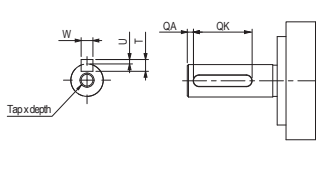


Models with brake





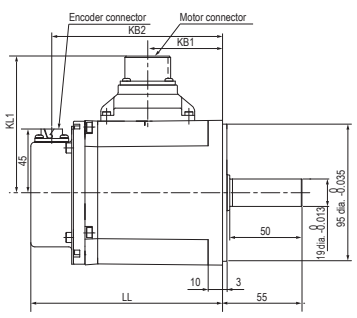
Shaft end



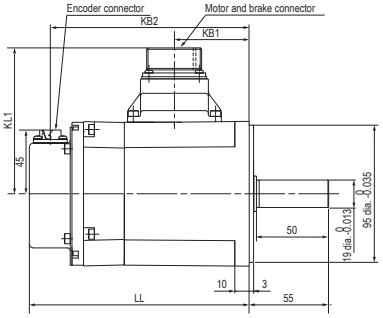
Type 2000 r/min motors (400 V, 400 W to 600 W)

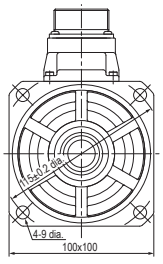
Dimensions (mm)	Without brake				With brake				Approx. mass (kg)	
Model: R88M-1□	LL	KB1	KB2	KL1	LL	KB1	KB2	KL1	Without brake	With brake
M40020C-□S2	134.8	52	120.5	97	152.3	52	138	104	3.9	4.8
M60020C-□S2	151.8	69	137.5		169.3	69	155		4.7	5.8

Models without brake

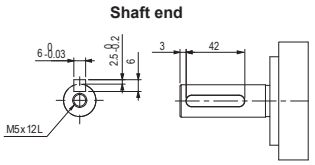


Models with brake





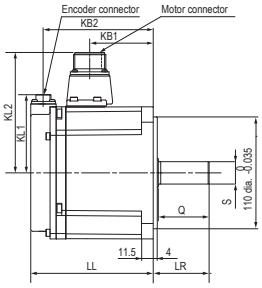
Shaft end



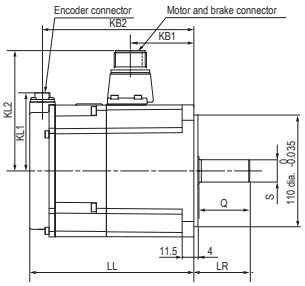
Type 2000 r/min motors (230 V, 1 kW to 1.5 kW / 400 V, 1 kW to 3 kW)

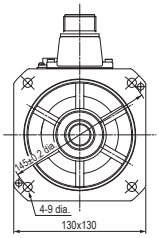
Dimensions (mm)	Without brake					With brake					LR	Shaft end							Approx. mass (kg)	
Model: R88M-1□	LL	KB1	KB2	KL1	KL2	LL	KB1	KB2	KL1	KL2		S	Q	QA	QK	W	U	T	Tap x depth	Without brake	With brake
M1K020T-□S2	120.5	63	109	76	118	162	63	149	76	118	55	22 dia. 0 -0.013	50	3	42	8 0 -0.036	3 0 -0.4	7	M5 x 12L	6.6	8.6
M1K520T-□S2	138	79	125			179	79	166												8.5	10.5
M1K020C-□S2	120.5	63	109			162	64	150		119										6.6	8.6
M1K520C-□S2	138	79	125			179	81	167												8.5	10.5
M2K020C-□S2	160	98	148			201	99	189												10.0	12.0
M3K020C-□S2	191	119	176	45	116	234	118	219	45	119	65	24 dia. 0 -0.013	60		52				M8 x 20L	12.0	15.0

Models without brake

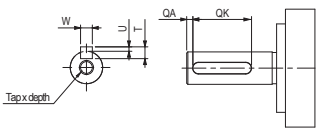


Models with brake





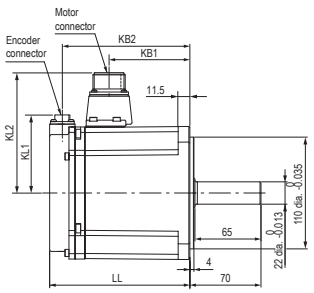
Shaft end



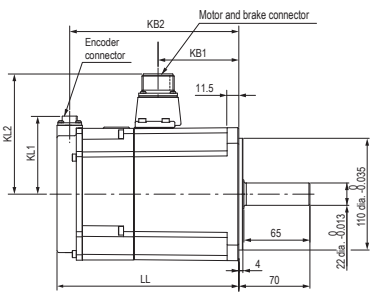
Type 1000 r/min motors (230 V, 900 W / 400 V, 900 W)

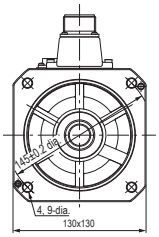
Dimensions (mm)	Without brake					With brake					Approx. mass (kg)	
Model: R88M-1□	LL	KB1	KB2	KL1	KL2	LL	KB1	KB2	KL1	KL2	Without brake	With brake
M90010T-□S2	138	79	125	76	118	179	79	166	76	118	8.5	10.5
M90010C-□S2							81	167		117		

Models without brake

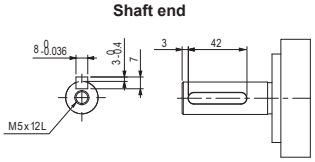


Models with brake





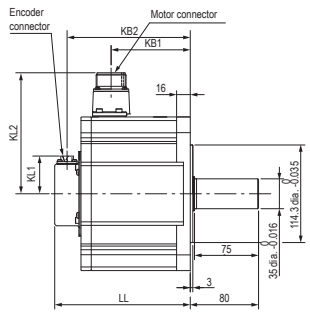
Shaft end



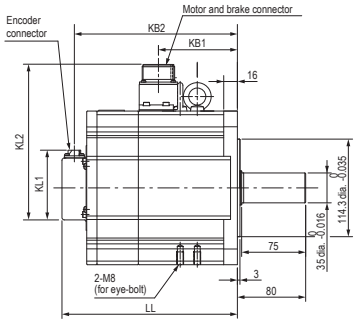
Type 1000 r/min motors (400 V, 2 kW)

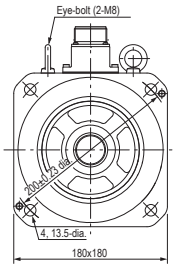
Dimensions (mm)	Without brake					With brake					Approx. mass (kg)	
Model: R88M-1□	LL	KB1	KB2	KL1	KL2	LL	KB1	KB2	KL1	KL2	Without brake	With brake
M2K010C-□S2	159	93	145	45	141	206	92	191	45	144	18.0	22.0

Models without brake

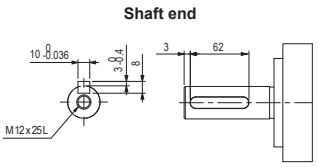


Models with brake





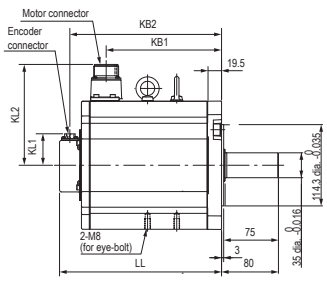
Shaft end



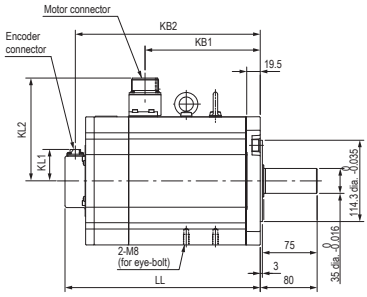
Type 1000 r/min motors (400 V, 3 kW)

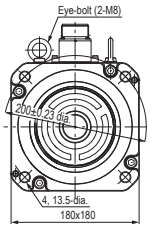
Dimensions (mm)	Without brake					With brake					Approx. mass (kg)	
Model: R88M-1□	LL	KB1	KB2	KL1	KL2	LL	KB1	KB2	KL1	KL2	Without brake	With brake
M3K010C-□S2	228	162	213	45	141	274	162	260	45	144	28.0	33.0

Models without brake

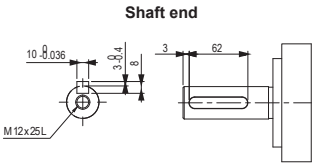


Models with brake





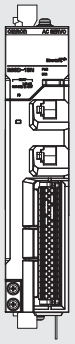
Shaft end



Ordering information

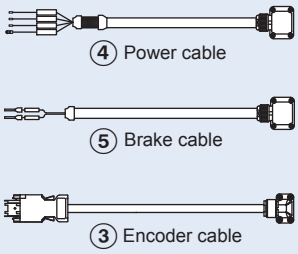
(Refer to servo drive chapter)

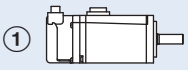
② Drive options



1S servo drive

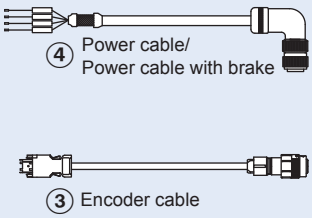
1S servo motor (Flange size 80 mm or less)

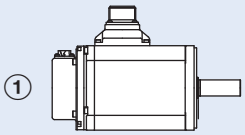




3000 rpm (100 W - 750 W)

1S servo motor (Flange size 100 mm or more)





3000 rpm (1 kW - 3 kW)
2000 rpm (400 W - 3 kW)
1000 rpm (900 W - 3 kW)

Servo motors

① Select motor from R88M-1□ family using motor tables in next pages.

Servo drives

② Refer to the 1S servo drive chapter for detailed drive specifications and selection of drive accessories.

Servo motors

Servo motors 3000 r/min (100 W to 3 kW)

Symbol	Specifications						Model	Compatible 1S servo drive
	Voltage	Encoder and design		Rated torque	Capacity	Flange size		
①	230 V	Absolute encoder (23-bit) Straight shaft with key and tap	Without brake	0.318 Nm	100 W	40 mm	R88M-1M10030T-S2	R88D-1SN01H-ECT
				0.637 Nm	200 W	60 mm	R88M-1M20030T-S2	R88D-1SN02H-ECT
				1.27 Nm	400 W	60 mm	R88M-1M40030T-S2	R88D-1SN04H-ECT
				2.39 Nm	750 W	80 mm	R88M-1M75030T-S2	R88D-1SN08H-ECT
				3.18 Nm	1 kW	100 mm	R88M-1L1K030T-S2	R88D-1SN15H-ECT
				4.77 Nm	1.5 kW	100 mm	R88M-1L1K530T-S2	R88D-1SN15H-ECT
			With brake	0.318 Nm	100 W	40 mm	R88M-1M10030T-BS2	R88D-1SN01H-ECT
				0.637 Nm	200 W	60 mm	R88M-1M20030T-BS2	R88D-1SN02H-ECT
				1.27 Nm	400 W	60 mm	R88M-1M40030T-BS2	R88D-1SN04H-ECT
				2.39 Nm	750 W	80 mm	R88M-1M75030T-BS2	R88D-1SN08H-ECT
				3.18 Nm	1 kW	100 mm	R88M-1L1K030T-BS2	R88D-1SN15H-ECT
				4.77 Nm	1.5 kW	100 mm	R88M-1L1K530T-BS2	R88D-1SN15H-ECT
	400 V		Without brake	2.39 Nm	750 W	100 mm	R88M-1L75030C-S2	R88D-1SN10F-ECT
				3.18 Nm	1 kW	100 mm	R88M-1L1K030C-S2	R88D-1SN10F-ECT
				4.77 Nm	1.5 kW	100 mm	R88M-1L1K530C-S2	R88D-1SN15F-ECT
				6.37 Nm	2 kW	100 mm	R88M-1L2K030C-S2	R88D-1SN20F-ECT
				9.55 Nm	3 kW	130 mm	R88M-1L3K030C-S2	R88D-1SN30F-ECT
			With brake	2.39 Nm	750 W	100 mm	R88M-1L75030C-BS2	R88D-1SN10F-ECT
				3.18 Nm	1 kW	100 mm	R88M-1L1K030C-BS2	R88D-1SN10F-ECT
				4.77 Nm	1.5 kW	100 mm	R88M-1L1K530C-BS2	R88D-1SN15F-ECT
				6.37 Nm	2 kW	100 mm	R88M-1L2K030C-BS2	R88D-1SN20F-ECT
				9.55 Nm	3 kW	130 mm	R88M-1L3K030C-BS2	R88D-1SN30F-ECT

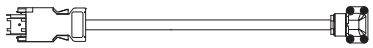
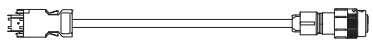
Servo motors 2000 r/min (400 W to 3 kW)

Symbol	Specifications						Model	Compatible 1S servo drive
	Voltage	Encoder and design		Rated torque	Capacity	Flange size		
①	230 V	Absolute encoder (23-bit) Straight shaft with key and tap	Without brake	4.77 Nm	1 kW	130 mm	R88M-1M1K020T-S2	R88D-1SN15H-ECT
				7.16 Nm	1.5 kW	130 mm	R88M-1M1K520T-S2	R88D-1SN15H-ECT
			With brake	4.77 Nm	1 kW	130 mm	R88M-1M1K020T-BS2	R88D-1SN15H-ECT
				7.16 Nm	1.5 kW	130 mm	R88M-1M1K520T-BS2	R88D-1SN15H-ECT
	400 V		Without brake	1.91 Nm	400 W	100 mm	R88M-1M40020C-S2	R88D-1SN06F-ECT
				2.86 Nm	600 W	100 mm	R88M-1M60020C-S2	R88D-1SN06F-ECT
				4.77 Nm	1 kW	130 mm	R88M-1M1K020C-S2	R88D-1SN10F-ECT
				7.16 Nm	1.5 kW	130 mm	R88M-1M1K520C-S2	R88D-1SN15F-ECT
				9.55 Nm	2 kW	130 mm	R88M-1M2K020C-S2	R88D-1SN20F-ECT
				14.3 Nm	3 kW	130 mm	R88M-1M3K020C-S2	R88D-1SN30F-ECT
			With brake	1.91 Nm	400 W	100 mm	R88M-1M40020C-BS2	R88D-1SN06F-ECT
				2.86 Nm	600 W	100 mm	R88M-1M60020C-BS2	R88D-1SN06F-ECT
				4.77 Nm	1 kW	130 mm	R88M-1M1K020C-BS2	R88D-1SN10F-ECT
				7.16 Nm	1.5 kW	130 mm	R88M-1M1K520C-BS2	R88D-1SN15F-ECT
				9.55 Nm	2 kW	130 mm	R88M-1M2K020C-BS2	R88D-1SN20F-ECT
				14.3 Nm	3 kW	130 mm	R88M-1M3K020C-BS2	R88D-1SN30F-ECT

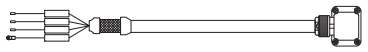
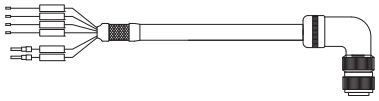
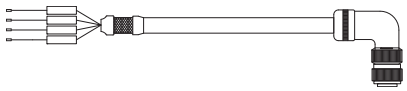
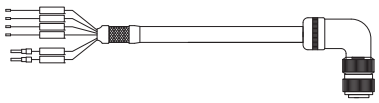
Servo motors 1000 r/min (900 W to 3 kW)

Symbol	Specifications						Model	Compatible 1S servo drive
	Voltage	Encoder and design		Rated torque	Capacity	Flange size		
①	230 V	Absolute encoder (23-bit) Straight shaft with key and tap	Without brake	8.59 Nm	900 W	130 mm	R88M-1M90010T-S2	R88D-1SN15H-ECT
			With brake	8.59 Nm	900 W	130 mm	R88M-1M90010T-BS2	R88D-1SN15H-ECT
	400 V		Without brake	8.59 Nm	900 W	130 mm	R88M-1M90010C-S2	R88D-1SN10F-ECT
				19.1 Nm	2 kW	180 mm	R88M-1M2K010C-S2	R88D-1SN20F-ECT
				28.7 Nm	3 kW	180 mm	R88M-1M3K010C-S2	R88D-1SN30F-ECT
			With brake	8.59 Nm	900 W	130 mm	R88M-1M90010C-BS2	R88D-1SN10F-ECT
				19.1 Nm	2 kW	180 mm	R88M-1M2K010C-BS2	R88D-1SN20F-ECT
				28.7 Nm	3 kW	180 mm	R88M-1M3K010C-BS2	R88D-1SN30F-ECT

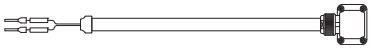
Encoder cables

Symbol	Specifications		Model	Appearance
③	Encoder cable for servo motors R88M-1M(100/200/400/750)30T-□	1.5 m	R88A-CR1A001-5CF-E	
		3 m	R88A-CR1A003CF-E	
		5 m	R88A-CR1A005CF-E	
		10 m	R88A-CR1A010CF-E	
		15 m	R88A-CR1A015CF-E	
		20 m	R88A-CR1A020CF-E	
	Encoder cable for servo motors R88M-1L(1K0/1K5)30T-□ R88M-1L(750/1K0/1K5/2K0/3K0)30C-□ R88M-1M(1K0/1K5)20T-□ R88M-1M(400/600/1K0/1K5/2K0/3K0)20C-□ R88M-1M90010T-□ R88M-1M(900/2K0/3K0)10C-□	1.5 m	R88A-CR1B001-5NF-E	
		3 m	R88A-CR1B003NF-E	
		5 m	R88A-CR1B005NF-E	
		10 m	R88A-CR1B010NF-E	
		15 m	R88A-CR1B015NF-E	
		20 m	R88A-CR1B020NF-E	

Power cables

Symbol	Specifications			Model	Appearance
④	For 230 V servo motors R88M-1M(100/200/400/750)30T-□S2 **Note:** For servo motors with brake R88M-1M(100/200/400/750)30T-BS2, the separate brake cable R88A-CA1A□□□BF-E is needed.	Without brake	1.5 m	R88A-CA1A001-5SF-E	
			3 m	R88A-CA1A003SF-E	
			5 m	R88A-CA1A005SF-E	
			10 m	R88A-CA1A010SF-E	
			15 m	R88A-CA1A015SF-E	
			20 m	R88A-CA1A020SF-E	
	For 230 V servo motors R88M-1L(1K0/1K5)30T-□S2 R88M-1M(1K0/1K5)20T-□S2 R88M-1M90010T-□S2	Without brake	1.5 m	R88A-CA1C001-5SF-E	
			3 m	R88A-CA1C003SF-E	
			5 m	R88A-CA1C005SF-E	
			10 m	R88A-CA1C010SF-E	
			15 m	R88A-CA1C015SF-E	
			20 m	R88A-CA1C020SF-E	
		With brake	1.5 m	R88A-CA1C001-5BF-E	
			3 m	R88A-CA1C003BF-E	
			5 m	R88A-CA1C005BF-E	
			10 m	R88A-CA1C010BF-E	
			15 m	R88A-CA1C015BF-E	
			20 m	R88A-CA1C020BF-E	
	For 400 V servo motors R88M-1L(750/1K0/1K5/2K0)30C-□S2 R88M-1M(400/600/1K0/1K5/2K0)20C-□S2 R88M-1M90010C-□S2	Without brake	1.5 m	R88A-CA1C001-5SF-E	
			3 m	R88A-CA1C003SF-E	
			5 m	R88A-CA1C005SF-E	
			10 m	R88A-CA1C010SF-E	
			15 m	R88A-CA1C015SF-E	
			20 m	R88A-CA1C020SF-E	
		With brake	1.5 m	R88A-CA1E001-5BF-E	
			3 m	R88A-CA1E003BF-E	
			5 m	R88A-CA1E005BF-E	
			10 m	R88A-CA1E010BF-E	
			15 m	R88A-CA1E015BF-E	
			20 m	R88A-CA1E020BF-E	
	For 400 V servo motors R88M-1L3K030C-□S2 R88M-1M3K020C-□S2 R88M-1M(2K0/3K0)10C-□S2	Without brake	1.5 m	R88A-CA1E001-5SF-E	
			3 m	R88A-CA1E003SF-E	
			5 m	R88A-CA1E005SF-E	
			10 m	R88A-CA1E010SF-E	
			15 m	R88A-CA1E015SF-E	
			20 m	R88A-CA1E020SF-E	
		With brake	1.5 m	R88A-CA1E001-5BF-E	
			3 m	R88A-CA1E003BF-E	
			5 m	R88A-CA1E005BF-E	
			10 m	R88A-CA1E010BF-E	
			15 m	R88A-CA1E015BF-E	
			20 m	R88A-CA1E020BF-E	

Brake cables (for 230 V, 100 W to 750 W servo motors)

Symbol	Specifications		Model	Appearance
⑤	Brake cable only For 230 V servo motors with brake R88M-1M(100/200/400/750)30T-BS2	1.5 m	R88A-CA1A001-5BF-E	
		3 m	R88A-CA1A003BF-E	
		5 m	R88A-CA1A005BF-E	
		10 m	R88A-CA1A010BF-E	
		15 m	R88A-CA1A015BF-E	
		20 m	R88A-CA1A020BF-E	

Connectors for encoder, power and brake cables

Specifications		Applicable servo motor	Model
Connectors for encoder cables	Drive side (CN2)	All models	R88A-CN101R
	Motor side	R88M-1M(100/200/400/750)30T-□	R88A-CNK02R
		R88M-1L(1K0/1K5)30T-□ R88M-1L(750/1K0/1K5/2K0/3K0)30C-□ R88M-1M(1K0/1K5)20T-□ R88M-1M(400/600/1K0/1K5/2K0/3K0)20C-□ R88M-1M90010T-□ R88M-1M(900/2K0/3K0)10C-□	R88A-CN104R
Connectors for power cables	Motor side	R88M-1M(100/200/400/750)30T-_S2	R88A-CN111A
		R88M-1L(1K0/1K5)30T-S2 R88M-1M(1K0/1K5)20T-S2 R88M-1M90010T-S2 R88M-1L(750/1K0/1K5/2K0)30C-S2 R88M-1M(400/600/1K0/1K5/2K0)20C-S2 R88M-1M90010C-S2	MS3108E20-4S
		R88M-1L(1K0/1K5)30T-BS2 R88M-1M(1K0/1K5)20T-BS2 R88M-1M90010T-BS2	MS3108E20-18S
		R88M-1L3K030C-S2 R88M-1M3K020C-S2 R88M-1M(2K0/3K0)10C-S2	MS3108E22-22S
		R88M-1L(750/1K0/1K5/2K0/3K0)30C-BS2 R88M-1M(400/600/1K0/1K5/2K0/3K0)20C-BS2 R88M-1M(900/2K0/3K0)10C-BS2	MS3108E24-11S
Connectors for brake cables	Motor side	R88M-1M(100/200/400/750)30T-BS2	R88A-CN111B

Cable clamp (spare parts)

Applicable 1S power cable	Model
230 V, 100 W to 750 W models	R88A-SC011S-E
230 V, 1.5 kW model 400 V, 600 W to 3 kW models	R88A-SC021S-E

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I189E-EN-01C In the interest of product improvement, specifications are subject to change without notice.

R88D-KN□□□-ECT

Accurax G5 rotary drive



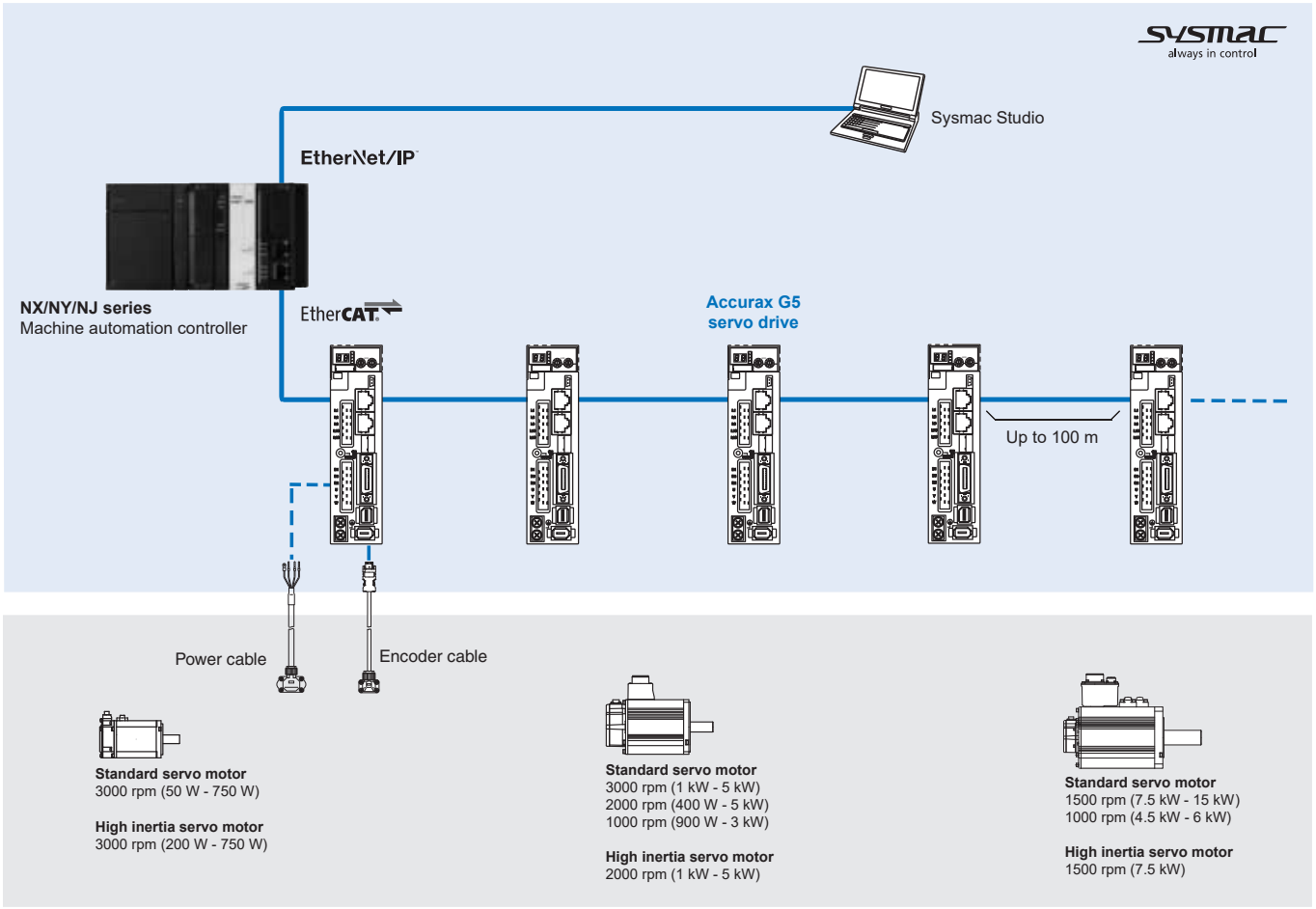
Accurate motion control in a compact size servo drive family. EtherCAT and safety built-in.

- Safety conforming ISO13849-1 PL-d
- High-response frequency of 2 kHz
- High resolution provided by 20 bits encoder
- External encoder input for full closed loop
- Real time auto-tuning
- Advanced tuning algorithms (Anti-vibration function, torque feedforward, disturbance observer)

Ratings

- 230 VAC single-phase 100 W to 1.5 kW (8.59 Nm)
- 400 VAC three-phase 600 W to 15 kW (95.5 Nm)

System configuration



Servo motor supported

Standard servo motors

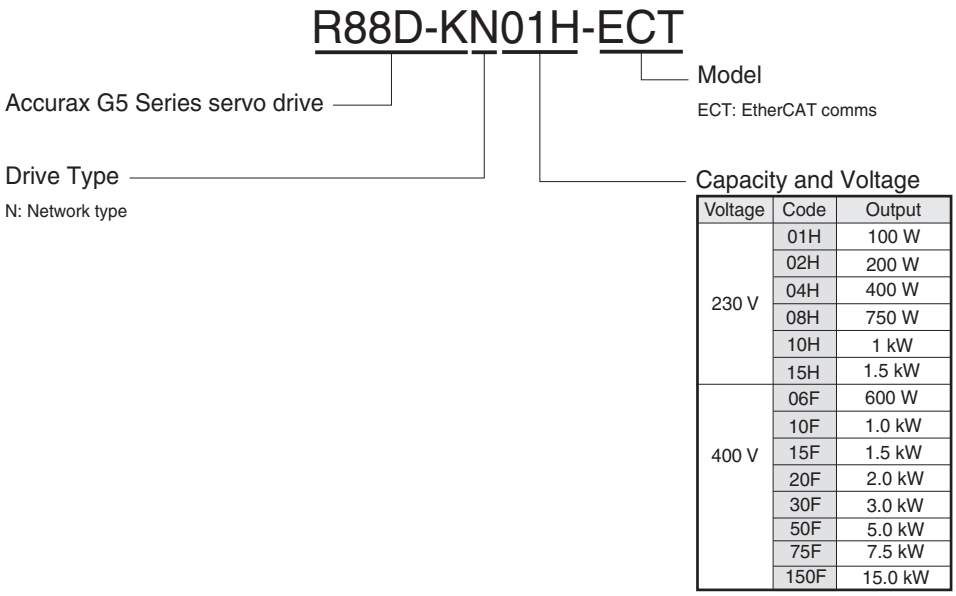
Accurax G5 rotary servo motor						Servo drive model
	Voltage	Speed	Rated torque	Capacity	Model	G5 EtherCAT
	230 V	3000 min^{-1}	0.16 Nm	50 W	R88M-K05030(H/T)-□	R88D-KN01H-ECT
			0.32 Nm	100 W	R88M-K10030(H/T)-□	R88D-KN01H-ECT
			0.64 Nm	200 W	R88M-K20030(H/T)-□	R88D-KN02H-ECT
			1.3 Nm	400 W	R88M-K40030(H/T)-□	R88D-KN04H-ECT
			2.4 Nm	750 W	R88M-K75030(H/T)-□	R88D-KN08H-ECT
			3.18 Nm	1000 W	R88M-K1K030(H/T)-□	R88D-KN15H-ECT
			4.77 Nm	1500 W	R88M-K1K530(H/T)-□	R88D-KN15H-ECT
	400 V		2.39 Nm	750 W	R88M-K75030(F/C)-□	R88D-KN10F-ECT
			3.18 Nm	1000 W	R88M-K1K030(F/C)-□	R88D-KN15F-ECT
			4.77 Nm	1500 W	R88M-K1K530(F/C)-□	R88D-KN15F-ECT
			6.37 Nm	2000 W	R88M-K2K030(F/C)-□	R88D-KN20F-ECT
			9.55 Nm	3000 W	R88M-K3K030(F/C)-□	R88D-KN30F-ECT
			12.7 Nm	4000 W	R88M-K4K030(F/C)-□	R88D-KN50F-ECT
230 V (1 kW - 1.5 kW) 400 V (400 W - 5 kW)			15.9 Nm	5000 W	R88M-K5K030(F/C)-□	R88D-KN50F-ECT
	230 V	2000 min^{-1}	4.77 Nm	1000 W	R88M-K1K020(H/T)-□	R88D-KN10H-ECT
			7.16 Nm	1500 W	R88M-K1K520(H/T)-□	R88D-KN15H-ECT
	400 V		1.91 Nm	400 W	R88M-K40020(F/C)-□	R88D-KN06F-ECT
			2.86 Nm	600 W	R88M-K60020(F/C)-□	R88D-KN06F-ECT
			4.77 Nm	1000 W	R88M-K1K020(F/C)-□	R88D-KN10F-ECT
			7.16 Nm	1500 W	R88M-K1K520(F/C)-□	R88D-KN15F-ECT
			9.55 Nm	2000 W	R88M-K2K020(F/C)-□	R88D-KN20F-ECT
			14.3 Nm	3000 W	R88M-K3K020(F/C)-□	R88D-KN30F-ECT
			19.1 Nm	4000 W	R88M-K4K020(F/C)-□	R88D-KN50F-ECT
7.5 kW - 15 kW			23.9 Nm	5000 W	R88M-K5K020(F/C)-□	R88D-KN50F-ECT
		1500 min^{-1}	47.8 Nm	7500 W	R88M-K7K515C-□	R88D-KN75F-ECT
			70.0 Nm	11000 W	R88M-K11K015C-□	R88D-KN150F-ECT
			95.5 Nm	15000 W	R88M-K15K015C-□	R88D-KN150F-ECT
	230 V	1000 min^{-1}	8.59 Nm	900 W	R88M-K90010(H/T)-□	R88D-KN15H-ECT
	400 V		8.59 Nm	900 W	R88M-K90010(F/C)-□	R88D-KN15F-ECT
			19.1 Nm	2000 W	R88M-K2K010(F/C)-□	R88D-KN30F-ECT
			28.7 Nm	3000 W	R88M-K3K010(F/C)-□	R88D-KN50F-ECT
			43.0 Nm	4500 W	R88M-K4K510C-□	R88D-KN50F-ECT
			57.3 Nm	6000 W	R88M-K6K010C-□	R88D-KN75F-ECT

High inertia servo motors

Accurax G5 rotary servo motor						Servo drive model
	Voltage	Speed	Rated torque	Capacity	Model	G5 EtherCAT
	230 V	3000 min^{-1}	0.64 Nm	200 W	R88M-KH20030(H/T)-□	R88D-KN02H-ECT
			1.3 Nm	400 W	R88M-KH40030(H/T)-□	R88D-KN04H-ECT
200 W - 750 W			2.4 Nm	750 W	R88M-KH75030(H/T)-□	R88D-KN08H-ECT
	400 V	2000 min^{-1}	4.77 Nm	1000 W	R88M-KH1K020(F/C)-□	R88D-KN10F-ECT
			7.16 Nm	1500 W	R88M-KH1K520(F/C)-□	R88D-KN15F-ECT
			9.55 Nm	2000 W	R88M-KH2K020(F/C)-□	R88D-KN20F-ECT
1 kW - 5 kW			14.3 Nm	3000 W	R88M-KH3K020(F/C)-□	R88D-KN30F-ECT
			19.1 Nm	4000 W	R88M-KH4K020(F/C)-□	R88D-KN50F-ECT
			23.9 Nm	5000 W	R88M-KH5K020(F/C)-□	R88D-KN50F-ECT
7.5 kW		1500 min^{-1}	47.8 Nm	7500 W	R88M-KH7K515C-□	R88D-KN75F-ECT

Type designation

Servo drive



Voltage	Code	Output
230 V	01H	100 W
	02H	200 W
	04H	400 W
	08H	750 W
	10H	1 kW
	15H	1.5 kW
400 V	06F	600 W
	10F	1.0 kW
	15F	1.5 kW
	20F	2.0 kW
	30F	3.0 kW
	50F	5.0 kW
	75F	7.5 kW
	150F	15.0 kW

Servo drive specifications

Single-phase, 230 V

Servo drive type			R88D-KN	01H-ECT	02H-ECT	04H-ECT	08H-ECT	10H-ECT	15H-ECT
Applicable servo motor			R88M-K□	05030(H/T)-□	20030(H/T)-□	40030(H/T)-□	75030(H/T)-□	1K020(H/T)-□	1K030(H/T)-□
				10030(H/T)-□	–	–	–	–	1K530(H/T)-□
				–	–	–	–	–	1K520(H/T)-□
				–	–	–	–	–	90010(H/T)-□
Basic specifications	Max. applicable motor capacity		W	100	200	400	750	1000	1500
	Continuous output current		Arms	1.2	1.6	2.6	4.1	5.9	9.4
	Input power	Main circuit		Single-phase/3-phase, 200 to 240 VAC +10 to –15% (50/60 Hz)					
	Supply	Control circuit		Single-phase, 200 to 240 VAC +10 to –15% (50/60 Hz)					
	Control method			IGBT-driven PWM method, sinusoidal drive					
	Feedback			Serial encoder (incremental/absolute value)					
	Conditions	Usage/storage temperature		0 to 55°C/–20 to 65°C					
		Usage/storage humidity		90% RH or less (non-condensing)					
		Altitude		1000 m or less above sea level					
		Vibration/shock resistance	(max.)	5.88 m/s^2 10 to 60 Hz (Continuous operation at resonance point is not allowed)/19.6 m/s^2					
	Configuration			Base mounted					
	Approx. weight		kg	0.8		1.1	1.6	1.8	

Three-phase, 400 V

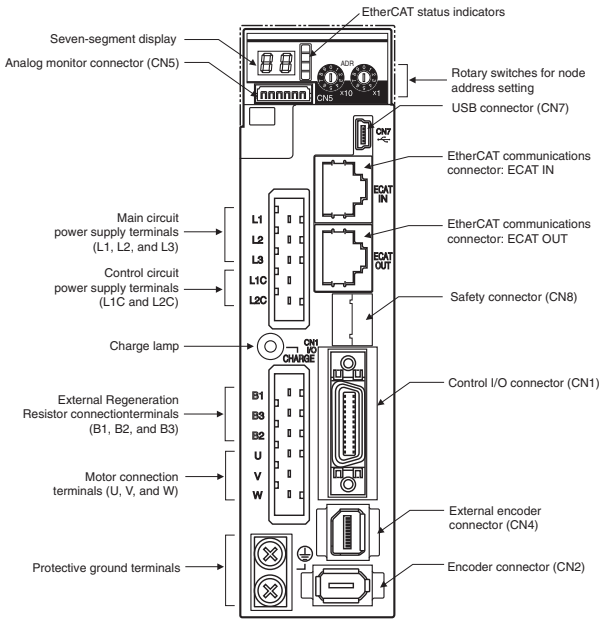
Servo drive type			R88D-KN	06F-ECT	10F-ECT	15F-ECT	20F-ECT	30F-ECT	50F-ECT	75F-ECT	150F-ECT
Applicable servo motor			R88M-K□	40020(F/C)-□	75030(F/C)-□	1K030(F/C)-□	2K030(F/C)-□	3K030(F/C)-□	4K030(F/C)-□	6K010C-□	11K015C-□
				60020(F/C)-□	1K020(F/C)-□	1K530(F/C)-□	2K020(F/C)-□	3K020(F/C)-□	5K030(F/C)-□	7K515C-□	15K015C-□
				–	–	1K520(F/C)-□	–	2K010(F/C)-□	4K020(F/C)-□	–	–
				–	–	90010(F/C)-□	–	–	5K020(F/C)-□	–	–
				–	–	–	–	–	4K510C-□	–	–
				–	–	–	–	–	3K010(F/C)-□	–	–
Basic specifications	Max. applicable motor capacity		kW	0.6	1.0	1.5	2.0	3.0	5.0	7.5	15.0
	Continuous output current		Arms	1.5	2.9	4.7	6.7	9.4	16.5	22.0	33.4
	Input power	Main circuit		3-phase, 380 to 480 VAC +10 to –15% (50/60 Hz)							
	Supply	Control circuit		24 VDC ±15%							
	Control method			IGBT-driven PWM method, sinusoidal drive							
	Feedback	Serial encoder		Incremental or absolute encoder						Absolute encoder	
	Conditions	Usage/storage temperature		0 to 55°C/–20 to +65°C							
		Usage/storage humidity		90% RH or less (non-condensing)							
		Altitude		1000 m or less above sea level							
		Vibration/shock resistance	(max.)	5.88 m/s^2 10 to 60 Hz (Continuous operation at resonance point is not allowed)/19.6 m/s^2							
	Configuration			Base mounted							
	Approx. weight		kg	1.9			2.7	4.7		13.5	21.0

General specifications

Performance		Frequency characteristics	2 kHz
EtherCAT interface	Command input		EtherCAT commands (for sequence, motion, data setting/reference, monitor, adjustment, and other commands).
	Drive Profile*1		CSP, CSV, CST, Homing and Position Profile modes (CiA402 Drive Profile) Homing mode Position profile mode Dual touch probe function (Latch function) Torque limit function
I/O signal	Sequence input signal		Multi-function input × 8 by parameter setting (forward/reverse drive prohibition, emergency stop, external latch, origin proximity, forward/reverse torque limit, general purpose monitor input).
	Sequence output signal		1 × servo drive error output 2 × multi-function outputs by parameters setting (servo ready, brake release, torque limit detection, zero speed detection, warning output, position completion, error clear attributed, programmable output)
Integrated functions	USB communications	Interface	Personal computer/Connector mini-USB
		Communications standard	Compliant with USB 2.0 standard
		Function	Parameter setting, status monitoring and tuning
	EtherCAT communications	Communications protocol	IEC 61158 Type 12, IEC 61800-7
		Physical layer	100BASE-TX (IEEE802.3)
		Connectors	RJ45 × 2 ECAT IN: EtherCAT input × 1 ECAT OUT: EtherCAT output × 1
		Communications media	Category 5 or higher (cable with double, aluminium tape and braided shielding is recommended)
		Communications distance	Distance between nodes: 100 m max.
		LED indicators	RUN × 1 ERR × 1 L/A IN (Link/Activity IN) × 1 L/A OUT (Link/activity OUT) × 1
	Autotuning		Automatic motor parameter setting. One parameter rigidity setting. Inertia detection.
	Dynamic brake (DB)		Built-in. Operates during main power OFF, servo alarm, servo OFF or overtravel.
	Regenerative processing		Internal resistor included in models from 600 W to 5 kW. Regenerative resistor externally mounted (option).
	Overtravel (OT) prevention function		DB stop, deceleration stop or coast to stop during P-OT, N-OT operation
	Encoder divider function		Gear ratio
	Protective functions		Overcurrent, overvoltage, undervoltage, overspeed, overload, encoder error, overheat…
	Analog monitor functions for supervision		Analog monitor of motor speed, speed reference, torque reference, command following error, analog input… The monitoring signals to output and their scaling can be specified with parameters. Number of channels: 2 (Output voltage: ±10V DC)
	Panel operator	Display functions	2 × digit 7-segment LED display shows the drive status, alarm codes, parameters…
		Switches	2 × rotary switches for setting the node address
	CHARGE lamp		Lits when the main circuit power supply is turned ON.
	Safety terminal	Functions	Safety Torque OFF function to cut off the motor current and stop the motor. Output signal for failure monitoring function.
		Conformed standards	EN ISO13849-1:2008 (PL- d, Performance Level d), IEC61800-5 -2:2007 (function STO, Safe Torque OFF), EN61508:2001 (Safety Integrity Level 2, SIL2), EN954-1:1996 (CAT3).
	External encoder feedback		Serial signal and line-driver A-B-Z encoder for full-closed control

*1 The CSV, CST and Homing modes are supported in the servo drive with version 2.0 or higher. The Position profile mode is supported in the servo drive version 2.1 or higher

Servo drive part names



Note: The above picture shows 230 V servo drives models only. The 400 V servo drives have 24 VDC power input terminals for control circuit instead of L1C and L2C terminals.

I/O specifications

Terminals specifications

Symbol	Name	Function
L1	Main power supply input terminal	AC power input terminals for the main circuit **Note:** for single-phase servo drives connect the power supply input to L1 and L3.
L2		
L3		
L1C	Control power supply input terminal	AC power input terminals for the control circuit (for 200 V single/three-phase servo drives only).
L2C		
24 V		DC power input terminals for the control circuit (for 400 V three-phase servo drives only).
0 V		
B1	External regeneration resistor connection terminals	Servo drives 200 V below 750 W and 400 V above 5 kW: no internal resistor is connected. Leave B2 and B3 open. Connect an external regenerative resistor between B1 and B2. Servo drives from 600 W to 5 kW: short-circuit in B2 and B3 for internal regenerative resistor. If the internal regenerative resistor is insufficient, connect an external regenerative resistor between B1 and B2 and remove the wire between B2 and B3.
B2		
B3		
DB1	Dynamic brake resistance control terminals	For 7.5 kW and 15 kW servo drives: These terminals are used to control the MC for externally connected dynamic brake resistance. Connect them if required.
DB2		
DB3		For 7.5 kW servo drive: Normally DB3 and DB4 are connected. When using an externally connected Dynamic Brake Unit, remove the short bar from between DB3 and DB4.
DB4		
U	Servo motor connection terminals	Terminals for outputs to the servomotor.
V		
W		

I/O signals (CN1) - input signals

Pin No.	Signal name	Function	
6	I-COM	± pole of external DC power. The power must use 12 to 24 V (±5%)	
5	E-STOP	Emergency stop	The signal name shows the factory setting. The function can be changed by parameter setting.
7	P-OT	Forward run prohibited	
8	N-OT	Reverse run prohibited	
9	DEC	Origin proximity	
10	EXT3	External latch input 3	
11	EXT2	External latch input 2	
12	EXT1	External latch input 1	
13	SI-MON0	General purpose monitor input 0	
14	BTP-I	Connecting pin for the absolute encoder backup battery. Do not connect when a battery is connected to the encoder cable (CN2 connector).	
15	BTN-I		
17	–	Terminals not used. Do not connect.	
18	–		
19	–		
20	–		
21	–		
22	–		
23	–		
24	–		
-	PCL	Forward torque limit	The function of input signals allocated to pins 5 and 7 to 13 can be changed with these options by parameters settings.
	NCL	Reverse torque limit	
	SI-MON1	General-purpose monitor input 1	
	SI-MON2	General-purpose monitor input 2	
Shell	FG	Shield ground. Connected to frame ground if the shield wire of the I/O signal cable is connected to the connector shell.	
16	GND	Signal ground. It is insulated with power supply (I-COM) for the control signal in the servo drive.	

I/O signals (CN1) - output signals

Pin No.	Signal name	Function	
1	BRK-OFF+	External brake release signal	
2	BRK-OFF		
25	S-RDY+	Servo ready: ON when there is no servo alarm and control/main circuit power supply is ON	
26	S-RDY–		
3	ALM+	Servo alarm: Turns OFF when an error is detected	
4	ALM–		
–	INP1	Position complete output 1	The function of output signals allocated to pins 1, 2, 25 and 26 can be changed with these options by parameters settings
	TGON	Speed detection	
	T_LIM	Torque limit	
	ZSP	Zero speed	
	VCMP	Speed command status	
	INP2	Position complete output 2	
	WARN1	Warning 1	
	WARN2	Warning 2	
	PCMD	Position command status	
	V_LIM	Speed limit	
	ALM-ATB	Error clear attribute	
	R-OUT1	Programmable output 1	
	R-OUT2	Programmable output 2	

External encoder connector (CN4)

Pin No.	Signal name	Function
1	E5V	External scale power supply output. Use at 5.2 V ±5% and at or below 250 mA.
2	E0V	This is connected to the control circuit ground connected to connector CN1.
3	PS	External scale signal I/O (serial signal).
4	/PS	
5	EXA	External scale signal input (Phase A, B, and Z signals). Performs the input and output of phase A, B and Z signals.
6	/EXA	
7	EXB	
8	/EXB	
9	EXZ	
10	/EXZ	
Shell	FG	Shield ground

Monitor connector (CN5)

Pin No.	Signal name	Function
1	AM1	Analog monitor output 1. Outputs the analog signal for the monitor. Use the parameters setting to select the output to monitor. Default setting: Motor rotation speed 1 V/(1000 r/min).
2	AM2	Analog monitor output 2. Outputs the analog signal for the monitor. Use the parameters setting to select the output to monitor. Default setting: Motor rotation speed 1 V/(1000 r/min).
3	GND	Ground for analog monitors 1,2.
4	–	Terminals not used. Do not connect.
5	–	
6	–	

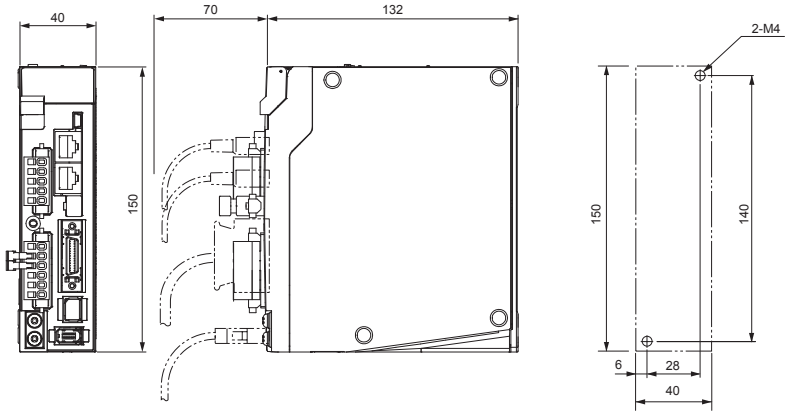
Safety connector (CN8)

Pin No.	Signal name	Function
1	–	Not used. Do not connect
2	–	
3	SF1–	Safety input 1 & 2. This input turns OFF the power transistor drive signals in the servo drive to cut off the current output to the motor.
4	SF1+	
5	SF2–	
6	SF2+	
7	EDM–	A monitor signal is output to detect a safety function failure.
8	EDM+	
Shell	FG	Frame ground.

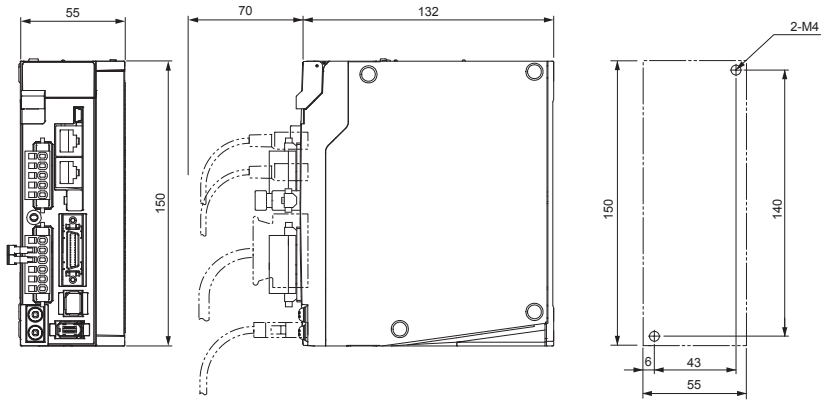
Dimensions

Servo drives

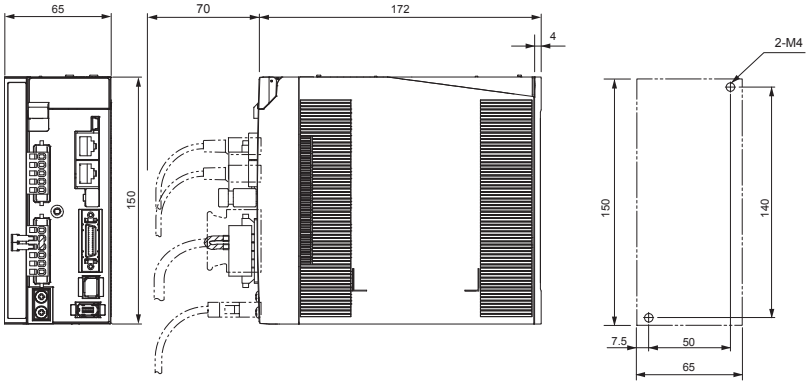
R88D-KN01H/02H-ECT (230 V, 100 to 200 W)



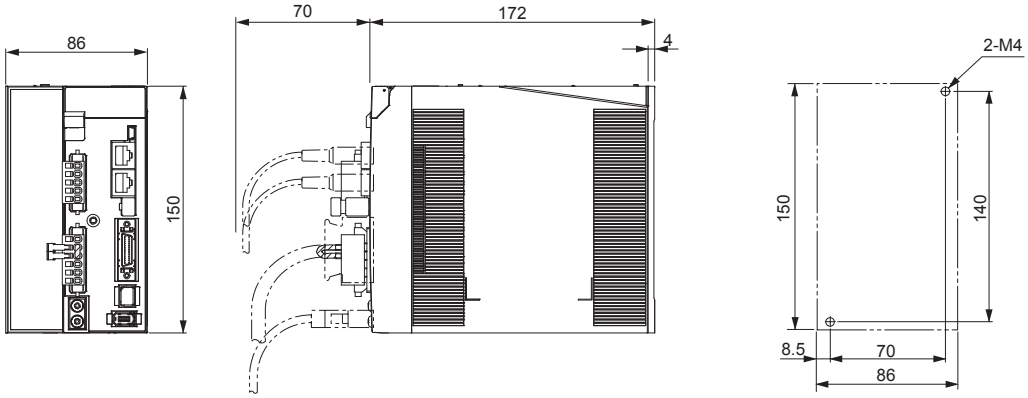
R88D-KN04H-ECT (230 V, 400 W)



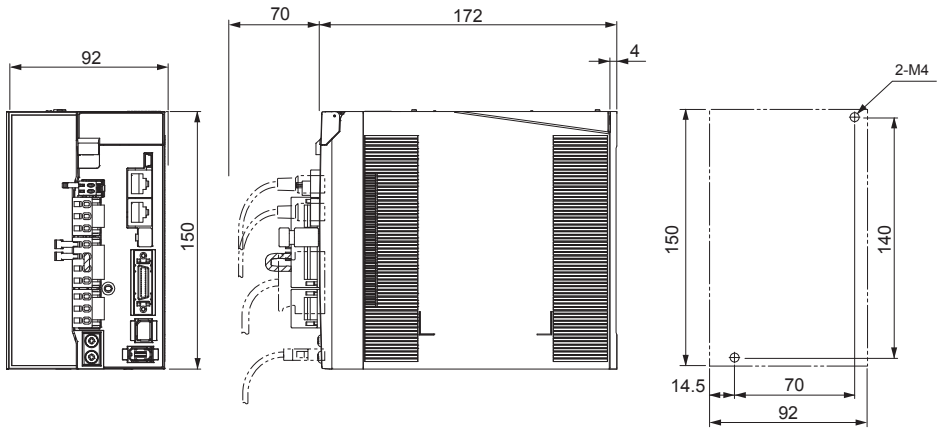
R88D-KN08H-ECT (230 V, 750 W)



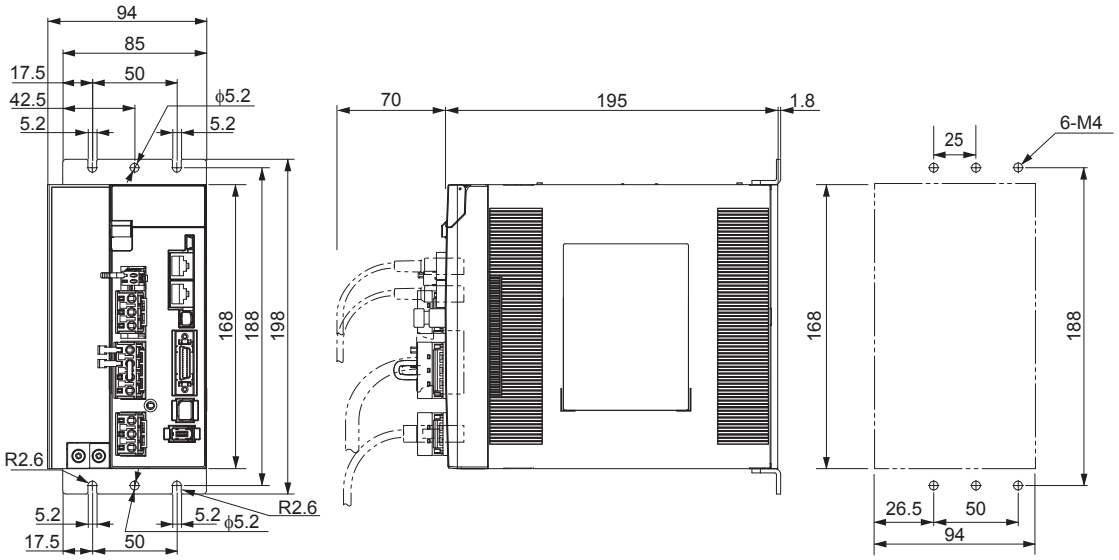
R88D-KN10H/15H-ECT (230 V, 1 to 1.5 kW)



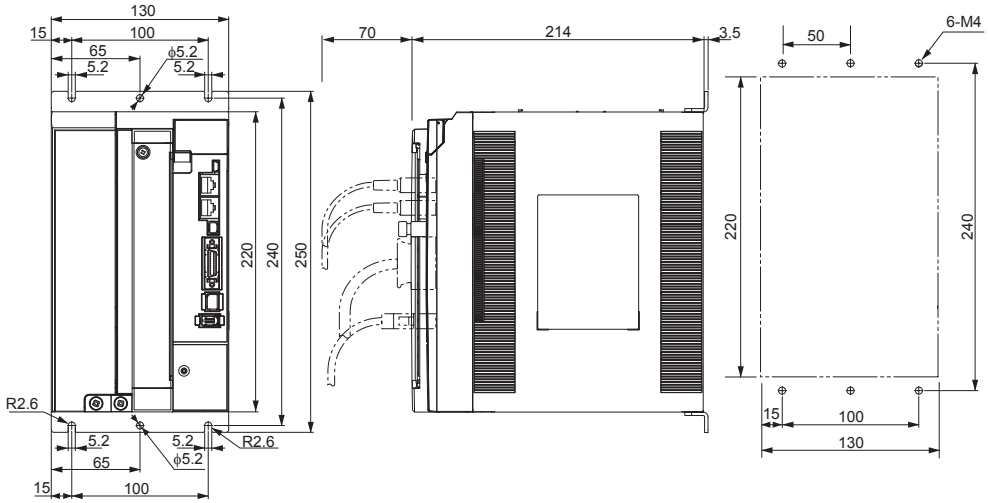
R88D-KN06F/10F/15F-ECT (400 V, 600 W to 1.5 kW)



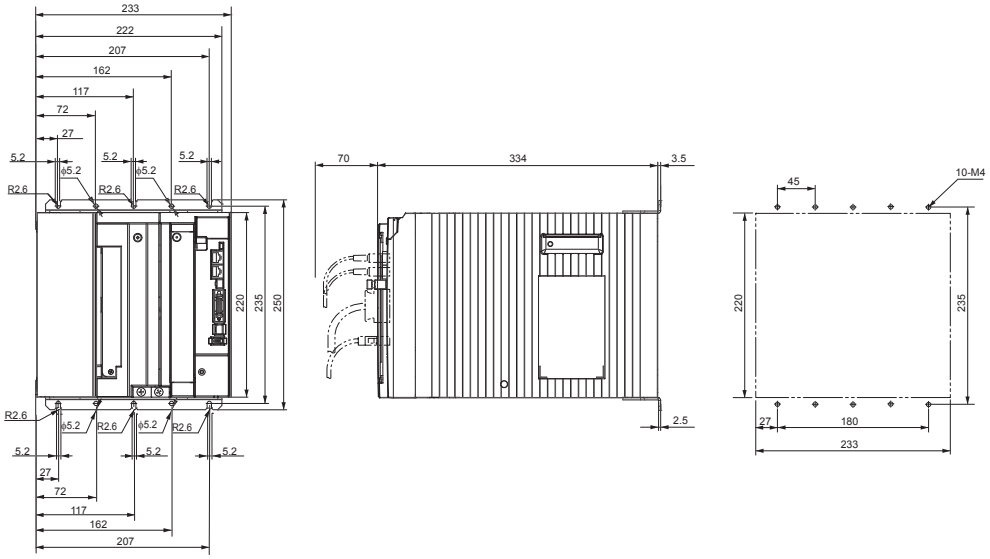
R88D-KN20F-ECT (400 V, 2 kW)



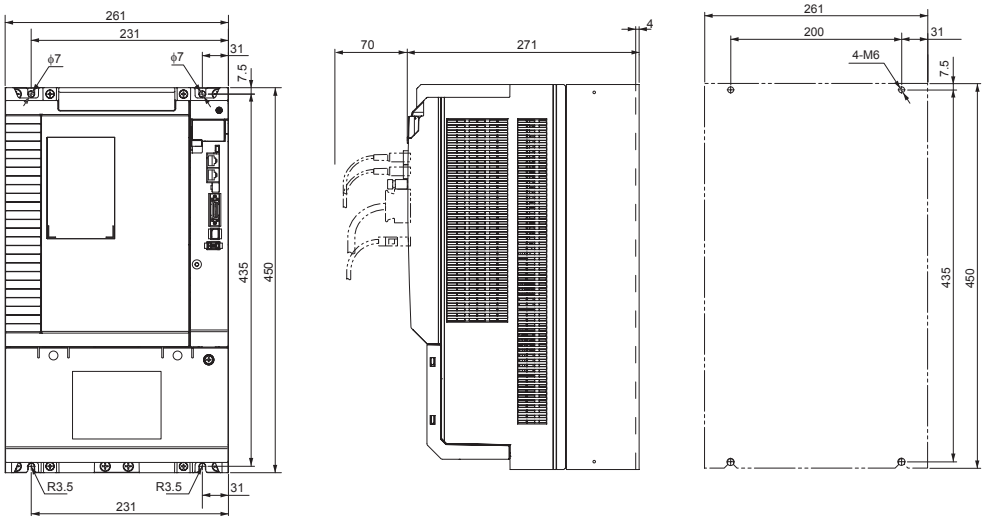
R88D-KN30F/50F-ECT (400 V, 3 to 5 kW)



R88D-KN75F-ECT (400 V, 7.5 kW)

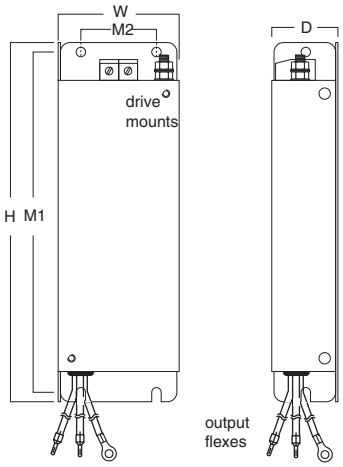


R88D-KN150F-ECT (400 V, 15 kW)



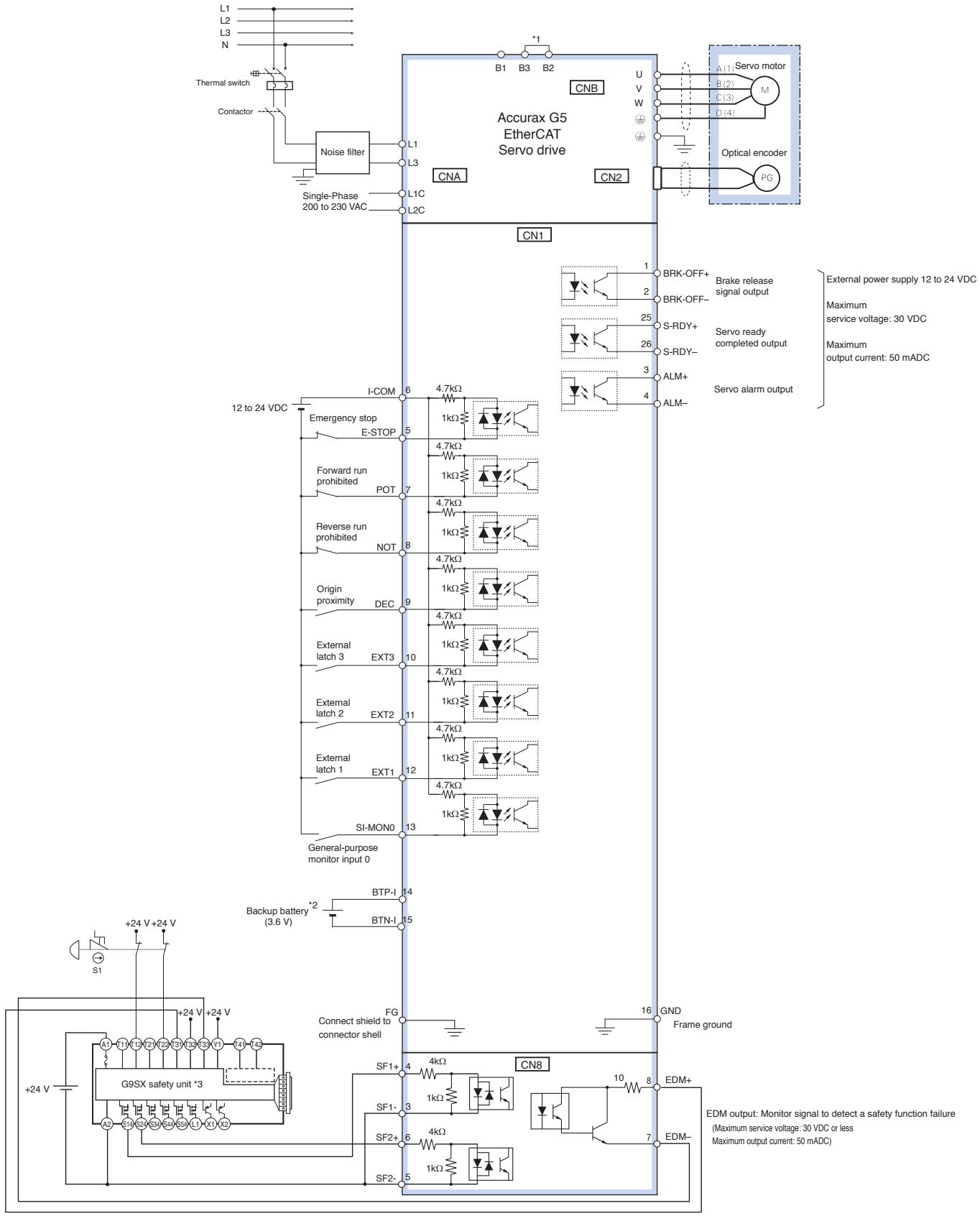
Filters

Filter model	External dimensions			Mount dimensions	
	H	W	D	M1	M2
R88A-FIK102-RE	190	42	44	180	20
R88A-FIK104-RE	190	57	30	180	30
R88A-FIK107-RE	190	64	35	180	40
R88A-FIK114-RE	190	86	35	180	60
R88A-FIK304-RE	196	92	40	186	70
R88A-FIK306-RE	238	94	40	228	70
R88A-FIK312-RE	291	130	40	278	100
R88A-FIK330-RE	310	233	50	293	180
R88A-FIK350-RE	506	261	52	491	200



Installation

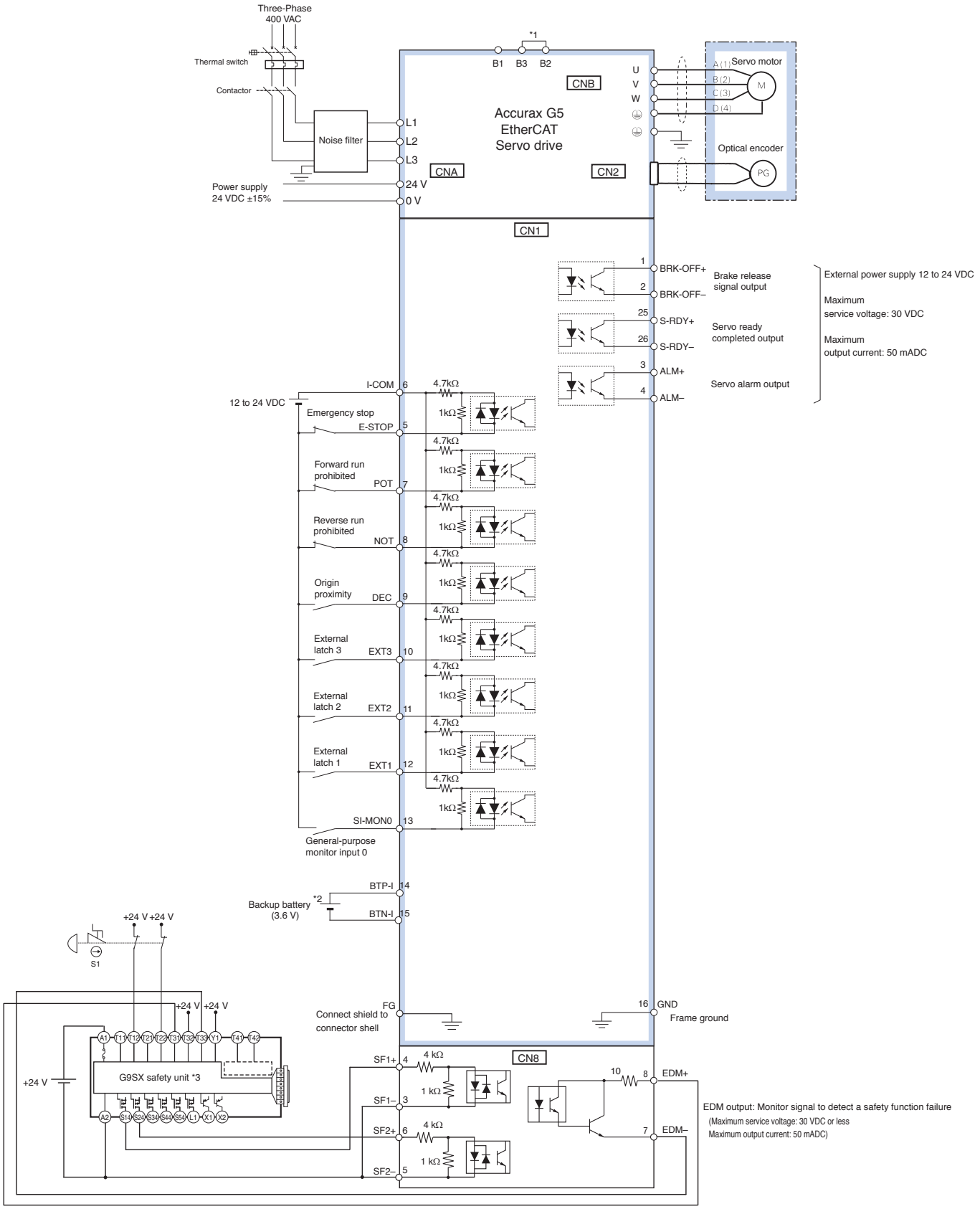
Single-phase, 230 VAC



*1 For servo drives from 750 W, B2 and B3 are short-circuited. If the internal regenerative resistor is insufficient, remove the wire between B2 and B3 and connect an external regenerative resistor between B1 and B2.
*2 For use only with an absolute encoder. If a backup battery is connected to CN1 I/O connector, an encoder cable with a battery is not required.
*3 Wiring diagram example using the G9SX safety unit. If a safety unit is not used, keep the factory safety bypass connector installed in the CN8.

Note: The input function of pins 5 and 7 to 13, and output function of pins 1, 2, 25 and 26, can be changed via parameter settings.

Three-phase, 400 VAC

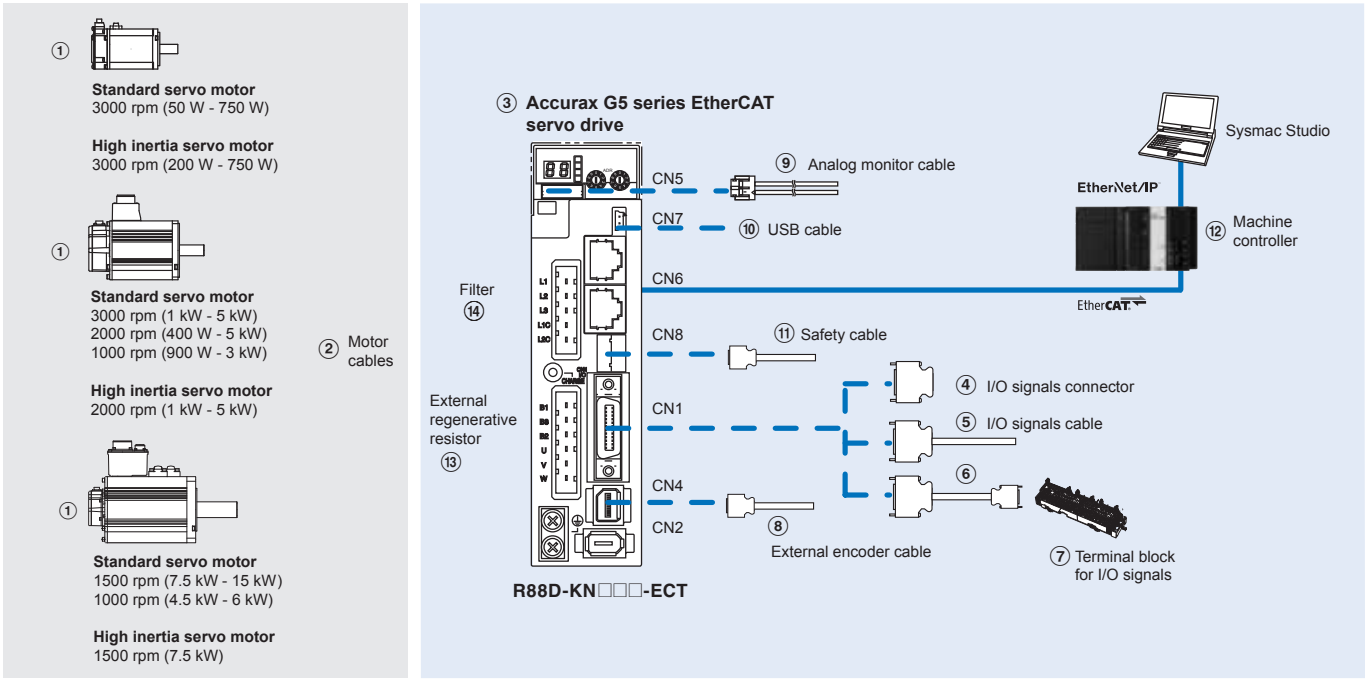


*1 For servo drives from 600 W to 5 kW, B2 and B3 are short-circuited. If the internal regenerative resistor is insufficient, remove the wire between B2 and B3 and connect an external regenerative resistor between B1 and B2.
*2 For use only with an absolute encoder. If a backup battery is connected to CN1 I/O connector, an encoder cable with a battery is not required.
*3 Wiring diagram example using the G9SX safety unit. If a safety unit is not used, keep the factory safety bypass connector installed in the CN8.

Note: The input function of pins 5 and 7 to 13, and output function of pins 1, 2, 25 and 26, can be changed via parameter settings.

Ordering information

Accurax G5 series EtherCAT reference configuration



Note: The symbols ①②③④⑤... show the recommended sequence to select the components in Accurax G5 servo system

Servo motors, power & encoder cables

Note: ①② Refer to the Accurax G5 servo motor chapter for servomotor, motor cables or connectors selection

Servo drives

Symbol	Specifications		Servo drive models	① Compatible G5 series rotary servo motors	
				Standard models	High inertia models
③	1 phase 230 VAC	100 W	R88D-KN01H-ECT	R88M-K05030(H/T)-□	–
				R88M-K10030(H/T)-□	–
		200 W	R88D-KN02H-ECT	R88M-K20030(H/T)-□	R88M-KH20030(H/T)-□
		400 W	R88D-KN04H-ECT	R88M-K40030(H/T)-□	R88M-KH40030(H/T)-□
		750 W	R88D-KN08H-ECT	R88M-K75030(H/T)-□	R88M-KH75030(H/T)-□
		1.0 kW	R88D-KN10H-ECT	R88M-K1K020(H/T)-□	–
		1.5 kW	R88D-KN15H-ECT	R88M-K1K030(H/T)-□	–
				R88M-K1K530(H/T)-□	–
				R88M-K1K520(H/T)-□	–
				R88M-K90010(H/T)-□	–
	3 phase 400 VAC	600 W	R88D-KN06F-ECT	R88M-K40020(F/C)-□	–
				R88M-K60020(F/C)-□	–
		1.0 kW	R88D-KN10F-ECT	R88M-K75030(F/C)-□	–
				R88M-K1K020(F/C)-□	R88M-KH1K020(F/C)-□
		1.5 kW	R88D-KN15F-ECT	R88M-K1K030(F/C)-□	–
				R88M-K1K530(F/C)-□	–
				R88M-K1K520(F/C)-□	R88M-KH1K520(F/C)-□
				R88M-K90010(F/C)-□	–
		2.0 kW	R88D-KN20F-ECT	R88M-K2K030(F/C)-□	–
				R88M-K2K020(F/C)-□	R88M-KH2K020(F/C)-□
		3.0 kW	R88D-KN30F-ECT	R88M-K3K030(F/C)-□	–
				R88M-K3K020(F/C)-□	R88M-KH3K020(F/C)-□
				R88M-K2K010(F/C)-□	–
		5.0 kW	R88D-KN50F-ECT	R88M-K4K030(F/C)-□	–
				R88M-K5K030(F/C)-□	–
				R88M-K4K020(F/C)-□	R88M-KH4K020(F/C)-□
				R88M-K5K020(F/C)-□	R88M-KH5K020(F/C)-□
				R88M-K4K510C-□	–
				R88M-K3K010(F/C)-□	–
		7.5 kW	R88D-KN75F-ECT	R88M-K6K010C-□	–
				R88M-K7K515C-□	R88M-KH7K515C-□
		15 kW	R88D-KN150F-ECT	R88M-K11K015C-□	–
				R88M-K15K015C-□	–

Signals cables for I/O general purpose (CN1)

Symbol	Description	Connect to		Model
④	I/O connector kit (26 pins)	For I/O general purpose	–	R88A-CNW01C
⑤	I/O signals cable	For I/O general purpose	1 m	R88A-CPKB001S-E
			2 m	R88A-CPKB002S-E
⑥	Terminal block cable	For I/O general purpose	1 m	XW2Z-100J-B34
			2 m	XW2Z-200J-B34
⑦	Terminal block (M3 screw and for pin terminals)		–	XW2B-20G4
	Terminal block (M3.5 screw and for fork/round terminals)		–	XW2B-20G5
	Terminal block (M3 screw and for fork/round terminals)		–	XW2D-20G6

External encoder cable (CN4)

Symbol	Name		Model
⑧	External encoder cable	5 m	R88A-CRKM005SR-E
		10 m	R88A-CRKM010SR-E
		20 m	R88A-CRKM020SR-E

Analog monitor (CN5)

Symbol	Name		Model
⑨	Analog monitor cable	1 m	R88A-CMK001S

USB personal computer cable (CN7)

Symbol	Name		Model
⑩	USB mini-connector cable	2 m	AX-CUSBM002-E

Cable for safety (CN8)

Symbol	Name		Model
⑪	Safety cable	3 m	R88A-CSK003S-E

Machine controller

Symbol	Name		Model
⑫	IPC machine controller	Industrial box PC type	NY512-□
		Industrial panel PC type	NY532-□
	NX7 series	CPU unit	NX701-□
		Power supply unit	NX-PA9001 (220 VAC)
			NX-PD7001 (24 VDC)
	NJ series	CPU unit	NJ501-□
			NJ301-□
			NJ101-□
		Power supply unit	NJ-PA3001 (220 VAC)
			NJ-PD3001 (24 VDC)
	NX1 series	CPU unit	NX1P2-□

External regenerative resistor

Symbol	Regenerative resistor unit model	Specifications
⑬	R88A-RR08050S	50 Ω, 80 W
	R88A-RR080100S	100 Ω, 80 W
	R88A-RR22047S	47 Ω, 220 W
	R88A-RR50020S	20 Ω, 500 W

Filters

Symbol	Applicable servodrive	Filter model	Manufacturer	Rated current	Leakage current	Rated voltage
⑭	R88D-KN01H-ECT, R88D-KN02H-ECT	R88A-FIK102-RE	Rasmi Electronics Ltd.	2.4 A	3.5 mA	250 VAC single-phase
	R88D-KN04H-ECT	R88A-FIK104-RE		4.1 A	3.5 mA	
	R88D-KN08H-ECT	R88A-FIK107-RE		6.6 A	3.5 mA	
	R88D-KN10H-ECT, R88D-KN15H-ECT	R88A-FIK114-RE		14.2 A	3.5 mA	
	R88D-KN06F-ECT, R88D-KN10F-ECT, R88D-KN15F-ECT	R88A-FIK304-RE		4 A	0.3 mA / 32 mA[1]	400 VAC three-phase
	R88D-KN20F-ECT	R88A-FIK306-RE		6 A	0.3 mA / 32 mA[1]	
	R88D-KN30F-ECT, R88D-KN50F-ECT	R88A-FIK312-RE		12.1 A	0.3 mA / 32 mA[1]	
	R88D-KN75F-ECT	R88A-FIK330-RE		22 A	0.3 mA / 40 mA[1]	
	R88D-KN150F-ECT	R88A-FIK350-RE		44 A	2 mA / 130 mA[1]	

1. Momentary peak leakage current for the filter at switch-on/off.

Connectors

Specifications	Model
External encoder connector (for CN4)	R88A-CNK41L
Safety I/O signal connector (for CN8)	R88A-CNK81S

Computer software

Specifications	Model
Sysmac Studio version 1.0 or higher	SYSMAC-SE2□□□
CX-Drive version 2.10 or higher	CX-DRIVE 2.10
CX-One software package including CX-Drive 2.10 or higher	CX-ONE

Note: If CX-One is installed on the same computer as Sysmac Studio, it must be CX-One v4.2 or higher.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I101E-EN-04A In the interest of product improvement, specifications are subject to change without notice.

R88M-K□, R88M-KH□

Accurax G5 rotary motor



Servo family for accurate motion control.
Power range extended up to 15 kW.

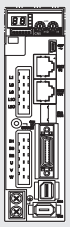
- Standard and high inertia servo motor models
- Peak torque 300% of rated torque during 3 seconds or more depending on model
- High resolution serial encoder provided by 20 bits encoder
- IP67 protection in all models
- Ultra-light and compact size motor
- Low speed ripple and low torque ripple due to low torque cogging
- Various shaft, brake and seal options

Ratings

- 230 VAC from 50 W to 1.5 kW (rated torque from 0.16 to 8.59 Nm)
- 400 VAC from 400 W to 15 kW (rated torque from 1.91 Nm to 95.5 Nm)

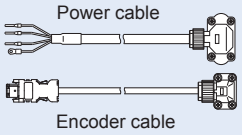
System configuration

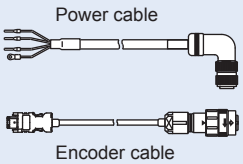
(Refer to servo drive chapter)



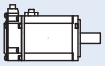
Accurax G5 servo drive
EtherCAT model

Standard servo motors

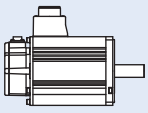




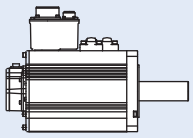
SYSMAC always in control



3000 rpm (50 W to 750 W)

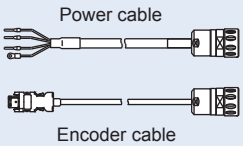


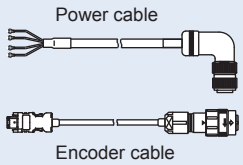
3000 rpm (750 W to 5 kW)
2000 rpm (400 W to 5 kW)
1000 rpm (900 W to 3 kW)

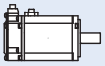


1500 rpm (7.5 kW to 15 kW)
1000 rpm (4.5 kW to 6 kW)

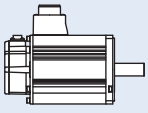
High inertia servo motors



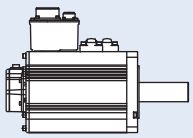




3000 rpm (200 W to 750 W)



2000 rpm (1 kW to 5 kW)



1500 rpm (7.5 kW)

Servo motor / servo drive combination

Standard servo motors

Accurax G5 rotary servo motor						Servo drive model
	Voltage	Speed	Rated torque	Capacity	Model	G5 EtherCAT
	230 V	3000 min^{-1}	0.16 Nm	50 W	R88M-K05030(H/T)-□	R88D-KN01H-ECT
			0.32 Nm	100 W	R88M-K10030(H/T)-□	R88D-KN01H-ECT
			0.64 Nm	200 W	R88M-K20030(H/T)-□	R88D-KN02H-ECT
			1.3 Nm	400 W	R88M-K40030(H/T)-□	R88D-KN04H-ECT
			2.4 Nm	750 W	R88M-K75030(H/T)-□	R88D-KN08H-ECT
 230V (1 kW - 1.5 kW) 400V (400 W - 5 kW)			3.18 Nm	1000 W	R88M-K1K030(H/T)-□	R88D-KN15H-ECT
			4.77 Nm	1500 W	R88M-K1K530(H/T)-□	R88D-KN15H-ECT
	400 V		2.39 Nm	750 W	R88M-K75030(F/C)-□	R88D-KN10F-ECT
			3.18 Nm	1000 W	R88M-K1K030(F/C)-□	R88D-KN15F-ECT
			4.77 Nm	1500 W	R88M-K1K530(F/C)-□	R88D-KN15F-ECT
			6.37 Nm	2000 W	R88M-K2K030(F/C)-□	R88D-KN20F-ECT
			9.55 Nm	3000 W	R88M-K3K030(F/C)-□	R88D-KN30F-ECT
			12.7 Nm	4000 W	R88M-K4K030(F/C)-□	R88D-KN50F-ECT
			15.9 Nm	5000 W	R88M-K5K030(F/C)-□	R88D-KN50F-ECT
 7.5 KW - 15 kW	230 V	2000 min^{-1}	4.77 Nm	1000 W	R88M-K1K020(H/T)-□	R88D-KN10H-ECT
			7.16 Nm	1500 W	R88M-K1K520(H/T)-□	R88D-KN15H-ECT
	400 V		1.91 Nm	400 W	R88M-K40020(F/C)-□	R88D-KN06F-ECT
			2.86 Nm	600 W	R88M-K60020(F/C)-□	R88D-KN06F-ECT
			4.77 Nm	1000 W	R88M-K1K020(F/C)-□	R88D-KN10F-ECT
			7.16 Nm	1500 W	R88M-K1K520(F/C)-□	R88D-KN15F-ECT
			9.55 Nm	2000 W	R88M-K2K020(F/C)-□	R88D-KN20F-ECT
			14.3 Nm	3000 W	R88M-K3K020(F/C)-□	R88D-KN30F-ECT
			19.1 Nm	4000 W	R88M-K4K020(F/C)-□	R88D-KN50F-ECT
			23.9 Nm	5000 W	R88M-K5K020(F/C)-□	R88D-KN50F-ECT
	400 V	1500 min^{-1}	47.8 Nm	7500 W	R88M-K7K515C-□	R88D-KN75F-ECT
			70.0 Nm	11000 W	R88M-K11K015C-□	R88D-KN150F-ECT
			95.5 Nm	15000 W	R88M-K15K015C-□	R88D-KN150F-ECT
	230 V	1000 min^{-1}	8.59 Nm	900 W	R88M-K90010(H/T)-□	R88D-KN15H-ECT
	400 V		8.59 Nm	900 W	R88M-K90010(F/C)-□	R88D-KN15F-ECT
			19.1 Nm	2000 W	R88M-K2K010(F/C)-□	R88D-KN30F-ECT
			28.7 Nm	3000 W	R88M-K3K010(F/C)-□	R88D-KN50F-ECT
			43.0 Nm	4500 W	R88M-K4K510C-□	R88D-KN50F-ECT
			57.3 Nm	6000 W	R88M-K6K010C-□	R88D-KN75F-ECT

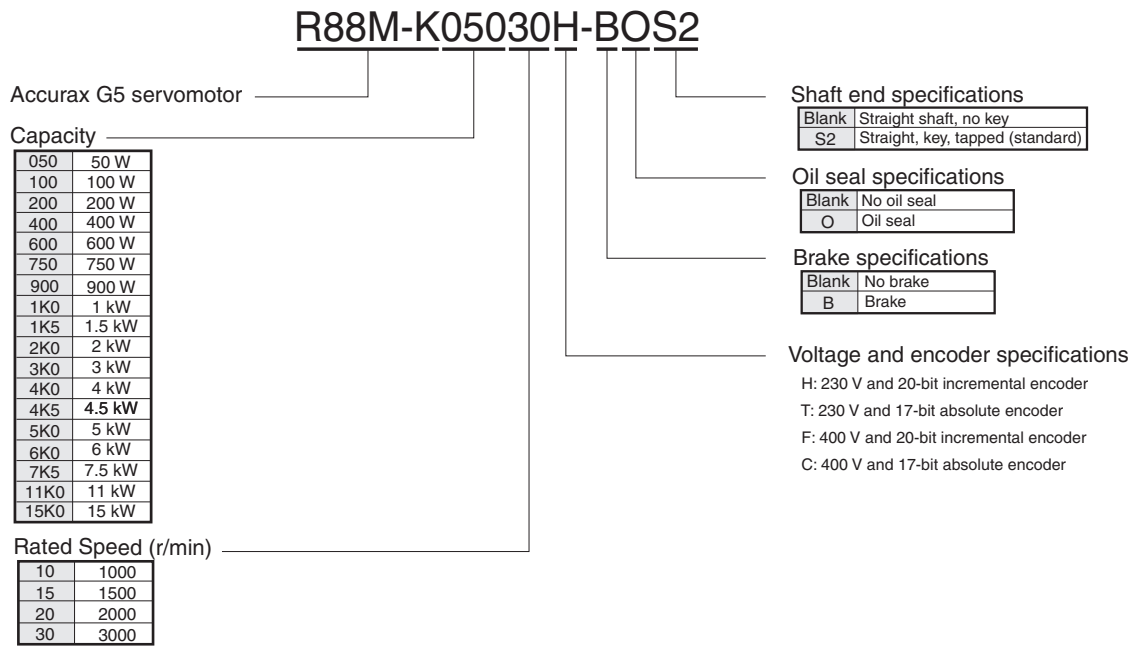
High inertia servo motors

Accurax G5 rotary servo motor						Servo drive model
	Voltage	Speed	Rated torque	Capacity	Model	G5 EtherCAT
	230 V	3000 min^{-1}	0.64 Nm	200 W	R88M-KH20030(H/T)-□	R88D-KN02H-ECT
			1.3 Nm	400 W	R88M-KH40030(H/T)-□	R88D-KN04H-ECT
			2.4 Nm	750 W	R88M-KH75030(H/T)-□	R88D-KN08H-ECT
 1 kW - 5 kW	400 V	2000 min^{-1}	4.77 Nm	1000 W	R88M-KH1K020(F/C)-□	R88D-KN10F-ECT
			7.16 Nm	1500 W	R88M-KH1K520(F/C)-□	R88D-KN15F-ECT
			9.55 Nm	2000 W	R88M-KH2K020(F/C)-□	R88D-KN20F-ECT
			14.3 Nm	3000 W	R88M-KH3K020(F/C)-□	R88D-KN30F-ECT
			19.1 Nm	4000 W	R88M-KH4K020(F/C)-□	R88D-KN50F-ECT
			23.9 Nm	5000 W	R88M-KH5K020(F/C)-□	R88D-KN50F-ECT
7.5 KW		1500 min^{-1}	47.8 Nm	7500 W	R88M-KH7K515C-□	R88D-KN75F-ECT

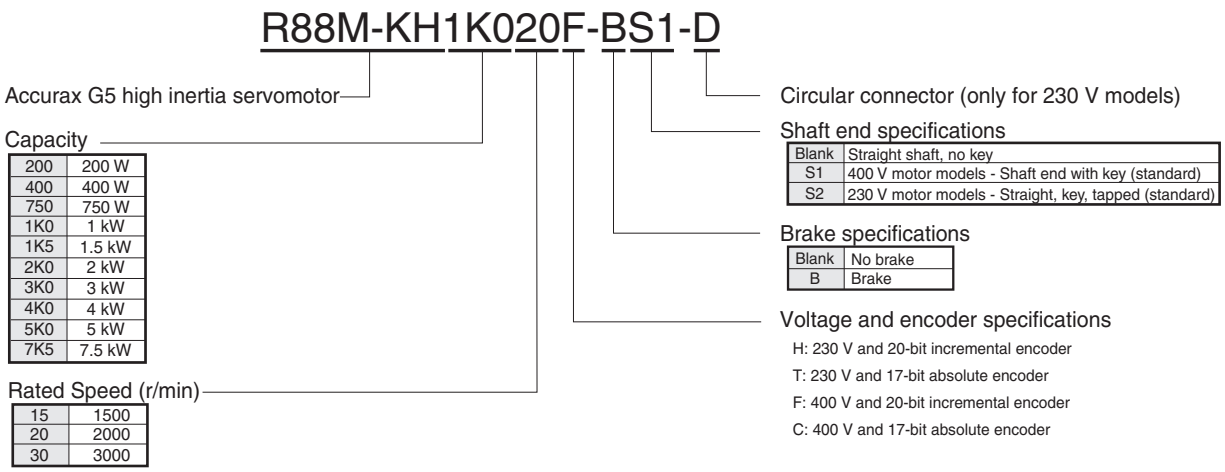
Note: 1. For servo motor and cables part numbers refer to ordering information at the end of this chapter
2. Refer to the servo drive chapter for drive options selection and detailed specifications

Servo motor type designation

Standard servo motors



High inertia servo motors



Servo motor specifications

Standard servo motors 3000 r/min, 230 V

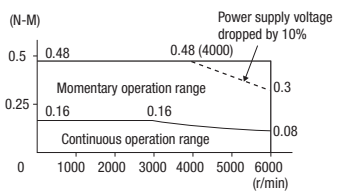
Ratings and specifications

Voltage			230 V						
Servo motor model R88M-K□		20-bit incremental encoder	05030H-□	10030H-□	20030H-□	40030H-□	75030H-□	1K030H-□	1K530H-□
		17-bit absolute encoder	05030T-□	10030T-□	20030T-□	40030T-□	75030T-□	1K030T-□	1K530T-□
Rated output		W	50	100	200	400	750	1000	1500
Rated torque		Nm	0.16	0.32	0.64	1.3	2.4	3.18	4.77
Instantaneous peak torque		Nm	0.48	0.95	1.91	3.8	7.1	9.55	14.3
Rated current		A (rms)	1.1	1.1	1.5	2.4	4.1	6.6	8.2
Instantaneous max. current		A (rms)	4.7	4.7	6.5	10.2	17.4	28	35
Rated speed		min^{-1}	3000						
Max. speed		min^{-1}	6000					5000	
Torque constant		N·m/A	0.11±10%	0.21±10%	0.31±10%	0.39±10%	0.42±10%	0.37	0.45
Rotor moment of inertia (JM)		$kg·m^2×10^{-4}$ (without brake)	0.025	0.051	0.14	0.26	0.87	2.03	2.84
		$kg·m^2×10^{-4}$ (with brake)	0.027	0.054	0.16	0.28	0.97	2.35	3.17
Allowable load moment of inertia (JL)		Multiple of (JM)	30*1				20*1	15*1	
Rated power rate		kW/s (without brake)	10.1	19.9	29.0	62.4	65.6	49.8	80.1
		kW/s (with brake)	9.4	18.8	25.4	58	58.8	43	71.8
Allowable radial load		N	68		245		490		
Allowable thrust load		N	58		98		196		
Approx. mass		kg (without brake)	0.32	0.47	0.82	1.2	2.3	3.5	4.4
		kg (with brake)	0.53	0.68	1.3	1.7	3.1	4.5	5.4
Brake specifications	Rated voltage		24 VDC ±10%						
	Holding brake moment of inertia J	$kg·m^2×10^{-4}$	0.002		0.0018		0.33		
	Power consumption (at 20°C)	W	7		9		17	19	
	Current consumption (at 20°C)	A	0.3		0.36		0.70±10%	0.81±10%	
	Static friction torque	N·m (minimum)	0.29		1.27		2.5	7.8	
	Rise time for holding torque	ms (max.)	35		50				
	Release time	ms (max)	20		15				
Basic specifications	Time Rating		Continuous						
	Insulation class		Type B					Type F	
	Ambient operating/ storage temperature		0 to 40°C/–20 to 65°C						
	Ambient operating/ storage humidity		20 to 80% (non-condensing)					20 to 85% (non-condensing)	
	Vibration class		V-15						
	Insulation resistance		20 MΩ min. at 500 VDC between the power terminals and FG terminal						
	Enclosure		Totally-enclosed, self-cooling, IP67 (excluding shaft opening)						
	Vibration resistance		Vibration acceleration 49 m/s²						
	Mounting		Flange-mounted						

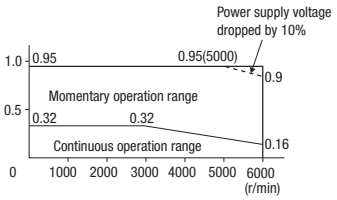
*1 Applicable load inertia: The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.

Torque-speed characteristics

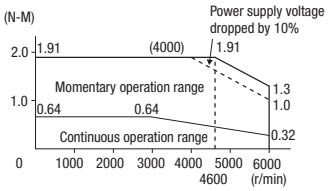
R88M-K05030H/T (50 W)



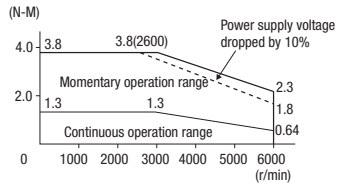
R88M-K10030H/T (100 W)



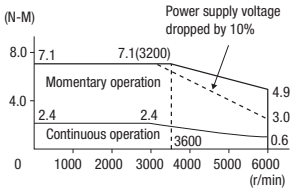
R88M-K20030H/T (200 W)



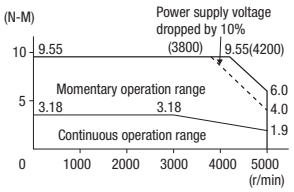
R88M-K40030H/T (400 W)



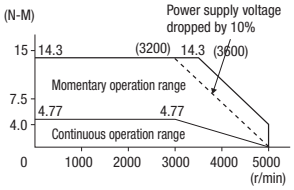
R88M-K75030H/T (750 W)



R88M-K1K030H/T (1 kW)



R88M-K1K530H/T (1.5 kW)



Standard servo motors 3000 r/min, 400 V

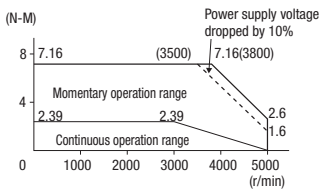
Ratings and specifications

Voltage			400 V						
Servo motor model R88M-K□		20-bit incremental encoder	75030F-□	1K030F-□	1K530F-□	2K030F-□	3K030F-□	4K030F-□	5K030F-□
		17-bit absolute encoder	75030C-□	1K030C-□	1K530C-□	2K030C-□	3K030C-□	4K030C-□	5K030C-□
Rated output		W	750	1000	1500	2000	3000	4000	5000
Rated torque		N·m	2.39	3.18	4.77	6.37	9.55	12.7	15.9
Instantaneous peak torque		N·m	7.16	9.55	14.3	19.1	28.6	38.2	47.7
Rated current		A (rms)	2.4	3.3	4.2	5.7	9.2	9.9	12
Instantaneous max. current		A (rms)	10	14	18	24	39	42	51
Rated speed		min^{-1}	3000						
Max. speed		min^{-1}	5000					4500	
Torque constant		N·m/A	0.78	0.75	0.89	0.87	0.81	0.98	
Rotor moment of inertia (JM)		$kg·m^2×10^{-4}$ (without brake)	1.61	2.03	2.84	3.68	6.5	12.9	17.4
		$kg·m^2×10^{-4}$ (with brake)	1.93	2.35	3.17	4.01	7.85	14.2	18.6
Allowable load moment of inertia (JL)		Multiple of (JM)	20*1	15*1					
Rated power rate		kW/s (without brake)	35.5	49.8	80.1	110	140	126	146
		kW/s (with brake)	29.6	43	71.8	101	116	114	136
Allowable radial load		N	490					784	
Allowable thrust load		N	196					343	
Approx. mass		kg (without brake)	3.1	3.5	4.4	5.3	8.3	11	14
		kg (with brake)	4.1	4.5	5.4	6.3	9.4	12.6	16
Brake specifications	Rated voltage		24 VDC ±10%						
	Holding brake moment of inertia J	$kg·m^2×10^{-4}$	0.33						1.35
	Power consumption (at 20°C)	W	17	19				22	
	Current consumption (at 20°C)	A	0.70±10%	0.81±10%				0.90±10%	
	Static friction torque	N.m (minimum)	2.5	7.8			11.8	16.1	
	Rise time for holding torque	ms (max.)	50					110	
	Release time	ms (max)	15					50	
Basic specifications	Time Rating		Continuous						
	Insulation class		Type F						
	Ambient operating/ storage temperature		0 to 40°C/–20 to 65°C						
	Ambient operating/ storage humidity		20% to 85% (non-condensing)						
	Vibration class		V-15						
	Insulation resistance		20 MΩ min. at 500 VDC between the power terminals and FG terminal						
	Enclosure		Totally-enclosed, self-cooling, IP67(excluding shaft opening)						
	Vibration resistance		Vibration acceleration 49 m/s²						
	Mounting		Flange-mounted						

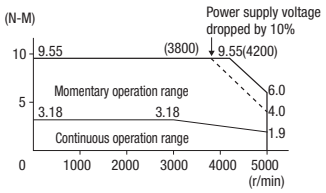
*1 Applicable load inertia: The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.

Torque-speed characteristics

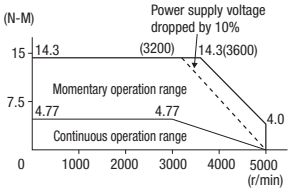
R88M-K75030F/C (750 W)



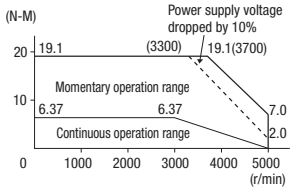
R88M-K1K030F/C (1 kW)



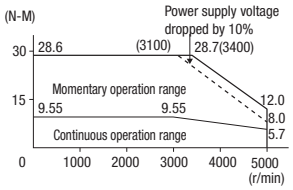
R88M-K1K530F/C (1.5 kW)



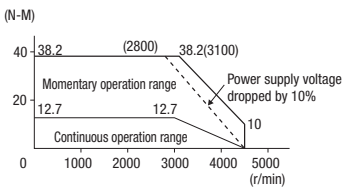
R88M-K2K030F/C (2 kW)



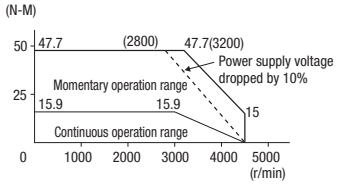
R88M-K3K030F/C (3 kW)



R88M-K4K030F/C (4 kW)



R88M-K5K030F/C (5 kW)



Standard servo motors 2000 r/min, 230 V/400 V

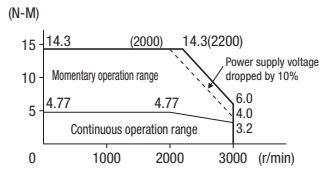
Ratings and specifications

Voltage			230 V		400 V							
Servo motor model R88M-K□		20-bit incremental encoder	1K020H-□	1K520H-□	40020F-□	60020F-□	1K020F-□	1K520F-□	2K020F-□	3K020F-□	4K020F-□	5K020F-□
		17-bit absolute encoder	1K020T-□	1K520T-□	40020C-□	60020C-□	1K020C-□	1K520C-□	2K020C-□	3K020C-□	4K020C-□	5K020C-□
Rated output		W	1000	1500	400	600	1000	1500	2000	3000	4000	5000
Rated torque		N·m	4.77	7.16	1.91	2.86	4.77	7.16	9.55	14.3	19.1	23.9
Instantaneous peak torque		N·m	14.3	21.5	5.73	8.59	14.3	21.5	28.7	43	57.3	71.6
Rated current		A (rms)	5.7	9.4	1.2	1.5	2.8	4.7	5.9	8.7	10.6	13
Instantaneous max. current		A (rms)	24	40	4.9	6.5	12	20	25	37	45	55
Rated speed		min^{-1}	2000									
Max. speed		min^{-1}	3000									
Torque constant		N·m/A	0.63	0.58	1.27	1.38	1.27	1.16	1.27	1.18	1.40	1.46
Rotor moment of inertia (JM)		$kg·m^2×10^{-4}$ (without brake)	4.60	6.70	1.61	2.03	4.60	6.70	8.72	12.9	37.6	48
		$kg·m^2×10^{-4}$ (with brake)	5.90	7.99	1.90	2.35	5.90	7.99	10	14.2	38.6	48.8
Max. load moment of inertia (JL)		Multiple of (JM)	10*1									
Rated power rate		kW/s (without brake)	49.5	76.5	22.7	40.3	49.5	76.5	105	159	97.1	119
		kW/s (with brake)	38.6	64.2	19.2	34.8	38.6	64.2	91.2	144	94.5	117
Allowable radial load		N	490							784		
Allowable thrust load		N	196							343		
Approx. mass		kg (without brake)	5.2	6.7	3.1	3.5	5.2	6.7	8	11	15.5	18.6
		kg (with brake)	6.7	8.2	4.1	4.5	6.7	8.2	9.5	12.6	18.7	21.8
Brake specifications	Rated voltage		24 VDC ±10%									
	Holding brake moment inertia	(J) $kg·m^2×10^{-4}$	1.35								4.7	
	Power consumption (20°C)	W	14	19	17		14	19		22	31	
	Current consumption (20°C)	A	0.59±10%	0.79±10%	0.70±10%		0.59±10%	0.79±10%		0.90±10%	1.3±10%	1.3 ±10%
	Static friction torque	N.m (minimum)	4.9	13.7	2.5		4.9	13.7		16.2	24.5	
	Rise time for holding torque	ms (max.)	80	100	50		80	100		110	80	
	Release time	ms (max)	70	50	15		70	50			25	
Basic specifications	Time Rating		Continuous									
	Insulation class		Type F									
	Ambient operating/ storage temperature		0 to 40°C/–20 to 85°C									
	Ambient operating/ storage humidity		20% to 85% (non-condensing)									
	Vibration class		V-15									
	Insulation resistance		20 MΩ min. at 500 VDC between the power terminals and FG terminal									
	Enclosure		Totally-enclosed, self-cooling, IP67 (excluding shaft opening)									
	Vibration resistance		Vibration acceleration 49 m/s²									
	Mounting		Flange-mounted									

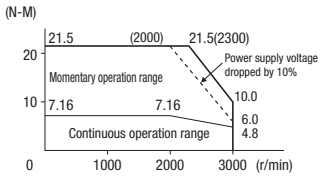
*1 Applicable load inertia: The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.

Torque-speed characteristics

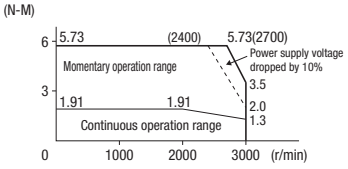
R88M-K1K020H/T (230V, 1 kW)



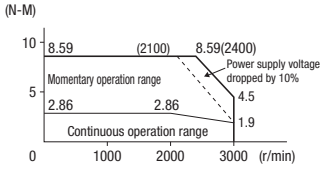
R88M-K1K520H/T (230V, 1.5 kW)



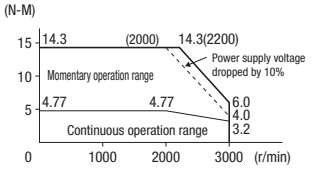
R88M-K40020F/C (400V, 400 W)



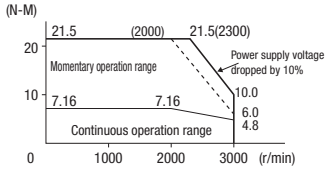
R88M-K60020F/C (400V, 600 W)



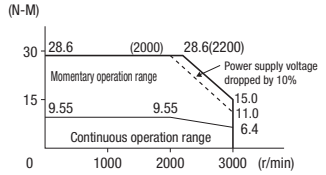
R88M-K1K020F/C (400V, 1 kW)



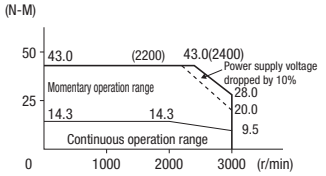
R88M-K1K520F/C (400V, 1.5 kW)



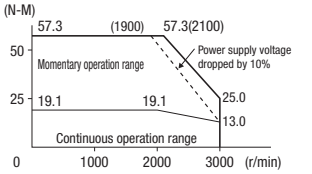
R88M-K2K020F/C (400V, 2 kW)



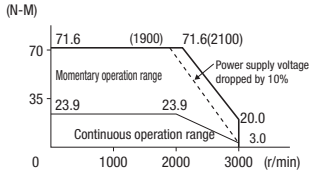
R88M-K3K020F/C (400V, 3 kW)



R88M-K4K020F/C (400V, 4 kW)



R88M-K5K020F/C (400V, 5 kW)



Standard servo motors 1500 r/min, 400 V

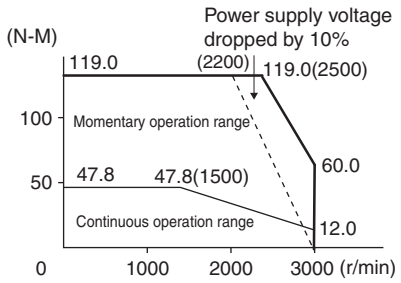
Ratings and specifications

Applied voltage			400 V		
Servo motor model R88M-K□		**17-bit absolute encoder**	**7K515C-□**	**11K015C-□**	**15K015C-□**
Rated output		W	7500	11000	15000
Rated torque		N·m	47.8	70.0	95.5
Instantaneous peak torque		N·m	119.0	175.0	224.0
Rated current		A (rms)	22.0	27.1	33.1
Instantaneous max. current		A (rms)	83	101	118
Rated speed		min^{-1}	1500		
Max. speed		min^{-1}	3000	2000	
Torque constant		N·m/A	1.54	1.84	2.10
Rotor moment of inertia (JM)		$kg·m^2×10^{-4}$ (without brake)	101	212	302
		$kg·m^2×10^{-4}$ (with brake)	107	220	311
Allowable load moment of inertia (JL)		Multiple of (JM)	10*1		
Rated power rate		kW/s (without brake)	226	231	302
		kW/s (with brake)	213	223	293
Allowable radial load		N	1176	2254	
Allowable thrust load		N	490	686	
Approx. mass		kg (without brake)	36.4	52.7	70.2
		kg (with brake)	40.4	58.9	76.3
Brake specifications	Rated voltage		24VDC ±10%		
	Holding brake moment of inertia J	$kg·m^2×10^{-4}$	4.7	7.1	
	Power consumption (at 20°C)	W	34	26	
	Current consumption (at 20°C)	A	1.4±10%	1.08±10%	
	Static friction torque	N.m (minimum)	58.8	100	
	Rise time for holding torque	ms (max.)	150	300	
	Release time	ms (max)	50	140	
Basic specifications	Time Rating		Continuous		
	Insulation class		Type F		
	Ambient operating/ storage temperature		0 to 40°C/–20 to 65°C		
	Ambient operating/ storage humidity		20% to 85% RH (non-condensing)		
	Vibration class		V-15		
	Insulation resistance		20 MΩ min. at 500 VDC between the power terminals and FG terminal		
	Enclosure		Totally-enclosed, self-cooling, IP67 (excluding shaft opening)		
	Vibration resistance		Vibration acceleration 49 m/s²		
	Mounting		Flange-mounted		

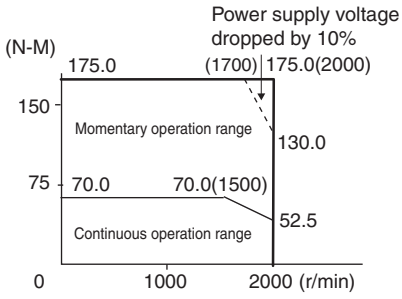
*1 Applicable load inertia: The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.

Torque-speed characteristics

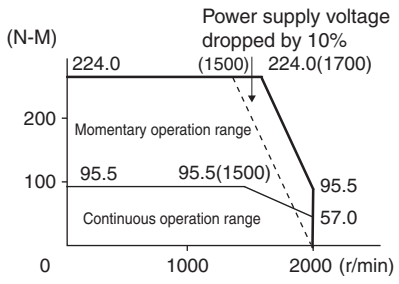
R88M-K7K515C (7.5 kW)



R88M-K11K015C (11 kW)



R88M-K15K015C (15 kW)



Standard servo motors 1000 r/min, 230 V/400 V

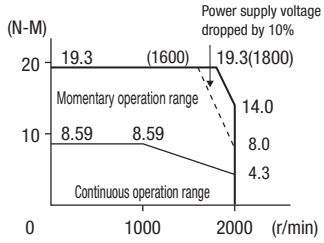
Ratings and specifications

Applied voltage		230 V	400 V				
Servo motor model R88M-K□	**20-bit incremental encoder**	**90010H-□**	**90010F-□**	**2K010F-□**	**3K010F-□**		
	17-bit absolute encoder	**90010T-□**	**90010C-□**	**2K010C-□**	**3K010C-□**	**4K510C-□**	**6K010C-□**
Rated output	W	900	900	2000	3000	4500	6000
Rated torque	N·m	8.59		19.1	28.7	43.0	57.3
Instantaneous peak torque	N·m	19.3		47.7	71.7	107.0	143.0
Rated current	A (rms)	7.6	3.8	8.5	11.3	14.8	19.4
Instantaneous max. current	A (rms)	24	12	30	40	55	74
Rated speed	min^{-1}	1000					
Max. speed	min^{-1}	2000					
Torque constant	N·m/A	0.86	1.72	1.76	1.92	2.05	2.08
Rotor moment of inertia (JM)	$kg·m^2×10^{-4}$ (without brake)	6.70		30.3	48.4	79.1	101
	$kg·m^2×10^{-4}$ (with brake)	7.99		31.4	49.2	84.4	107
Allowable load moment of inertia (JL)	Multiple of (JM)	10*1					
Rated power rate	kW/s (without brake)	110		120	170	233	325
	kW/s (with brake)	92.4		116	167	219	307
Allowable radial load	N	686		1176	1470		1764
Allowable thrust load	N	196		490			588
Approx. mass	kg (without brake)	6.7		14	20	29.4	36.4
	kg (with brake)	8.2		17.5	23.5	33.3	40.4
Brake specifications: Rated voltage		24VDC ±10%					
Brake specifications: Holding brake moment of inertia J	$kg·m^2×10^{-4}$	1.35		4.7			
Brake specifications: Power consumption (at 20°C)	W	19		31	34		
Brake specifications: Current consumption (at 20°C)	A	0.79±10%		1.3±10%	1.4±10%		
Brake specifications: Static friction torque	N.m (minimum)	13.7		24.5	58.8		
Brake specifications: Rise time for holding torque	ms (max.)	100		80	150		
Brake specifications: Release time	ms (max)	50		25	50		
Basic specifications: Time Rating		Continuous					
Basic specifications: Insulation class		Type F					
Basic specifications: Ambient operating/ storage temperature		0 to 40°C/–20 to 65°C					
Basic specifications: Ambient operating/ storage humidity		20% to 85% RH (non-condensing)					
Basic specifications: Vibration class		V-15					
Basic specifications: Insulation resistance		20 MΩ min. at 500 VDC between the power terminals and FG terminal					
Basic specifications: Enclosure		Totally-enclosed, self-cooling, IP67 (excluding shaft opening)					
Basic specifications: Vibration resistance		Vibration acceleration 49 m/s2					
Basic specifications: Mounting		Flange-mounted					

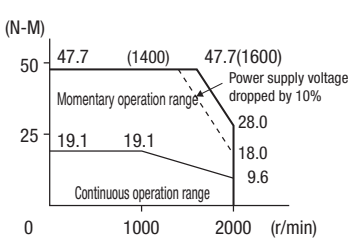
*1 Applicable load inertia: The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.

Torque-speed characteristics

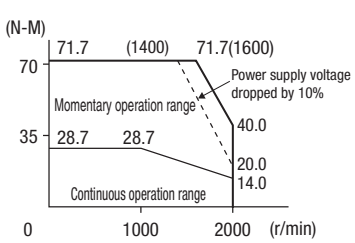
R88M-K90010H/T/F/C



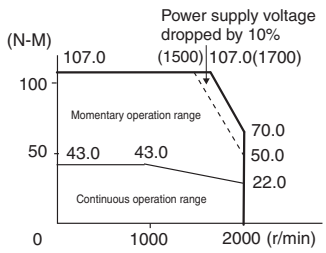
R88M-K2K010F/C



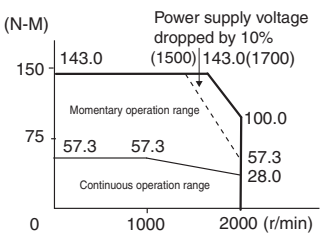
R88M-K3K010F/C



R88M-K4K510C



R88M-K6K010C



High inertia servo motors 3000 r/min, 230 V

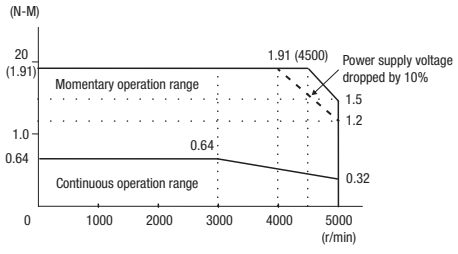
Ratings and specifications

Voltage			230 V		
Servo motor model R88M-KH□	**20-bit incremental encoder**		**20030H-□**	**40030H-□**	**75030H-□**
	17-bit absolute encoder		**20030T-□**	**40030T-□**	**75030T-□**
Rated output	W		200	400	750
Rated torque	N·m		0.64	1.3	2.4
Instantaneous peak torque	N·m		1.91	3.8	7.1
Rated current	A (rms)		1.6	2.6	4.0
Instantaneous max. current	A (rms)		6.9	11.0	17.0
Rated speed	min^{-1}		3000		
Max. speed	min^{-1}		5000		4500
Torque constant	N·m/A		0.29±10%	0.36±10%	0.45±10%
Rotor moment of inertia (JM)	$kg·m^2×10^{-4}$ (without brake)		0.42	0.67	1.51
	$kg·m^2×10^{-4}$ (with brake)		0.45	0.70	1.61
Allowable load moment of inertia (JL)	Multiple of (JM)		30 *1		20 *1
Rated power rate	kW/s (without brake)		9.58	24.1	37.7
	kW/s (with brake)		9.06	23.3	35.3
Allowable radial load	N		245		392
Allowable thrust load	N		98		147
Approx. mass	kg (without brake)		0.96	1.4	2.5
	kg (with brake)		1.4	1.8	3.3
Brake specifications	Rated voltage		24 VDC ±5%		
	Holding brake moment of inertia J	$kg·m^2×10^{-4}$	0.018		0.075
	Power consumption (at 20°C)	W	9		10
	Current consumption (at 20°C)	A	0.36		0.42
	Static friction torque	N.m (minimum)	1.27		2.45
	Rise time for holding torque	ms (max.)	50		70
	Release time	ms (max)	15		20
Basic specifications	Time Rating		Continuous		
	Insulation class		Type B		
	Ambient operating/ storage temperature		0 to 40°C/–20 to 65°C		
	Ambient operating/ storage humidity		20% to 85% RH (non-condensing)		
	Vibration class		V-15		
	Insulation resistance		20 MΩ min. at 500 VDC between the power terminals and FG terminal		
	Enclosure		Totally-enclosed, self-cooling, IP65 (excluding shaft opening and lead wire ends)		
	Vibration resistance		Vibration acceleration 49 m/s^2		
	Mounting		Flange-mounted		

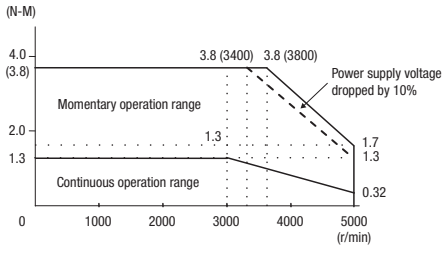
*1 Applicable load inertia: The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.

Torque-speed characteristics

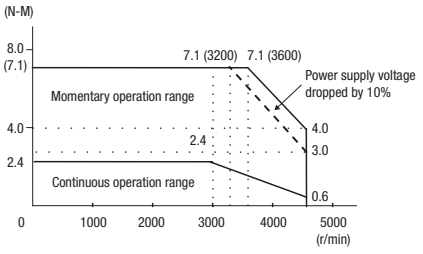
R88M-KH20030H/T (230 V, 200 W)



R88M-KH40030H/T (230 V, 400 W)



R88M-KH75030H/T (230 V, 750 W)



High inertia servo motors 2000 and 1500 r/min, 400 V

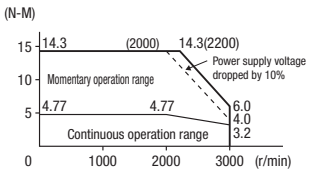
Ratings and specifications

R/min, Voltage		2000r/min, 400 V						1500r/min, 400 V
Servo motor model R88M-KH□	20-bit incremental encoder	1K020F-□	1K520F-□	2K020F-□	3K020F-□	4K020F-□	5K020F-□	
	17-bit absolute encoder	1K020C-□	1K520C-□	2K020C-□	3K020C-□	4K020C-□	5K020C-□	7K515C-□
Rated output	W	1000	1500	2000	3000	4000	5000	7500
Rated torque	N·m	4.77	7.16	9.55	14.3	19.1	23.9	47.8
Instantaneous peak torque	N·m	14.3	21.5	28.6	43.0	57.3	71.6	119
Rated current	A (rms)	2.9	4.7	5.5	8.0	10.5	13.0	22.0
Instantaneous max. current	A (rms)	12	20	24	34	45	55	83
Rated speed	min^{-1}	2000						1500
Max. speed	min^{-1}	3000						3000
Torque constant	N·m/A	1.27	1.16	1.31	1.34	1.38	1.39	1.54
Rotor moment of inertia (JM)	$kg·m^2×10^{-4}$ (without brake)	24.7	37.1	57.8	90.2	112	162	273
	$kg·m^2×10^{-4}$ (with brake)	26.0	38.4	62.9	95.3	117	167	279
Max. load moment of inertia (JL)	Multiple of (JM)	5*1						
Rated power rate	kW/s (without brake)	9.2	13.8	15.8	22.7	32.5	35.1	86.7
	kW/s (with brake)	8.8	13.4	14.5	21.5	31.1	34.1	85.1
Allowable radial load	N	490		784				1176
Allowable thrust load	N	196		343				490
Approx. mass	kg (without brake)	6.7	8.6	12.2	16.0	18.6	23.0	42.3
	kg (with brake)	8.1	10.1	15.5	19.2	21.8	26.2	46.2
Brake specifications: Rated voltage		24 VDC ±10%						
Brake specifications: Holding brake moment of inertia	(J) $kg·m^2×10^{-4}$	1.35		4.7				
Brake specifications: Power consumption (20°C)	W	14	19	31				34
Brake specifications: Current consumption (20°C)	A	0.59±10%	0.79±10%	1.30±10%				1.40±10%
Brake specifications: Static friction torque	N.m (minimum)	4.9	13.7	24.5				58.8
Brake specifications: Rise time for holding torque	ms (max.)	80	100	80				150
Brake specifications: Release time	ms (max)	70	50	25				50
Basic specifications: Time Rating		Continuous						
Basic specifications: Insulation class		Type F						
Basic specifications: Ambient operating/ storage temperature		0 to 40°C/–20 to 65°C						
Basic specifications: Ambient operating/ storage humidity		20% to 85% RH (non-condensing)						
Basic specifications: Vibration class		V-15						
Basic specifications: Insulation resistance		20 MΩ min. at 500 VDC between the power terminals and FG terminal						
Basic specifications: Enclosure		Totally-enclosed, self-cooling, IP67 (excluding shaft opening)						
Basic specifications: Vibration resistance		Vibration acceleration 49 m/s²						
Basic specifications: Mounting		Flange-mounted						

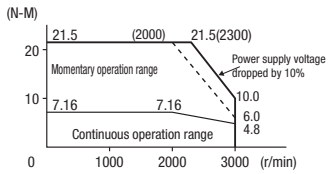
*1 Applicable load inertia: The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.

Torque-speed characteristics

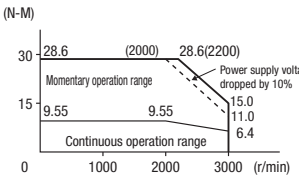
R88M-KH1K020F/C (400V, 1 kW)



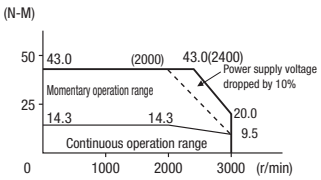
R88M-KH1K520F/C (400V, 1.5 kW)



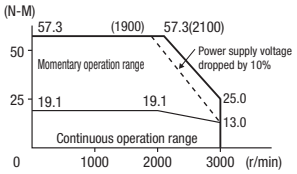
R88M-KH2K020F/C (400V, 2 kW)



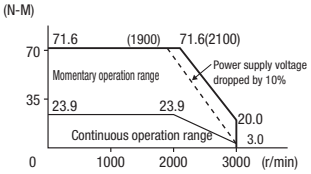
R88M-KH3K020F/C (400V, 3 kW)



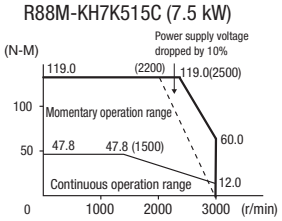
R88M-KH4K020F/C (400V, 4 kW)



R88M-KH5K020F/C (400V, 5 kW)



R88M-KH7K515C (7.5 kW)

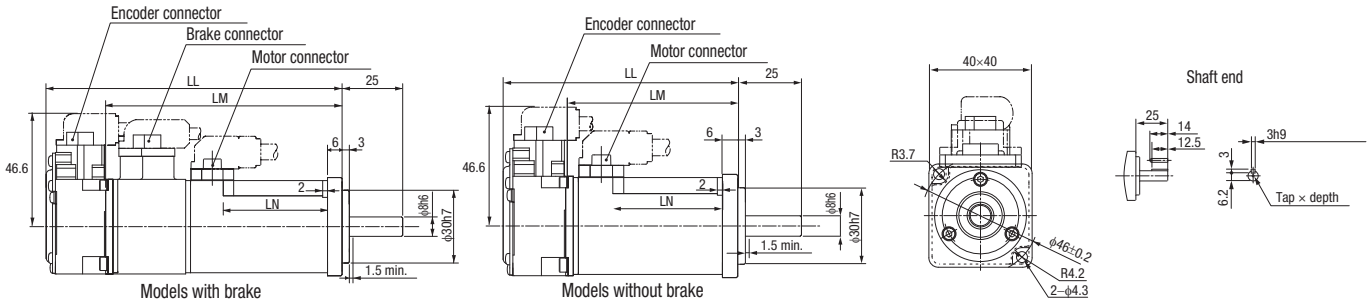


Dimensions

Standard servo motors

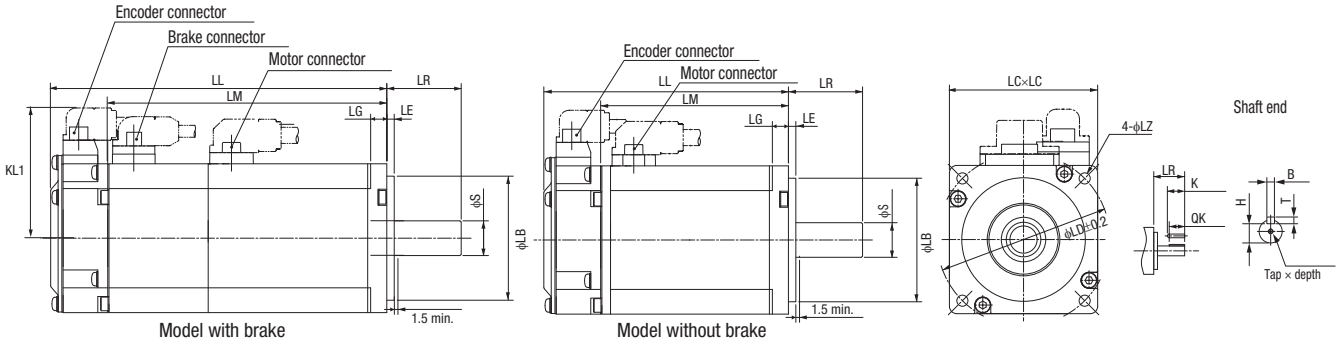
Type 3000 r/min motors (230 V, 50 to 100 W)

Dimensions (mm)	Without brake		With brake		LN	Shaft end dimensions	Approx. mass (kg)	
Model	LL	LM	LL	LM		Tap × Depth	Without brake	With brake
R88M-K05030(H/T)-□S2	72	48	102	78	23	M3 × 6L	0.32	0.53
R88M-K10030(H/T)-□S2	92	68	122	98	43		0.47	0.68



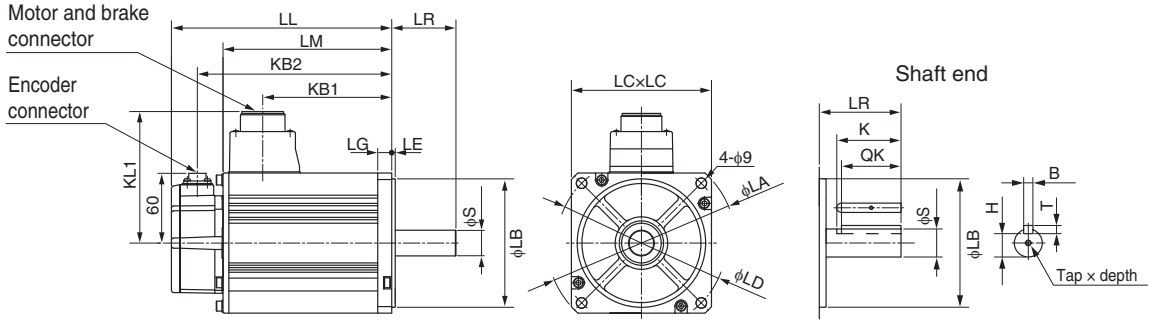
Type 3000 r/min motors (230 V, 200 to 750 W)

Dimensions (mm)	Without brake			With brake			LR	Flange surface						Shaft end dimensions							Approx. mass (kg)	
Model	LL	LM	KL1	LL	LM	KL1		LB	LC	LD	LE	LG	LZ	S	K	QK	H	B	T	Tap × Depth	Without brake	With brake
R88M-K20030(H/T)-□S2	79.5	56.5	52.5	116	93	52.5	30	50^{h7}	60	70	3	6.5	4.5	11^{h6}	20	18	8.5	4^{h9}	4	M4 × 8L	0.82	1.3
R88M-K40030(H/T)-□S2	99	76	52.5	135.5	112.5	52.5								14^{h6}	25	22.5	11	5^{h9}	5	M5 × 10L	1.2	1.7
R88M-K75030(H/T)-□S2	112.2	86.2	60	148.2	122.2	61.6	35	70^{h7}	80	90		8	6	19^{h6}		22	15.5	6^{h9}	6		2.3	3.1



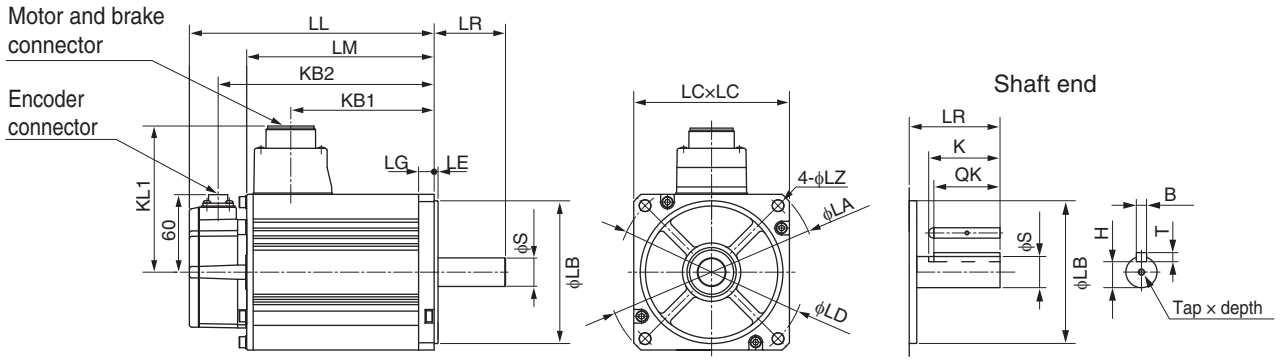
Type 3000 r/min motors (230 V, 1 to 1.5 kW/400 V, 750 W to 5 kW)

Dimensions (mm)		Without brake					With brake					LR	Flange surface						Shaft end dimensions							Approx. mass (kg)	
Voltage	Model R88M-K□	LL	LM	KB1	KB2	KL1	LL	LM	KB1	KB2	KL1		LA	LB	LC	LD	LE	LG	S	Tap × Depth	K	QK	H	B	T	Without brake	With brake
230	1K030(H/T)-□S2	141	97	66	119	101	168	124	66	146	101	55	135	95^{h7}	100	115	3	10	19^{h6}	M5 × 12L	45	42	15.5	6^{h9}	6	3.5	4.5
	1K530(H/T)-□S2	159.5	115.5	84.5	137.5		186.5	142.5	84.5	164.5																4.4	5.4
400	75030(F/C)-□S2	131.5	87.5	56.5	109.5		158.5	114.5	53.5	136.5	103															3.1	4.1
	1K030(F/C)-□S2	141	97	66	119		168	124	63	146																3.5	4.5
	1K530(F/C)-□S2	159.5	115.5	84.5	137.5		186.5	142.5	81.5	164.5																4.4	5.4
	2K030(F/C)-□S2	178.5	134.5	103.5	156.5		205.5	161.5	100.5	183.5																5.3	6.3
	3K030(F/C)-□S2	190	146	112	168	113	215	171	112	193	113		162	110^{h7}	120	145		12	22^{h6}			41	18	8^{h9}	7	8.3	9.4
	4K030(F/C)-□S2	208	164	127	186	118	233	189	127	211	118	65	165		130		6		24^{h6}	M8 × 20L	55	51	20			11	12.6
	5K030(F/C)-□S2	243	199	162	221		268	224	162	246																14	16



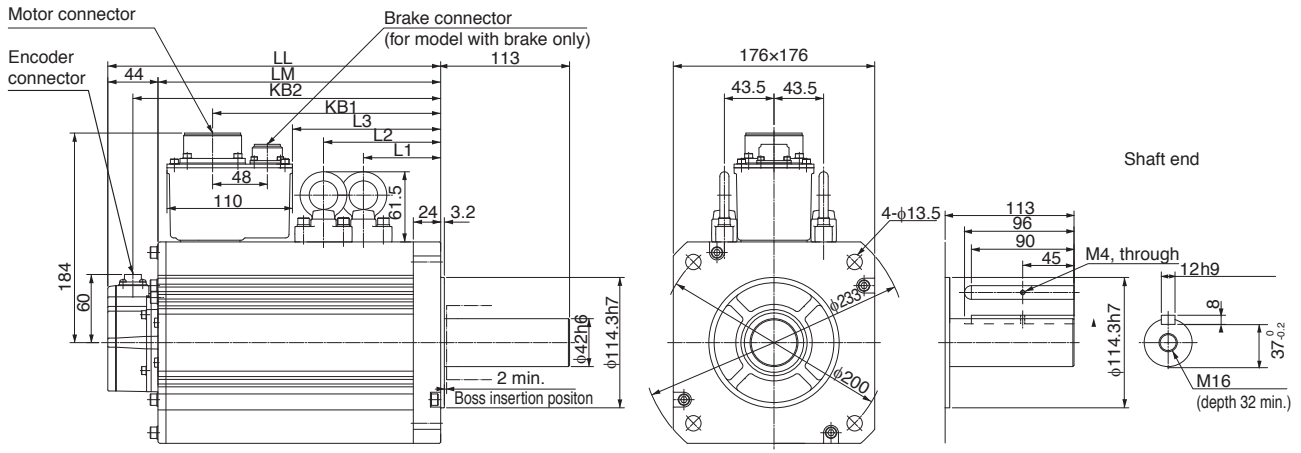
Type 2000 r/min motors (230 V, 1 to 1.5 kW/400 V, 400 W to 5 kW)

Dimensions (mm)		Without brake					With brake					LR	Flange surface							Shaft end dimensions							Approx. mass (kg)	
Voltage	Model R88M-K□	LL	LM	KB1	KB2	KL1	LL	LM	KB1	KB2	KL1		LA	LB	LC	LD	LE	LG	LZ	S	Tap × Depth	K	QK	H	B	T	Without brake	With brake
230	1K020(H/T)-□S2	138	94	60	116	116	163	119	60	141	116	55	165	110^{h7}	130	145	6	12	9	22^{h6}	M5× 12L	45	41	18	8^{h9}	7	5.2	6.7
	1K520(H/T)-□S2	155.5	111.5	77.5	133.5		180.5	136.5	77.5	158.5																	6.7	8.2
400	40020(F/C)-□S2	131.5	87.5	56.5	109.5	101	158.5	114.5	53.5	136.5	103		135	95^{h7}	100	115	3	10		19^{h6}			42	15.5	6^{h9}	6	3.1	4.1
	60020(F/C)-□S2	141	97	66	119		168	124	63	146																	3.5	4.5
	1K020(F/C)-□S2	138	94	60	116	116	163	119	57	141	118		165	110^{h7}	130	145	6	12		22^{h6}			41	18	8^{h9}	7	5.2	6.7
	1K520(F/C)-□S2	155.5	111.5	77.5	133.5		180.5	136.5	74.5	158.5																	6.7	8.2
	2K020(F/C)-□S2	173	129	95	151		198	154	92	176																	8	9.5
	3K020(F/C)-□S2	208	164	127	186	118	233	189	127	211		65								24^{h6}	M8× 20L	55	51	20			11	12.6
	4K020(F/C)-□S2	177	133	96	155	140	202	158	96	180	140	70	233	114.3^{h7}	176	200	3.2	18	13.5	35^{h6}	M12 × 25L		50	30	10^{h9}	8	15.5	18.7
	5K020(F/C)-□S2	196	152	115	174		221	177	115	199																	18.6	21.8



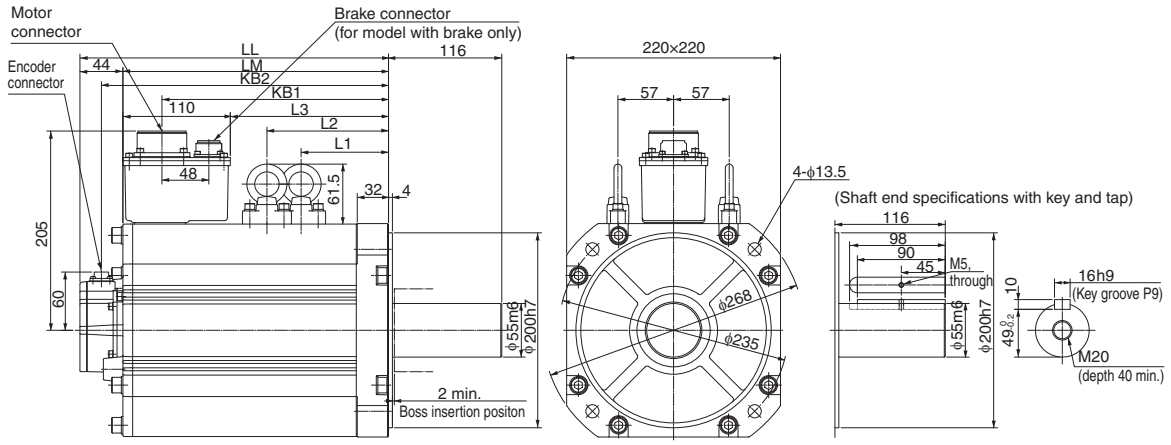
Type 1500 r/min motors (400 V, 7.5 kW)

Dimensions (mm)		Without brake							With brake							Approx. mass (kg)	
Voltage	Model R88M-K□	LL	LM	KB1	KB2	L1	L2	L3	LL	LM	KB1	KB2	L1	L2	L3	Whithout brake	With brake
400	7K515C-□S2	312	268	219	290	117.5	117.5	149	337	293	253	315	117.5	152.5	183	36.4	40.4



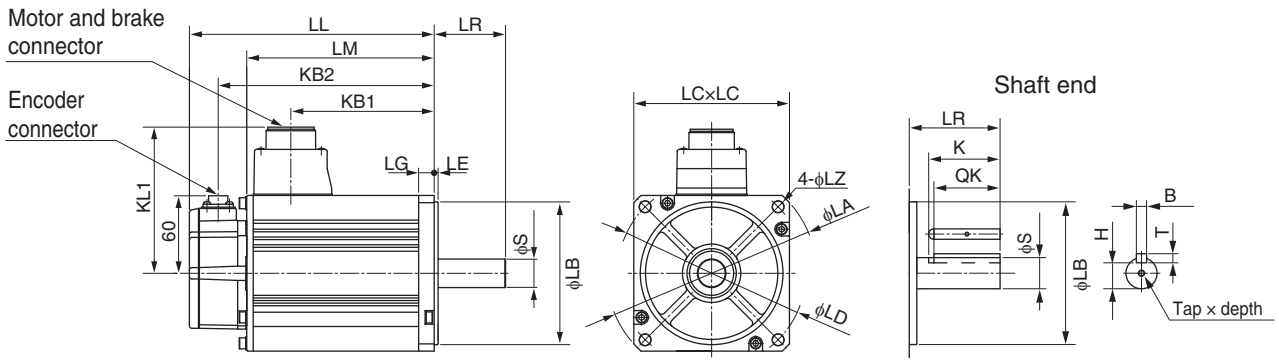
Type 1500 r/min motors (400 V, 11 to 15 kW)

Dimensions (mm)		Without brake							With brake							Approx. mass (kg)	
Voltage	Model R88M-K□	LL	LM	KB1	KB2	L1	L2	L3	LL	LM	KB1	KB2	L1	L2	L3	Whithout brake	With brake
400	11K015C-□S2	316	272	232	294	124.5	124.5	162	364	320	266	342	124.5	159.5	196	52.7	58.9
	15K015C-□S2	384	340	300	362	158.5	158.5	230	432	388	334	410	158.5	193.5	264	70.2	76.3



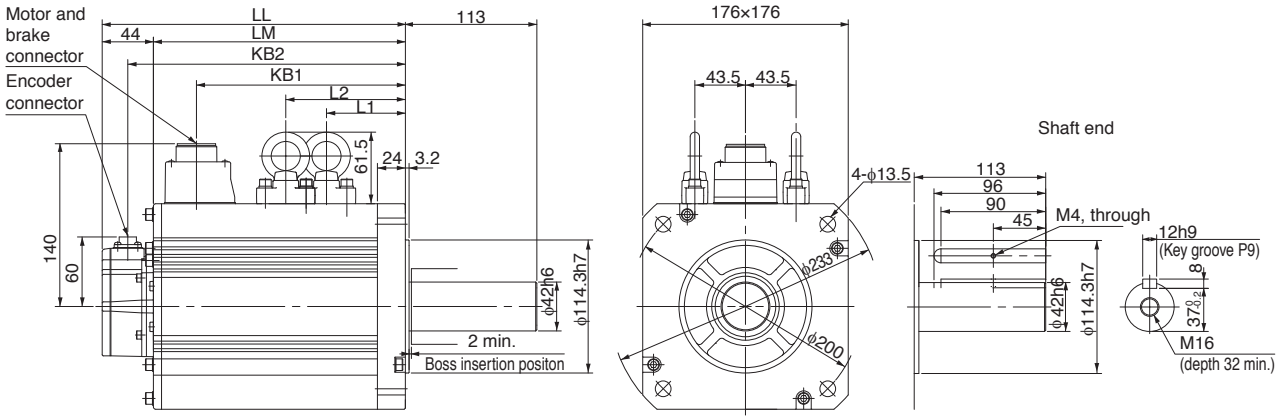
Type 1000 r/min motors (230 V, 900 W/400 V, 900 W to 3 kW)

Dimensions (mm)		Without brake					With brake					LR	Flange surface							Shaft end dimensions							Approx. mass (kg)	
Voltage	Model R88M-K□	LL	LM	KB1	KB2	KL1	LL	LM	KB1	KB2	KL1		LA	LB	LC	LD	LE	LG	LZ	S	Tap × Depth	K	QK	H	B	T	Without brake	With brake
230	90010(H/T)-□S2	155.5	111.5	77.5	133.5	116	180.5	136.5	77.5	158.5	116	70	165	110^{h7}	130	145	6	12	9	22^{h6}	M5× 12L	45	41	18	8^{h9}	7	6.7	8.2
400	90010(F/C)-□S2								74.5		118																	
	2K010(F/C)-□S2	163.5	119.5	82.5	141.5	140	188.5	144.5	82.5	166.5	140	80	233	114.3^{h7}	176	200	3.2	18	13.5	35^{h6}	M12× 25L	55	50	30	10^{h9}	8	14	17.5
	3K010(F/C)-□S2	209.5	165.5	128.5	187.5		234.5	190.5	128.5	212.5																	20	23.5



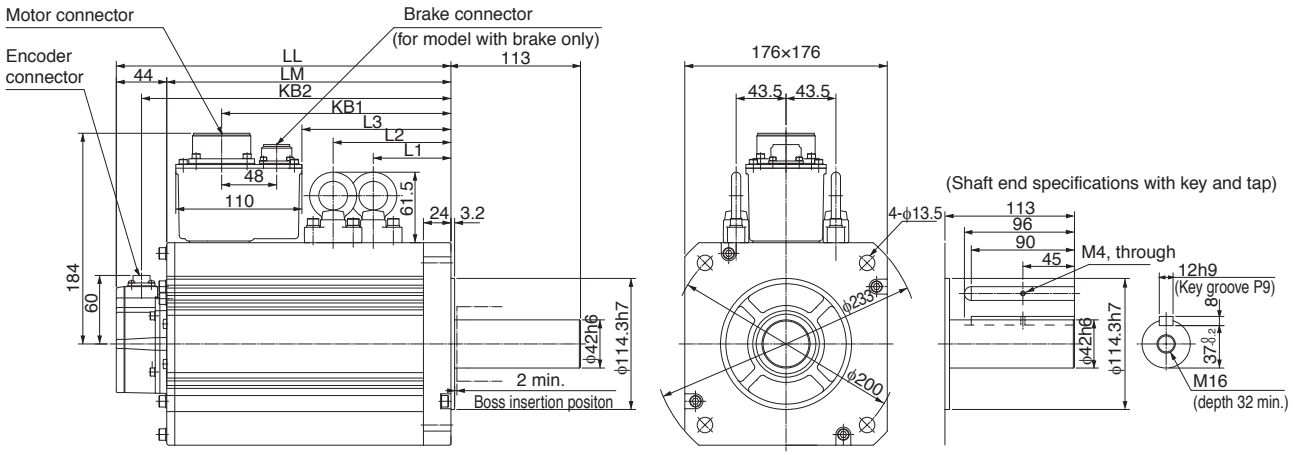
Type 1000 r/min motors (400 V, 4.5 kW)

Dimensions (mm)		Without brake						With brake						Approx. mass (Kg)	
Voltage	Model R88M-K□	LL	LM	KB1	KB2	L1	L2	LL	LM	KB1	KB2	L1	L2	Without brake	With brake
400	4K510C-□S2	266	222	185	244	98	98	291	247	185	269	98	133	29.4	33.3



Type 1000 r/min motors (400 V, 6 kW)

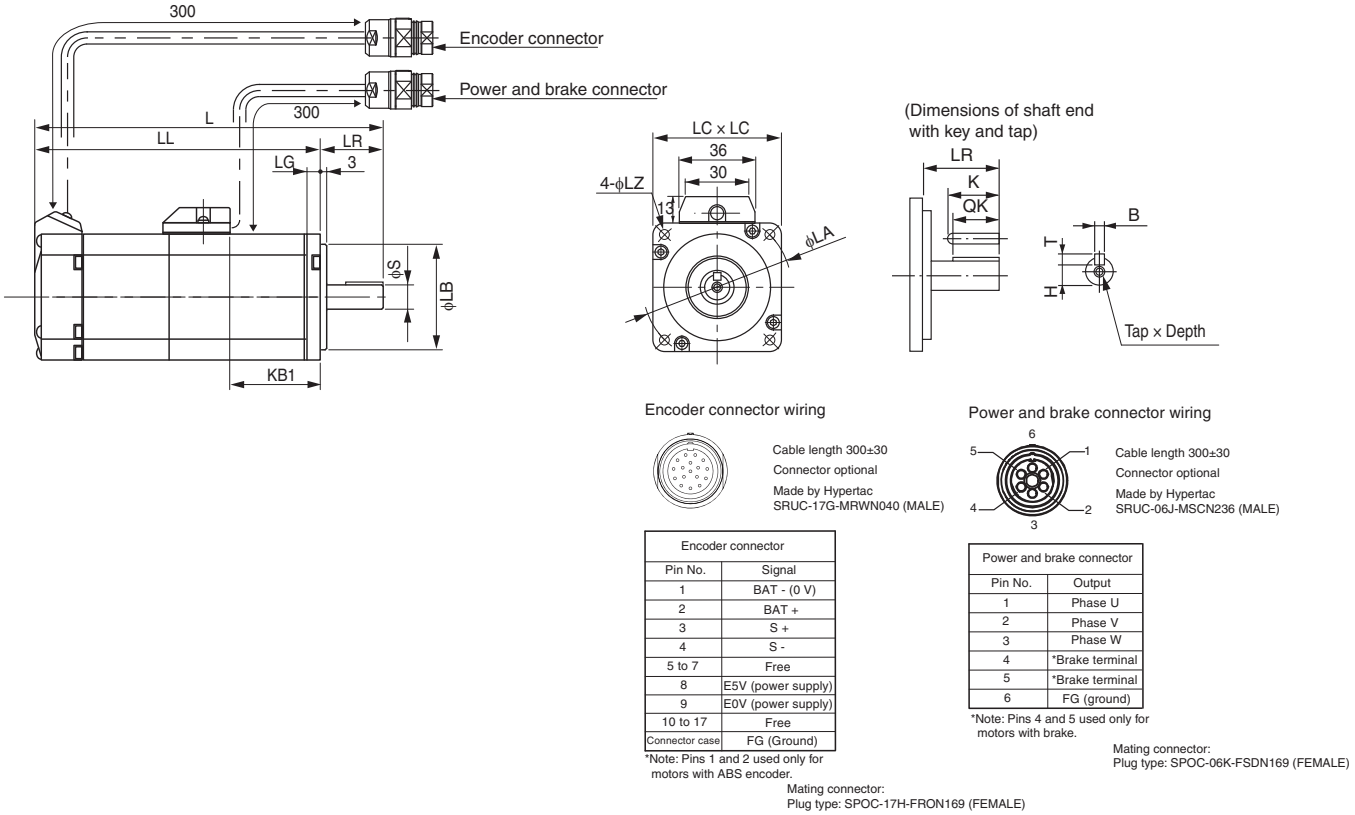
Dimensions (mm)		Without brake							With brake							Approx. mass (Kg)	
Voltage	Model R88M-K□	LL	LM	KB1	KB2	L1	L2	L3	LL	LM	KB1	KB2	L1	L2	L3	Without brake	With brake
400	6K010C-□S2	312	268	219	290	117.5	117.5	149	337	293	253	315	117.5	152.5	183	36.4	40.4



High inertia servo motors

Type 3000 r/min motors (230 V, 200 W to 750 W)

Dimensions (mm)		Without brake		With brake		KB1	LR	Flange surface					Shaft end dimensions							Approx. mass (kg)	
Voltage	Model R88M-KH□	L	LL	L	LL			LA	LB	LC	LG	LZ	S	Tap x Depth	K	QK	H	B	T	Without brake	With brake
230	20030(H/T)-□S2-D	129	99	165.5	135.5	42	30	70	50^{h7}	60	6.5	4.5	11^{h6}	M4×8L	20	18	8.5	4^{h9}	4	0.96	1.4
	40030(H/T)-□S2-D	148.5	118.5	185	155	61.5							14^{h6}	M5×10L	25	22.5	11	5^{h9}	5	1.4	1.8
	75030(H/T)-□S2-D	162.2	127.2	199.2	164.2	67.2	35	90	70^{h7}	80	8	6	19^{h6}	M5×10L	25	22	15.5	6^{h9}	6	2.5	3.3



Encoder connector	
Pin No.	Signal
1	BAT - (0 V)
2	BAT +
3	S +
4	S -
5 to 7	Free
8	E5V (power supply)
9	E0V (power supply)
10 to 17	Free
Connector case	FG (Ground)

*Note: Pins 1 and 2 used only for motors with ABS encoder.

Mating connector:
Plug type: SPOC-17H-FRON169 (FEMALE)

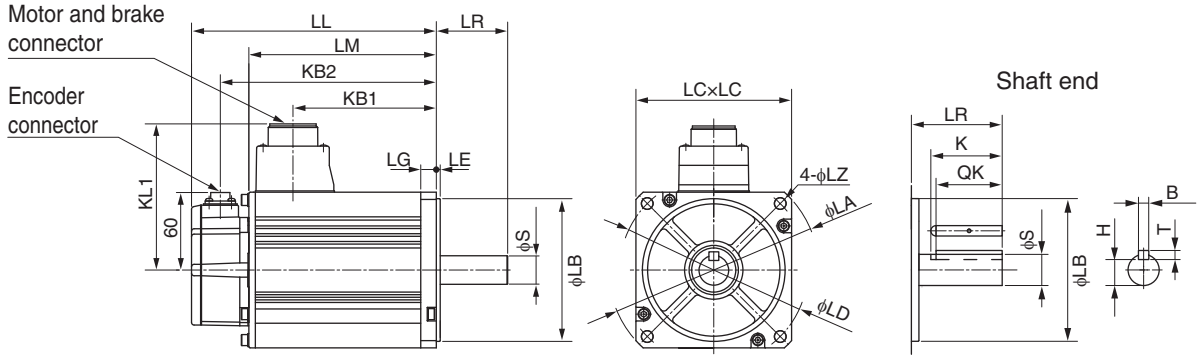
Power and brake connector	
Pin No.	Output
1	Phase U
2	Phase V
3	Phase W
4	*Brake terminal
5	*Brake terminal
6	FG (ground)

*Note: Pins 4 and 5 used only for motors with brake.

Mating connector:
Plug type: SPOC-06K-FSDN169 (FEMALE)

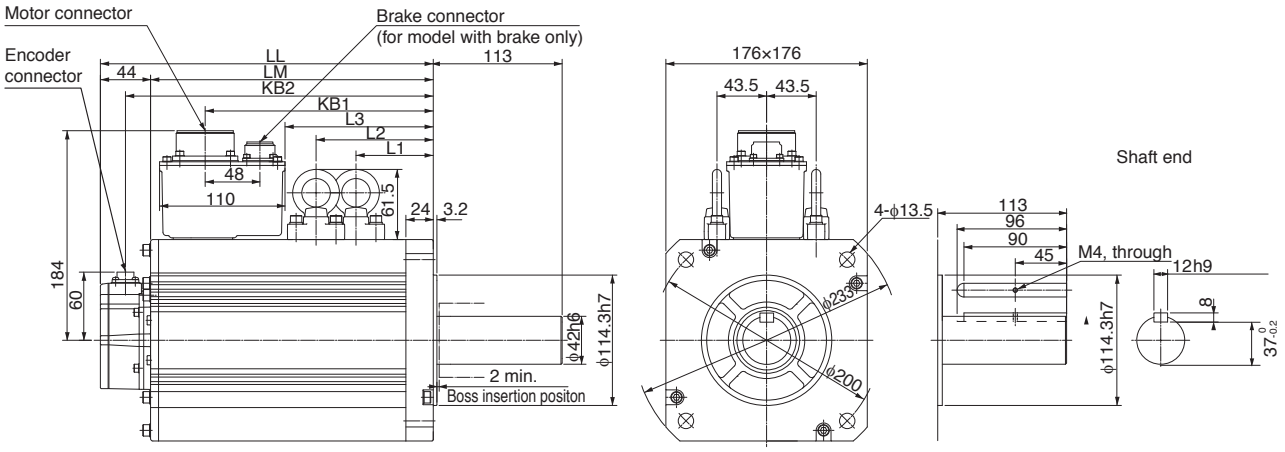
Type 2000 r/min motors (400 V, 1 kW to 5 kW)

Dimensions (mm)		Without brake					With brake					LR	Flange surface							Shaft end dimensions						Approx. mass (kg)	
Voltage	Model R88M-KH□	LL	LM	KB1	KB2	KL1	LL	LM	KB1	KB2	KL1		LA	LB	LC	LD	LE	LG	LZ	S	K	QK	H	B	T	Without brake	With brake
400	1K020(F/C)-□S1	173	129	95	151	116	201	157	92	179	118	70	165	110^{h7}	130	145	6	12	9	22^{h6}	45	41	18	8^{h9}	7	6.7	8.1
	1K520(F/C)-□S1	190.5	146.5	112.5	168.5		218.5	174.5	109.5	196.5																8.6	10.1
	2K020(F/C)-□S1	177	133	96	155	140	206	162	96	184	140	80	233	114.3^{h7}	176	200	3.2	18	13.5	35^{h6}	55	50	30	10^{h9}	8	12.2	15.5
	3K020(F/C)-□S1	196	152	115	174		225	181	115	203																16.0	19.2
	4K020(F/C)-□S1	209.5	165.5	128.5	187.5		238.5	194.5	128.5	216.5																18.6	21.8
	5K020(F/C)-□S1	238.5	194.5	157.5	216.5		267.5	223.5	157.5	245.5																23.0	26.2



Type 1500 r/min motors (400 V, 7.5 kW)

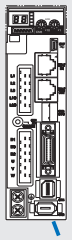
Dimensions (mm)		Without brake							With brake							Approx. mass (kg)	
Voltage	Model R88M-KH□	LL	LM	KB1	KB2	L1	L2	L3	LL	LM	KB1	KB2	L1	L2	L3	Without brake	With brake
400	7K515C-□S1	357	313	264	335	146.5	146.5	194	382	338	298	360	146.5	181.5	228	42.3	46.2



Ordering information

(Refer to servo drive chapter)

② Drive options

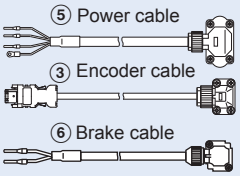


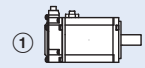
Accurax G5 servo drive
EtherCAT model



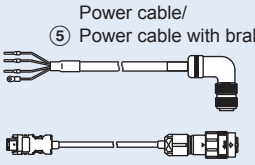
④ Extension cable for absolute encoder (with battery holder)

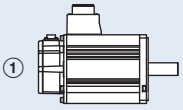
Standard servo motors



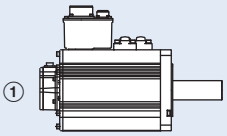


3000 rpm (50 W to 750 W)



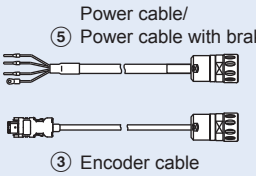


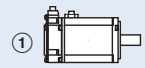
3000 rpm (750 W to 5 kW)
2000 rpm (400 W to 5 kW)
1000 rpm (900 W to 3 kW)



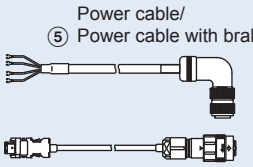
1500 rpm (7.5 kW to 15 kW)
1000 rpm (4.5 kW to 6 kW)

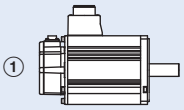
High inertia servo motors



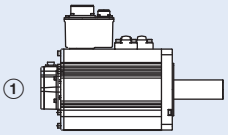


3000 rpm (200 W to 750 W)





2000 rpm (1 kW to 5 kW)



1500 rpm (7.5 kW)

Note: The symbols ①②③... show the recommended sequence to select the servo motor and cables

Servo motor

① Select motor from R88M-K or R88M-KH families using motor tables in next pages.

Servo drive

② Refer to Accurax G5 servo drive chapter for detailed drive specifications and selection of drive accessories.

Standard servo motors

Servo motors 3000 r/min (50 to 5000 W)

Symbol	Specifications					Servo motor model	Compatible servo drives ②
	Voltage	Encoder and design		Rated torque	Capacity		G5 EtherCAT
①  230 V (50 to 750 W)  230 V (1 kW to 1.5 kW) 400 V (750 W to 5 kW)	230 V	Incremental encoder (20 bit) Straight shaft with key and tap	Without brake	0.16 Nm	50 W	R88M-K05030H-S2	R88D-KN01H-ECT
				0.32 Nm	100 W	R88M-K10030H-S2	R88D-KN01H-ECT
				0.64 Nm	200 W	R88M-K20030H-S2	R88D-KN02H-ECT
				1.3 Nm	400 W	R88M-K40030H-S2	R88D-KN04H-ECT
				2.4 Nm	750 W	R88M-K75030H-S2	R88D-KN08H-ECT
				3.18 Nm	1000 W	R88M-K1K030H-S2	R88D-KN15H-ECT
				4.77 Nm	1500 W	R88M-K1K530H-S2	R88D-KN15H-ECT
			With brake	0.16 Nm	50 W	R88M-K05030H-BS2	R88D-KN01H-ECT
				0.32 Nm	100 W	R88M-K10030H-BS2	R88D-KN01H-ECT
				0.64 Nm	200 W	R88M-K20030H-BS2	R88D-KN02H-ECT
				1.3 Nm	400 W	R88M-K40030H-BS2	R88D-KN04H-ECT
				2.4 Nm	750 W	R88M-K75030H-BS2	R88D-KN08H-ECT
				3.18 Nm	1000 W	R88M-K1K030H-BS2	R88D-KN15H-ECT
				4.77 Nm	1500 W	R88M-K1K530H-BS2	R88D-KN15H-ECT
		Absolute encoder (17 bit) Straight shaft with key and tap	Without brake	0.16 Nm	50 W	R88M-K05030T-S2	R88D-KN01H-ECT
				0.32 Nm	100 W	R88M-K10030T-S2	R88D-KN01H-ECT
				0.64 Nm	200 W	R88M-K20030T-S2	R88D-KN02H-ECT
				1.3 Nm	400 W	R88M-K40030T-S2	R88D-KN04H-ECT
				2.4 Nm	750 W	R88M-K75030T-S2	R88D-KN08H-ECT
				3.18 Nm	1000 W	R88M-K1K030T-S2	R88D-KN15H-ECT
				4.77 Nm	1500 W	R88M-K1K530T-S2	R88D-KN15H-ECT
			With brake	0.16 Nm	50 W	R88M-K05030T-BS2	R88D-KN01H-ECT
				0.32 Nm	100 W	R88M-K10030T-BS2	R88D-KN01H-ECT
				0.64 Nm	200 W	R88M-K20030T-BS2	R88D-KN02H-ECT
				1.3 Nm	400 W	R88M-K40030T-BS2	R88D-KN04H-ECT
				2.4 Nm	750 W	R88M-K75030T-BS2	R88D-KN08H-ECT
				3.18 Nm	1000 W	R88M-K1K030T-BS2	R88D-KN15H-ECT
				4.77 Nm	1500 W	R88M-K1K530T-BS2	R88D-KN15H-ECT
	400 V	Incremental encoder (20 bit) Straight shaft with key and tap	Without brake	2.39 Nm	750 W	R88M-K75030F-S2	R88D-KN10F-ECT
				3.18 Nm	1000 W	R88M-K1K030F-S2	R88D-KN15F-ECT
				4.77 Nm	1500 W	R88M-K1K530F-S2	R88D-KN15F-ECT
				6.37 Nm	2000 W	R88M-K2K030F-S2	R88D-KN20F-ECT
				9.55 Nm	3000 W	R88M-K3K030F-S2	R88D-KN30F-ECT
				12.7 Nm	4000 W	R88M-K4K030F-S2	R88D-KN50F-ECT
				15.9 Nm	5000 W	R88M-K5K030F-S2	R88D-KN50F-ECT
			With brake	2.39 Nm	750 W	R88M-K75030F-BS2	R88D-KN10F-ECT
				3.18 Nm	1000 W	R88M-K1K030F-BS2	R88D-KN15F-ECT
				4.77 Nm	1500 W	R88M-K1K530F-BS2	R88D-KN15F-ECT
				6.37 Nm	2000 W	R88M-K2K030F-BS2	R88D-KN20F-ECT
				9.55 Nm	3000 W	R88M-K3K030F-BS2	R88D-KN30F-ECT
				12.7 Nm	4000 W	R88M-K4K030F-BS2	R88D-KN50F-ECT
				15.9 Nm	5000 W	R88M-K5K030F-BS2	R88D-KN50F-ECT
		Absolute encoder (17 bit) Straight shaft with key and tap	Without brake	2.39 Nm	750 W	R88M-K75030C-S2	R88D-KN10F-ECT
				3.18 Nm	1000 W	R88M-K1K030C-S2	R88D-KN15F-ECT
				4.77 Nm	1500 W	R88M-K1K530C-S2	R88D-KN15F-ECT
				6.37 Nm	2000 W	R88M-K2K030C-S2	R88D-KN20F-ECT
				9.55 Nm	3000 W	R88M-K3K030C-S2	R88D-KN30F-ECT
				12.7 Nm	4000 W	R88M-K4K030C-S2	R88D-KN50F-ECT
				15.9 Nm	5000 W	R88M-K5K030C-S2	R88D-KN50F-ECT
			With brake	2.39 Nm	750 W	R88M-K75030C-BS2	R88D-KN10F-ECT
				3.18 Nm	1000 W	R88M-K1K030C-BS2	R88D-KN15F-ECT
				4.77 Nm	1500 W	R88M-K1K530C-BS2	R88D-KN15F-ECT
				6.37 Nm	2000 W	R88M-K2K030C-BS2	R88D-KN20F-ECT
				9.55 Nm	3000 W	R88M-K3K030C-BS2	R88D-KN30F-ECT
				12.7 Nm	4000 W	R88M-K4K030C-BS2	R88D-KN50F-ECT
				15.9 Nm	5000 W	R88M-K5K030C-BS2	R88D-KN50F-ECT

Servo motors 2000 r/min (1 to 5 kW)

Symbol	Specifications					Servo motor model	Compatible servo drives ②
	Voltage	Encoder and design		Rated torque	Capacity		G5 EtherCAT
① 	230 V	**Incremental encoder (20 bit)** Straight shaft with key and tap	Without brake	4.77 Nm	1000 W	R88M-K1K020H-S2	R88D-KN10H-ECT
				7.16 Nm	1500 W	R88M-K1K520H-S2	R88D-KN15H-ECT
			With brake	4.77 Nm	1000 W	R88M-K1K020H-BS2	R88D-KN10H-ECT
				7.16 Nm	1500 W	R88M-K1K520H-BS2	R88D-KN15H-ECT
		Absolute encoder (17 bit) Straight shaft with key and tap	Without brake	4.77 Nm	1000 W	R88M-K1K020T-S2	R88D-KN10H-ECT
				7.16 Nm	1500 W	R88M-K1K520T-S2	R88D-KN15H-ECT
			With brake	4.77 Nm	1000 W	R88M-K1K020T-BS2	R88D-KN10H-ECT
				7.16 Nm	1500 W	R88M-K1K520T-BS2	R88D-KN15H-ECT
	400 V	**Incremental encoder (20 bit)** Straight shaft with key and tap	Without brake	1.91 Nm	400 W	R88M-K40020F-S2	R88D-KN06F-ECT
				2.86 Nm	600 W	R88M-K60020F-S2	R88D-KN06F-ECT
				4.77 Nm	1000 W	R88M-K1K020F-S2	R88D-KN10F-ECT
				7.16 Nm	1500 W	R88M-K1K520F-S2	R88D-KN15F-ECT
				9.55 Nm	2000 W	R88M-K2K020F-S2	R88D-KN20F-ECT
				14.3 Nm	3000 W	R88M-K3K020F-S2	R88D-KN30F-ECT
				19.1 Nm	4000 W	R88M-K4K020F-S2	R88D-KN50F-ECT
				23.9 Nm	5000 W	R88M-K5K020F-S2	R88D-KN50F-ECT
			With brake	1.91 Nm	400 W	R88M-K40020F-BS2	R88D-KN06F-ECT
				2.86 Nm	600 W	R88M-K60020F-BS2	R88D-KN06F-ECT
				4.77 Nm	1000 W	R88M-K1K020F-BS2	R88D-KN10F-ECT
				7.16 Nm	1500 W	R88M-K1K520F-BS2	R88D-KN15F-ECT
				9.55 Nm	2000 W	R88M-K2K020F-BS2	R88D-KN20F-ECT
				14.3 Nm	3000 W	R88M-K3K020F-BS2	R88D-KN30F-ECT
				19.1 Nm	4000 W	R88M-K4K020F-BS2	R88D-KN50F-ECT
				23.9 Nm	5000 W	R88M-K5K020F-BS2	R88D-KN50F-ECT
		Absolute encoder (17 bit) Straight shaft with key and tap	Without brake	1.91 Nm	400 W	R88M-K40020C-S2	R88D-KN06F-ECT
				2.86 Nm	600 W	R88M-K60020C-S2	R88D-KN06F-ECT
				4.77 Nm	1000 W	R88M-K1K020C-S2	R88D-KN10F-ECT
				7.16 Nm	1500 W	R88M-K1K520C-S2	R88D-KN15F-ECT
				9.55 Nm	2000 W	R88M-K2K020C-S2	R88D-KN20F-ECT
				14.3 Nm	3000 W	R88M-K3K020C-S2	R88D-KN30F-ECT
				19.1 Nm	4000 W	R88M-K4K020C-S2	R88D-KN50F-ECT
				23.9 Nm	5000 W	R88M-K5K020C-S2	R88D-KN50F-ECT
			With brake	1.91 Nm	400 W	R88M-K40020C-BS2	R88D-KN06F-ECT
				2.86 Nm	600 W	R88M-K60020C-BS2	R88D-KN06F-ECT
				4.77 Nm	1000 W	R88M-K1K020C-BS2	R88D-KN10F-ECT
				7.16 Nm	1500 W	R88M-K1K520C-BS2	R88D-KN15F-ECT
				9.55 Nm	2000 W	R88M-K2K020C-BS2	R88D-KN20F-ECT
				14.3 Nm	3000 W	R88M-K3K020C-BS2	R88D-KN30F-ECT
				19.1 Nm	4000 W	R88M-K4K020C-BS2	R88D-KN50F-ECT
				23.9 Nm	5000 W	R88M-K5K020C-BS2	R88D-KN50F-ECT

Servo motors 1500 r/min (7.5 to 15 KW)

Symbol	Specifications					Servo motor model	Compatible servo drives ②
	Voltage	Encoder and design		Rated torque	Capacity		G5 EtherCAT
① 	400 V	**Absolute encoder (17 bit)** Straight shaft with key and tap	Without brake	47.8 Nm	7500 W	R88M-K7K515C-S2	R88D-KN75F-ECT
				70.0 Nm	11000 W	R88M-K11K015C-S2	R88D-KN150F-ECT
				95.5 Nm	15000 W	R88M-K15K015C-S2	R88D-KN150F-ECT
			With brake	47.8 Nm	7500 W	R88M-K7K515C-BS2	R88D-KN75F-ECT
				70.0 Nm	11000 W	R88M-K11K015C-BS2	R88D-KN150F-ECT
				95.5 Nm	15000 W	R88M-K15K015C-BS2	R88D-KN150F-ECT

Servo motors 1000 r/min (900 to 6000 W)

Symbol	Specifications					Servo motor model	Compatible servo drives ②
	Voltage	Encoder and design		Rated torque	Capacity		G5 EtherCAT
①  900 W to 3 kW  4.5 kW to 6 kW	230 V	**Incremental encoder (20 bit)** Straight shaft with key and tap	No brake	8.59 Nm	900 W	R88M-K90010H-S2	R88D-KN15H-ECT
			With brake	8.59 Nm	900 W	R88M-K90010H-BS2	R88D-KN15H-ECT
		Absolute encoder (17 bit) Straight shaft with key and tap	No brake	8.59 Nm	900 W	R88M-K90010T-S2	R88D-KN15H-ECT
			With brake	8.59 Nm	900 W	R88M-K90010T-BS2	R88D-KN15H-ECT
	400 V	**Incremental encoder (20 bit)** Straight shaft with key and tap	No brake	8.59 Nm	900 W	R88M-K90010F-S2	R88D-KN15F-ECT
				19.1 Nm	2000 W	R88M-K2K010F-S2	R88D-KN30F-ECT
				28.7 Nm	3000 W	R88M-K3K010F-S2	R88D-KN50F-ECT
			With brake	8.59 Nm	900 W	R88M-K90010F-BS2	R88D-KN15F-ECT
				19.1 Nm	2000 W	R88M-K2K010F-BS2	R88D-KN30F-ECT
				28.7 Nm	3000 W	R88M-K3K010F-BS2	R88D-KN50F-ECT
		Absolute encoder (17 bit) Straight shaft with key and tap	No brake	8.59 Nm	900 W	R88M-K90010C-S2	R88D-KN15F-ECT
				19.1 Nm	2000 W	R88M-K2K010C-S2	R88D-KN30F-ECT
				28.7 Nm	3000 W	R88M-K3K010C-S2	R88D-KN50F-ECT
				43.0 Nm	4500 W	R88M-K4K510C-S2	R88D-KN50F-ECT
				57.3 Nm	6000 W	R88M-K6K010C-S2	R88D-KN75F-ECT
			With brake	8.59 Nm	900 W	R88M-K90010C-BS2	R88D-KN15F-ECT
				19.1 Nm	2000 W	R88M-K2K010C-BS2	R88D-KN30F-ECT
				28.7 Nm	3000 W	R88M-K3K010C-BS2	R88D-KN50F-ECT
				43.0 Nm	4500 W	R88M-K4K510C-BS2	R88D-KN50F-ECT
				57.3 Nm	6000 W	R88M-K6K010C-BS2	R88D-KN75F-ECT

High inertia servo motors

Servo motors 3000 r/min (200 to 750 W)

Symbol	Specifications					Servo motor model	Compatible servo drives ②
	Voltage	Encoder and design		Rated torque	Capacity		G5 EtherCAT
① 	230 V	**Incremental encoder (20 bit)** Straight shaft with key and tap	Without brake	0.64 Nm	200 W	R88M-KH20030H-S2-D	R88D-KN02H-ECT
				1.3 Nm	400 W	R88M-KH40030H-S2-D	R88D-KN04H-ECT
				2.4 Nm	750 W	R88M-KH75030H-S2-D	R88D-KN08H-ECT
			With brake	0.64 Nm	200 W	R88M-KH20030H-BS2-D	R88D-KN02H-ECT
				1.3 Nm	400 W	R88M-KH40030H-BS2-D	R88D-KN04H-ECT
				2.4 Nm	750 W	R88M-KH75030H-BS2-D	R88D-KN08H-ECT
		Absolute encoder (17 bit) Straight shaft with key and tap	Without brake	0.64 Nm	200 W	R88M-KH20030T-S2-D	R88D-KN02H-ECT
				1.3 Nm	400 W	R88M-KH40030T-S2-D	R88D-KN04H-ECT
				2.4 Nm	750 W	R88M-KH75030T-S2-D	R88D-KN08H-ECT
			With brake	0.64 Nm	200 W	R88M-KH20030T-BS2-D	R88D-KN02H-ECT
				1.3 Nm	400 W	R88M-KH40030T-BS2-D	R88D-KN04H-ECT
				2.4 Nm	750 W	R88M-KH75030T-BS2-D	R88D-KN08H-ECT

Servo motors 2000 r/min (1 to 5 kW)

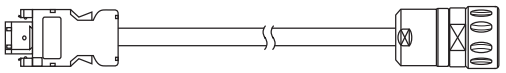
Symbol	Specifications					Servo motor model	Compatible servo drives ②
	Voltage	Encoder and design		Rated torque	Capacity		G5 EtherCAT
① 	400 V	**Incremental encoder (20 bit)** Shaft end with key	Without brake	4.77 Nm	1000 W	R88M-KH1K020F-S1	R88D-KN10F-ECT
				7.16 Nm	1500 W	R88M-KH1K520F-S1	R88D-KN15F-ECT
				9.55 Nm	2000 W	R88M-KH2K020F-S1	R88D-KN20F-ECT
				14.3 Nm	3000 W	R88M-KH3K020F-S1	R88D-KN30F-ECT
				19.1 Nm	4000 W	R88M-KH4K020F-S1	R88D-KN50F-ECT
				23.9 Nm	5000 W	R88M-KH5K020F-S1	R88D-KN50F-ECT
			With brake	4.77 Nm	1000 W	R88M-KH1K020F-BS1	R88D-KN10F-ECT
				7.16 Nm	1500 W	R88M-KH1K520F-BS1	R88D-KN15F-ECT
				9.55 Nm	2000 W	R88M-KH2K020F-BS1	R88D-KN20F-ECT
				14.3 Nm	3000 W	R88M-KH3K020F-BS1	R88D-KN30F-ECT
				19.1 Nm	4000 W	R88M-KH4K020F-BS1	R88D-KN50F-ECT
				23.9 Nm	5000 W	R88M-KH5K020F-BS1	R88D-KN50F-ECT
		Absolute encoder (17 bit) Shaft end with key	Without brake	4.77 Nm	1000 W	R88M-KH1K020C-S1	R88D-KN10F-ECT
				7.16 Nm	1500 W	R88M-KH1K520C-S1	R88D-KN15F-ECT
				9.55 Nm	2000 W	R88M-KH2K020C-S1	R88D-KN20F-ECT
				14.3 Nm	3000 W	R88M-KH3K020C-S1	R88D-KN30F-ECT
				19.1 Nm	4000 W	R88M-KH4K020C-S1	R88D-KN50F-ECT
				23.9 Nm	5000 W	R88M-KH5K020C-S1	R88D-KN50F-ECT
			With brake	4.77 Nm	1000 W	R88M-KH1K020C-BS1	R88D-KN10F-ECT
				7.16 Nm	1500 W	R88M-KH1K520C-BS1	R88D-KN15F-ECT
				9.55 Nm	2000 W	R88M-KH2K020C-BS1	R88D-KN20F-ECT
				14.3 Nm	3000 W	R88M-KH3K020C-BS1	R88D-KN30F-ECT
				19.1 Nm	4000 W	R88M-KH4K020C-BS1	R88D-KN50F-ECT
				23.9 Nm	5000 W	R88M-KH5K020C-BS1	R88D-KN50F-ECT

Servo motors 1500 r/min (7.5 kW)

Symbol	Specifications					Servo motor model	Compatible servo drives ②
	Voltage	Encoder and design		Rated torque	Capacity		G5 EtherCAT
① 	400 V	Absolute encoder (17 bit) Shaft end with key	Without brake	47.8 Nm	7500 W	R88M-KH7K515C-S1	R88D-KN75F-ECT
			With brake	47.8 Nm	7500 W	R88M-KH7K515C-BS1	R88D-KN75F-ECT

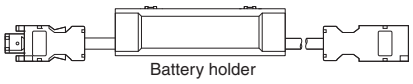
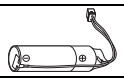
Encoder cables

For absolute and incremental encoders

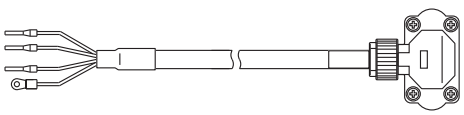
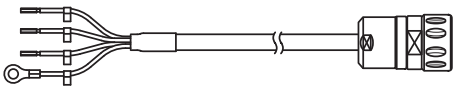
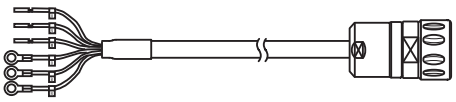
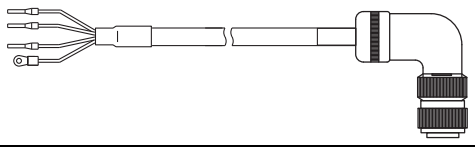
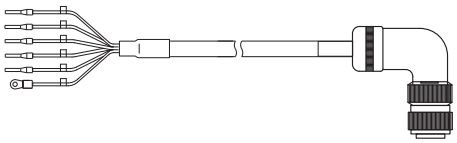
Symbol	Specifications		Model	Appearance
③	Encoder cable for servomotors R88M-K(050/100/200/400/750)30(H/T)□	1.5 m	R88A-CRKA001-5CR-E	
		3 m	R88A-CRKA003CR-E	
		5 m	R88A-CRKA005CR-E	
		10 m	R88A-CRKA010CR-E	
		15 m	R88A-CRKA015CR-E	
		20 m	R88A-CRKA020CR-E	
	Encoder cable for servomotors R88M-KH(200/400/750)30(H/T)□	3 m	R88A-CRWA003C-DE	
		5 m	R88A-CRWA005C-DE	
		10 m	R88A-CRWA010C-DE	
		15 m	R88A-CRWA015C-DE	
		20 m	R88A-CRWA020C-DE	
	Encoder cable for servomotors R88M-K(1K0/1K5)30(H/T)□ R88M-K(750/1K0/1K5/2K0/3K0/4K0/5K0)30(F/C)□ R88M-K(400/600/1K0/1K5/2K0/3K0/4K0/5K0)20□ R88M-K(7K5/11K0/15K0)15□ R88M-K(900/2K0/3K0/4K5/6K0)10□ R88M-KH(1K0/1K5/2K0/3K0/4K0/5K0)20(F/C)□ R88M-KH7K515C□	1.5 m	R88A-CRKC001-5NR-E	
		3 m	R88A-CRKC003NR-E	
		5 m	R88A-CRKC005NR-E	
		10 m	R88A-CRKC010NR-E	
		15 m	R88A-CRKC015NR-E	
		20 m	R88A-CRKC020NR-E	

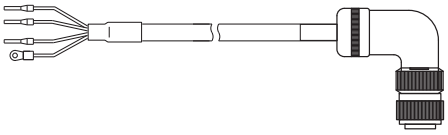
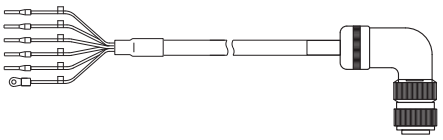
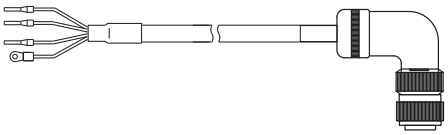
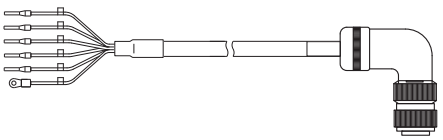
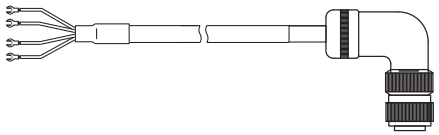
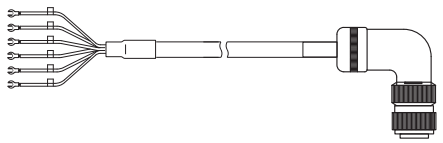
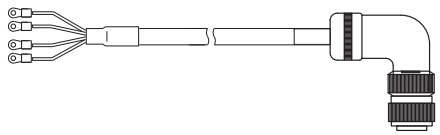
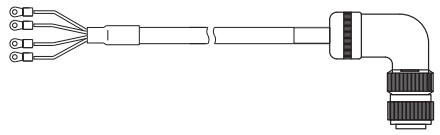
Note: For servomotors fitted with an absolute encoder you have to add the extension battery cable R88A-CRGD0R3C□ (see below) or connect a backup battery in the CN1 I/O connector.

Absolute encoder battery cable (encoder extension cable only)

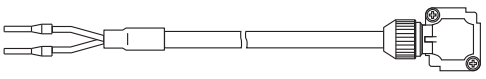
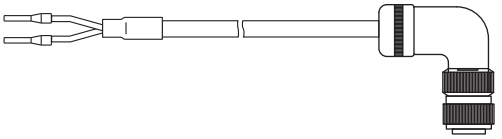
Symbol	Specifications			Model	Appearance
④	Absolute encoder battery cable	Battery not included	0.3 m	R88A-CRGD0R3C-E	 Battery holder
		Battery included	0.3 m	R88A-CRGD0R3C-BS-E	
	Absolute encoder backup battery	2,000 mA.h 3.6 V	–	R88A-BAT01G	

Power cables

Symbol	Specifications			Model	Appearance
⑤	For 200 V servomotors R88M-K(050/100/200/400/750)30(H/T)-□□S2 **Note:** for servomotors with brake R88M-K(050/100/200/400/750)30(H/T)-BS2, the separate brake cable R88A-CAKA□□□BR-E is needed	Power cable only (without brake)	1.5 m	R88A-CAKA001-5SR-E	
			3 m	R88A-CAKA003SR-E	
			5 m	R88A-CAKA005SR-E	
			10 m	R88A-CAKA010SR-E	
			15 m	R88A-CAKA015SR-E	
			20 m	R88A-CAKA020SR-E	
	For 200 V servomotors R88M-KH(200/400/750)30(H/T)-□□S2	without brake	3 m	R88A-CAWA003S-DE	
			5 m	R88A-CAWA005S-DE	
			10 m	R88A-CAWA010S-DE	
			15 m	R88A-CAWA015S-DE	
			20 m	R88A-CAWA020S-DE	
		with brake	3 m	R88A-CAWA003B-DE	
			5 m	R88A-CAWA005B-DE	
			10 m	R88A-CAWA010B-DE	
			15 m	R88A-CAWA015B-DE	
			20 m	R88A-CAWA020B-DE	
	For 200 V servomotors R88M-K(1K0/1K5)30(H/T)-□□S2 R88M-K(1K0/1K5)20(H/T)-□□S2 R88M-K90010(H/T)-□□S2	without brake	1.5 m	R88A-CAGB001-5SR-E	
			3 m	R88A-CAGB003SR-E	
			5 m	R88A-CAGB005SR-E	
			10 m	R88A-CAGB010SR-E	
			15 m	R88A-CAGB015SR-E	
			20 m	R88A-CAGB020SR-E	
		with brake	1.5 m	R88A-CAGB001-5BR-E	
			3 m	R88A-CAGB003BR-E	
			5 m	R88A-CAGB005BR-E	
			10 m	R88A-CAGB010BR-E	
			15 m	R88A-CAGB015BR-E	
			20 m	R88A-CAGB020BR-E	

Symbol	Specifications			Model	Appearance
⑤	For 400 V servomotors R88M-K(750/1K0/1K5/2K0)30(F/C)-□□S2 R88M-K(400/600/1K0/1K5/2K0)20(F/C)-□□S2 R88M-K90010(F/C)-□□S2 R88M-KH(1K0/1K5)20(F/C)-□S1	without brake	1.5 m	R88A-CAGB001-5SR-E	
			3 m	R88A-CAGB003SR-E	
			5 m	R88A-CAGB05SR-E	
			10 m	R88A-CAGB010SR-E	
			15 m	R88A-CAGB015SR-E	
			20 m	R88A-CAGB020SR-E	
		with brake	1.5 m	R88A-CAKF001-5BR-E	
			3 m	R88A-CAKF003BR-E	
			5 m	R88A-CAKF005BR-E	
			10 m	R88A-CAKF010BR-E	
			15 m	R88A-CAKF015BR-E	
			20 m	R88A-CAKF020BR-E	
	For 400 V servomotors R88M-KH2K020(F/C)-□S1	without brake	1.5 m	R88A-CAKC001-5SR-E	
			3 m	R88A-CAKC003SR-E	
			5 m	R88A-CAKC005SR-E	
			10 m	R88A-CAKC010SR-E	
			15 m	R88A-CAKC015SR-E	
			20 m	R88A-CAKC020SR-E	
		with brake	1.5 m	R88A-CAKF001-5BR-E	
			3 m	R88A-CAKF003BR-E	
			5 m	R88A-CAKF005BR-E	
			10 m	R88A-CAKF010BR-E	
			15 m	R88A-CAKF015BR-E	
			20 m	R88A-CAKF020BR-E	
	For 400 V servomotors R88M-K(3K0/4K0/5K0)30(F/C)-□□S2 R88M-K(3K0/4K0/5K0)20(F/C)-□□S2 R88M-K(2K0/3K0)10(F/C)-□□S2 R88M-K4K510C-□□S2 R88M-KH(3K0/4K0/5K0)20(F/C)-□S1	without brake	1.5 m	R88A-CAGD001-5SR-E	
			3 m	R88A-CAGD003SR-E	
			5 m	R88A-CAGD005SR-E	
			10 m	R88A-CAGD010SR-E	
			15 m	R88A-CAGD015SR-E	
			20 m	R88A-CAGD020SR-E	
		with brake	1.5 m	R88A-CAGD001-5BR-E	
			3 m	R88A-CAGD003BR-E	
			5 m	R88A-CAGD005BR-E	
			10 m	R88A-CAGD010BR-E	
			15 m	R88A-CAGD015BR-E	
			20 m	R88A-CAGD020BR-E	
	For 400 V servomotors R88M-K6K010C-□□S2 R88M-K7K515C-□□S2 R88M-KH7K515C-□S1 **Note:** for servomotors with brake R88M-K(6K010/7K515)C-BS2 and R88M-KH7K515C-BS1 the separate brake cable R88A-CAGE□□□BR-E is needed	Power cable only (without brake)	1.5 m	R88A-CAKE001-5SR-E	
			3 m	R88A-CAKE003SR-E	
			5 m	R88A-CAKE005SR-E	
			10 m	R88A-CAKE010SR-E	
			15 m	R88A-CAKE015SR-E	
			20 m	R88A-CAKE020SR-E	
	For 400 V servomotors R88M-K(11K0/15K0)15C-□□S2 **Note:** for servomotors with brake R88M-K(11K0/15K0)15C-BS2, the separate brake cable R88A-CAGE□□□BR-E is needed	Power cable only (without brake)	1.5 m	R88A-CAKG001-5SR-E	
			3 m	R88A-CAKG003SR-E	
			5 m	R88A-CAKG005SR-E	
			10 m	R88A-CAKG010SR-E	
			15 m	R88A-CAKG015SR-E	
			20 m	R88A-CAKG020SR-E	

Brake cables (for 200 V 50 to 750 W servo motors and 400 V 6 to 15 kW servo motors)

Symbol	Specifications		Model	Appearance
⑥	Brake cable only. For 200 V servo motors with brake R88M-K(050/100/200/400/750)30(H/T)-BS2	1.5 m	R88A-CAKA001-5BR-E	
		3 m	R88A-CAKA003BR-E	
		5 m	R88A-CAKA005BR-E	
		10 m	R88A-CAKA010BR-E	
		15 m	R88A-CAKA015BR-E	
		20 m	R88A-CAKA020BR-E	
	Brake cable only. For 400 V servo motors with brake R88M-K6K010C-BS2 R88M-K(7K5/11K0/15K0)15C-BS2 R88M-KH7K515C-BS1	1.5 m	R88A-CAGE001-5BR-E	
		3 m	R88A-CAGE003BR-E	
		5 m	R88A-CAGE005BR-E	
		10 m	R88A-CAGE0010BR-E	
		15 m	R88A-CAGE015BR-E	
		20 m	R88A-CAGE020BR-E	

Connectors for encoder, power and brake cables

Specifications		Applicable Servomotor	Model
Connectors for making encoder cables	Drive side (CN2)	All models	R88A-CNW01R
	Motor side	R88M-K(050/100/200/400/750)30(H/T)□	R88A-CNK02R
	Motor side	R88M-KH(200/400/750)□	SPOC-17H-FRON169
	Motor side	R88M-K(1K0/1K5)30(H/T)□ R88M-K(750/1K0/1K5/2K0/3K0/4K0/5K0)30(F/C)□ R88M-K(400/600/1K0/1K5/2K0/3K0/4K0/5K0)20□ R88M-K(900/2K0/3K0)10□ R88M-K(4K5/6K0)10C-□ R88M-K(7K5/11K0/15K0)15C-□ R88M-KH(1K0/1K5/2K0/3K0/4K0/5K0/7K5)□	R88A-CNK04R
Connectors for making power cables	Motor side	R88M-K(050/100/200/400/750)30(H/T)□	R88A-CNK11A
	Motor side	R88M-KH(200/400/750)30(H/T)□	SPOC-06K-FSDN169
	Motor side	R88M-K(1K0/1K5)30(H/T)-S2 R88M-K(1K0/1K5)20(H/T)-S2 R88M-K90010(H/T)-S2 R88M-K(750/1K0/1K5/2K0)30(F/C)-S2, R88M-K(400/600/1K0/1K5/2K0)20(F/C)-S2 R88M-K90010(F/C)-S2 R88M-KH(1K0/1K5)20(F/C)-S1	MS3108E20-4S
	Motor side	R88M-K(1K0/1K5)30(H/T)-BS2 R88M-K(1K0/1K5)20(H/T)-BS2 R88M-K90010(H/T)-BS2	MS3108E20-18S
	Motor side	R88M-K(750/1K0/1K5/2K0/3K0/4K0/5K0)30(F/C)-BS2 R88M-K(400/600/1K0/1K5/2K0/3K0/4K0/5K0)20(F/C)-BS2 R88M-K(900/2K0/3K0)10(F/C)-BS2 R88M-K4K510C-BS2 R88M-KH(1K0/1K5/2K0/3K0/4K0/5K0)20(F/C)-BS1	MS3108E24-11S
	Motor side	R88M-K(3K0/4K0/5K0)30(F/C)-S2 R88M-K(3K0/4K0/5K0)20(F/C)-S2 R88M-K(2K0/3K0)10(F/C)-S2 R88M-K4K510C-S2 R88M-KH(2K0/3K0/4K0/5K0)20(F/C)-S1	MS3108E22-22S
	Motor side	R88M-K6K010C-□ R88M-K(7K5/11K0/15K0)15C-□ R88M-KH7K515C-□S1	MS3108E32-17S
Connector for brake cable	Motor side	R88M-K(050/100/200/400/750)30(H/T)-BS2	R88A-CNK11B
	Motor side	R88M-K6K010C-BS2 R88M-K(7K5/11K0/15K0)15C-BS2 R88M-KH7K515C-BS1	MS3108E14S-2S

Note: 1. All cables listed are flexible and shielded (except the R88A-CAKA□□□-BR-E which is only a flexible cable).
2. All connectors and cables listed have IP67 class (except R88A-CNW01R connector and R88A-CRGD0R3C cable).

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I100E-EN-04A In the interest of product improvement, specifications are subject to change without notice.

R88D-KN□□□-ECT-L

Accurax G5 linear drive



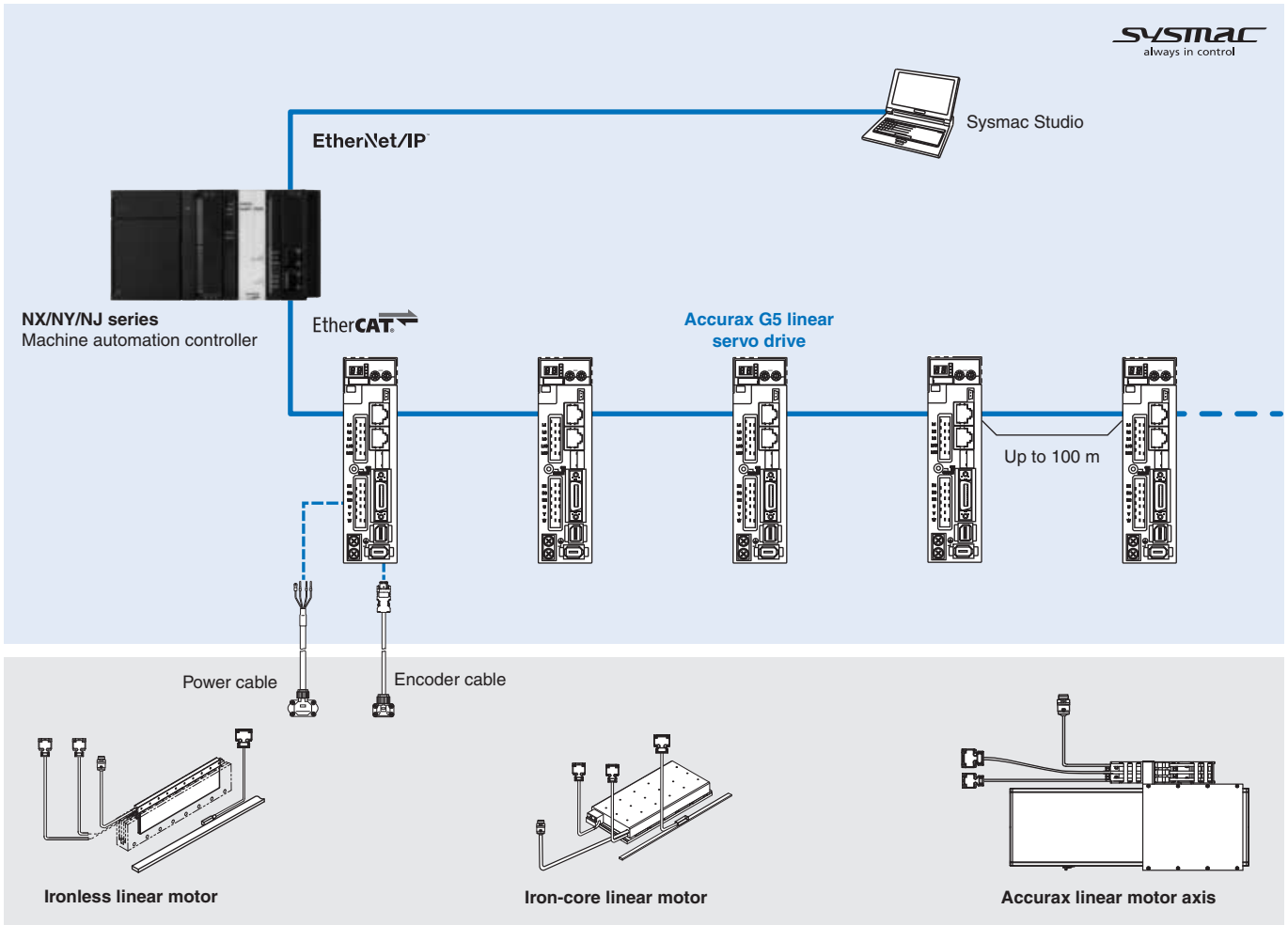
Accurate motion control in a compact size servo drive family. EtherCAT and safety built-in.

- Ironless and iron-core motor types
- Safety conforming ISO13849-1 PL-d
- High-response frequency of 2 kHz
- High resolution serial encoder for greater accuracy provided by 20 bits encoder
- Real time auto-tuning
- Advanced tuning algorithms (Anti-vibration function, torque feedforward, disturbance observer)

Ratings

- Iron-core motors - 48 to 760 N (2000 N peak force)
- Ironless motors - 29 to 423 N (2100 N peak force)

System configuration



Servo motor supported

Linear servo motor					Accurax G5 linear drive EtherCAT model	
Type	Rated force	Peak force	Model		230V	400V
Linear motor coil						
R88L-EC-FW-□ Iron-core motors  230 V/400 V	48 N	105 N	Coil without connectors	R88L-EC-FW-0303-ANPC	R88D-KN02H-ECT-L	R88D-KN06F-ECT-L
	96 N	210 N		R88L-EC-FW-0306-ANPC	R88D-KN04H-ECT-L	R88D-KN10F-ECT-L
	160 N	400 N		R88L-EC-FW-0606-ANPC	R88D-KN08H-ECT-L	R88D-KN15F-ECT-L
	240 N	600 N		R88L-EC-FW-0609-ANPC	R88D-KN10H-ECT-L	R88D-KN20F-ECT-L
	320 N	800 N		R88L-EC-FW-0612-ANPC	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	608 N	1600 N		R88L-EC-FW-1112-ANPC	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	760 N	2000 N		R88L-EC-FW-1115-ANPC	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	48 N	105 N	Coil with connectors	R88L-EC-FW-0303-APLC	R88D-KN02H-ECT-L	R88D-KN06F-ECT-L
	96 N	210 N		R88L-EC-FW-0306-APLC	R88D-KN04H-ECT-L	R88D-KN10F-ECT-L
	160 N	400 N		R88L-EC-FW-0606-APLC	R88D-KN08H-ECT-L	R88D-KN15F-ECT-L
	240 N	600 N		R88L-EC-FW-0609-APLC	R88D-KN10H-ECT-L	R88D-KN20F-ECT-L
	320 N	800 N		R88L-EC-FW-0612-APLC	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	608 N	1600 N		R88L-EC-FW-1112-APLC	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	760 N	2000 N		R88L-EC-FW-1115-APLC	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
R88L-EC-GW-□ Ironless motors  230 V	29 N	100 N	Coil without connectors	R88L-EC-GW-0303-ANPS	R88D-KN02H-ECT-L	–
	58 N	200 N		R88L-EC-GW-0306-ANPS	R88D-KN08H-ECT-L	–
	87 N	300 N		R88L-EC-GW-0309-ANPS	R88D-KN10H-ECT-L	–
	70 N	240 N		R88L-EC-GW-0503-ANPS	R88D-KN02H-ECT-L	–
	140 N	480 N		R88L-EC-GW-0506-ANPS	R88D-KN04H-ECT-L	–
	210 N	720 N		R88L-EC-GW-0509-ANPS	R88D-KN08H-ECT-L	–
	141 N	700 N		R88L-EC-GW-0703-ANPS	R88D-KN04H-ECT-L	–
	282 N	1400 N		R88L-EC-GW-0706-ANPS	R88D-KN08H-ECT-L	–
	423 N	2100 N		R88L-EC-GW-0709-ANPS	R88D-KN10H-ECT-L	–
	29 N	100 N	Coil with connectors	R88L-EC-GW-0303-APLS	R88D-KN02H-ECT-L	–
	58 N	200 N		R88L-EC-GW-0306-APLS	R88D-KN08H-ECT-L	–
	87 N	300 N		R88L-EC-GW-0309-APLS	R88D-KN10H-ECT-L	–
	70 N	240 N		R88L-EC-GW-0503-APLS	R88D-KN02H-ECT-L	–
	140 N	480 N		R88L-EC-GW-0506-APLS	R88D-KN04H-ECT-L	–
	210 N	720 N		R88L-EC-GW-0509-APLS	R88D-KN08H-ECT-L	–
	141 N	700 N		R88L-EC-GW-0703-APLS	R88D-KN04H-ECT-L	–
	282 N	1400 N		R88L-EC-GW-0706-APLS	R88D-KN08H-ECT-L	–
	423 N	2100 N		R88L-EC-GW-0709-APLS	R88D-KN10H-ECT-L	–
Accurax linear motor axis						
R88L-EA-AF-□ Linear motor axis 	48 N	105 N	R88L-EA-AF-0303-□		R88D-KN02H-ECT-L	R88D-KN06F-ECT-L
	96 N	210 N	R88L-EA-AF-0306-□		R88D-KN04H-ECT-L	R88D-KN10F-ECT-L
	160 N	400 N	R88L-EA-AF-0606-□		R88D-KN08H-ECT-L	R88D-KN15F-ECT-L
	240 N	600 N	R88L-EA-AF-0609-□		R88D-KN10H-ECT-L	R88D-KN20F-ECT-L
	320 N	800 N	R88L-EA-AF-0612-□		R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	608 N	1600 N	R88L-EA-AF-1112-□		R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	760 N	2000 N	R88L-EA-AF-1115-□		R88D-KN15H-ECT-L	R88D-KN30F-ECT-L

Type designation

Servo drive

R88D-KN01H-ECT-L

- Accurax G5 series servo drive
- Drive type
  N: Network type
- Linear drive
- Model
  ECT: EtherCAT comms
- Capacity and voltage

Voltage	Code	Output
230 V	01H	100 W
	02H	200 W
	04H	400 W
	08H	750 W
	10H	1 kW
	15H	1.5 kW
400 V	06F	600 W
	10F	1.0 kW
	15F	1.5 kW
	20F	2.0 kW
	30F	3.0 kW

Servo drive specifications

Single-phase, 230 V

Linear servo drive type			R88D-KN	02H-ECT-L	04H-ECT-L	08H-ECT-L	10H-ECT-L	15H-ECT-L
Applicable linear servo motor			R88L-EC-	FW-0303	FW-0306	FW-0606	FW-0609	FW-0612
				GW-0303	GW-0506	GW-0306	GW-0309	FW-1112
				GW-0503	GW-0703	GW-0509	GW-0709	FW-1115
				–	–	GW-0706	–	–
Basic specifications	Power		W	200	400	750	1000	1500
	Continuous output current		Arms	1.6	2.6	4.1	5.9	9.4
	Max. output current		Arms	4.8	7.8	12.3	16.9	28.2
	Input power	Main circuit		Single-phase/3-phase, 200 to 240 VAC +10% to –15% (50/60 Hz)				
	Supply	Control circuit		Single-phase, 200 to 240 VAC +10% to –15% (50/60 Hz)				
	Control method			IGBT-driven PWM method, sinusoidal drive				
	Feedback			Serial encoder (incremental/absolute value)				
	Conditions	Usage/storage temperature		0 to 55°C/–20 to 65°C				
		Usage/storage humidity		90% RH or less (non-condensing)				
		Altitude		1000 m or less above sea level				
		Vibration/shock resistance	(max.)	5.88 m/s^2 10 to 60 Hz (Continuous operation at resonance point is not allowed)/19.6 m/s^2				
	Configuration			Base mounted				
	Approx. weight		kg	0.8	1.1	1.6	1.8	

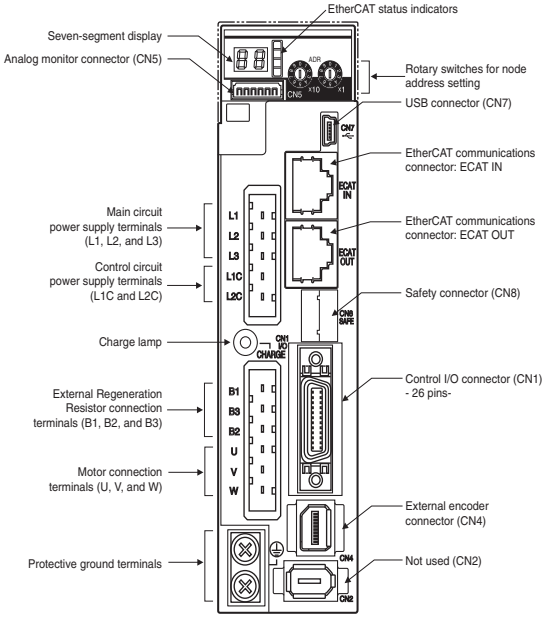
Three-phase, 400 V

Linear servo drive type			R88D-KN	06F-ECT-L	10F-ECT-L	15F-ECT-L	20F-ECT-L	30F-ECT-L
Applicable linear servo motor			R88L-EC-	FW-0303	FW-0306	FW-0606	FW-0609	FW-0612
				–	–	–	–	FW-1112
				–	–	–	–	FW-1115
Basic specifications	Power		kW	0.6	1	1.5	2	3
	Continuous output current		Arms	1.5	2.9	4.7	6.7	9.4
	Max. output current		Arms	6.4	8.7	14.1	19.7	28.2
	Input power	Main circuit		3-phase, 380 to 480 VAC +10 to –15% (50/60Hz)				
	Supply	Control circuit		24 VDC ±15%				
	Control method			IGBT-driven PWM method, sinusoidal drive				
	Feedback	Serial encoder		Incremental or absolute encoder				
	Conditions	Usage/storage temperature		0 to 55°C/–20 to 65°C				
		Usage/storage humidity		90% RH or less (non-condensing)				
		Altitude		1000 m or less above sea level				
		Vibration/shock resistance	(max.)	5.88 m/s^2 10 to 60 Hz (Continuous operation at resonance point is not allowed)/19.6 m/s^2				
	Configuration			Base mounted				
	Approx. weight		kg	1.9			2.7	4.7

General specifications

Performance		Frequency characteristics	2 kHz
EtherCAT interface	Command input		EtherCAT commands (for sequence, motion, data setting/reference, monitor, adjustment, and other commands).
	CiA402 Drive profile		Cyclic synchronous position mode Cyclic synchronous velocity mode Cyclic synchronous torque mode Touch probe function Torque limit function Homing mode
I/O signal	Sequence input signal		- Multi-function input × 8 by parameter setting (forward/reverse drive prohibition, emergency stop, external latch, origin proximity, forward/reverse torque limit, general purpose monitor inputs).
	Sequence output signal		1 × servo drive error output 2 × multi-function outputs by parameters setting (servo ready, brake release, speed limit detection, force limit detection, zero speed detection, warning output, position completion, error clear attributed, remote output, speed detection, position command status, speed command status)
Integrated functions	USB communications	Interface	Personal computer/Connector mini-USB
		Communications standard	Compliant with USB 2.0 standard
		Function	Parameter setting and status monitoring
	EtherCAT communications	Communications protocol	IEC 61158 Type 12, IEC 61800-7
		Physical layer	100BASE-TX (IEEE802.3)
		Connectors	RJ45 × 2 ECAT IN: EtherCAT input × 1 ECAT OUT: EtherCAT output × 1
		Communications media	Category 5 or higher (cable with double, aluminium tape and braided shielding is recommended)
		Communications distance	Distance between nodes: 100 m max.
		LED indicators	RUN × 1 ERR × 1 L/A IN (Link/Activity IN) × 1 L/A OUT (Link/activity OUT) × 1
	Automatic load inertia detection		Automatic motor parameter setting. One parameter rigidity setting.
	Dynamic brake (DB)		Built-in. Operates during main power OFF, servo alarm, servo OFF or overtravel.
	Regenerative processing		Internal resistor included in models from 600 W to 5 kW. Regenerative resistor externally mounted (option).
	Overtravel (OT) prevention function		DB stop, deceleration stop or coast to stop during P-OT, N-OT operation
	Encoder divider function		Optional division possible
	Protective functions		Overcurrent, overvoltage, undervoltage, overspeed, overload, encoder error, overheat...
	Analog monitor functions for supervision		Analog monitor of motor speed, speed reference, torque reference, command following error, analog input … The monitoring signals to output and their scaling can be specified with parameters. Number of channels: 2 (Output voltage: ±10 VDC)
	Panel operator	Display functions	2 × digit 7-segment LED display shows the drive status, alarm codes, parameters...
		Switches	2 × rotary switches for setting the node address
	CHARGE lamp		Lits when the main circuit power supply is turned ON.
	Safety terminal	Functions	Safety Torque OFF function to cut off the motor current and stop the motor. Output signal for failure monitoring function.
		Conformed standards	EN ISO13849-1:2008 (PL- d, Performance Level d), IEC61800-5 -2:2007 (function STO, Safe Torque OFF), EN61508:2001 (Safety Integrity Level 2, SIL2), EN954-1:1996 (CAT3).
	External encoder feedback		Serial signal and line-driver A-B-Z encoder

Servo drive part names



Note: The above picture shows 230 V servo drives models only. The 400 V servo drives have 24 VDC power input terminals for control circuit instead of L1C and L2C terminals.

I/O specifications

Terminals specifications

Symbol	Name	Function
L1	Main power supply input terminal	AC power input terminals for the main circuit **Note:** for single-phase servo drives connect the power supply input to L1 and L3.
L2		
L3		
L1C	Control power supply input terminal	AC power input terminals for the control circuit (for 200V single/three-phase servo drives only).
L2C		
24 V		DC power input terminals for the control circuit (for 400V three-phase servo drives only).
0 V		
B1	External regeneration resistor connection terminals	Servo drives below 750 W: no internal resistor is connected. Leave B2 and B3 open. Connect an external regenerative resistor between B1 and B2. Servo drives from 750 W to 5 kW: short-circuit in B2 and B3 for internal regenerative resistor. If the internal regenerative resistor is insufficient, connect an external regenerative resistor between B1 and B2 and remove the wire between B2 and B3.
B2		
B3		
U	Servo motor connection terminals	Terminals for outputs to the servomotor.
V		
W		

I/O signals (CN1) - Input signals

Pin No.	Signal name	Function	
6	I-COM	± pole of external DC power. The power must use 12 V to 24 V (±5%)	
5	E-STOP	Emergency stop	The signal name shows the factory setting. The function can be changed by parameter setting.
7	P-OT	Forward run prohibited	
8	N-OT	Reverse run prohibited	
9	DEC	Origin proximity	
10	EXT3	External latch input 3	
11	EXT2	External latch input 2	
12	EXT1	External latch input 1	
13	SI-MON0	General purpose monitor input 0	
14	–	Terminals not used. Do not connect.	
15	–		
17	–		
18	–		
19	–		
20	–		
21	–		
22	–		
23	–		
24	–		
–	PCL	Forward force limit	The function of input signals allocated to pins 5 and 7 to 13 can be changed with these options by parameters settings.
	NCL	Reverse force limit	
	SI-MON1	General-purpose monitor input 1	
	SI-MON2	General-purpose monitor input 2	
Shell	FG	Shield ground. Connected to frame ground if the shield wire of the I/O signal cable is connected to the connector shell.	
16	GND	Signal ground. It is insulated with power supply (I-COM) for the control signal in the servo drive.	

I/O signals (CN1) - Output signals

Pin No.	Signal name	Function	
1	BRK-OFF+	External brake release signal	
2	BRK-OFF		
25	S-RDY+	Servo ready: ON when there is no servo alarm and control/main circuit power supply is ON	
26	S-RDY–		
3	ALM+	Servo alarm: Turns OFF when an error is detected	
4	ALM–		
–	INP1	Position complete output 1	The function of output signals allocated to pins 1, 2, 25 and 26 can be changed with these options by parameters settings
	TGON	Motor speed detection	
	F_LIMIT	Force limit detection	
	ZSP	Zero speed	
	VCMP	Speed conformity output	
	WARN1	Warning 1	
	WARN2	Warning 2	
	PCMD	Position command status	
	INP2	Position complete output 2	
	VLIMIT	Speed limit detection	
	ALM-ATB	Error clear attribute	
	VCMD	Speed command status	
	R-OUT1	Remote output 1	
	R-OUT2	Remote output 1	

External encoder connector (CN4)

Pin No.	Signal name	Function
1	E5V	External scale power supply output. Use at 5.2 V ±5% and at or below 250 mA.
2	E0V	This is connected to the control circuit ground connected to connector CN1.
3	PS	External scale signal I/O (serial signal).
4	/PS	
5	EXA	External scale signal input (Phase A, B, and Z signals). Performs the input and output of phase A, B and Z signals.
6	/EXA	
7	EXB	
8	/EXB	
9	EXZ	
10	/EXZ	
Shell	FG	Shield ground

Monitor connector (CN5)

Pin No.	Signal name	Function
1	AM1	Analog monitor output 1. Outputs the analog signal for the monitor. Use the parameters setting to select the output to monitor. Default setting: Motor rotation speed 1 V/(500 mm/s).
2	AM2	Analog monitor output 2. Outputs the analog signal for the monitor. Use the parameters setting to select the output to monitor. Default setting: Motor rotation speed 1 V/(33% of nominal force).
3	GND	Ground for analog monitors 1,2.
4	–	Terminals not used. Do not connect.
5	–	
6	–	

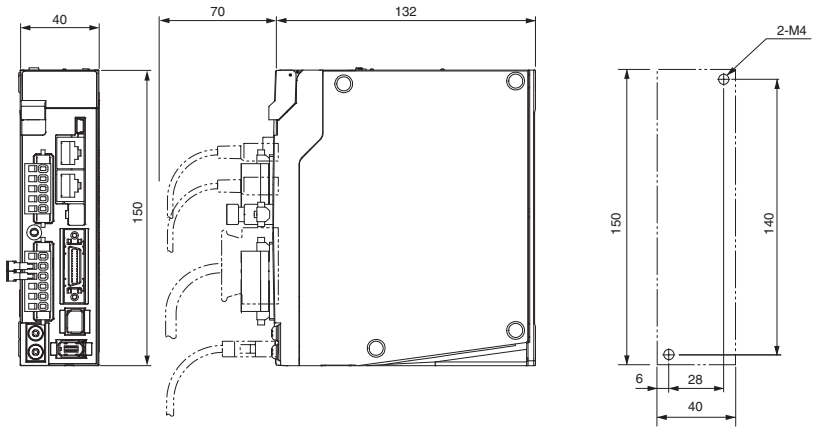
Safety connector (CN8)

Pin No.	Signal name	Function
1	–	Not used. Do not connect.
2	–	
3	SF1–	Safety input 1 & 2. This input turns OFF the power transistor drive signals in the servo drive to cut off the current output to the motor.
4	SF1+	
5	SF2–	
6	SF2+	
7	EDM–	A monitor signal is output to detect a safety function failure.
8	EDM+	
Shell	FG	Frame ground.

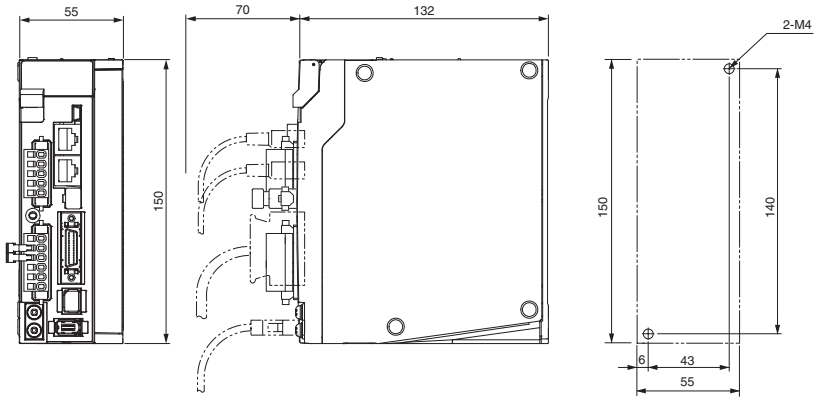
Dimensions

Servo drives

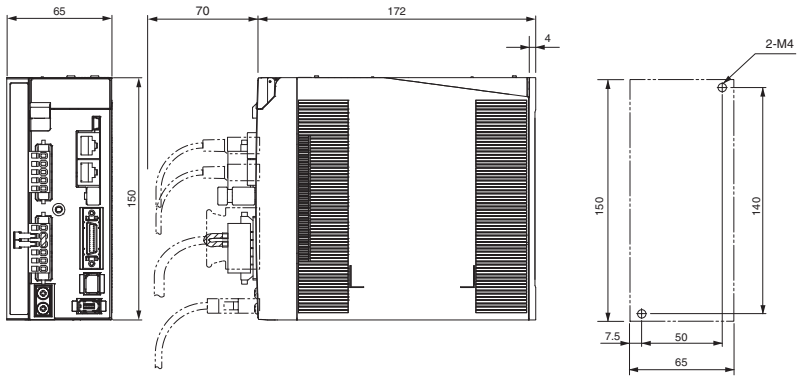
R88D-KN02H-ECT-L (230 V, 200 W)



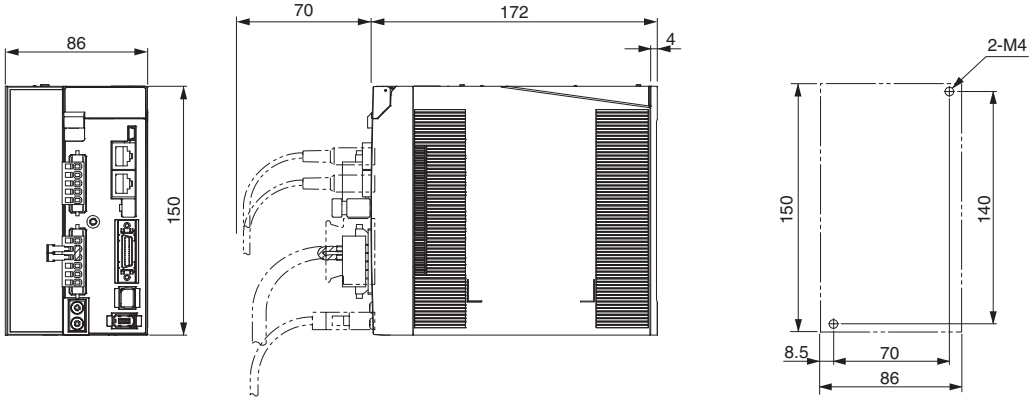
R88D-KN04H-ECT-L (230 V, 400 W)



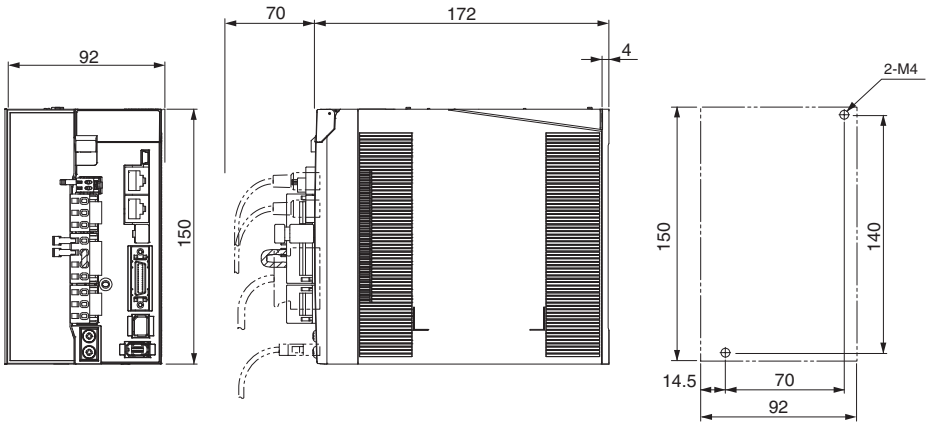
R88D-KN08H-ECT-L (230 V, 800 W)



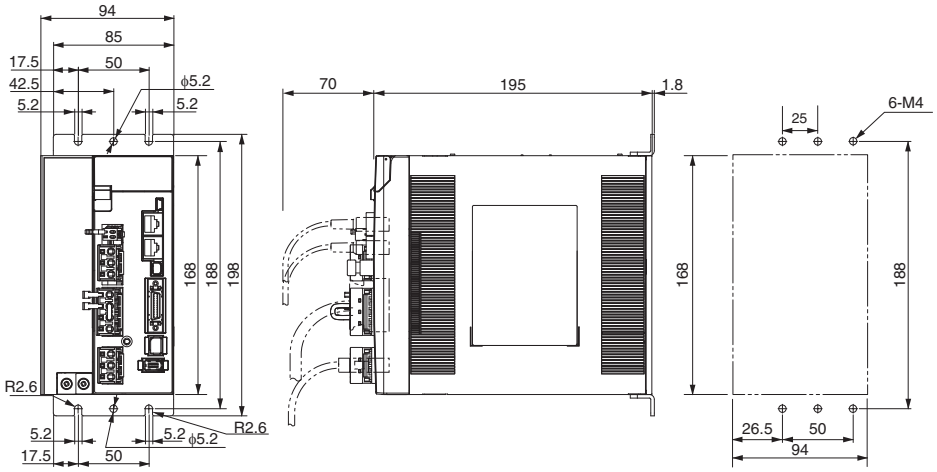
R88D-KN10H/15H-ECT-L (230 V, 1 to 1.5 kW)



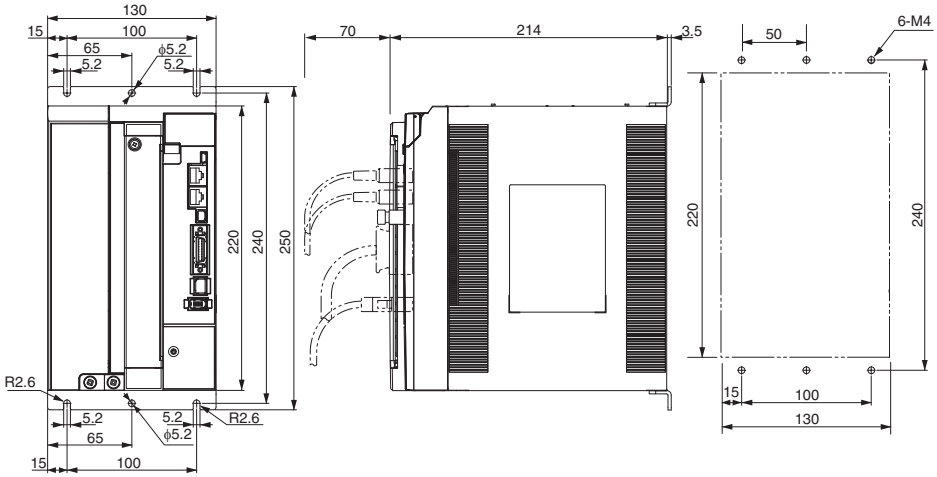
R88D-KN06F/10F/15F-ECT-L (400 V, 600 W to 1.5 kW)



R88D-KN20F-ECT-L (400 V, 2 kW)

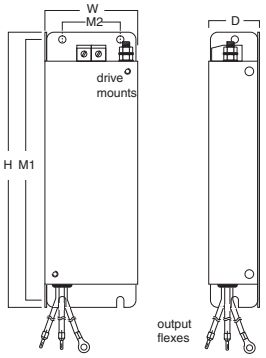


R88D-KN30F-ECT-L (400V, 3 kW)



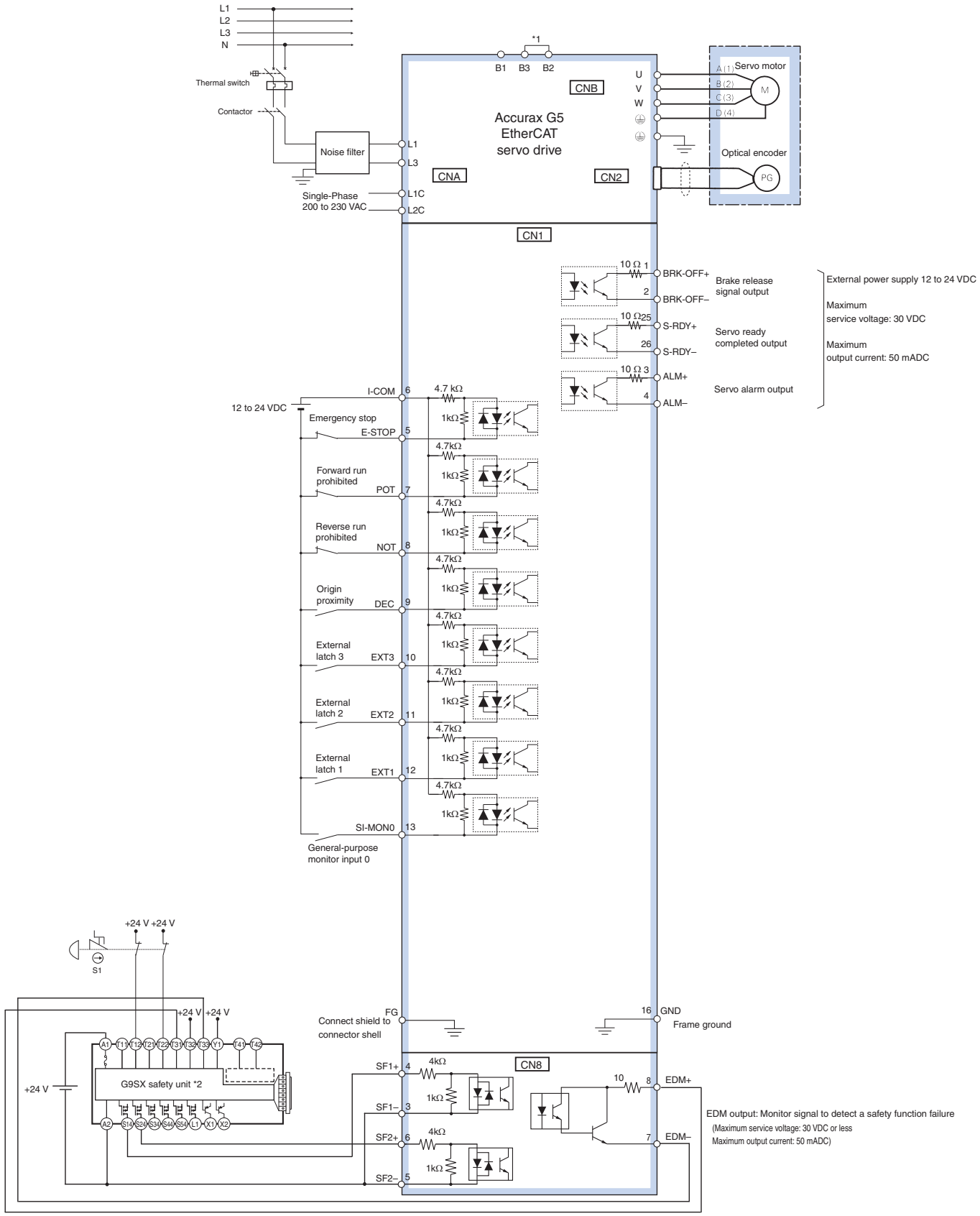
Filters

Filter model	External dimensions			Mount dimensions	
	H	W	D	M1	M2
R88A-FIK102-RE	190	42	44	180	20
R88A-FIK104-RE	190	57	30	180	30
R88A-FIK107-RE	190	64	35	180	40
R88A-FIK114-RE	190	86	35	180	60
R88A-FIK304-RE	196	92	40	186	70
R88A-FIK306-RE	238	94	40	228	70
R88A-FIK312-RE	291	130	40	278	100



Installation

Single-phase, 230 VAC

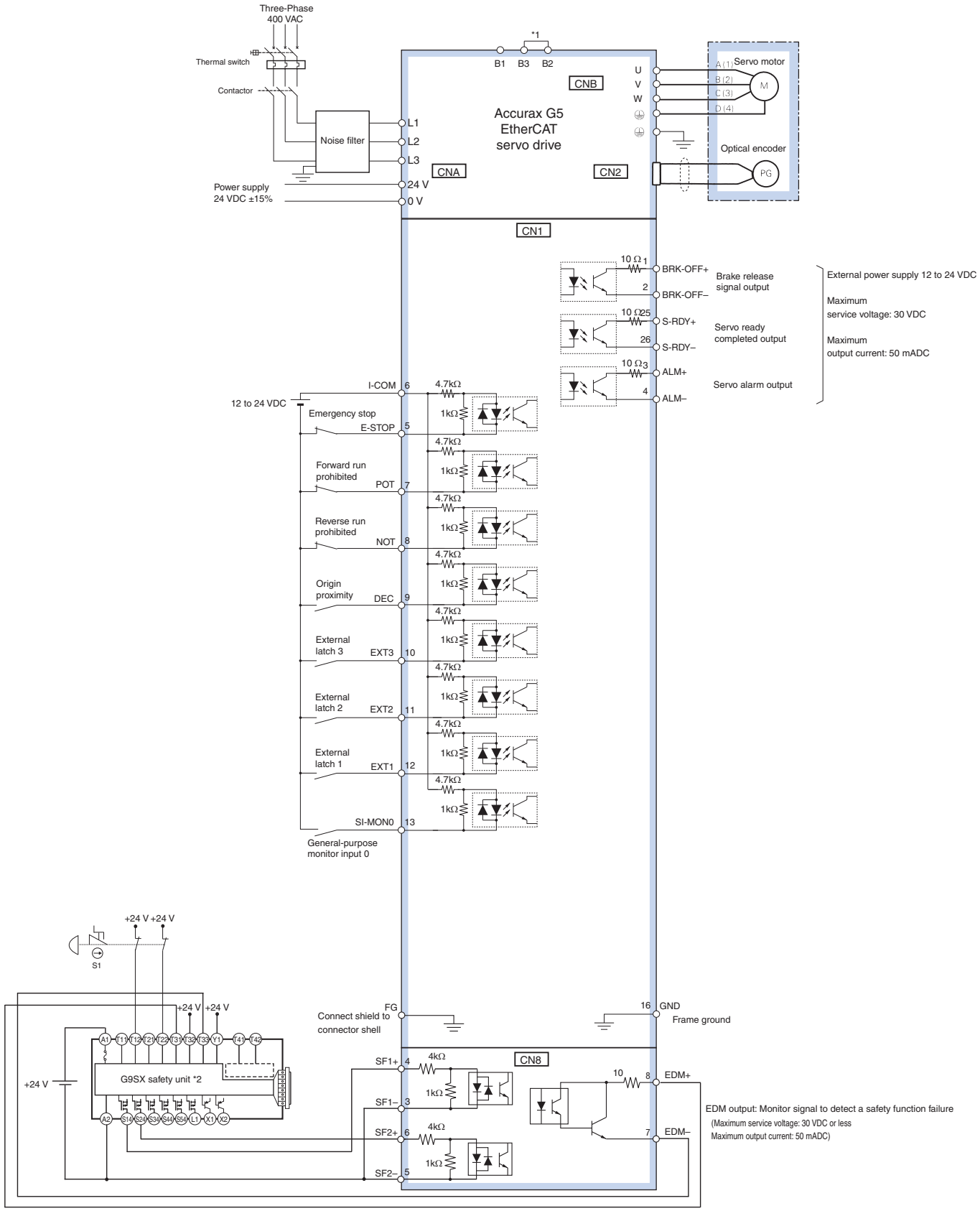


*1 For servo drives from 750 W, B2 and B3 are short-circuited. If the internal regenerative resistor is insufficient, remove the wire between B2 and B3 and connect an external regenerative resistor between B1 and B2.

*2 Wiring diagram example using the G9SX safety unit. If a safety unit is not used, keep the factory safety bypass connector installed in the CN8.

Note: The input function of pins 5 and 7 to 13, and output function of pins 1, 2, 25 and 26, can be changed via parameter settings.

Three-phase, 400 VAC



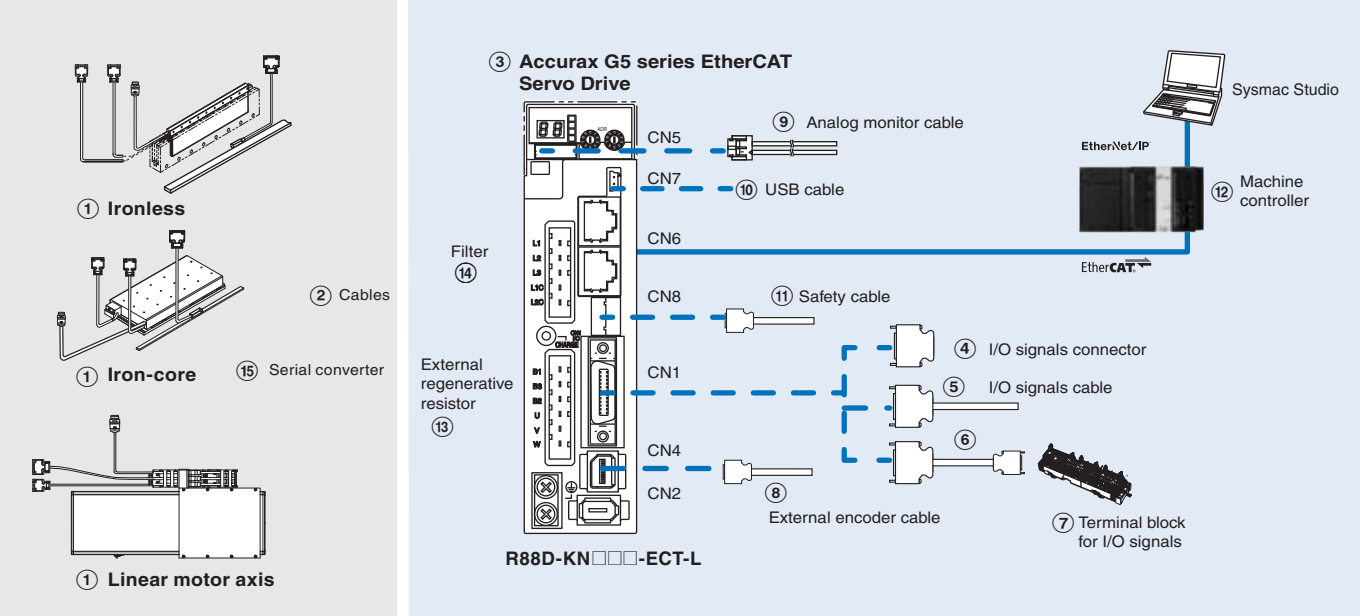
*1 Normally B2 and B3 are short-circuited. If the internal regenerative resistor is insufficient, remove the wire between B2 and B3 and connect an external regenerative resistor between B1 and B2.

*2 Wiring diagram example using the G9SX safety unit. If a safety unit is not used, keep the factory safety bypass connector installed in the CN8.

Note: The input function of pins 5 and 7 to 13, and output function of pins 1, 2, 25 and 26, can be changed via parameter settings.

Ordering information

Accurax G5 series EtherCAT reference configuration



Note: The symbols ①②③④⑤... show the recommended sequence to select the components in Accurax G5 servo system

Servo motors, power & encoder cables

Note: ①② Refer to the Accurax linear motor chapter for linear motor, cables or connectors selection

Servo drives

Symbol	Specifications	Servo drive models	① Compatible Accurax G5 Linear motors		
			Iron-core motors	Ironless motors	Linear motor axis
③	1 phase 230 VAC	R88D-KN02H-ECT-L	R88L-EC-FW-0303-□	R88L-EC-GW-0303-□	R88L-EA-AF-0303-□
				R88L-EC-GW-0503-□	
		R88D-KN04H-ECT-L	R88L-EC-FW-0306-□	R88L-EC-GW-0506-□	R88L-EA-AF-0306-□
				R88L-EC-GW-0703-□	
		R88D-KN08H-ECT-L	R88L-EC-FW-0606-□	R88L-EC-GW-0306-□	R88L-EA-AF-0606-□
				R88L-EC-GW-0509-□	
				R88L-EC-GW-0706-□	
		R88D-KN10H-ECT-L	R88L-EC-FW-0609-□	R88L-EC-GW-0309-□	R88L-EA-AF-0609-□
				R88L-EC-FW-0709-□	
		R88D-KN15H-ECT-L	R88L-EC-FW-0612-□	–	R88L-EA-AF-0612-□
			R88L-EC-FW-1112-□		R88L-EA-AF-1112-□
			R88L-EC-FW-1115-□		R88L-EA-AF-1115-□
	3 phase 400 VAC	R88D-KN06F-ECT-L	R88L-EC-FW-0303-□	–	R88L-EA-AF-0303-□
		R88D-KN10F-ECT-L	R88L-EC-FW-0306-□	–	R88L-EA-AF-0306-□
		R88D-KN15F-ECT-L	R88L-EC-FW-0606-□	–	R88L-EA-AF-0606-□
		R88D-KN20F-ECT-L	R88L-EC-FW-0609-□	–	R88L-EA-AF-0609-□
		R88D-KN30F-ECT-L	R88L-EC-FW-0612-□	–	R88L-EA-AF-0612-□
			R88L-EC-FW-1112-□		R88L-EA-AF-1112-□
			R88L-EC-FW-1115-□		R88L-EA-AF-1115-□

Signals cables for I/O general purpose (CN1)

Symbol	Description	Connect to		Model
④	I/O connector kit (26 pins)	For I/O general purpose	–	R88A-CNW01C
⑤	I/O signals cable	For I/O general purpose	1 m	R88A-CPKB001S-E
			2 m	R88A-CPKB002S-E
⑥	Terminal block cable	For I/O general purpose	1 m	XW2Z-100J-B34
			2 m	XW2Z-200J-B34
⑦	Terminal block (M3 screw and for pin terminals)		–	XW2B-20G4
	Terminal block (M3.5 screw and for fork/round terminals)		–	XW2B-20G5
	Terminal block (M3 screw and for fork/round terminals)		–	XW2D-20G6

External encoder cable (CN4)

Symbol	Name		Model
⑧	External encoder cable	5 m	R88A-CRKM005SR-E
		10 m	R88A-CRKM010SR-E
		20 m	R88A-CRKM020SR-E

Analog monitor (CN5)

Symbol	Name		Model
⑨	Analog monitor cable	1 m	R88A-CMK001S

USB personal computer cable (CN7)

Symbol	Name		Model
⑩	USB mini-connector cable	2 m	AX-CUSBM002-E

Cable for safety (CN8)

Symbol	Name		Model
⑪	Safety cable	3 m	R88A-CSK003S-E

Machine controller

Symbol	Name		Model
⑫	IPC machine controller	Industrial box PC type	NY512-□
		Industrial panel PC type	NY532-□
	NX7 series	CPU unit	NX701-□
		Power supply unit	NX-PA9001 (220 VAC)
			NX-PD7001 (24 VDC)
	NJ series	CPU unit	NJ501-□
			NJ301-□
			NJ101-□
		Power supply unit	NJ-PA3001 (220 VAC)
			NJ-PD3001 (24 VDC)
	NX1 series	CPU unit	NX1P2-□

External regenerative resistor

Symbol	Regenerative resistor unit model	Specifications
⑬	R88A-RR08050S	50 Ω, 80 W
	R88A-RR080100S	100 Ω, 80 W
	R88A-RR22047S	47 Ω, 220 W
	R88A-RR50020S	20 Ω, 500 W

Filters

Symbol	Applicable servodrive	Filter model	Manufacturer	Rated current	Leakage current	Rated voltage
⑭	R88D-KN02H-ECT-L	R88A-FIK102-RE	Rasmi Electronics Ltd.	2.4 A	3.5 mA	250 VAC single-phase
	R88D-KN04H-ECT-L	R88A-FIK104-RE		4.1 A	3.5 mA	
	R88D-KN08H-ECT-L	R88A-FIK107-RE		6.6 A	3.5 mA	
	R88D-KN10H-ECT-L, R88D-KN15H-ECT-L	R88A-FIK114-RE		14.2 A	3.5 mA	
	R88D-KN06F-ECT-L, R88D-KN10F-ECT-L, R88D-KN15F-ECT-L	R88A-FIK304-RE		4 A	0.3 mA/32 mA*1	400 VAC three-phase
	R88D-KN20F-ECT-L	R88A-FIK306-RE		6 A	0.3 mA/32 mA*1	
	R88D-KN30F-ECT-L	R88A-FIK312-RE		12.1 A	0.3 mA/32 mA*1	

*1 Momentary peak leakage current for the filter at switch-on/off.

Connectors

Specifications	Model
External encoder connector (for CN4)	R88A-CNK41L
Safety I/O signal connector (for CN8)	R88A-CNK81S

Computer software

Specifications	Model
Sysmac Studio version 1.0 or higher	SYSMAC-SE2□□□
CX-Drive version 2.60 or higher	CX-DRIVE 2.60

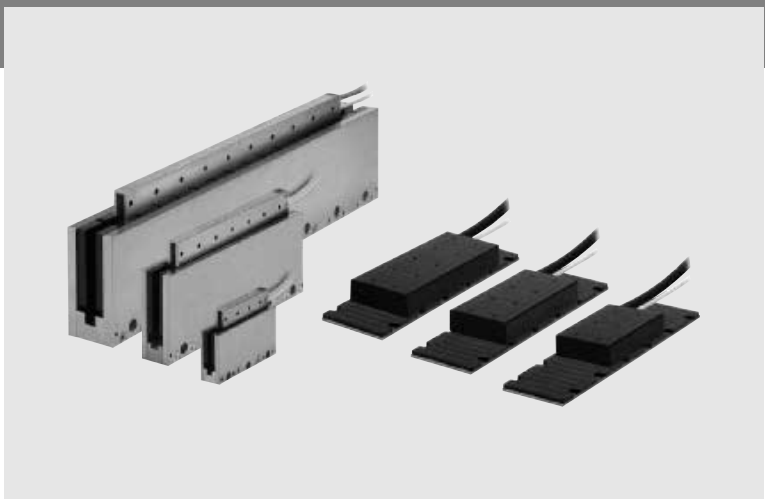
Note: If CX-One is installed on the same computer as Sysmac Studio, it must be CX-One v4.2 or higher

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I165E-EN-03 In the interest of product improvement, specifications are subject to change without notice.

R88L-EC-FW/GW-□

Accurax linear motor



New linear motors with optimised efficiency

Iron-core motors for high speed and high duty cycle operations and Ironless motors for cogging-free and high dynamic applications. Both motor and families deliver unparalleled accuracy and performance benefits.

- Ironless and iron-core types available
- High dynamic and precise positioning
- Compact and flat design iron-core motors
- Excellent force-to-weight ratio ironless motors
- Weight-optimised magnet track
- Optional digital hall-sensor and connectors
- Temperature sensors included

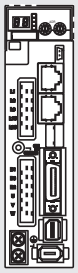
Ratings

- Iron-core motors - 48 to 760 N (2000 N peak force)
- Ironless motors - 29 to 423 N (2100 N peak force)

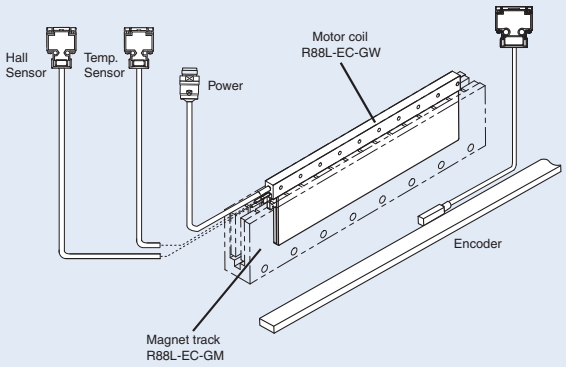
System configuration

(Refer to servo drive chapter)

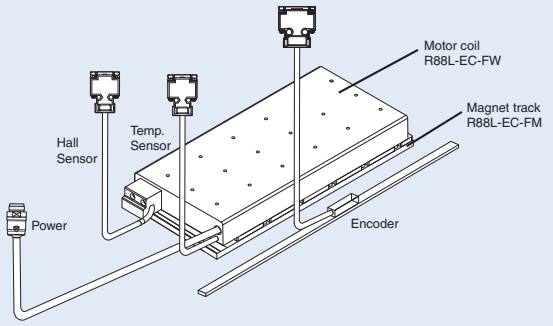
SYSMAC always in control



Accurax G5 servo drive
EtherCAT model



Ironless linear motor



Iron-core linear motor

Linear motor / Servo drive combination

Linear motor coil					Linear Servo drive Accurax G5 EtherCAT model	
Type	Rated force	Peak force	Model		230V	400V
R88L-EC-FW-□ Iron-core motors  230 V/400 V	48 N	105 N	Coil without connectors	R88L-EC-FW-0303-ANPC	R88D-KN02H-ECT-L	R88D-KN06F-ECT-L
	96 N	210 N		R88L-EC-FW-0306-ANPC	R88D-KN04H-ECT-L	R88D-KN10F-ECT-L
	160 N	400 N		R88L-EC-FW-0606-ANPC	R88D-KN08H-ECT-L	R88D-KN15F-ECT-L
	240 N	600 N		R88L-EC-FW-0609-ANPC	R88D-KN10H-ECT-L	R88D-KN20F-ECT-L
	320 N	800 N		R88L-EC-FW-0612-ANPC	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	608 N	1600 N		R88L-EC-FW-1112-ANPC	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	760 N	2000 N		R88L-EC-FW-1115-ANPC	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	48 N	105 N	Coil with connectors	R88L-EC-FW-0303-APLC	R88D-KN02H-ECT-L	R88D-KN06F-ECT-L
	96 N	210 N		R88L-EC-FW-0306-APLC	R88D-KN04H-ECT-L	R88D-KN10F-ECT-L
	160 N	400 N		R88L-EC-FW-0606-APLC	R88D-KN08H-ECT-L	R88D-KN15F-ECT-L
	240 N	600 N		R88L-EC-FW-0609-APLC	R88D-KN10H-ECT-L	R88D-KN20F-ECT-L
	320 N	800 N		R88L-EC-FW-0612-APLC	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	608 N	1600 N		R88L-EC-FW-1112-APLC	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	760 N	2000 N		R88L-EC-FW-1115-APLC	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
R88L-EC-GW-□ Ironless motors  230 V	29 N	100 N	Coil without connectors	R88L-EC-GW-0303-ANPS	R88D-KN02H-ECT-L	–
	58 N	200 N		R88L-EC-GW-0306-ANPS	R88D-KN08H-ECT-L	–
	87 N	300 N		R88L-EC-GW-0309-ANPS	R88D-KN10H-ECT-L	–
	70 N	240 N		R88L-EC-GW-0503-ANPS	R88D-KN02H-ECT-L	–
	140 N	480 N		R88L-EC-GW-0506-ANPS	R88D-KN04H-ECT-L	–
	210 N	720 N		R88L-EC-GW-0509-ANPS	R88D-KN08H-ECT-L	–
	141 N	700 N		R88L-EC-GW-0703-ANPS	R88D-KN04H-ECT-L	–
	282 N	1400 N		R88L-EC-GW-0706-ANPS	R88D-KN08H-ECT-L	–
	423 N	2100 N		R88L-EC-GW-0709-ANPS	R88D-KN10H-ECT-L	–
	29 N	100 N	Coil with connectors	R88L-EC-GW-0303-APLS	R88D-KN02H-ECT-L	–
	58 N	200 N		R88L-EC-GW-0306-APLS	R88D-KN08H-ECTL	–
	87 N	300 N		R88L-EC-GW-0309-APLS	R88D-KN10H-ECT-L	–
	70 N	240 N		R88L-EC-GW-0503-APLS	R88D-KN02H-ECT-L	–
	140 N	480 N		R88L-EC-GW-0506-APLS	R88D-KN04H-ECT-L	–
	210 N	720 N		R88L-EC-GW-0509-APLS	R88D-KN08H-ECT-L	–
	141 N	700 N		R88L-EC-GW-0703-APLS	R88D-KN04H-ECT-L	–
	282 N	1400 N		R88L-EC-GW-0706-APLS	R88D-KN08H-ECT-L	–
	423 N	2100 N		R88L-EC-GW-0709-APLS	R88D-KN10H-ECT-L	–

Type designation

Linear motor coil

R88L-EC-FW-0303-ANPC

Accurax linear motor component

Motor type	
Code	Specifications
FW	Iron-core motor coil
GW	Ironless motor coil

Magnet width	
Code	Specifications
03	30 mm active magnet width
05	50 mm active magnet width
06	60 mm active magnet width
07	70 mm active magnet width
11	110 mm active magnet width

Coil model	
Code	Specifications
03	3-coil model
06	6-coil model
09	9-coil model
12	12-coil model
15	15-coil model

Motor series	
Code	Specifications
C	Compact (Iron-core models)
S	Standard (Ironless models)

Connector options	
Code	Specifications
NP	No connectors
PL	With connectors

Design Revision No.

Magnet track

R88L-EC-FM-03□□□ -A

Accurax linear motor component

Magnet track type	
Code	Specifications
FM	Iron-core magnet track
GM	Ironless magnet track

Design Revision No.

Length of magnet track in mm

Magnet width	
Code	Specifications
03	30 mm active magnet width
05	50 mm active magnet width
06	60 mm active magnet width
07	70 mm active magnet width
11	110 mm active magnet width

Hall sensor

R88L-EC-FH-NNNN-A

Accurax linear motor component

Hall sensor type	
Code	Specifications
FH	Iron-core digital Hall-sensor
GH	Ironless digital Hall-sensor

Design Revision No.

Placeholder

Magnet width for Ironless type	
Code	Specifications
03	30 mm active magnet width
05	50 mm active magnet width
07	70 mm active magnet width
NN	Placeholder

Linear servomotor specifications

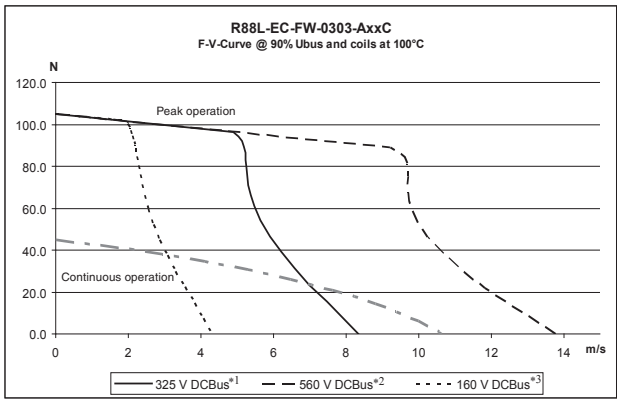
Iron-core motors R88L-EC-FW-□ (230/400 VAC)

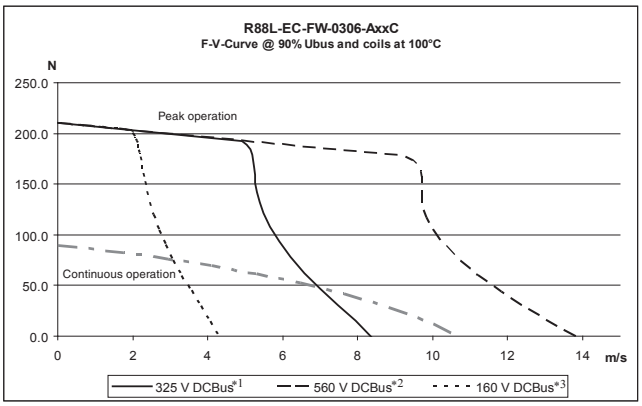
Voltage		230/400V						
Linear motor model	**R88L-EC-FW-□**	**0303-□**	**0306-□**	**0606-□**	**0609-□**	**0612-□**	**1112-□**	**1115-□**
Maximum speed (100 V)	**m/s**	2,5		2			1	
Maximum speed (200 V)	**m/s**	5		4			2	
Maximum speed (400 V)	**m/s**	10		8			4	
Peak force[*1]	**N**	105	210	400	600	800	1600	2000
Peak current[*1]	**Arms**	3.1	6.1	10	15	20	20	25
Continuous force[*2]	**N**	48	96	160	240	320	608	760
Continuous current[*2]	**Arms**	1.24	2.4	3.4	5.2	6.9	6.5	8.2
Motor force constant	**N/A_{rms}**	39.7		46.5			93	
BEMF	**V/m/s**	32		38			76	
Motor constant	**$N/\sqrt{W}$**	9.75	13.78	19.49	23.87	27.57	41.47	46.37
Phase resistance	**Ω**	5.34	2.68	1.83	1.23	0.92	1.6	1.29
Phase Inductance	**mH**	34.7	17.4	13.7	9.2	6.9	12.8	10.3
Electrical time constant	**ms**	6,5		7,5			8	
Max. cont. power dissipation (all coils)	**W**	32	63	88	131	175	279	349
Thermal resistance	**K/W**	2.20	1.10	0.78	0.52	0.39	0.23	0.18
Thermal time constant	**s**	110		124			126	
Magnetic attraction force	**N**	300	500	1020	1420	1820	3640	4440
Magnet pole pitch	**mm**	24						
Weight coil unit[*3]	**kg**	0.48	0.78	1.31	1.84	2.37	4.45	5.45
Weight magnet track	**kg/m**	2.1		3.8			10.5	
Dimension cooling plate (l × w × h)	**mm**	238×220×10		250×287×12			371×330×14	
Protection methods[*4]		Temperature sensors (KTY-83/121 & PTC 110C), self cooling						
Hall sensor		Digital (optional)						
Insulation class		Class B						
Max. bus voltage		560 VDC						
Insulation resistance		500 VDC, min. 10 MΩ						
Di-electric strength		2750V for 1sec						
Max. allowable coil temperature		130°C						
Ambient humidity		20 to 80% (non-condensing)						
Max. allowable magnet temperature		70°C						

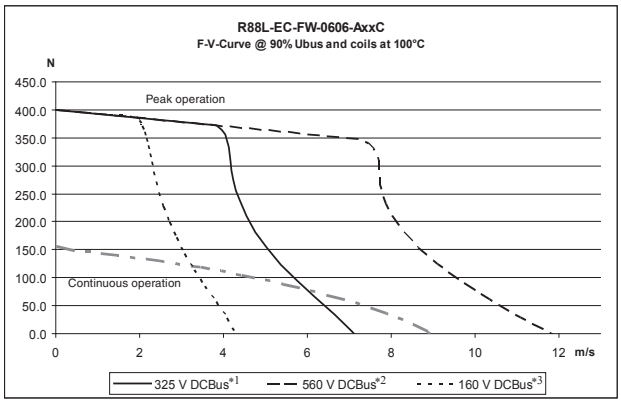
[*1] Coil temperature rising by 6K/s.
[*2] Values at 100°C coil temperature and magnets at 25°C. Coil unit must be attached to the given cooling plate sizes in the table and an airstream of 2.5 m/s (25°C) has to be applied.
[*3] Weight without connector and cable.
[*4] I^2t has to be set properly for high current applications.

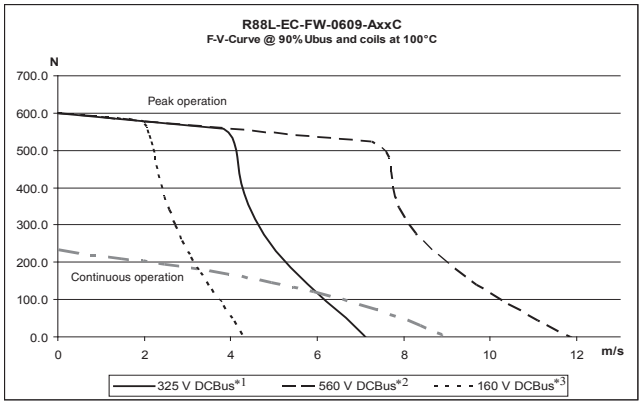
All other values at 25ºC (±10%).

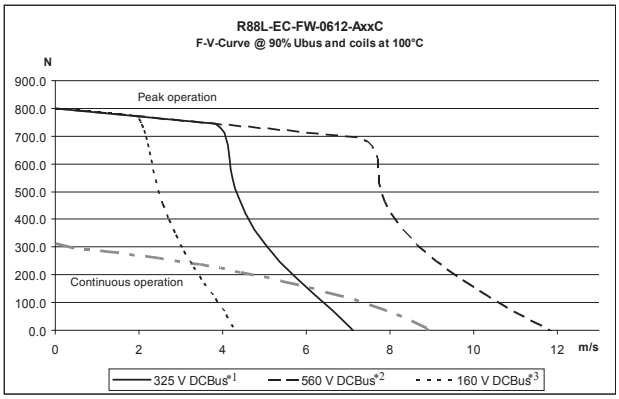
Force-speed characteristics

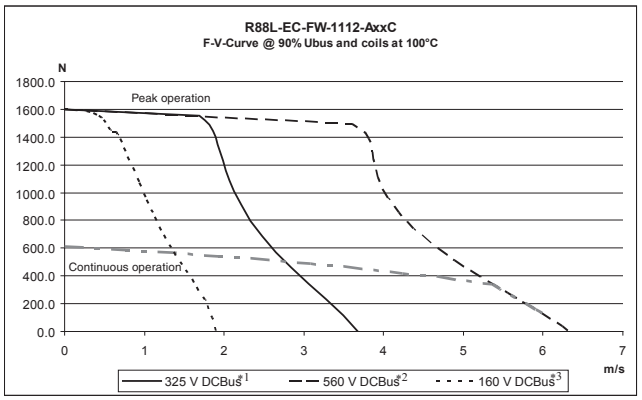


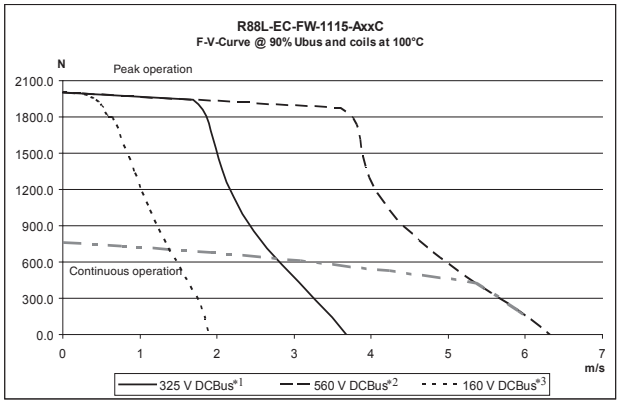












*1 The DCBus voltage corresponds to an AC voltage input (V_{ACIN}) of 235 V or more.
*2 The DCBus voltage corresponds to an AC voltage input (V_{ACIN}) of 400 V or more.
*3 The DCBus voltage corresponds to an AC voltage input (V_{ACIN}) of 115 V or more.

Note: The DCBus value is calculated from the below formula (where is the AV voltage drop in the DC Bus):

$$DCBuS = V_{ACIN} \times \sqrt{2} - \Delta V$$

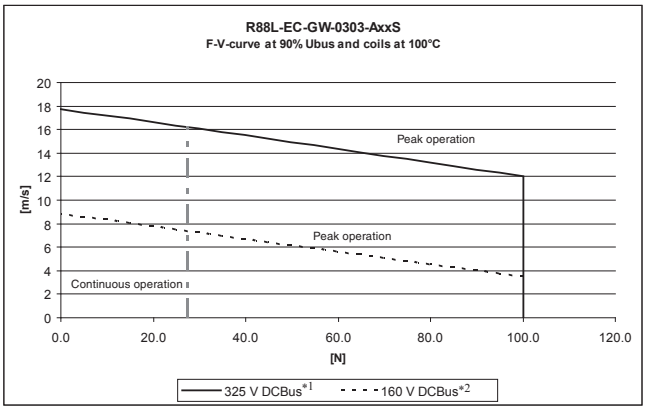
Ironless motors R88L-EC-GW-□ (230 VAC)

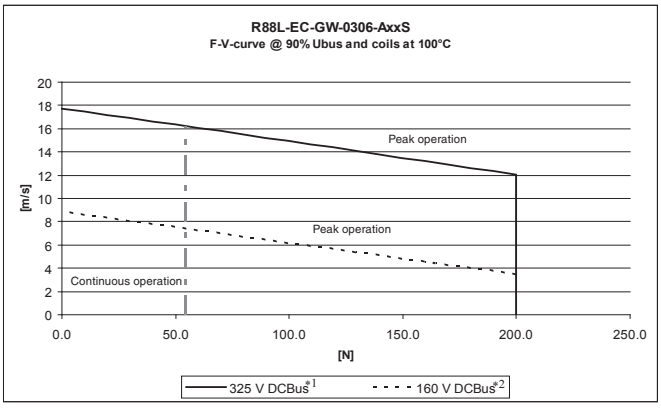
Voltage		230V								
Linear motor model	**R88L-EC-GW-□**	**0303-□**	**0306-□**	**0309-□**	**0503-□**	**0506-□**	**0509-□**	**0703-□**	**0706-□**	**0709-□**
Maximum speed (100V)	**m/s**	8			2.2			1.2		
Maximum speed (200V)	**m/s**	16			4.4			2.4		
Peak force[*1]	**N**	100	200	300	240	480	720	700	1400	2100
Peak current[*1]	**Arms**	5	10	15	3.5	7.0	10.5	5.6	11.3	16.9
Continuous force[*2]	**N**	29	58	87	70	140	210	141	282	423
Continuous current[*2]	**Arms**	1.5	2.9	4.4	1.03	2.1	3.1	1.14	2.27	3.4
Motor force constant	**N/A_{rms}**	19.9			68			124		
BEMF	**V/m/s**	16			55.5			101		
Motor constant	**$N/\sqrt{W}$**	5.07	7.16	8.78	9.74	13.77	17.13	18.15	25.67	32.02
Phase resistance	**Ω**	5.5	2,8	1.8	15.9	8	5,3	15.8	7.9	5.3
Phase Inductance	**mH**	1.8	0.9	0.6	13	6.5	4.2	28	14	9
Electrical time constant	**ms**	0.35			0.8			1.8		
Max. cont. power dissipation (all coils)	**W**	47	95	142	67	134	200	82	165	247
Thermal resistance[*2]	**K/W**	1.8	0.90	0.6	1.3	0.65	0.43	1.04	0.52	0.35
Thermal time constant	**s**	36			72			156		
Magnetic attraction force	**N**	0								
Magnet pole pitch	**mm**	30			42			57		
Weight coil unit[*3]	**kg**	0.084	0.162	0.240	0.25	0.47	0.69	0.55	0.95	1.35
Weight magnet track	**kg/m**	4.8			11.2			24		
Protection methods[*4]		Temperature sensors NTC10k, PTC110C, self cooling								
Hall sensor		Digital (optional)								
Insulation class		Class B								
Max. bus voltage		325 VDC								
Insulation resistance		500 VDC, min. 10 MΩ								
Di-electric strength		2250 V for 1 sec								
Max. allowable coil temperature		110°C								
Ambient humidity		20 to 80% non-condensing								
Max. allowable magnet temperature		70°C								

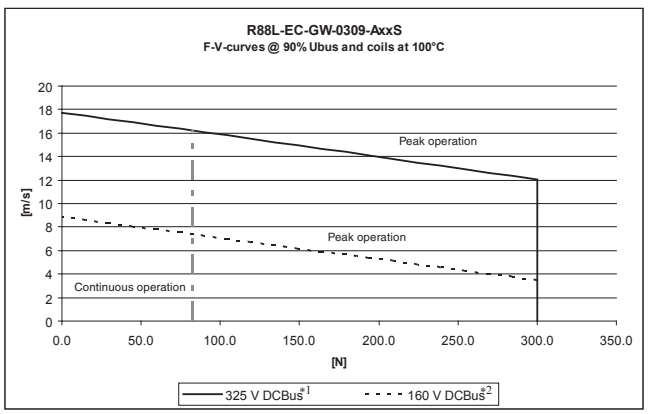
[*1] Coil temperature rising 03-series by 40K/s, 05-series by 20K/s and 07-series by 20K/s.
[*2] Values at 110°C coil temperature and magnets at 25°C. Coil unit installed on a water-cooled aluminium surface. Attention: All other values at 25°C. Values can have a tolerance of 10%.
[*3] Weight without connector and cable.
[*4] I^2t has to be set properly for high current overload applications.

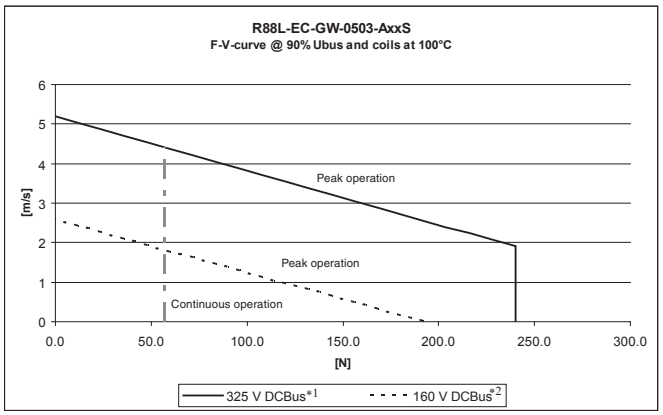
All other values at 25ºC (±10%).

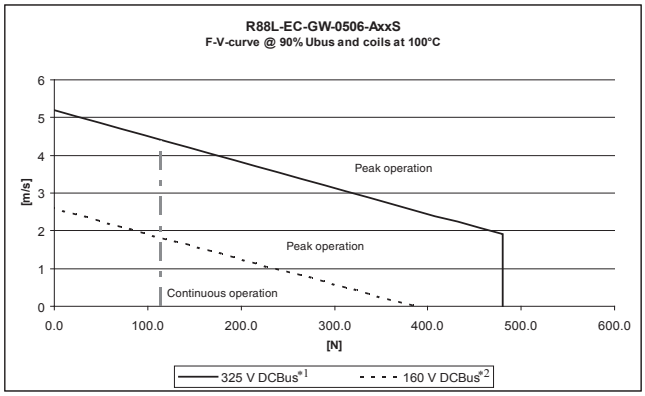
Force-speed characteristics

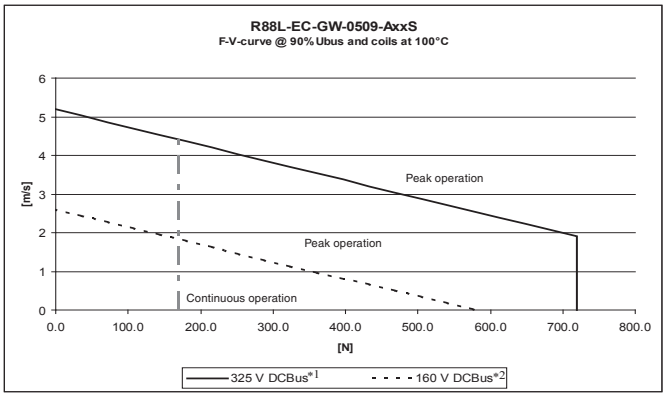


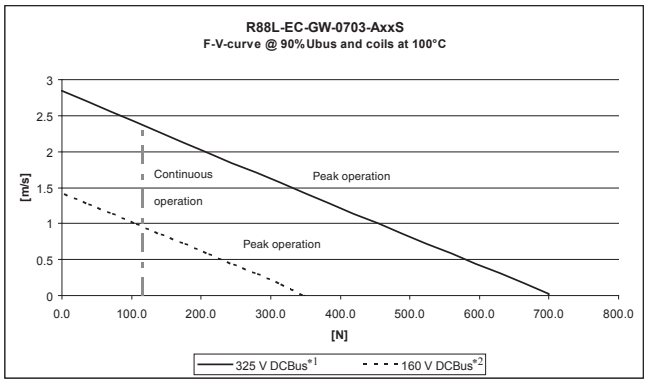


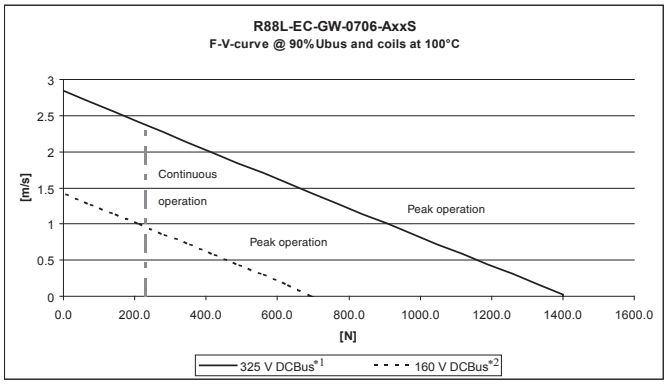


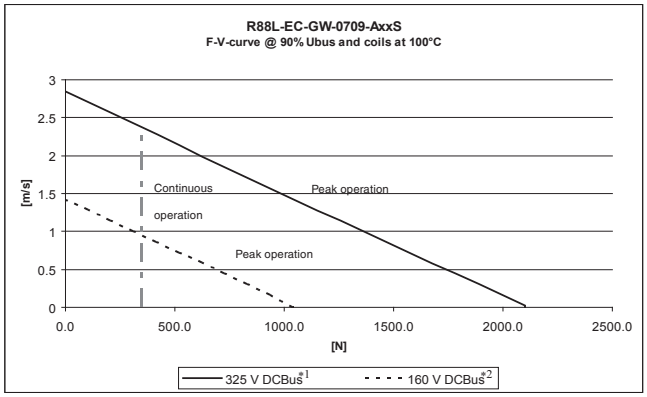












*1 The DCBus voltage corresponds to an AC voltage input (V_{ACIN}) of 235V or more.
*2 The DCBus voltage corresponds to an AC voltage input (V_{ACIN}) of 115V or more.

Note: The DCBus value is calculated from the below formula:

$$DCBuS = V_{ACIN} \times \sqrt{2} - \Delta V$$

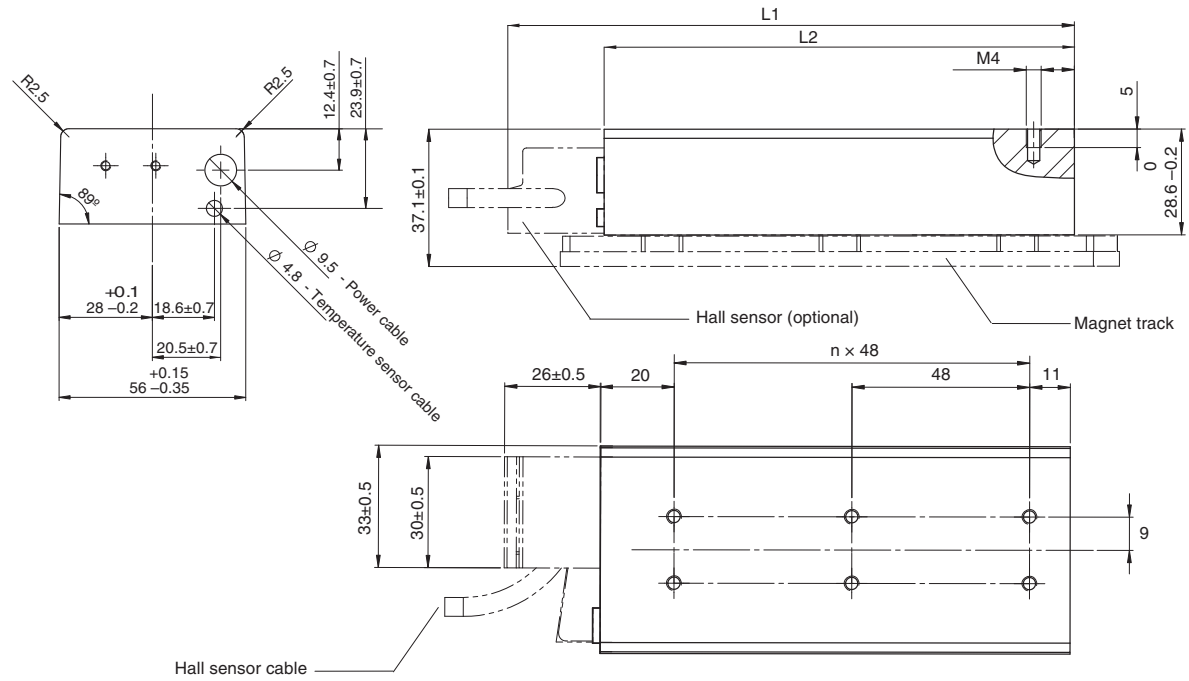
Dimensions

Iron-core R88L-EC-FW-03□

Motor coil

Model	L1 (mm)	L2 (mm)	n
R88L-EC-FW-0303-□	105 ±0.5	79 +0.15/–0.35	1
R88L-EC-FW-0306-□	153 ±0.5	127 +0.15/–0.35	2

Motor coil dimensions with magnet track and hall sensor (optional)



Units: mm

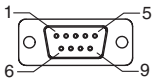
Wiring specifications for motor with connectors



Cable length 500±30
Connector optional
Made by Hypertac
LRRA06AMRPN182 (MALE)
Pin article code: 021.279.1020

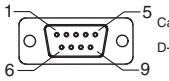
Power connector		
Pin No.	Wire	Function
1	Black-1	Phase U
2	Black-2	Phase V
3	Green/Yellow	Ground
4	Black-3	Phase W
5	Not used	–
6	Not used	–

Mating connector:
Plug type: LPRA06BFRBN170



Cable length 500±30
Connector optional
D-Sub 9-pin (FEMALE)

Temperature sensor connector		
Pin No.	Wire	Function
1	Not used	–
2	Not used	–
3	Not used	–
4	Not used	–
5	Not used	–
6	White	PTC
7	Brown	PTC
8	Green	KTY
9	Yellow	KTY
Case	Shield	–

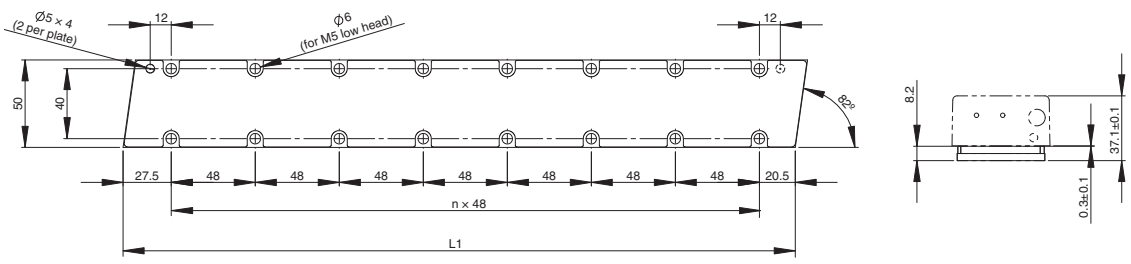


Cable length 500±30
D-Sub 9-pin (FEMALE)

Hall sensor connector (optional)		
Pin No.	Wire	Function
1	Brown	5V
2	Red	Hall U
3	Grey	Hall V
4	Yellow	Hall W
5	White	GND
6	Not used	Not used
7	Not used	Not used
8	Not used	Not used
9	Not used	Not used
Case	Shield	–

Magnet track

Model	L1 (mm)	n	Approx. weight (kg/m)
R88L-EC-FM-03096-A	96	1	2.1
R88L-EC-FM-03144-A	144	2	
R88L-EC-FM-03384-A	384	7	

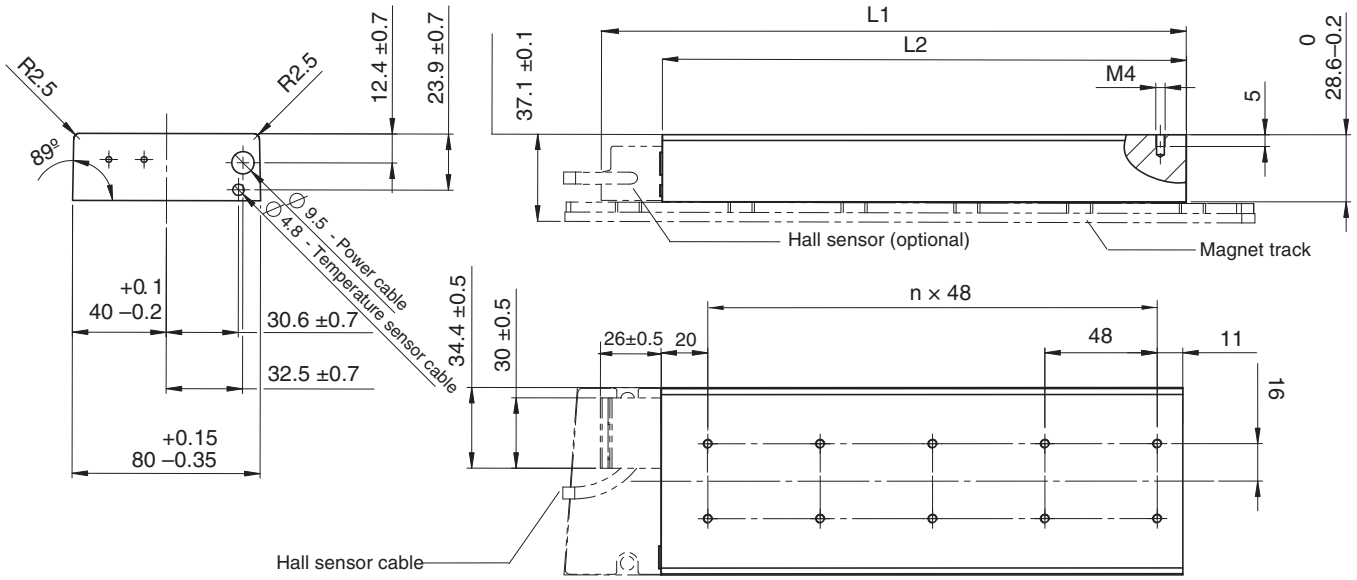


Iron-core R88L-EC-FW-06□

Motor coil

Model	L1 (mm)	L2 (mm)	n
R88L-EC-FW-0606-□	153 ±0.5	127 +0.15/–0.35	2
R88L-EC-FW-0609-□	201 ±0.5	175 +0.15/–0.35	3
R88L-EC-FW-0612-□	249 ±0.5	223 +0.15/–0.35	4

Motor coil dimensions with magnet track and hall sensor (optional)



Units: mm

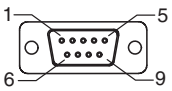
Wiring specifications for motor with connectors



Cable length 500±30
Connector optional
Made by Hypertac
LRRA06AMRPN182 (MALE)
Pin article code: 021.279.1020

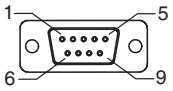
Power connector		
Pin No.	Wire	Function
1	Black-1	Phase U
2	Black-2	Phase V
3	Green/Yellow	Ground
4	Black-3	Phase W
5	Not used	–
6	Not used	–

Mating connector:
Plug type: LPRA06BFRBN170



Cable length 500±30
Connector optional
D-Sub 9-pin (FEMALE)

Temperature sensor connector		
Pin No.	Wire	Function
1	Not used	–
2	Not used	–
3	Not used	–
4	Not used	–
5	Not used	–
6	White	PTC
7	Brown	PTC
8	Green	KTY
9	Yellow	KTY
Case	Shield	–

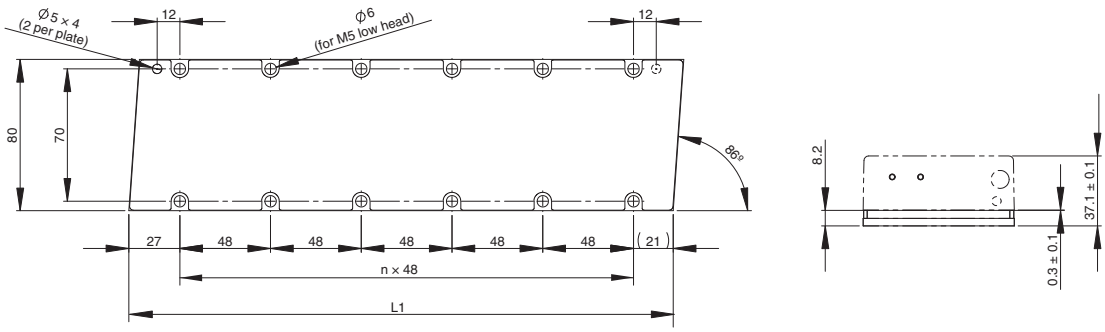


Cable length 500±30
D-Sub 9-pin (FEMALE)

Hall sensor connector (optional)		
Pin No.	Wire	Function
1	Brown	5 V
2	Red	Hall U
3	Grey	Hall V
4	Yellow	Hall W
5	White	GND
6	Not used	Not used
7	Not used	Not used
8	Not used	Not used
9	Not used	Not used
Case	Shield	–

Magnet track

Model	L1 (mm)	n	Approx. weight (kg/m)
R88L-EC-FM-06192-A	192	3	3.8
R88L-EC-FM-06288-A	288	5	

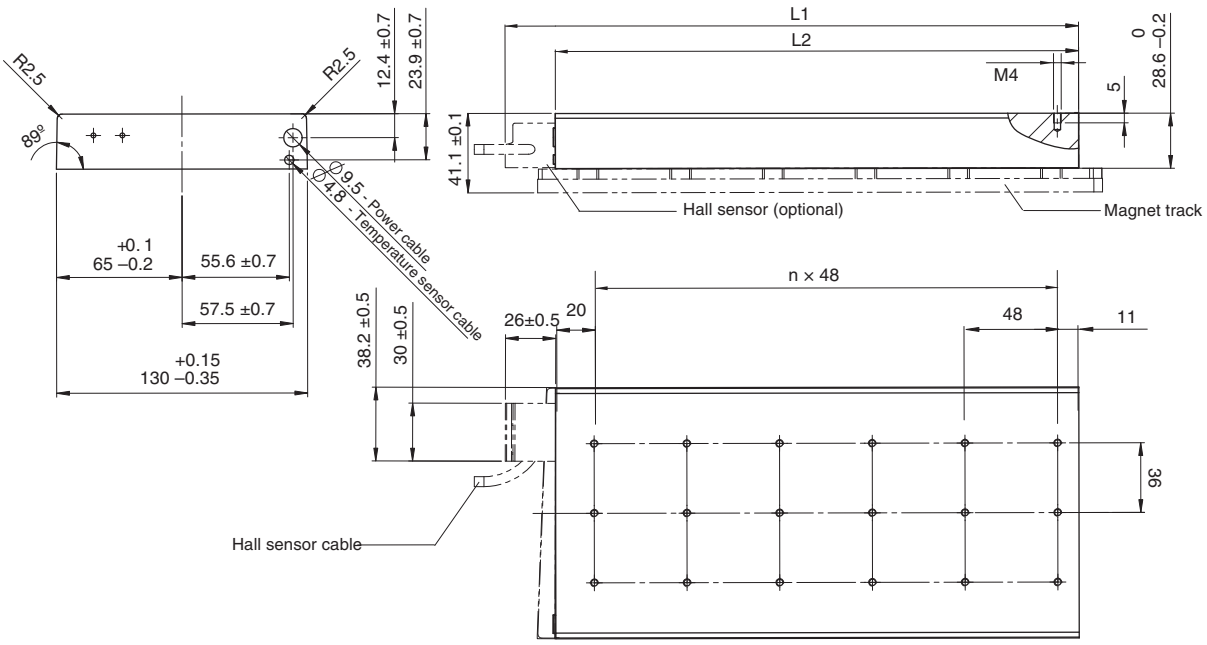


Iron-core R88L-EC-FW-11□

Motor coil

Model	L1 (mm)	L2 (mm)	n
R88L-EC-FW-1112-□	249 ±0.5	223 +0.15/–0.35	4
R88L-EC-FW-1115-□	297 ±0.5	271 +0.15/–0.35	5

Motor coil dimensions with magnet track and hall sensor (optional)



Units: mm

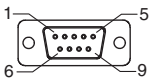
Wiring specifications for motor with connectors



Cable length 500±30
Connector optional
Made by Hypertac
LRRA06AMRPN182 (MALE)
Pin article code: 021.279.1020

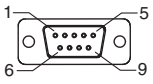
Power connector		
Pin No.	Wire	Function
1	Black-1	Phase U
2	Black-2	Phase V
3	Green/Yellow	Ground
4	Black-3	Phase W
5	Not used	–
6	Not used	–

Mating connector:
Plug type: LPRA06BFRBN170



Cable length 500±30
Connector optional
D-Sub 9-pin (FEMALE)

Temperature sensor connector		
Pin No.	Wire	Function
1	Not used	–
2	Not used	–
3	Not used	–
4	Not used	–
5	Not used	–
6	White	PTC
7	Brown	PTC
8	Green	KTY
9	Yellow	KTY
Case	Shield	–

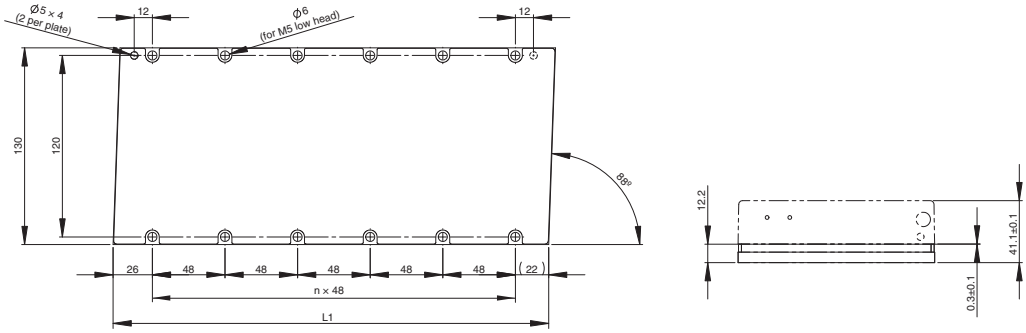


Cable length 500±30
D-Sub 9-pin (FEMALE)

Hall sensor connector (optional)		
Pin No.	Wire	Function
1	Brown	5 V
2	Red	Hall U
3	Grey	Hall V
4	Yellow	Hall W
5	White	GND
6	Not used	Not used
7	Not used	Not used
8	Not used	Not used
9	Not used	Not used
Case	Shield	–

Magnet track

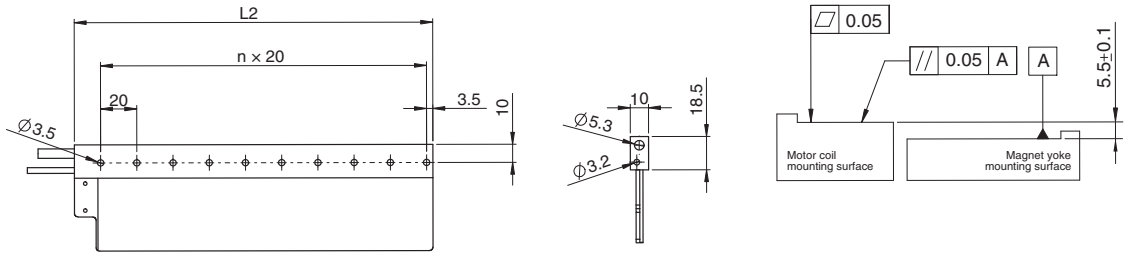
Model	L1 (mm)	n	Approx. weight (kg/m)
R88L-EC-FM-11192-A	192	3	10.5
R88L-EC-FM-11288-A	288	5	



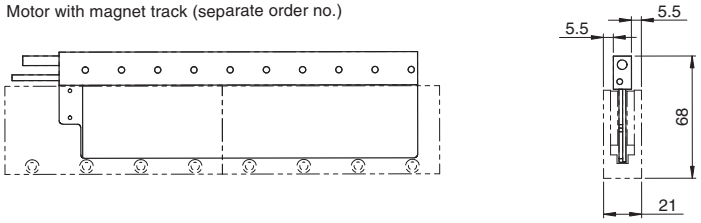
Ironless R88L-EC-GW-03□

Motor coil

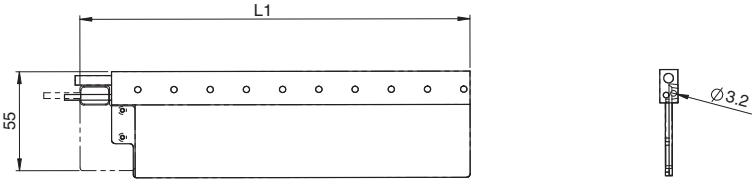
Model	L1 (mm)	L2 (mm)	n
R88L-EC-GW-0303-□	95.4	78	3
R88L-EC-GW-0306-□	155.4	138	6
R88L-EC-GW-0309-□	215.4	198	9



Motor with magnet track (separate order no.)

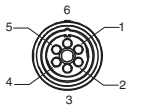


Motor with hall sensor (optional)



Units: mm

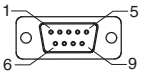
Wiring specifications for motor with connectors



Cable length 1000±30
Connector optional
Made by Hypertac
SROC06JMSCN169 (MALE)
Pin article code: 021.423.1020

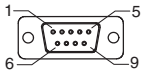
Power connector		
Pin No.	Wire	Function
1	Black	Phase U
2	Red	Phase V
3	White	Phase W
4	Not used	–
5	Not used	–
6	Green	Ground

Mating connector:
Plug type: SPOC06KFSDN169



Cable length 500±30
Connector optional
D-Sub 9-pin (FEMALE)

Temperature sensor connector		
Pin No.	Wire	Function
1	Not used	–
2	Not used	–
3	Not used	–
4	Not used	–
5	Not used	–
6	White	PTC
7	Brown	PTC
8	Green	NTC
9	Yellow	NTC
Case	Shield	–

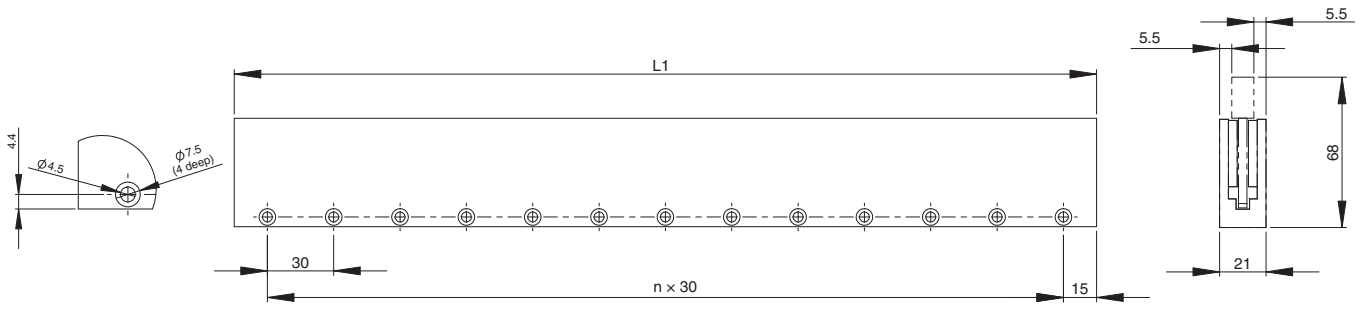


Cable length 500±30
D-Sub 9-pin (FEMALE)

Hall sensor connector (optional)		
Pin No.	Wire	Function
1	Brown	5 V
2	Red	Hall U
3	Grey	Hall V
4	Yellow	Hall W
5	White	GND
6	Not used	Not used
7	Not used	Not used
8	Not used	Not used
9	Not used	Not used
Case	Shield	–

Magnet track

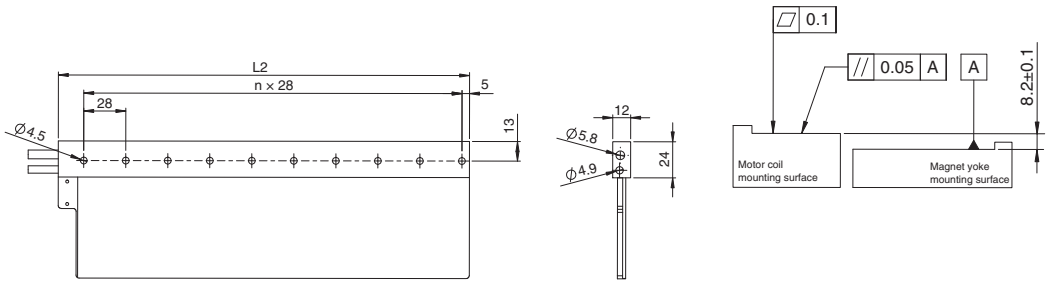
Model	L1 (mm)	n	Approx. weight (kg/m)
R88L-EC-GM-03090-A	90	2	4.8
R88L-EC-GM-03120-A	120	3	
R88L-EC-GM-03390-A	390	12	



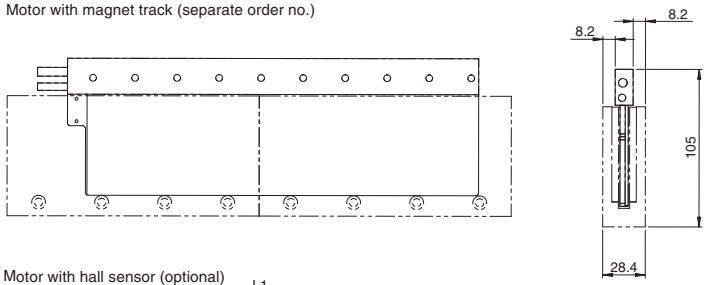
Ironless R88L-EC-GW-05□

Motor coil

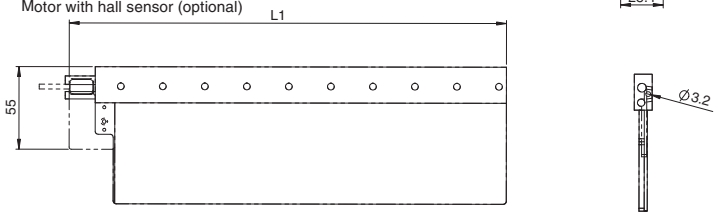
Model	L1 (mm)	L2 (mm)	n
R88L-EC-GW-0503-□	123.4	106	3
R88L-EC-GW-0506-□	207.4	190	6
R88L-EC-GW-0509-□	291.4	274	9



Motor with magnet track (separate order no.)

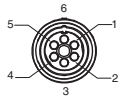


Motor with hall sensor (optional)



Units: mm

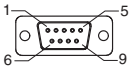
Wiring specifications for motor with connectors



Cable length 1000±30
Connector optional
Made by Hypertac
SROC06JMSCN169 (MALE)
Pin article code: 021.423.1020

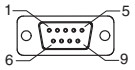
Power connector		
Pin No.	Wire	Function
1	Black	Phase U
2	Red	Phase V
3	White	Phase W
4	Not used	–
5	Not used	–
6	Green	Ground

Mating connector:
Plug type: SPOC06KFSDN169



Cable length 500±30
Connector optional
D-Sub 9-pin (FEMALE)

Temperature sensor connector		
Pin No.	Wire	Function
1	Not used	–
2	Not used	–
3	Not used	–
4	Not used	–
5	Not used	–
6	White	PTC
7	Brown	PTC
8	Green	NTC
9	Yellow	NTC
Case	Shield	–

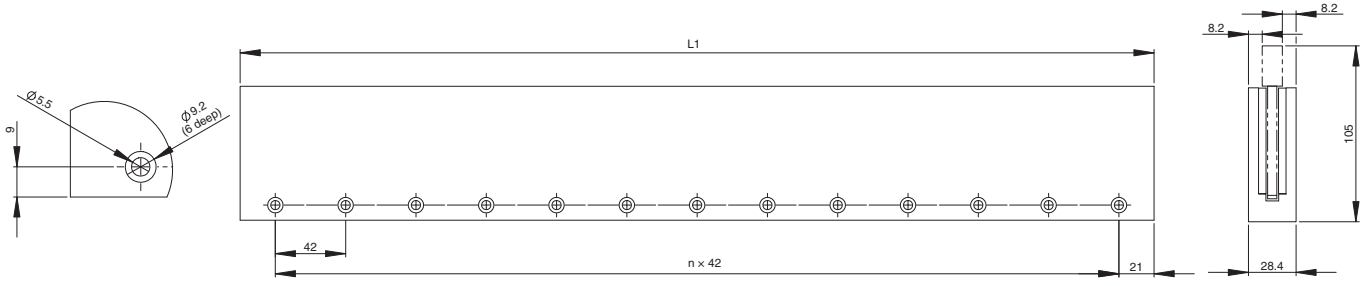


Cable length 500±30
D-Sub 9-pin (FEMALE)

Hall sensor connector (optional)		
Pin No.	Wire	Function
1	Brown	5 V
2	Red	Hall U
3	Grey	Hall V
4	Yellow	Hall W
5	White	GND
6	Not used	Not used
7	Not used	Not used
8	Not used	Not used
9	Not used	Not used
Case	Shield	–

Magnet track

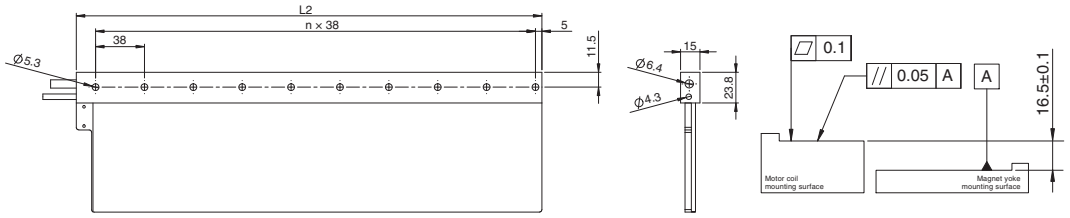
Model	L1 (mm)	n	Approx. weight (kg/m)
R88L-EC-GM-05126-A	126	2	11.2
R88L-EC-GM-05168-A	168	3	
R88L-EC-GM-05210-A	210	4	
R88L-EC-GM-05546-A	546	12	



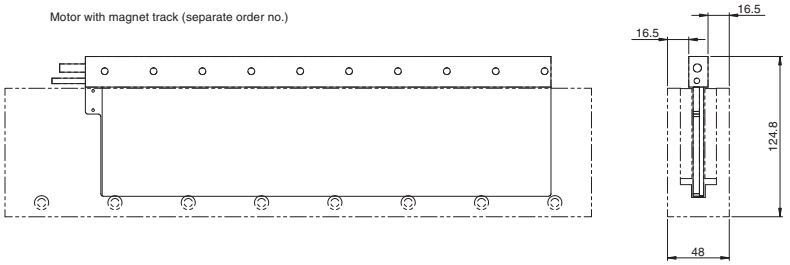
Ironless R88L-EC-GW-07□

Motor coil

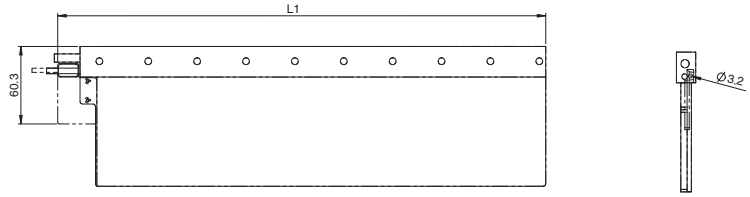
Model	L1 (mm)	L2 (mm)	n
R88L-EC-GW-0703-□	151.4	134	3
R88L-EC-GW-0706-□	265.4	248	6
R88L-EC-GW-0709-□	379.4	362	9



Motor with magnet track (separate order no.)

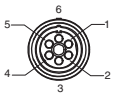


Motor with hall sensor (optional)



Units: mm

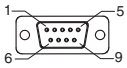
Wiring specifications for motor with connectors



Cable length 1000±30
Connector optional
Made by Hypertac
SROC06JMSCN169 (MALE)
Pin article code: 021.423.1020

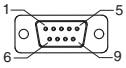
Power connector		
Pin No.	Wire	Function
1	Black	Phase U
2	Red	Phase V
3	White	Phase W
4	Not used	–
5	Not used	–
6	Green	Ground

Mating connector:
Plug type: SPOC06KFSDN169



Cable length 500±30
Connector optional
D-Sub 9-pin (FEMALE)

Temperature sensor connector		
Pin No.	Wire	Function
1	Not used	–
2	Not used	–
3	Not used	–
4	Not used	–
5	Not used	–
6	White	PTC
7	Brown	PTC
8	Green	NTC
9	Yellow	NTC
Case	Shield	–

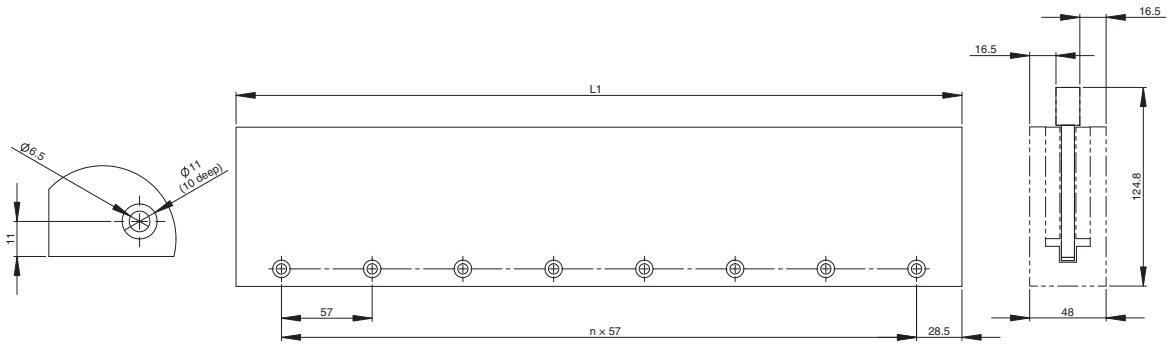


Cable length 500±30
D-Sub 9-pin (FEMALE)

Hall sensor connector (optional)		
Pin No.	Wire	Function
1	Brown	5V
2	Red	Hall U
3	Grey	Hall V
4	Yellow	Hall W
5	White	GND
6	Not used	Not used
7	Not used	Not used
8	Not used	Not used
9	Not used	Not used
Case	Shield	–

Magnet track

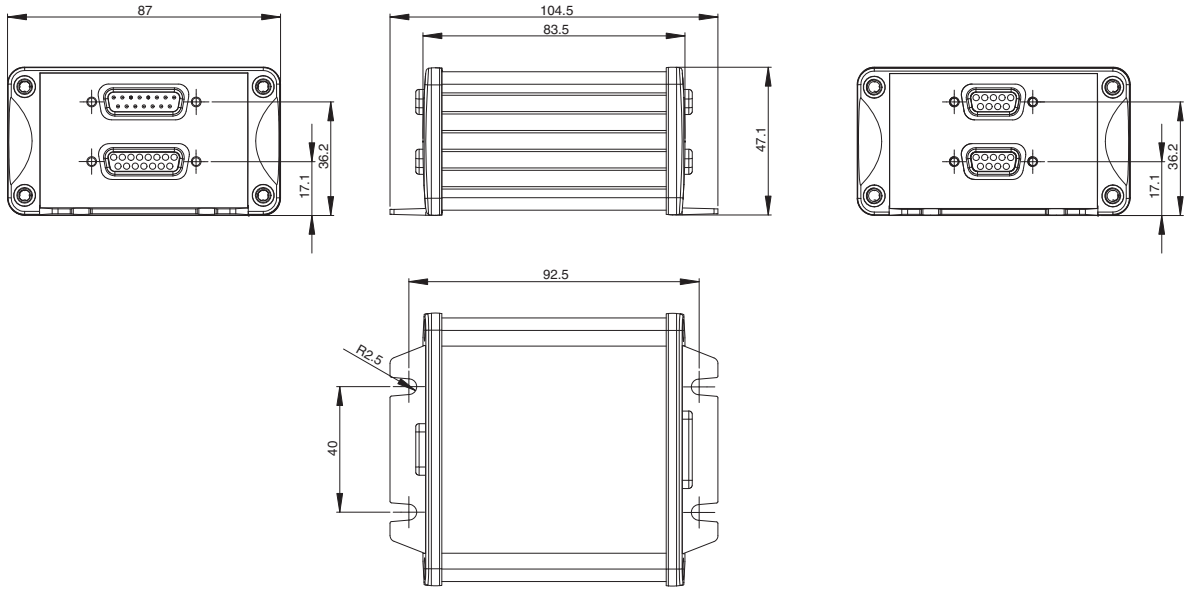
Model	L1 (mm)	n	Approx. weight (kg/m)
R88L-EC-GM-07114-A	114	1	25.5
R88L-EC-GM-07171-A	171	2	
R88L-EC-GM-07456-A	456	7	



Optional serial converter unit

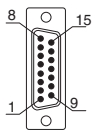
Specifications

Serial converter model R88A-		SC01K-E	SC02K-E
Description		Serial converter from 1 Vpp to G5 serial data transmission and with hall sensor input	
Temperature sensor		KTY sensor detection of iron-core motor coil	NTC sensor detection of ironless motor coil
Electrical characteristics	Power supply voltage	5 VDC, max. 250 mA supplied by the drive	
	Standard resolution	Interpolation factor 100 plus quadrature count	
	Max. input frequency	400 kHz 1 Vpp	
	Analog input signals (cos, sin, Ref)	Differential input amplitude: 0.4 V to 1.2 V Input signal level: 1.5 V to 3.5 V	
	Output signals	Position data, hall & temperature sensor information, and alarms	
	Output method	Serial data transmission	
	Transmission cycle	<42 µs	
Mechanical characteristics	Vibration resistance	98 m/s^2 max. (1 to 2500 Hz) in three directions	
	Shock resistance	980 m/s^2, (11 ms) two times in three directions	
Environmental conditions	Operating temperature	0 to 55°C	
	Storage temperature	–20 to +80°C	
	Humidity	20% to 90% relative humidity (without condensation)	



CN4

Serial data output to linear servo drive

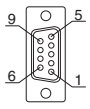


Connector D-Sub 15-pin (male)

Pin No.	Signal
1	PS
2	/PS
3	Not used
4	Not used
5	Not used
6	Not used
7	Not used
8	5 V
9	0 V
10	Not used
11	Not used
12	Not used
13	Not used
14	Not used
15	Inner shield
Case	Shield

CN3

Temperature sensor interface without Hall sensor

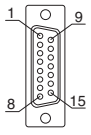


Connector D-Sub 9-pin (female)

Pin No.	Signal
1	Not used
2	Not used
3	Not used
4	Not used
5	Not used
6	PTC
7	PTC
8	KTY/ NTC
9	KTY/NTC
Case	Shield

CN1

Encoder input 1Vpp with programmable lines NUMERIK JENA standard

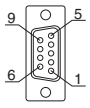


Connector D-Sub 15-pin (female)

Pin No.	Signal
1	SDA*
2	SCL*
3	Not used
4	/Ref signal (U_{0-})
5	/Cos signal (U_{2-})
6	/Sin signal (U_{1-})
7	Not used
8	5 V
9	0 V
10	Not used
11	Not used
12	Ref signal (U_0)
13	Cos signal (U_2)
14	Sin signal (U_1)
15	Inner shield (IS)
Case	Shield

CN2

Hall & temperature sensors interface



Connector D-Sub 9-pin (female)

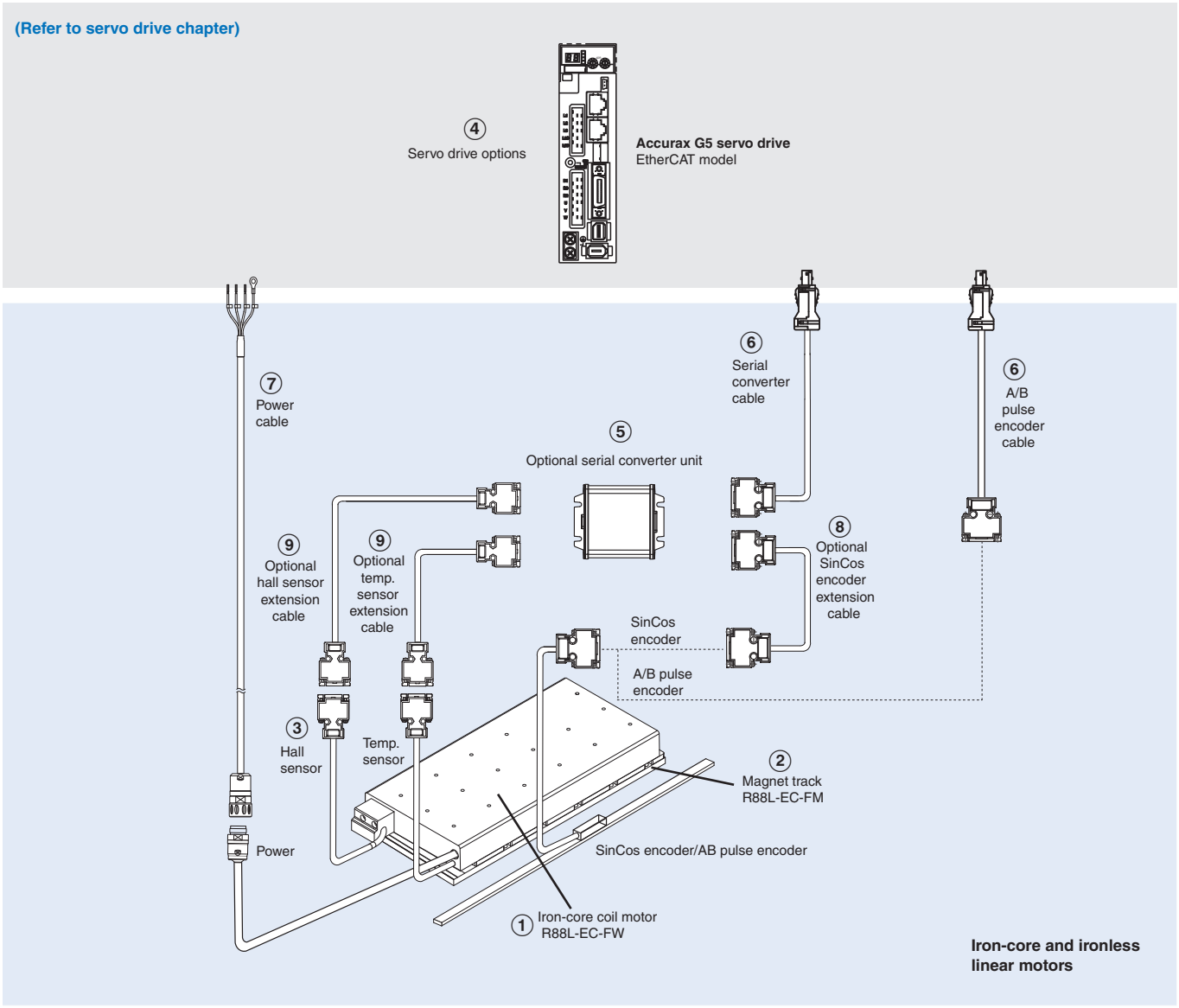
Pin No.	Signal
1	5V
2	Hall U
3	Hall V
4	Hall W
5	GND
6	PTC
7	PTC
8	KTY/NTC
9	KTY/NTC
Case	Shield

*Reserved. Please do not use

Note: As the 6,7,8,9 pins in the CN2 and CN3 connectors are internally wired, the Temperature sensor can be connected to both connectors. When the Hall sensor is also required, use the same cable for Hall & Temperature signals and the CN2 connector.

Ordering information

(Refer to servo drive chapter)



Note: The symbols ①②③... show the recommended sequence to select the linear motor, cables and serial converter for a linear motor system.

Linear motors

R88L-EC-FW-□ Iron-core type

230 VAC single phase/three phase, 400 VAC three phase

Linear motor parts							Linear Servo drive ④ Accurax G5 EtherCAT	
Symbol	Rated force	Peak force	① Iron-core motor coil		② Magnet track	③ Hall Sensor	230 V	400 V
①②③④ 	48 N	105 N	Coil without connectors	R88L-EC-FW-0303-ANPC	R88L-EC-FM-03096-A R88L-EC-FM-03144-A R88L-EC-FM-03384-A	R88L-EC-FH-NNNN-A	R88D-KN02H-ECT-L	R88D-KN06F-ECT-L
	96 N	210 N		R88L-EC-FW-0306-ANPC			R88D-KN04H-ECT-L	R88D-KN10F-ECT-L
	160 N	400 N		R88L-EC-FW-0606-ANPC	R88L-EC-FM-06192-A R88L-EC-FM-06288-A		R88D-KN08H-ECT-L	R88D-KN15F-ECT-L
	240 N	600 N		R88L-EC-FW-0609-ANPC			R88D-KN10H-ECT-L	R88D-KN20F-ECT-L
	320 N	800 N		R88L-EC-FW-0612-ANPC			R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	608 N	1600 N		R88L-EC-FW-1112-ANPC	R88L-EC-FM-11192-A R88L-EC-FM-11288-A		R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	760 N	2000 N		R88L-EC-FW-1115-ANPC			R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	48 N	105 N	Coil with connectors	R88L-EC-FW-0303-APLC	R88L-EC-FM-03096-A R88L-EC-FM-03144-A R88L-EC-FM-03384-A		R88D-KN02H-ECT-L	R88D-KN06F-ECT-L
	96 N	210 N		R88L-EC-FW-0306-APLC			R88D-KN04H-ECT-L	R88D-KN10F-ECT-L
	160 N	400 N		R88L-EC-FW-0606-APLC	R88L-EC-FM-06192-A R88L-EC-FM-06288-A		R88D-KN08H-ECT-L	R88D-KN15F-ECT-L
	240 N	600 N		R88L-EC-FW-0609-APLC			R88D-KN10H-ECT-L	R88D-KN20F-ECT-L
	320 N	800 N		R88L-EC-FW-0612-APLC			R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	608 N	1600 N		R88L-EC-FW-1112-APLC	R88L-EC-FM-11192-A R88L-EC-FM-11288-A		R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	760 N	2000 N		R88L-EC-FW-1115-APLC			R88D-KN15H-ECT-L	R88D-KN30F-ECT-L

R88L-EC-GW-□ Ironless type

230 VAC single phase/three phase

Linear motor parts							Linear Servo drive
							④ Accurax G5 EtherCAT
Type	Rated force	Peak force	① Ironless motor coil		② Magnet track	③ Hall Sensor	230V
①② ③④ 	29 N	100 N	Coil without connectors	R88L-EC-GW-0303-ANPS	R88L-EC-GM-03090-A R88L-EC-GM-03120-A R88L-EC-GM-03390-A	R88L-EC-GH-03NN-A	R88D-KN02H-ECT-L
	58 N	200 N		R88L-EC-GW-0306-ANPS			R88D-KN08H-ECT-L
	87 N	300 N		R88L-EC-GW-0309-ANPS			R88D-KN10H-ECT-L
	70 N	240 N		R88L-EC-GW-0503-ANPS	R88L-EC-GM-05126-A R88L-EC-GM-05546-A R88L-EC-GM-05168-A R88L-EC-GM-05210-A	R88L-EC-GH-05NN-A	R88D-KN02H-ECT-L
	140 N	480 N		R88L-EC-GW-0506-ANPS			R88D-KN04H-ECT-L
	210 N	720 N		R88L-EC-GW-0509-ANPS			R88D-KN08H-ECT-L
	141 N	700 N		R88L-EC-GW-0703-ANPS	R88L-EC-GM-07114-A R88L-EC-GM-07171-A R88L-EC-GM-07456-A	R88L-EC-GH-07NN-A	R88D-KN04H-ECT-L
	282 N	1400 N		R88L-EC-GW-0706-ANPS			R88D-KN08H-ECT-L
	423 N	2100 N		R88L-EC-GW-0709-ANPS			R88D-KN10H-ECT-L
	29 N	100 N	Coil with connectors	R88L-EC-GW-0303-APLS	R88L-EC-GM-03090-A R88L-EC-GM-03120-A R88L-EC-GM-03390-A	R88L-EC-GH-03NN-A	R88D-KN02H-ECT-L
	58 N	200 N		R88L-EC-GW-0306-APLS			R88D-KN08H-ECT-L
	87 N	300 N		R88L-EC-GW-0309-APLS			R88D-KN10H-ECT-L
	70 N	240 N		R88L-EC-GW-0503-APLS	R88L-EC-GM-05126-A R88L-EC-GM-05546-A R88L-EC-GM-05168-A R88L-EC-GM-05210-A	R88L-EC-GH-05NN-A	R88D-KN02H-ECT-L
	140 N	480 N		R88L-EC-GW-0506-APLS			R88D-KN04H-ECTL
	210 N	720 N		R88L-EC-GW-0509-APLS			R88D-KN08H-ECT-L
	141 N	700 N		R88L-EC-GW-0703-APLS	R88L-EC-GM-07114-A R88L-EC-GM-07171-A R88L-EC-GM-07456-A	R88L-EC-GH-07NN-A	R88D-KN04H-ECTL
	282 N	1400 N		R88L-EC-GW-0706-APLS			R88D-KN08H-ECT-L
	423 N	2100 N		R88L-EC-GW-0709-APLS			R88D-KN10H-ECT-L

Servo drive

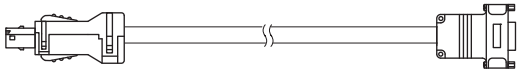
④ Refer to Accurax G5 servo drive chapter for detailed drive specifications and selection of drive accessories.

Serial converter unit

Symbol	Specifications	Model
⑤	Serial converter unit from 1 Vpp to G5 serial data transmission (with KTY sensor detection of iron-core motor coil)	R88A-SC01K-E
	Serial converter unit from 1 Vpp to G5 serial data transmission (with NTC sensor detection of ironless motor coil)	R88A-SC02K-E

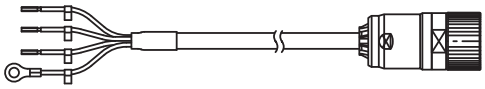
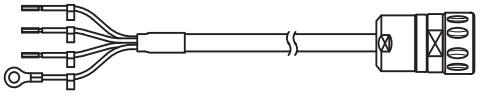
Note: If no temperature sensor is needed, then it does not matter which converter you use.

Serial converter cable to servo drive

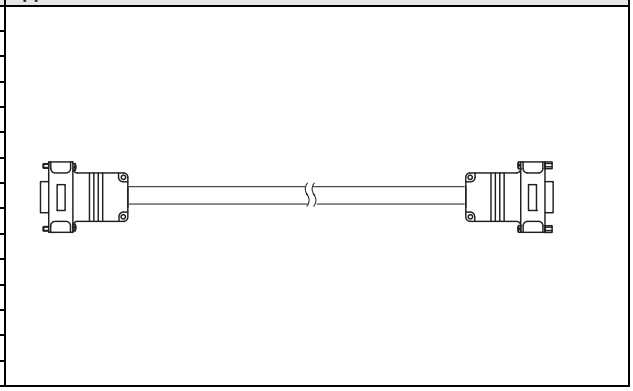
Symbol	Specifications		Model	Appearance
⑥	Accurax G5-Linear drive to serial converter cable. (Connectors R88A-CNK41L and DB-15)	1.5 m	R88A-CRKN001-5CR-E	
		3 m	R88A-CRKN003CR-E	
		5 m	R88A-CRKN005CR-E	
		10 m	R88A-CRKN010CR-E	
		15 m	R88A-CRKN015CR-E	
		20 m	R88A-CRKN020CR-E	

Note: This cable can be used also for A/B pulse encoder Numerik Jena standard pinout.

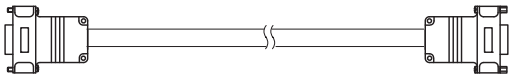
Power cable

Symbol	Specifications		Model	Appearance
⑦	For iron-core linear motors R88L-EC-FW-0303-□ R88L-EC-FW-0306-□	1.5 m	R88A-CAWK001-5S-DE	
		3 m	R88A-CAWK003S-DE	
		5 m	R88A-CAWK005S-DE	
		10 m	R88A-CAWK010S-DE	
		15 m	R88A-CAWK015S-DE	
		20 m	R88A-CAWK020S-DE	
	For iron-core linear motors R88L-EC-FW-0606-□ R88L-EC-FW-0609-□ R88L-EC-FW-0612-□ R88L-EC-FW-1112-□ R88L-EC-FW-1115-□	1.5 m	R88A-CAWL001-5S-DE	
		3 m	R88A-CAWL003S-DE	
		5 m	R88A-CAWL005S-DE	
		10 m	R88A-CAWL010S-DE	
		15 m	R88A-CAWL015S-DE	
		20 m	R88A-CAWL020S-DE	
	For ironless linear motors R88L-EC-GW-□	1.5 m	R88A-CAWB001-5S-DE	
		3 m	R88A-CAWB003S-DE	
		5 m	R88A-CAWB005S-DE	
		10 m	R88A-CAWB010S-DE	
		15 m	R88A-CAWB015S-DE	
		20 m	R88A-CAWB020S-DE	

Linear encoder cable to serial converter

Symbol	Specifications		Model	Appearance
⑧	Extension cable for **Numerik Jena** linear encoder to R88A-SC0□K-E serial converter (Connector DB-15) (This extension cable is optional)	1.5 m	R88A-CFKA001-5CR-E	
		3 m	R88A-CFKA003CR-E	
		5 m	R88A-CFKA005CR-E	
		10 m	R88A-CFKA010CR-E	
		15 m	R88A-CFKA015CR-E	
	Extension cable for **Renishaw** linear encoder to R88A-SC0□K-E serial converter (Connector DB-15) (This extension cable is optional)	1.5 m	R88A-CFKC001-5CR-E	
		3 m	R88A-CFKC003CR-E	
		5 m	R88A-CFKC005CR-E	
		10 m	R88A-CFKC010CR-E	
		15 m	R88A-CFKC015CR-E	
	Extension cable for **Heidenhain** linear encoder to R88A-SC0□K-E serial converter (Connector DB-15) (This extension cable is optional)	1.5 m	R88A-CFKD001-5CR-E	
		3 m	R88A-CFKD003CR-E	
		5 m	R88A-CFKD005CR-E	
		10 m	R88A-CFKD010CR-E	
		15 m	R88A-CFKD015CR-E	

Hall and temperature sensors cable to serial converter

Symbol	Specifications		Model	Appearance
⑨	Extension cable from hall and temperature sensors to R88A-SC0□K-E serial converter. (Connector DB-9) (This extension cable is optional)	1.5 m	R88A-CFKB001-5CR-E	
		3 m	R88A-CFKB003CR-E	
		5 m	R88A-CFKB005CR-E	
		10 m	R88A-CFKB010CR-E	
		15 m	R88A-CFKB015CR-E	

Connectors

Specification	Model
Accurax G5 servo drive encoder connector (for CN4)	R88A-CNK41L
Hypertac power cable connector IP67 for iron-core linear motors	LPRA-06B-FRBN170
Hypertac power cable connector IP67 for ironless linear motors	SROC06JMSCN169

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I160E-EN-02A In the interest of product improvement, specifications are subject to change without notice.

R88E-AECT□, R88S-EAD□

Integrated servo motor



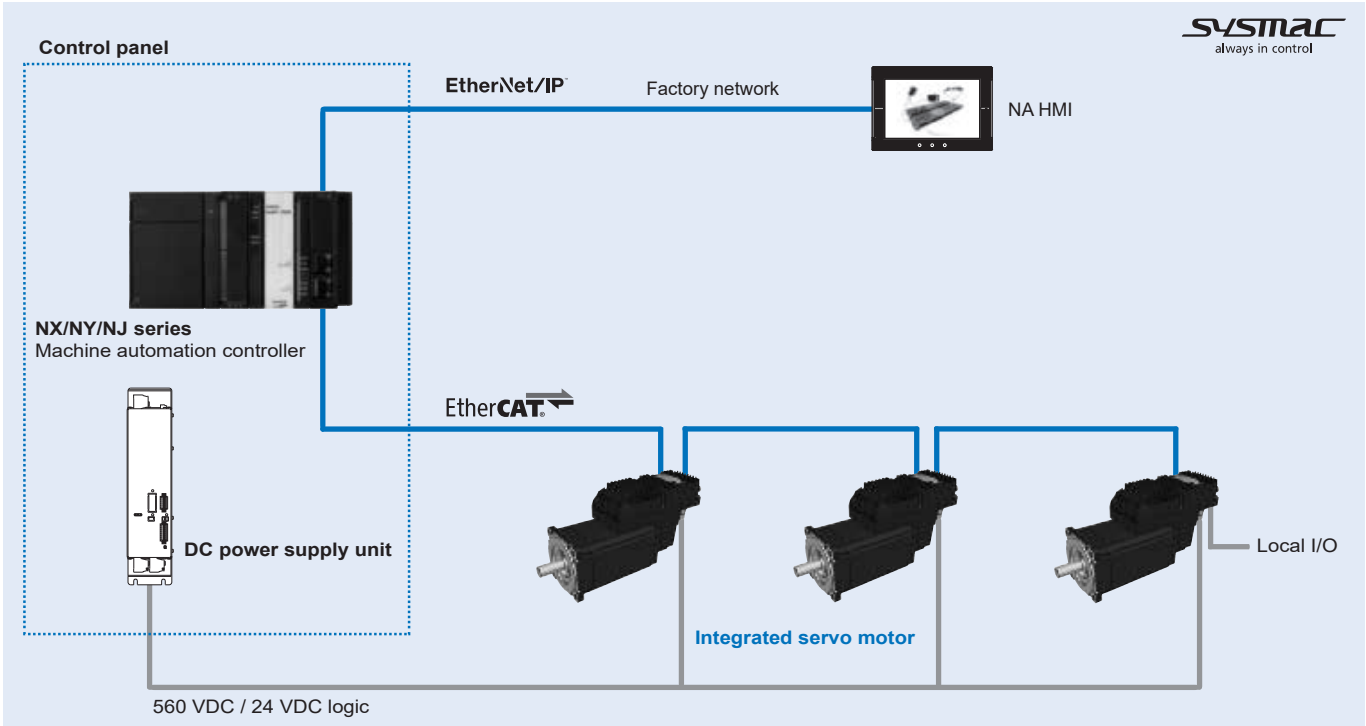
Motor and drive integrated for space optimization

- Wide range of motors from 2.55 Nm to 25 Nm
- 3000 rpm rated speed
- Peak torque 300% of rated torque
- IP65 protection
- Space-saving. Panel reduction
- Simplified wiring compared to conventional servos
- EtherCAT connectivity. Integration in Sysmac Automation Platform
- Energy saving by sharing DC Bus
- Incremental and multiturn absolute encoder options
- Embedded I/O's for dedicated or general purpose

Ratings

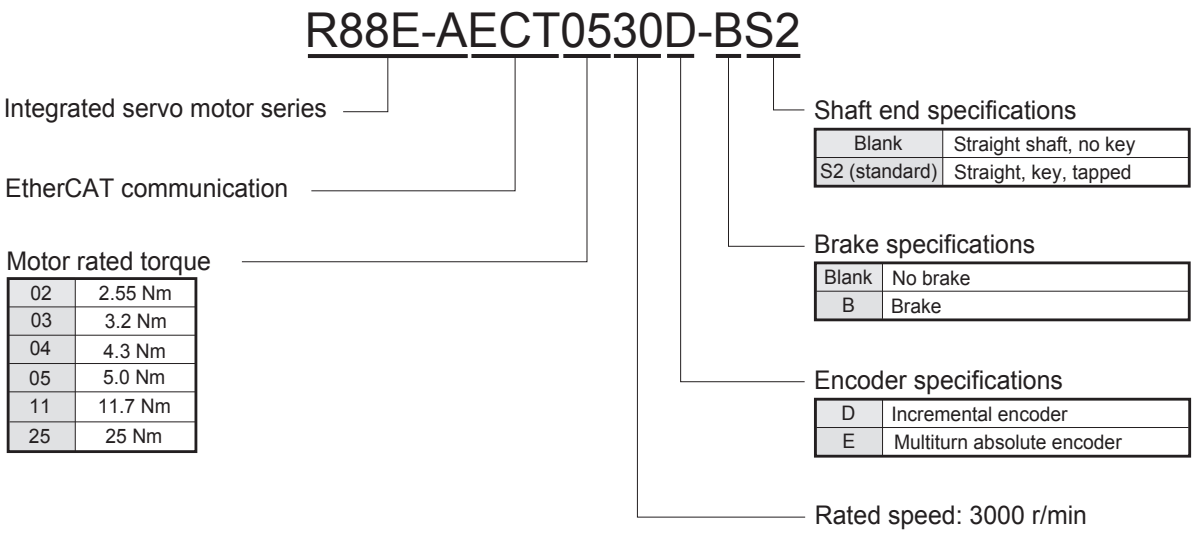
- From 880 W to 7.85 kW (rated torque from 2.55 Nm to 25 Nm)
- Power supply: Input 400 VAC (up to 40 A output)

System configuration

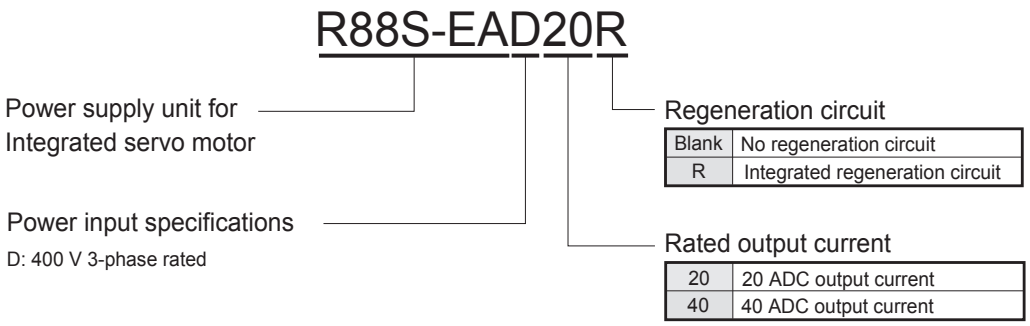


Type designation

Integrated servo motor



DC power supply unit



Integrated servo motor specifications

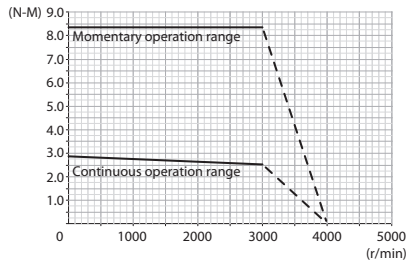
Integrated servo motor 3000 r/min, 560 VDC

Ratings and specifications

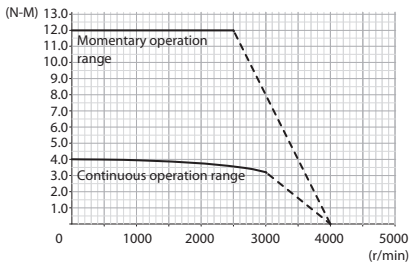
Voltage			560 VDC					
Integrated servo motor model R88E-AECT□		Incremental encoder	0230D-□	0330D-□	0430D-□	0530D-□	1130D-□	2530D-□
		Multiturn absolute encoder	0230E-□	0330E-□	0430E-□	0530E-□	1130E-□	2530E-□
Rated output		W	880	1000	1350	1570	3670	7850
Rated torque		N·m	2.55	3.2	4.3	5	11.7	25
Instantaneous peak torque		N·m	8.4	12	22	22	45	70
Rated current at rated speed		A (DC)	1.8	2.15	2.85	3.3	7.7	16.5
Instantaneous max. current		A (DC)	5.55	7.9	14.5	14.5	30	46
Rated speed		min^{-1}	3000					
Rotor moment of inertia (JM)		$kg·m^2×10^{-4}$ (without brake)	1.16	1.58	2.8	4	11.5	74
		$kg·m^2×10^{-4}$ (with brake)	1.38	1.80	3.6	5.06	13.2	106
Max. radial load		N	350	350	626	626	700	1000
Max. axial load		N	110	110	225	225	70	100
Approx. mass		kg (without brake)	4.1	5.1	6.7	8	17	38
		kg (with brake)	4.8	5.8	7.9	9.2	18.5	43
Brake	Holding brake moment of inertia J	$kg·m^2×10^{-4}$	0.22	0.22	0.8	1.06	1.7	32
Brake	Current consumption	A	0.50	0.50	0.75	0.75	1.0	0.85
Brake	Static friction torque	N·m	4.5	4.5	9	9	15	47
Logic	Rated voltage	Without brake	24 VDC (-15%, +15%)					
Logic		With brake	24 VDC (-10%, +6%)					
Logic	Internal protection		Fuse: 4 A-T not replaceable					
Logic	Current consumption		Nominal 250 mA, max. 500 mA					
Basic	IP rating		IP65					
Basic	Number of poles		8 poles					10 poles
Basic	Insulation class		Type F					
Basic	Ambient operating/storage temperature		0 to 40°C/–20 to 70°C					
Basic	Ambient operating/storage humidity		5% to 95% (without condensation)					
Basic	Ventilation		Natural				Forced with integrated fans	
Basic	Shock resistance		According to IEC 60068-2-27 (3 shock per direction, 11 ms, 14g on 3 axes)					
Basic	Vibration resistance		According to IEC 60068-2-6 (5 to 500 Hz, 2g on 3 axes)					
Encoder	Incremental		15-bit turn					
Encoder	Absolute multiturn		20-bit resolution (18-bit real accuracy)					

Torque-speed characteristics

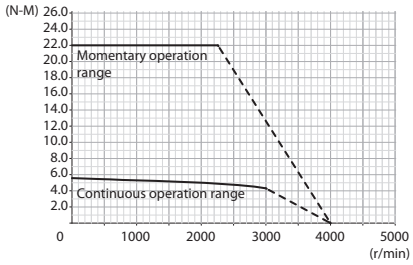
R88E-AECT0230D/E (880 W)



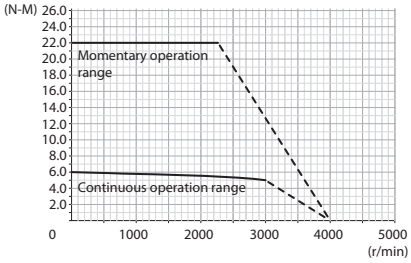
R88E-AECT0330D/E (1 kW)



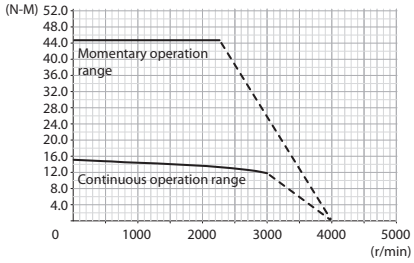
R88E-AECT0430D/E (1.35 kW)



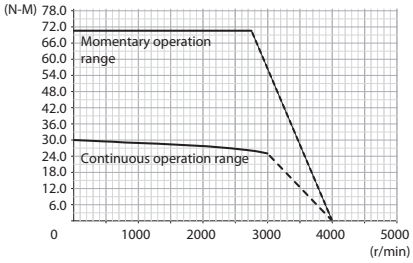
R88E-AECT0530D/E (1.57 kW)



R88E-AECT1130D/E (3.67 kW)



R88E-AECT2530D/E (7.85 kW)



Integrated servo motor nomenclature

I/O specifications



R88E-AECT0230/0330/
0430/0530 models



R88E-AECT1130/2530 models

Auxiliary - RS232 serial port (CN1)

Symbol	Signal name	Description
1	TX232	Transmit data RS232
2	RX232	Receive data RS232
3	NC	Not used. Do not connect
4	GND_COM	Ground RS232
Chassis	PE	Protection earth

Main bus - ECT (CN2-OUT/CN3-IN)

Symbol	Signal name	Description
1	TX Data+	Transmit data (+)
2	RX Data+	Receive data (+)
3	TX Data-	Transmit data (-)
4	RX Data-	Receive data (-)
Chassis	PE	Protection earth

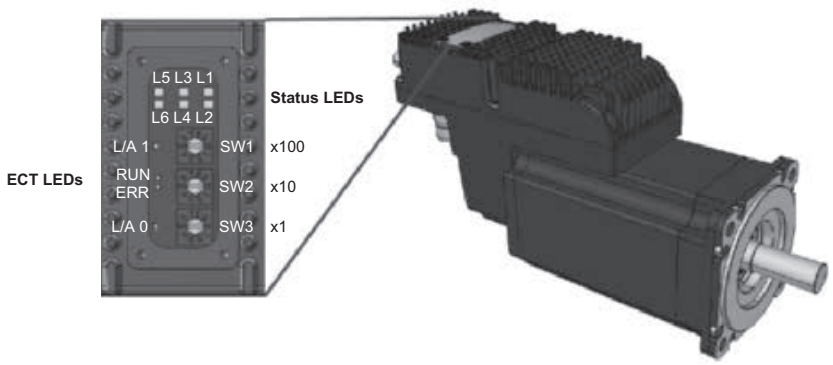
DC power supply and logic supply (CN5)

Symbol	Signal name	Description
1	HV-	DC power supply (negative pole)
3	-	Not used. Do not connect
4	HV+	DC power supply (positive pole)
T	PE	Protection earth
A	/STOP	Safety loop (the signal is at reversed logic)
B	0V	Ground logic supply
C	IN9	Digital input 9
D	+24 V	+24 VDC logic supply
Chassis	PE	Protection earth

Input/Output signals (CN4)

Symbol	Signal name	Description
1	IN/OUT1-	Differential line driver digital input/output 1 (-)
2	IN/OUT2-	Differential line driver digital input/output 2 (-)
3	AN_IN-	Analog input (-)
4	AN_IN+	Analog input (+)
5	IN/OUT2+	Differential line driver digital input/output 2 (+)
6	GND_5V	Ground of +5V
7	+5V	+5V supply (max 150mA) for auxiliary encoder
8	IN8	Digital input 8 PNP 24V
9	OUT5	Digital output 5 PNP 24V
10	IN/OUT3	Digital input/output 3 PNP 24V
11	IN7	Digital input 7 PNP 24V
12	IN/OUT0-	Differential line driver digital input/output 0 (-)
13	IN/OUT0+	Differential line driver digital input/output 0 (+)
14	IN/OUT1+	Differential line driver digital input/output 1 (+)
15	IN4	Digital input 4 PNP 24V
16	OUT4	Digital output 4 PNP 24V
17	OUT6	Digital output 6 PNP 24V
18	IN6	Digital input 6 PNP 24V
19	IN5	Digital input 5 PNP 24V (the function simulated GND is available)
Chassis	PE	Protection earth

LED and rotary switch specifications

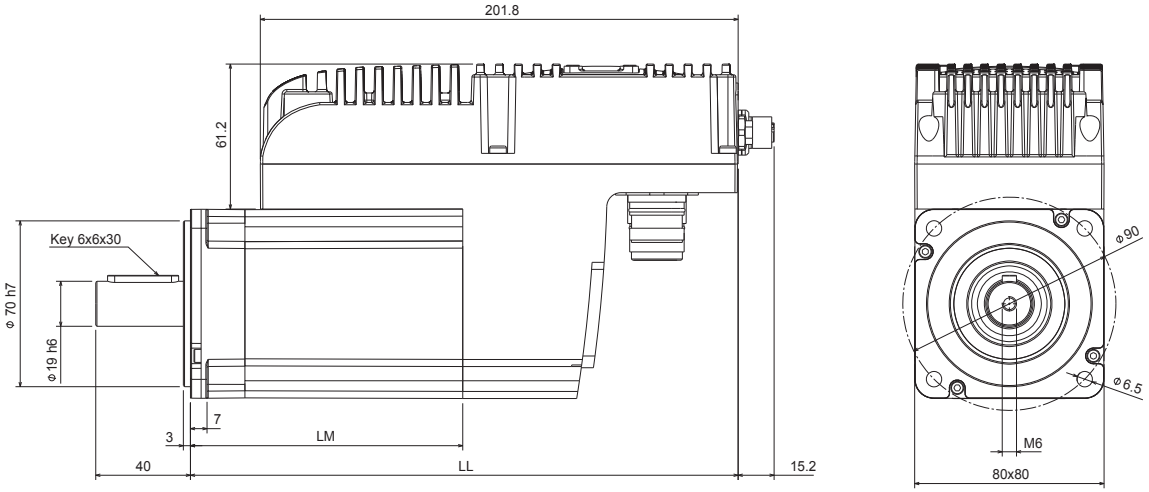


Name		Description
LED	L1, L2	Drive status (fault, warning, enabling)
	L3, L5	Reserved (LED OFF)
	L4	Overload (I2T) status
	L6	Input status /STOP
	L/A 0	Status of the physical link/activity of the EtherCAT port on the CN3 connector
	L/A 1	Status of the physical link/activity of the EtherCAT port on the CN2 connector
	ERR	EtherCAT error LED (ERR)
	RUN	EtherCAT run LED (RUN)
Rotary switch	SW1	EtherCAT user address (station alias) x100
	SW2	EtherCAT user address (station alias) x10
	SW3	EtherCAT user address (station alias) x1

Integrated servo motor dimensions

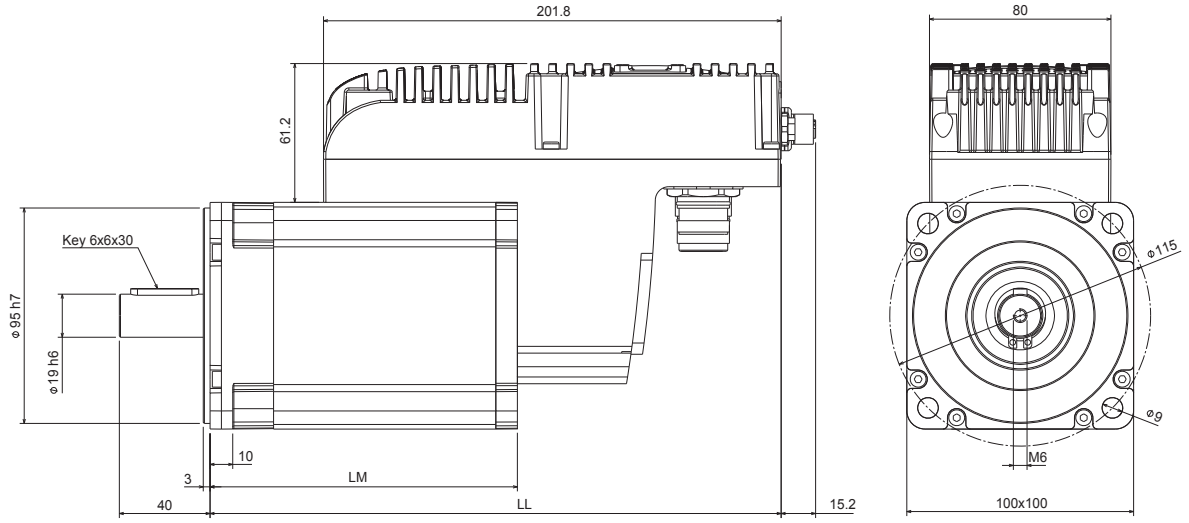
R88E-AECT0230□/0330□ (880 W to 1 kW)

Dimensions (mm)		Without brake		With brake		Flange	Approx. mass (kg)	
Voltage	Model	LM	LL	LM	LL		Without brake	With brake
560 VDC	R88E-AECT0230□	115	231.3	157	273.3	80	4.1	4.8
	R88E-AECT0330□	140	256.3	182	298.3		5.1	5.8



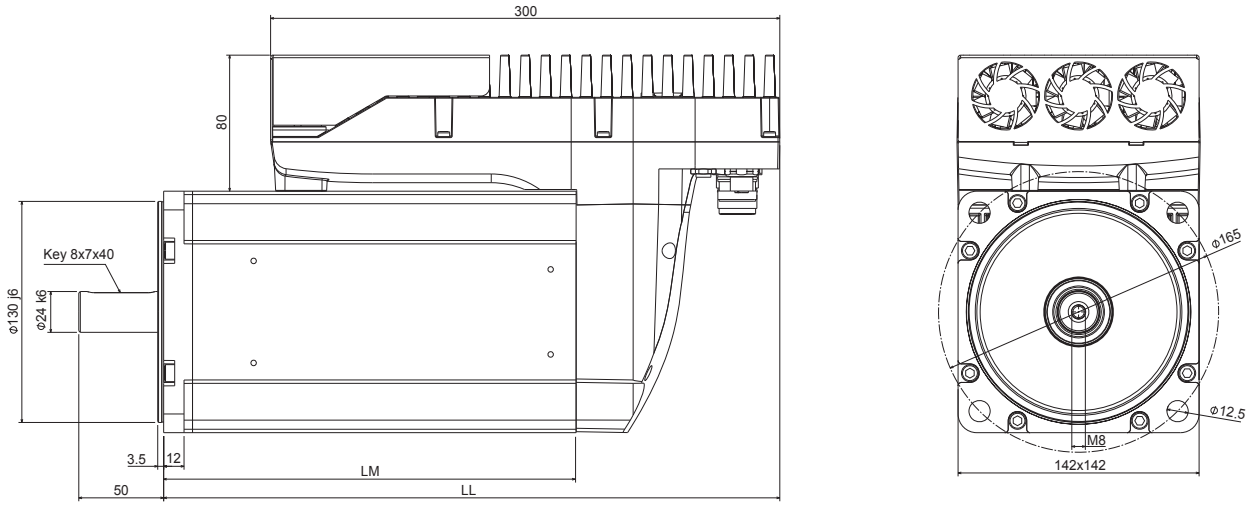
R88E-AECT0430□/0530□ (1.35 kW to 1.57 kW)

Dimensions (mm)		Without brake		With brake		Flange	Approx. mass (kg)	
Voltage	Model	LM	LL	LM	LL		Without brake	With brake
560 VDC	R88E-AECT0430□	135.5	251.8	186	302.3	100	6.7	7.9
	R88E-AECT0530□	165.5	281.8	216	332.3		8.0	9.2



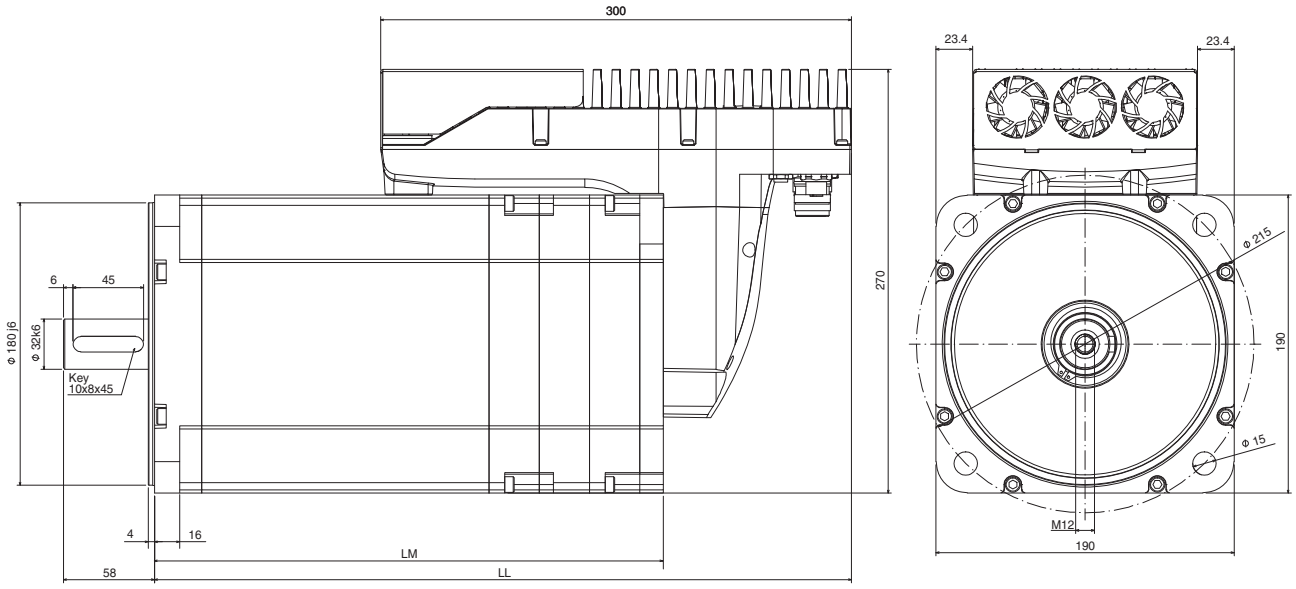
R88E-AECT1130□ (3.67 kW)

Dimensions (mm)		Without brake		With brake		Flange	Approx. mass (kg)	
Voltage	Model	LM	LL	LM	LL		Without brake	With brake
560 VDC	R88E-AECT1130□	238	363	268	388	142	17	18.5



R88E-AECT2530□ (7.85 kW)

Dimensions (mm)		Without brake		With brake		Flange	Approx. mass (kg)	
Voltage	Model	LM	LL	LM	LL		Without brake	With brake
560 VDC	R88E-AECT2530□	303.5	423.5	333.5	453.5	190	38	43



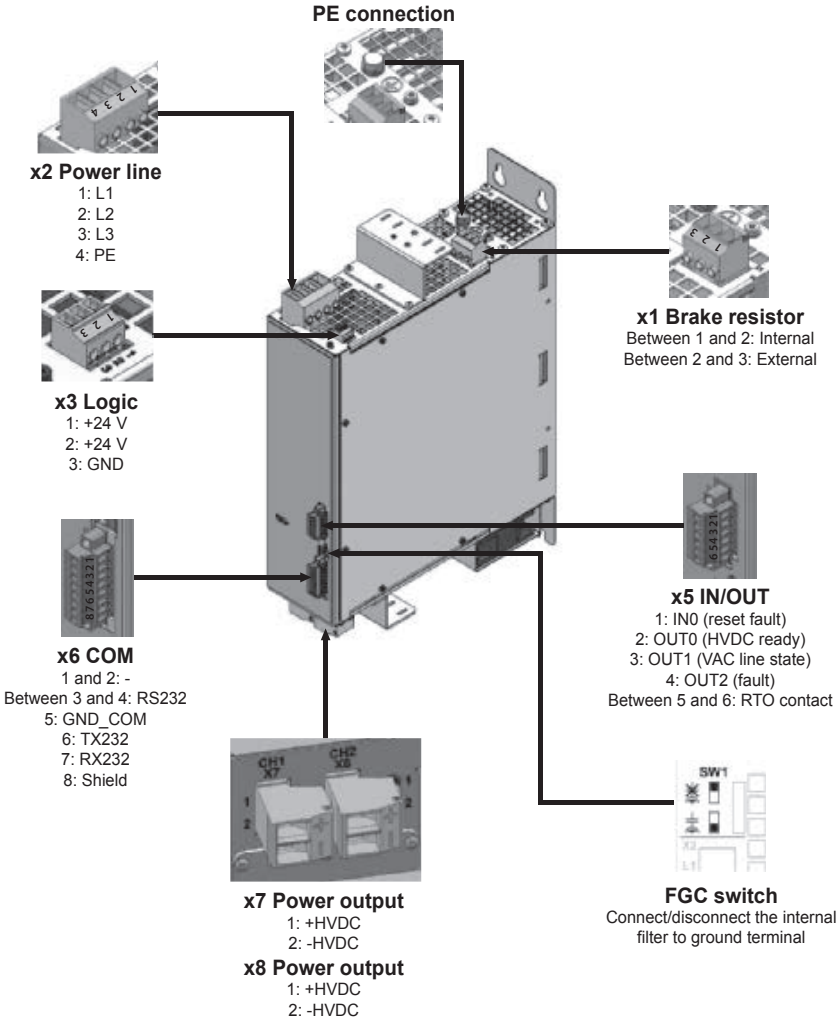
DC power supply unit specifications

DC power supply unit model R88S-EAD□		20R			40R		
Three-phase rated voltage	VAC	230	400	480	230	400	480
Absolute range voltage		180 to 520 VAC, 50/60 Hz					
Unbalance voltage		<3% of the main voltage					
Main filter		Integrated					
Line fuses: quick acting (by user)		32 A - I2T max = 700 A^2s			50 A - I2T max = 1300 A^2s		
Input current*1	Arms	22	25	23	42.5	47	42
Input current with power chokes	Arms	-	17*2	-	-	34*3	-
Rated output voltage	VDC	324	564	677	324	564	677
Rated output current	A	20	20	16.7	40	40	33
Max. current (≤ 5 sec)	A	40	40	33.4	80	80	66
Rated output power	kW	6.5	11.3	11.3	13	22.5	22.5
Pulse power (≤ 5 sec)	kW	13	22.6	22.6	26	46	46
Internal capacitance	uF	940			1500		
Thermal dissipation (without brake dissipation)	W	100			200		
Logic – Rated voltage		24 VDC, ±10%					
Logic – Internal protection		Fuse: 4 AT, reverse polarity					
Logic – Current consumption		0.6 A (digital output OFF)*4					
Logic – Digital output		Type: PNP Output voltage / current: 24 VDC / 0.3 A					
Relay – Rated voltage		30 VAC / VDC					
Relay – Rated current		Max. 1 A					
Braking circuit		Maximum pulse current: 50 A Maximum switch on threshold: 785 VDC Hysteresis threshold: 20 VDC Pulse power rating: 20 kW (0.3 sec) Minimum braking resistor: 17 Ω					
Internal braking resistor		Resistance: 33 Ω Power rating: 120 W continuous					
Power and logic protection		Overload output current: > 2 rated output current (t = 5 sec) Short circuit brake circuit: yes Overload brake energy / Overload charge energy: yes / yes Cable current limit: > 1.3 cable current limit (t = 1 hour) Under voltage / Over voltage HVDC: < 100 VDC / > 830 VDC Over temperature: Power (> 90ºC), Logic (> 85ºC) Under voltage LOGIC: < 18.3 VDC					
Ambient temperature		+5 to +40ºC, 90% RH or less (without condensation)					

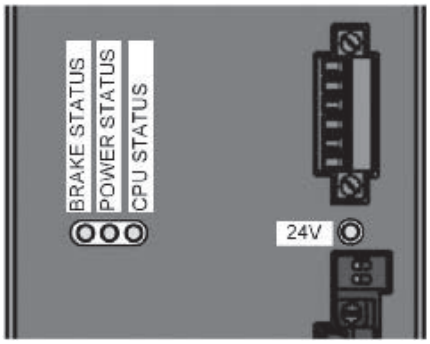
*1 Input current without line inductance.
*2 Value with a line inductance of 1 mH.
*3 Value with a line inductance of 0.5 mH.
*4 1.4 A for 100 ms when AC line is applied to the DC power supply unit.

DC power supply unit nomenclature

Connector specifications



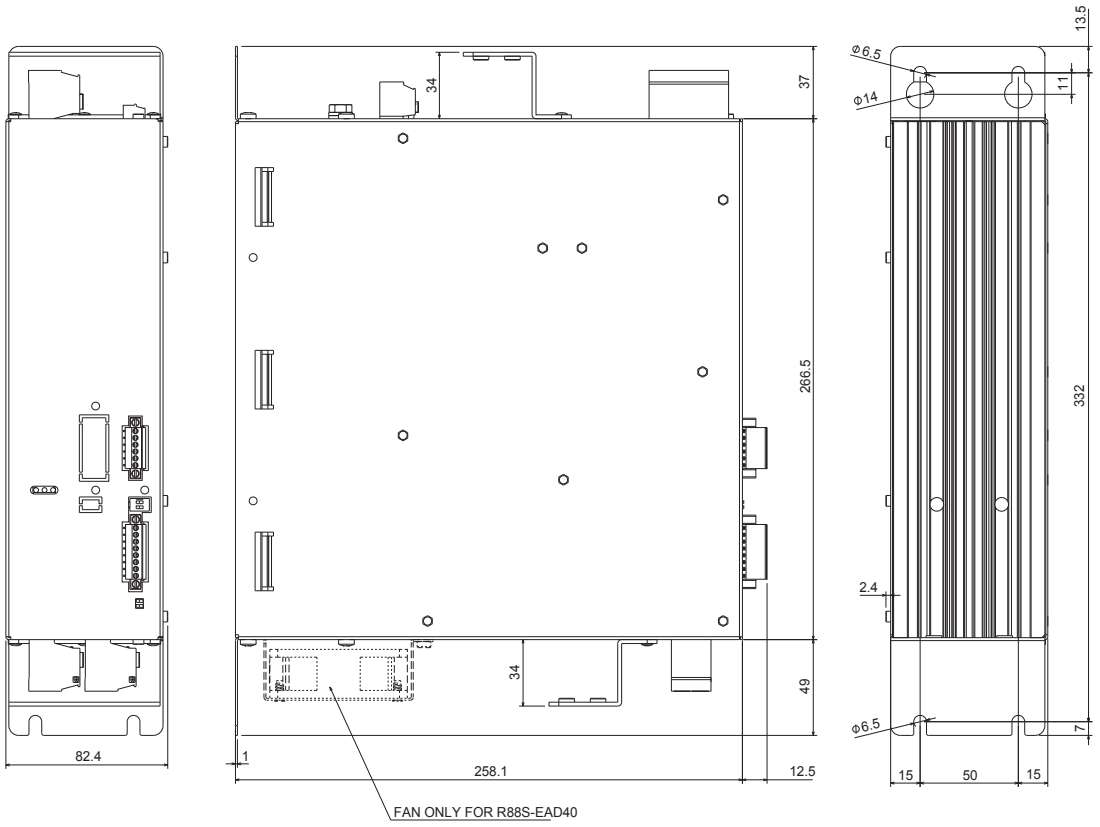
LED specifications



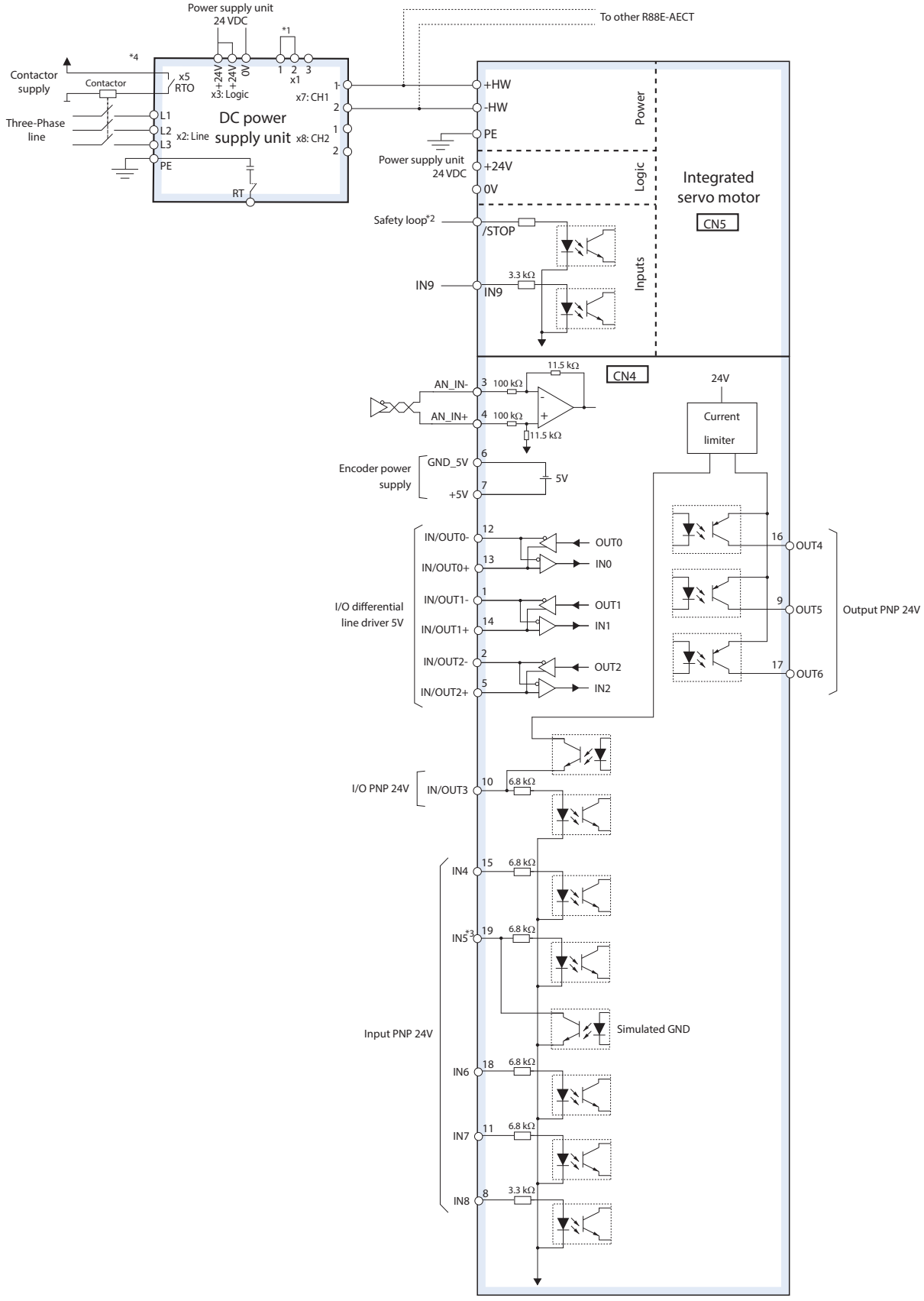
Name		Description
LED	24V	Logic voltage (with or without voltage)
	CPU status	CPU status (doesn't work, firmware mode, boot mode, in reset)
	Power status	Power status (power off, operating, warning, fault)
	Brake status	Brake status (without brake, with brake)

DC power supply unit dimensions

R88S-EAD20R/40R

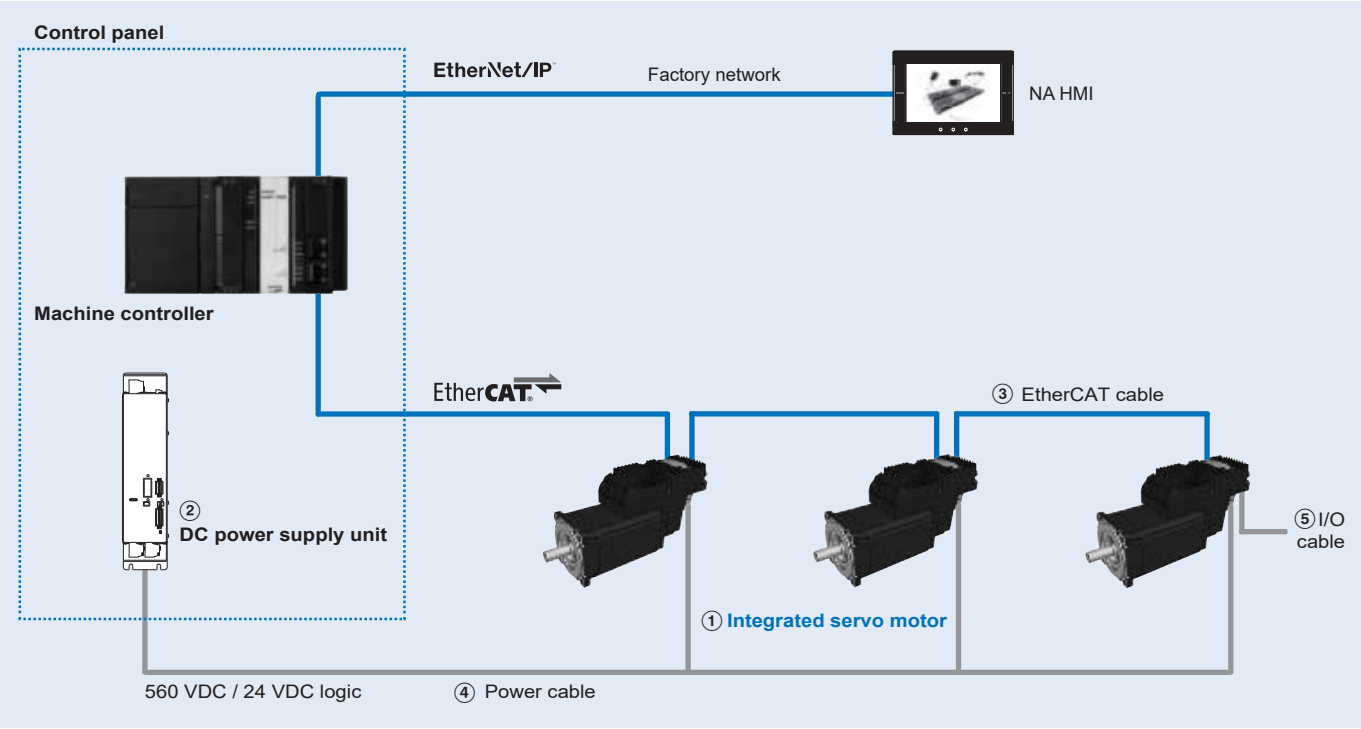


Installation



*1 1 and 2 are short-circuited. If the internal regenerative resistor is insufficient, remove the wire between 1 and 2 and connect an external regenerative resistor between 2 and 3.
*2 If security device is not used, connect /STOP to +24V.
*3 IN5 can be used as GND.
*4 Important to install a contactor that removes the supply in case of power supply unit error.

Ordering information



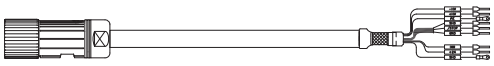
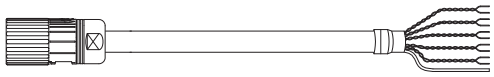
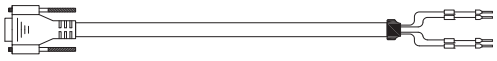
Integrated servo motor

Symbol	Specifications						Model
	Voltage	Encoder and design			Rated torque	Capacity	
①	560 VDC	Incremental encoder	Without brake	Straight shaft with key	2.55 Nm	880 W	R88E-AECT0230D-S2
					3.2 Nm	1000 W	R88E-AECT0330D-S2
					4.3 Nm	1350 W	R88E-AECT0430D-S2
					5.0 Nm	1570 W	R88E-AECT0530D-S2
					11.7 Nm	3670 W	R88E-AECT1130D-S2
					25 Nm	7850 W	R88E-AECT2530D-S2
			With brake		2.55 Nm	880 W	R88E-AECT0230D-BS2
					3.2 Nm	1000 W	R88E-AECT0330D-BS2
					4.3 Nm	1350 W	R88E-AECT0430D-BS2
					5.0 Nm	1570 W	R88E-AECT0530D-BS2
					11.7 Nm	3670 W	R88E-AECT1130D-BS2
					25 Nm	7850 W	R88E-AECT2530D-BS2
		Multiturn absolute encoder	Without brake		2.55 Nm	880 W	R88E-AECT0230E-S2
					3.2 Nm	1000 W	R88E-AECT0330E-S2
					4.3 Nm	1350 W	R88E-AECT0430E-S2
					5.0 Nm	1570 W	R88E-AECT0530E-S2
					11.7 Nm	3670 W	R88E-AECT1130E-S2
					25 Nm	7850 W	R88E-AECT2530E-S2
			With brake		2.55 Nm	880 W	R88E-AECT0230E-BS2
					3.2 Nm	1000 W	R88E-AECT0330E-BS2
					4.3 Nm	1350 W	R88E-AECT0430E-BS2
					5.0 Nm	1570 W	R88E-AECT0530E-BS2
					11.7 Nm	3670 W	R88E-AECT1130E-BS2
					25 Nm	7850 W	R88E-AECT2530E-BS2

DC power supply unit

Symbol	Specifications				Model
	Voltage input	Output current	Output power	Regeneration circuit	
②	400 V 3-phase	20 A	11.3 kW	Integrated	R88S-EAD20R
		40 A	22.5 kW		R88S-EAD40R

Cables

Symbol	Specifications			Model	Appearance
③	EtherCAT cables	EtherCAT RJ45 to M12 cable (M12 straight)	0.3 m	XS5W-T421-AMC-K	
			0.5 m	XS5W-T421-BMC-K	
			1 m	XS5W-T421-CMC-K	
			2 m	XS5W-T421-DMC-K	
			3 m	XS5W-T421-EMC-K	
			5 m	XS5W-T421-GMC-K	
			10 m	XS5W-T421-JMC-K	
			15 m	XS5W-T421-KMC-K	
		EtherCAT RJ45 to M12 cable (M12 L right angle)	0.3 m	XS5W-T422-AMC-K	
			0.5 m	XS5W-T422-BMC-K	
			1 m	XS5W-T422-CMC-K	
			2 m	XS5W-T422-DMC-K	
			3 m	XS5W-T422-EMC-K	
			5 m	XS5W-T422-GMC-K	
			10 m	XS5W-T422-JMC-K	
			15 m	XS5W-T422-KMC-K	
		EtherCAT M12 to M12 cable (M12 straight)	0.5 m	XS5W-T421-BM2-K	
			1 m	XS5W-T421-CM2-K	
			2 m	XS5W-T421-DM2-K	
			3 m	XS5W-T421-EM2-K	
			5 m	XS5W-T421-GM2-K	
			10 m	XS5W-T421-JM2-K	
			15 m	XS5W-T421-KM2-K	
		EtherCAT M12 to M12 cable (M12 L right angle)	0.5 m	XS5W-T422-BM2-K	
			1 m	XS5W-T422-CM2-K	
			2 m	XS5W-T422-DM2-K	
			3 m	XS5W-T422-EM2-K	
			5 m	XS5W-T422-GM2-K	
			10 m	XS5W-T422-JM2-K	
			15 m	XS5W-T422-KM2-K	
④	Power cables for Integrated servo motor with straight connector		1.5 m	R88A-CDEA001-5-E	
			3 m	R88A-CDEA003-E	
			5 m	R88A-CDEA005-E	
			10 m	R88A-CDEA010-E	
			15 m	R88A-CDEA015-E	
			20 m	R88A-CDEA020-E	
⑤	I/O cables with straight connector		1 m	R88A-CPEA001S-E	
			2 m	R88A-CPEA002S-E	
			5 m	R88A-CPEA005S-E	
-	Serial port cables	For Integrated servo motor with straight connector	2 m	R88A-CCEA002P2-E	
		For DC power supply unit with straight connector	2 m	R88A-CCSE002P2-E	

Accessories

Specifications			Model
Connectors for making power cables		M23 straight connector	R88A-CNEA01P-E
		M23 right angle 90º connector	R88A-CNEA02P-E
Connectors for making I/O cables		M23 straight connector	R88A-CNEA01C-E
		M23 right angle 90º connector	R88A-CNEA02C-E
Blind plugs 	For EtherCAT connectors	IP65 blind plug for M12 socket	R88A-PCVEA01-E
	For Power and I/O connectors	IP67 blind plug for M23 socket	R88A-PCVEA02-E

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I102E-EN-01 In the interest of product improvement, specifications are subject to change without notice.

R88L-EA-AF-□

Accurax linear motor axis



Advanced linear motor axis

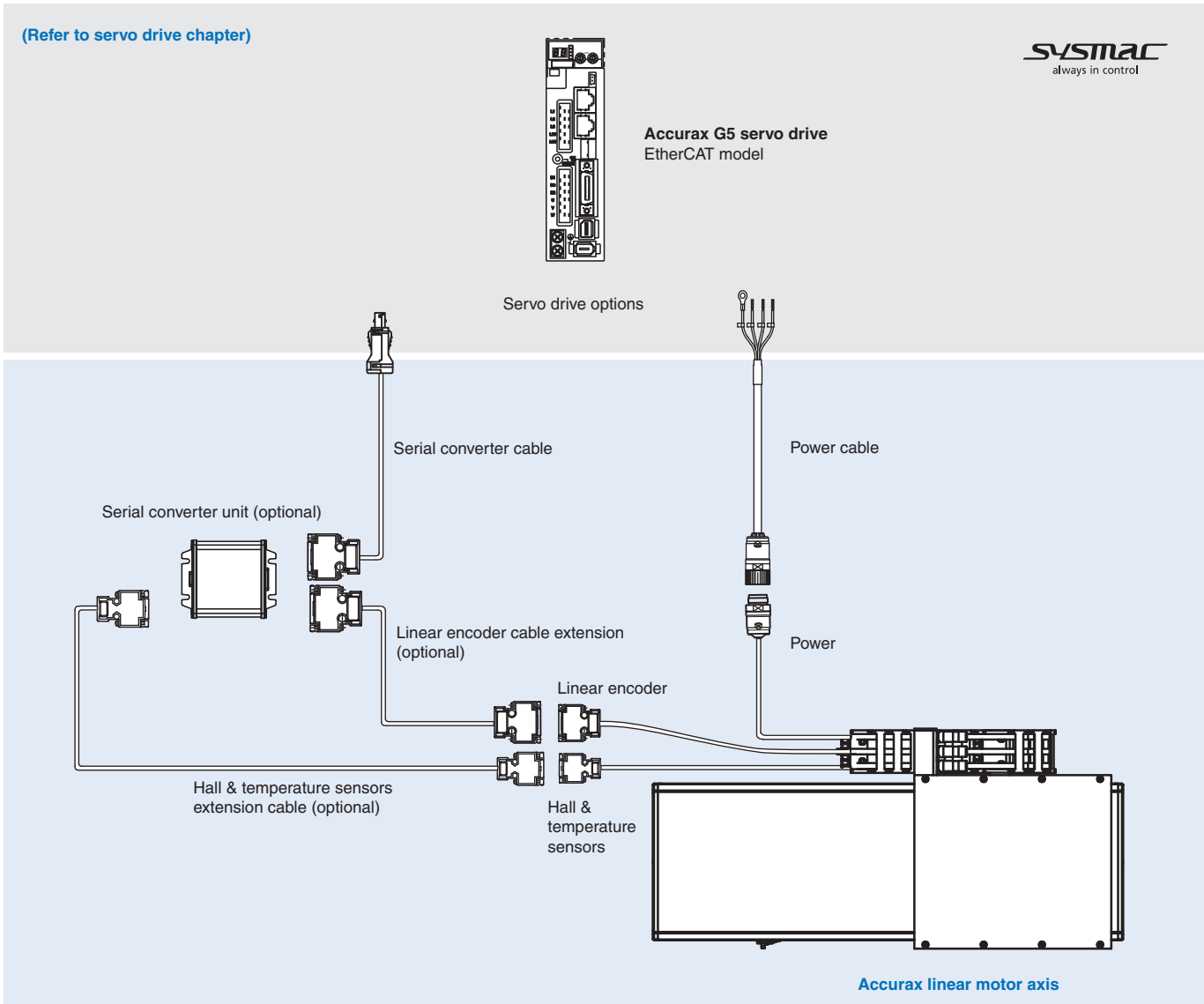
High-efficiency iron-core linear motors and magnet tracks in a wide range of over 100 standard linear motor axis.

- Low moving mass to ensure a high degree of dynamism
- Optimized stroke/product length ratio
- Up to 5 m/s maximum speed with 1 µm repeatability
- Compact and efficiency oriented design
- Highly versatile and ready-to-use

Ratings

- 230/400 VAC 48 to 760 N (2000 N peak force)

System configuration



Linear motor/servo drive combination

Linear axis					Linear servo drive	
					Accurax G5 EtherCAT	
Type	Voltage	Rated force	Peak force	Model	230 V	400 V
R88L-EA-AF-□ Linear motor axis 	230/ 400 V	48 N	105 N	R88L-EA-AF-0303-□	R88D-KN02H-ECT-L	R88D-KN06F-ECT-L
		96 N	210 N	R88L-EA-AF-0306-□	R88D-KN04H-ECT-L	R88D-KN10F-ECT-L
		160 N	400 N	R88L-EA-AF-0606-□	R88D-KN08H-ECT-L	R88D-KN15F-ECT-L
		240 N	600 N	R88L-EA-AF-0609-□	R88D-KN10H-ECT-L	R88D-KN20F-ECT-L
		320 N	800 N	R88L-EA-AF-0612-□	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
		608 N	1600 N	R88L-EA-AF-1112-□	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
		760 N	2000 N	R88L-EA-AF-1115-□	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L

Type designation

Linear motor axis

R88L - EA - AF - 0303 - 0110 - 0005

Accurax linear motor axis

Iron-core linear motor model	
Code	Specifications
0303	30 mm active magnet width, 3 coil
0306	30 mm active magnet width, 6 coil
0606	60 mm active magnet width, 6 coil
0609	60 mm active magnet width, 9 coil
0612	60 mm active magnet width, 12 coil
1112	110 mm active magnet width, 12 coil
1115	110 mm active magnet width, 15 coil

Stroke lenght (for effective stroke distances available see dimensions section)

Encoder type	
Code	Specifications
none	Optical, incremental, 1V ptp, 50 nm resolution
0001	Optical, incremental, TTL/line driver, 1 µm resolution
0002	Optical, incremental, TTL/line driver, 5 µm resolution
0003	Magnetical, incremental, 1V ptp, 2.5 µm resolution
0004	Optical, incremental, TTL/line driver, 0.5 µm resolution
0005 (standard)	Optical, absolute, Panasonic protocol, 50 nm resolution

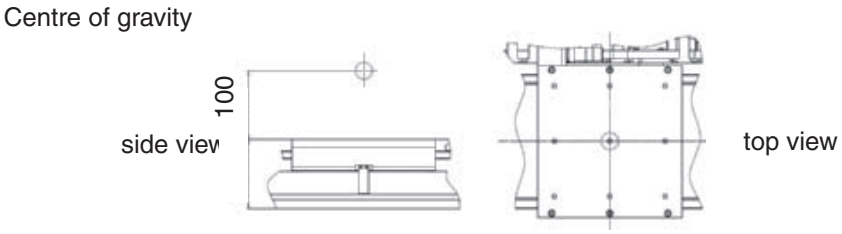
Linear servomotor specifications

Linear motor axis R88L-EA-AF-□ (230/400 VAC)

Voltage			230/400 VAC						
Linear axis model		R88L-EA-AF-□	0303-□	0306-□	0606-□	0609-□	0612-□	1112-□	1115-□
Motor specifications	Linear servo motor coil used	R88L-EC-FW-	0303	0306	0606	0609	0612	1112	1115
	Peak force[*1]	N	105	210	400	600	800	1600	2000
	Peak current[*1]	A_{rms}	3.1	6.1	10	15	20	20	25
	Continuous force[*2]	N	48	96	160	240	320	608	760
	Continuous current[*2]	A_{rms}	1.2	2.5	3.4	5.2	6.9	6.5	8.2
	Motor force constant	N/A_{rms}	39.7		46.5			93.0	
	BEMF	V/m/s	32		38			76	
	Motor constant	$N/\sqrt{W}$	9.75	13.78	19.49	23.87	27.57	41.47	46.37
	Phase resistance	Ω	5.34	2.68	1.83	1.23	0.92	1.6	1.29
	Phase Inductance	mH	34.7	17.4	13.7	9.2	6.9	12.8	10.3
	Electrical time constant	ms	6.5		7.5			8	
	Pole pitch	mm	24						
Mechanics	Weight of moving part	kg	3.1	3.9	5.4	6.7	7.9	13.7	15.9
	Recommended horizontal payload[*3]	kg	5		15			35	
	Uni-directional repeatability[*3]	µm	±1						
	Max. allowable speed	m/s	5						
	Min./max. standard stroke	mm	110/2126	158/2078	110/2126	158/2078	110/2030	110/2126	158/2174
	Stroke increment	mm	96						
Feedback	Encoder type		Panasonic protocol, optical, absolute						
	Encoder resolution		50 nm						
	Accuracy class		±5 µm/m						
	Hall sensor		Digital, TTL signals						
Other specifications	Protection methods[*4]		Temperature sensors (KTY-83/121 & PTC 110C), self cooling						
	Hall-Sensor supply		5 to 24 VDC, 25 mA						
	Encoder reading head supply		5 VDC, max. 250 mA						
	Insulation class		Class B						
	Max. bus voltage		560 VDC						
	Insulation resistance		500 VDC, min. 10 MΩ						
	Ambient humidity		20 to 80% (non-condensing)						
	Altitude		1000 m						
	Max. allowable magnet temperature		70°C						

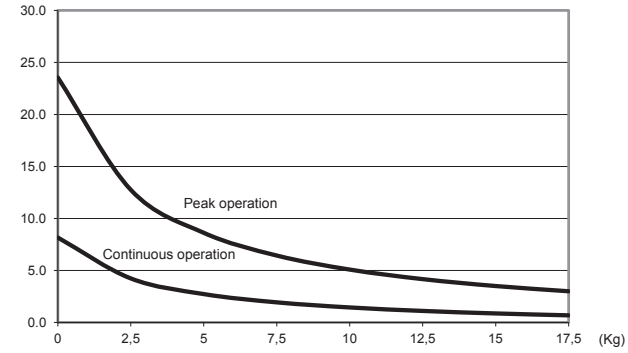
[*1] Coil temperature rising by 6K/s.
[*2] Values at 100°C coil temperature and magnets at 25°C. An airstream of 2.5 m/s (25°C) has to be applied.
[*3] Referring to the center of gravity, for higher payload or different position of payload please contact your OMRON representative.
[*4] I^2t has to be set properly for high current applications.

All other values at 25°C (±10%).

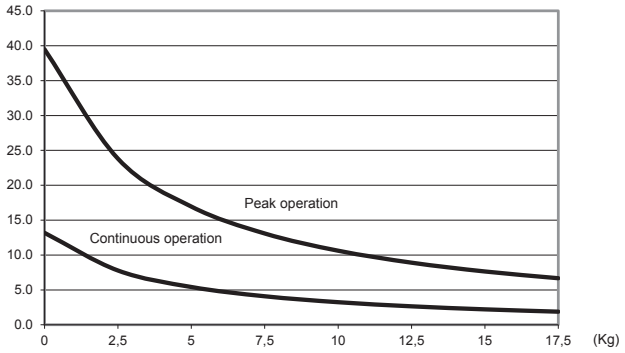


Acceleration-payload characteristics

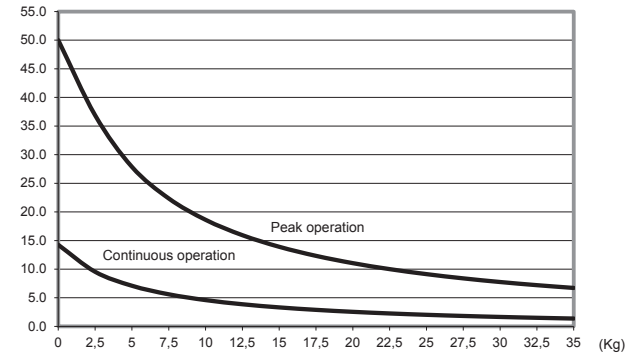
(m/s²) R88L-EA-AF-0303-□



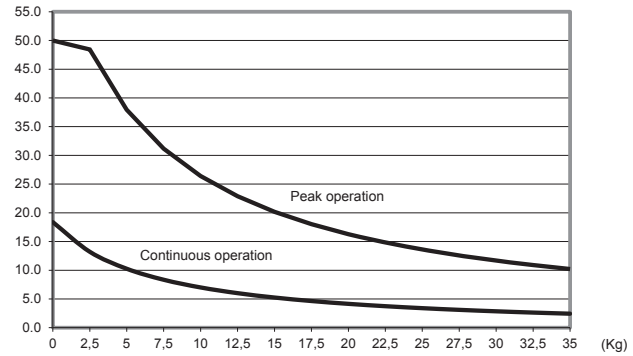
(m/s²) R88L-EA-AF-0306-□



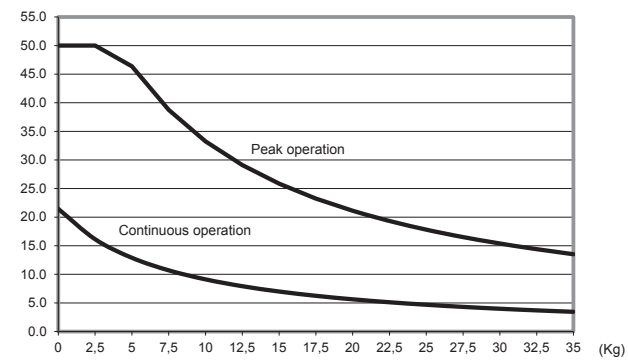
(m/s²) R88L-EA-AF-0606-□



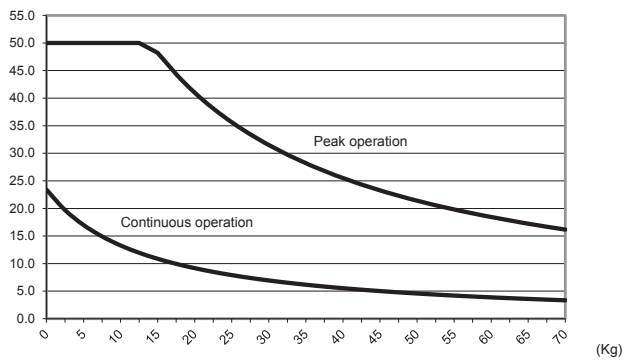
(m/s²) R88L-EA-AF-0609-□



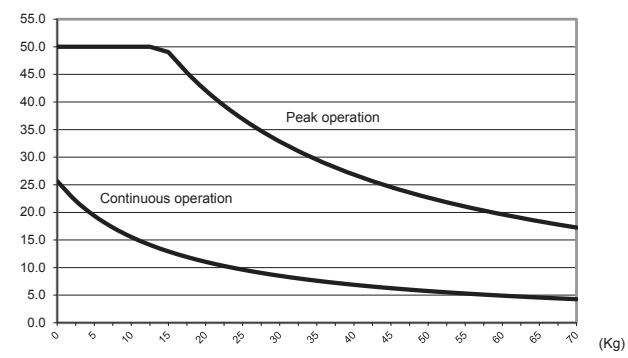
(m/s²) R88L-EA-AF-0612-□



(m/s²) R88L-EA-AF-1112- □



(m/s²) R88L-EA-AF-1115- □



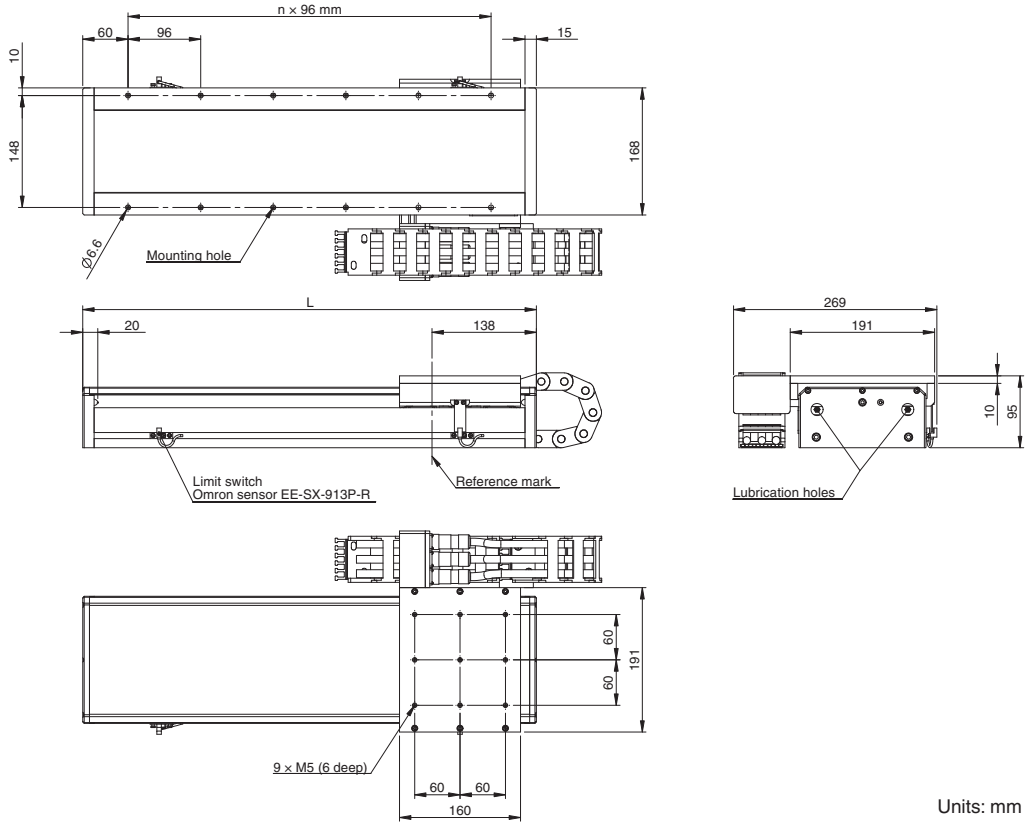
Note: The values on the above curves are calculated based on the below formula and with horizontal orientation:

$$Acceleration = (Force – Force_{Friction}) / Weigth_{Total}$$

Dimensions

R88L-EA-AF-0303-□ (230/400 VAC)

Linear axis model	Effective stroke in mm	L in mm	n	Nº of mounting holes	Weight of moving table including motor coil (kg)	Weight of the complete axis (kg)
R88L-EA-AF-0303-0110-0005	110	312	2	6	3.1	9.5
R88L-EA-AF-0303-0206-0005	206	408	3	8	3.1	10.9
R88L-EA-AF-0303-0302-0005	302	504	4	10	3.1	12.4
R88L-EA-AF-0303-0398-0005	398	600	5	12	3.1	13.8
R88L-EA-AF-0303-0494-0005	494	696	6	14	3.1	15.2
R88L-EA-AF-0303-0590-0005	590	792	7	16	3.1	16.7
R88L-EA-AF-0303-0686-0005	686	888	8	18	3.1	18.1
R88L-EA-AF-0303-0782-0005	782	984	9	20	3.1	19.6
R88L-EA-AF-0303-0878-0005	878	1080	10	22	3.1	21.0
R88L-EA-AF-0303-0974-0005	974	1176	11	24	3.1	22.5
R88L-EA-AF-0303-1070-0005	1070	1272	12	26	3.1	23.9
R88L-EA-AF-0303-1166-0005	1166	1368	13	28	3.1	25.4
R88L-EA-AF-0303-1262-0005	1262	1464	14	30	3.1	26.8
R88L-EA-AF-0303-1358-0005	1358	1560	15	32	3.1	28.2
R88L-EA-AF-0303-1454-0005	1454	1656	16	34	3.1	29.7
R88L-EA-AF-0303-1550-0005	1550	1752	17	36	3.1	31.1
R88L-EA-AF-0303-1646-0005	1646	1848	18	38	3.1	32.6
R88L-EA-AF-0303-1742-0005	1742	1944	19	40	3.1	34.0
R88L-EA-AF-0303-1838-0005	1838	2040	20	42	3.1	35.5
R88L-EA-AF-0303-1934-0005	1934	2136	21	44	3.1	36.9
R88L-EA-AF-0303-2030-0005	2030	2232	22	46	3.1	38.3
R88L-EA-AF-0303-2126-0005	2126	2328	23	48	3.1	39.8



Units: mm

Hall sensor & temperature cable

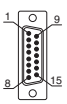
Cable length 500 mm approx.
Connector D-Sub 9 pins (male)



Pin No.	Name
1	5V
2	Hall U
3	Hall V
4	Hall W
5	GND
6	PTC
7	PTC
8	KTY
9	KTY
Case	Shield

Encoder cable

Cable length 500 mm approx.
Connector D-Sub 15 pins (male)



Pin No.	Signal
1	SDA*
2	SCL*
3	Not used
4	/Ref signal (U_{0-})
5	/Cos signal (U_{2-})
6	/Sin signal (U_{1-})
7	Not used
8	5 V
9	0 V
10	Not used
11	Not used
12	Ref signal (U_0)
13	Cos signal (U_2)
14	Sin signal (U_1)
15	Inner shield (IS)
Case	Shield

*Reserved. Please do not use

Power cable

Cable length 500 mm approx.
Connector Hypertac
LRRA06AMRPN182 (male)
Pin article code: 021.279.1020

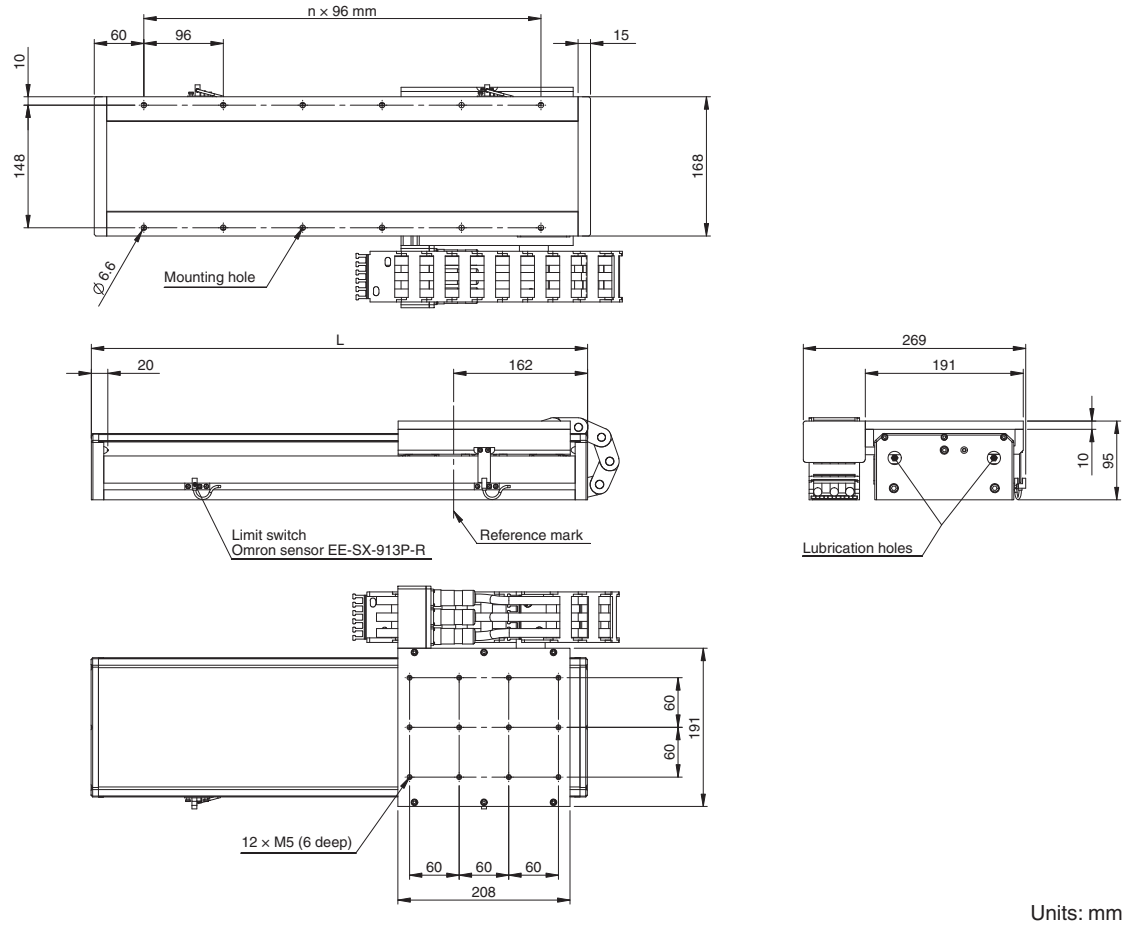


Pin No.	Name
1	Phase U
2	Phase V
3	Ground
4	Phase W
5	Not used
6	Not used

Mating connector:
Plug type: LPRA06BFRBN170

R88L-EA-AF-0306-□ (230/400 VAC)

Linear axis model	Effective stroke in mm	L in mm	n	Nº of mounting holes	Weight of moving table including motor coil (kg)	Weight of the complete axis (kg)
R88L-EA-AF-0306-0158-0005	158	408	3	8	3.9	11.6
R88L-EA-AF-0306-0254-0005	254	504	4	10	3.9	13.1
R88L-EA-AF-0306-0350-0005	350	600	5	12	3.9	14.5
R88L-EA-AF-0306-0446-0005	446	696	6	14	3.9	15.9
R88L-EA-AF-0306-0542-0005	542	792	7	16	3.9	17.4
R88L-EA-AF-0306-0638-0005	638	888	8	18	3.9	18.8
R88L-EA-AF-0306-0734-0005	734	984	9	20	3.9	20.3
R88L-EA-AF-0306-0830-0005	830	1080	10	22	3.9	21.7
R88L-EA-AF-0306-0926-0005	926	1176	11	24	3.9	23.2
R88L-EA-AF-0306-1022-0005	1022	1272	12	26	3.9	24.6
R88L-EA-AF-0306-1118-0005	1118	1368	13	28	3.9	26.1
R88L-EA-AF-0306-1214-0005	1214	1464	14	30	3.9	27.5
R88L-EA-AF-0306-1310-0005	1310	1560	15	32	3.9	28.9
R88L-EA-AF-0306-1406-0005	1406	1656	16	34	3.9	30.4
R88L-EA-AF-0306-1502-0005	1502	1752	17	36	3.9	31.8
R88L-EA-AF-0306-1598-0005	1598	1848	18	38	3.9	33.3
R88L-EA-AF-0306-1694-0005	1694	1944	19	40	3.9	34.7
R88L-EA-AF-0306-1790-0005	1790	2040	20	42	3.9	36.2
R88L-EA-AF-0306-1886-0005	1886	2136	21	44	3.9	37.6
R88L-EA-AF-0306-1982-0005	1982	2232	22	46	3.9	39.0
R88L-EA-AF-0306-2078-0005	2078	2328	23	48	3.9	40.5



Units: mm

Hall sensor & temperature cable

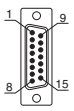
Cable length 500 mm approx.
Connector D-Sub 9 pins (male)



Pin No.	Name
1	5 V
2	Hall U
3	Hall V
4	Hall W
5	GND
6	PTC
7	PTC
8	KTY
9	KTY
Case	Shield

Encoder cable

Cable length 500 mm approx.
Connector D-Sub 15 pins (male)



Pin No.	Signal
1	SDA*
2	SCL*
3	Not used
4	/Ref signal (U_{0-})
5	/Cos signal (U_{2-})
6	/Sin signal (U_{1-})
7	Not used
8	5 V
9	0 V
10	Not used
11	Not used
12	Ref signal (U_0)
13	Cos signal (U_2)
14	Sin signal (U_1)
15	Inner shield (IS)
Case	Shield

*Reserved. Please do not use

Power cable

Cable length 500 mm approx.
Connector Hypertac
LRRA06AMRPN182 (male)
Pin article code: 021.279.1020

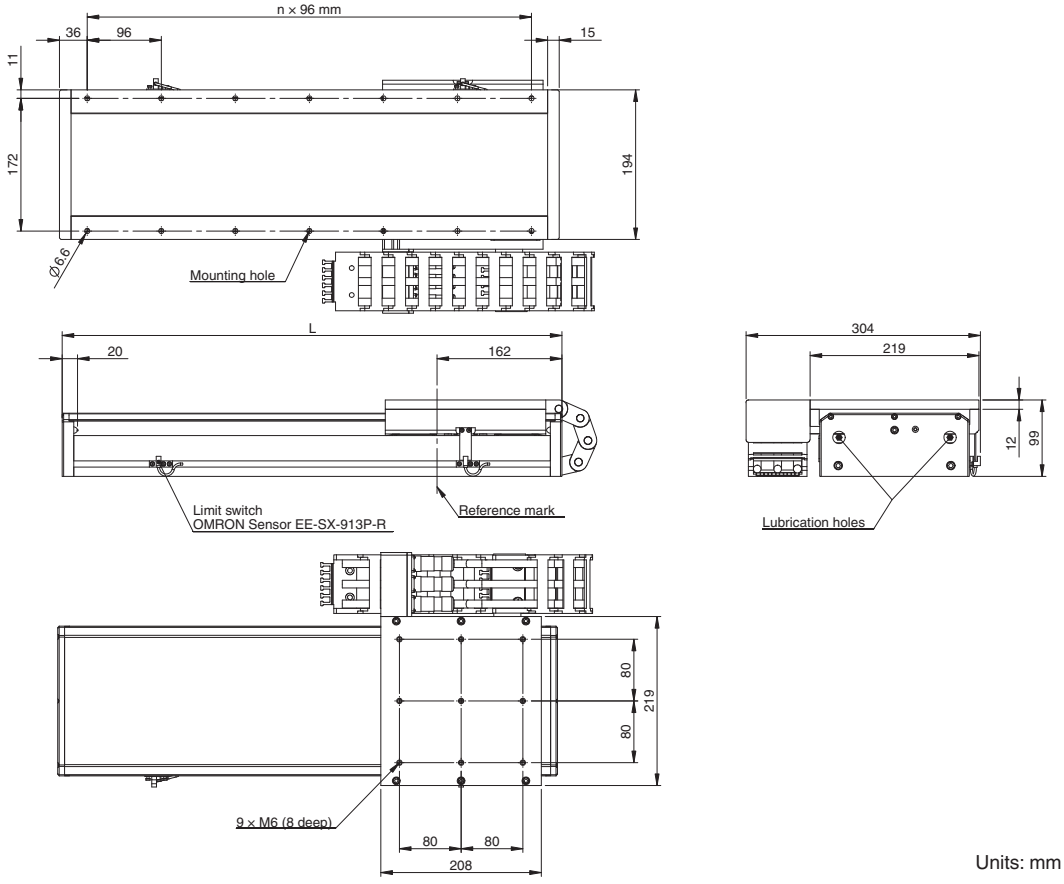


Mating connector:
Plug type: LPRA06BFRBN170

Pin No.	Name
1	Phase U
2	Phase V
3	Ground
4	Phase W
5	Not used
6	Not used

R88L-EA-AF-0606-□ (230/400 VAC)

Linear axis model	Effective stroke in mm	L in mm	n	Nº of mounting holes	Weight of moving table including motor coil (kg)	Weight of the complete axis (kg)
R88L-EA-AF-0606-0110-0005	110	360	3	8	5.4	14.1
R88L-EA-AF-0606-0206-0005	206	456	4	10	5.4	15.9
R88L-EA-AF-0606-0302-0005	302	552	5	12	5.4	17.6
R88L-EA-AF-0606-0398-0005	398	648	6	14	5.4	19.3
R88L-EA-AF-0606-0494-0005	494	744	7	16	5.4	21.0
R88L-EA-AF-0606-0590-0005	590	840	8	18	5.4	22.8
R88L-EA-AF-0606-0686-0005	686	936	9	20	5.4	24.5
R88L-EA-AF-0606-0782-0005	782	1032	10	22	5.4	26.2
R88L-EA-AF-0606-0878-0005	878	1128	11	24	5.4	28.0
R88L-EA-AF-0606-0974-0005	974	1224	12	26	5.4	29.7
R88L-EA-AF-0606-1070-0005	1070	1320	13	28	5.4	31.4
R88L-EA-AF-0606-1166-0005	1166	1416	14	30	5.4	33.2
R88L-EA-AF-0606-1262-0005	1262	1512	15	32	5.4	34.9
R88L-EA-AF-0606-1358-0005	1358	1608	16	34	5.4	36.6
R88L-EA-AF-0606-1454-0005	1454	1704	17	36	5.4	38.4
R88L-EA-AF-0606-1550-0005	1550	1800	18	38	5.4	40.1
R88L-EA-AF-0606-1646-0005	1646	1896	19	40	5.4	41.8
R88L-EA-AF-0606-1742-0005	1742	1992	20	42	5.4	43.6
R88L-EA-AF-0606-1838-0005	1838	2088	21	44	5.4	45.3
R88L-EA-AF-0606-1934-0005	1934	2184	22	46	5.4	47.0
R88L-EA-AF-0606-2030-0005	2030	2280	23	48	5.4	48.8
R88L-EA-AF-0606-2126-0005	2126	2376	24	50	5.4	50.5



Units: mm

Hall sensor & temperature cable

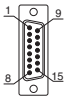
Cable length 500 mm approx.
Connector D-Sub 9 pins (male)



Pin No.	Name
1	5 V
2	Hall U
3	Hall V
4	Hall W
5	GND
6	PTC
7	PTC
8	KTY
9	KTY
Case	Shield

Encoder cable

Cable length 500 mm approx.
Connector D-Sub 15 pins (male)



Pin No.	Signal
1	SDA*
2	SCL*
3	Not used
4	/Ref signal (U_{0-})
5	/Cos signal (U_{2-})
6	/Sin signal (U_{1-})
7	Not used
8	5 V
9	0 V
10	Not used
11	Not used
12	Ref signal (U_0)
13	Cos signal (U_2)
14	Sin signal (U_1)
15	Inner shield (IS)
Case	Shield

*Reserved. Please do not use

Power cable

Cable length 500 mm approx.
Connector Hypertac
LRRA06AMRPN182 (male)
Pin article code: 021.279.1020

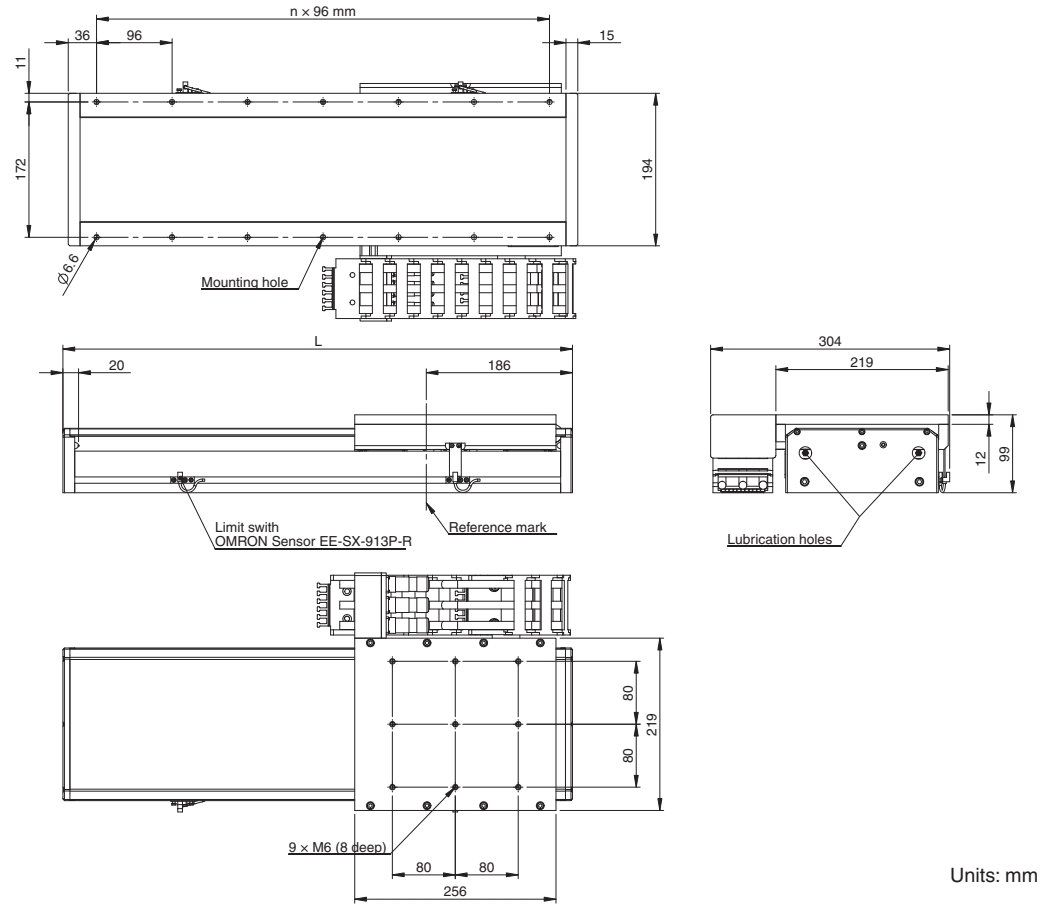


Mating connector:
Plug type: LPRA06BFRBN170

Pin No.	Name
1	Phase U
2	Phase V
3	Ground
4	Phase W
5	Not used
6	Not used

R88L-EA-AF-0609-□ (230/400 VAC)

Linear axis model	Effective stroke in mm	L in mm	n	Nº of mounting holes	Weight of moving table including motor coil (kg)	Weight of the complete axis (kg)
R88L-EA-AF-0609-0158-0005	158	456	4	10	6.7	17.2
R88L-EA-AF-0609-0254-0005	254	552	5	12	6.7	18.9
R88L-EA-AF-0609-0350-0005	350	648	6	14	6.7	20.6
R88L-EA-AF-0609-0446-0005	446	744	7	16	6.7	22.3
R88L-EA-AF-0609-0542-0005	542	840	8	18	6.7	24.1
R88L-EA-AF-0609-0638-0005	638	936	9	20	6.7	25.8
R88L-EA-AF-0609-0734-0005	734	1032	10	22	6.7	27.5
R88L-EA-AF-0609-0830-0005	830	1128	11	24	6.7	29.3
R88L-EA-AF-0609-0926-0005	926	1224	12	26	6.7	31.0
R88L-EA-AF-0609-1022-0005	1022	1320	13	28	6.7	32.7
R88L-EA-AF-0609-1118-0005	1118	1416	14	30	6.7	34.5
R88L-EA-AF-0609-1214-0005	1214	1512	15	32	6.7	36.2
R88L-EA-AF-0609-1310-0005	1310	1608	16	34	6.7	37.9
R88L-EA-AF-0609-1406-0005	1406	1704	17	36	6.7	39.7
R88L-EA-AF-0609-1502-0005	1502	1800	18	38	6.7	41.4
R88L-EA-AF-0609-1598-0005	1598	1896	19	40	6.7	43.1
R88L-EA-AF-0609-1694-0005	1694	1992	20	42	6.7	44.9
R88L-EA-AF-0609-1790-0005	1790	2088	21	44	6.7	46.6
R88L-EA-AF-0609-1886-0005	1886	2184	22	46	6.7	48.3
R88L-EA-AF-0609-1982-0005	1982	2280	23	48	6.7	50.1
R88L-EA-AF-0609-2078-0005	2078	2376	24	50	6.7	51.8



Units: mm

Hall sensor & temperature cable

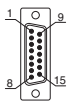
Cable length 500 mm approx.
Connector D-Sub 9 pins (male)



Pin No.	Name
1	5 V
2	Hall U
3	Hall V
4	Hall W
5	GND
6	PTC
7	PTC
8	KTY
9	KTY
Case	Shield

Encoder cable

Cable length 500 mm approx.
Connector D-Sub 15 pins (male)



*Reserved. Please do not use

Pin No.	Signal
1	SDA*
2	SCL*
3	Not used
4	/Ref signal (U_{0-})
5	/Cos signal (U_{2-})
6	/Sin signal (U_{1-})
7	Not used
8	5 V
9	0 V
10	Not used
11	Not used
12	Ref signal (U_0)
13	Cos signal (U_2)
14	Sin signal (U_1)
15	Inner shield (IS)
Case	Shield

Power cable

Cable length 500 mm approx.
Connector Hypertac
LRRA06AMRPN182 (male)
Pin article code: 021.279.1020

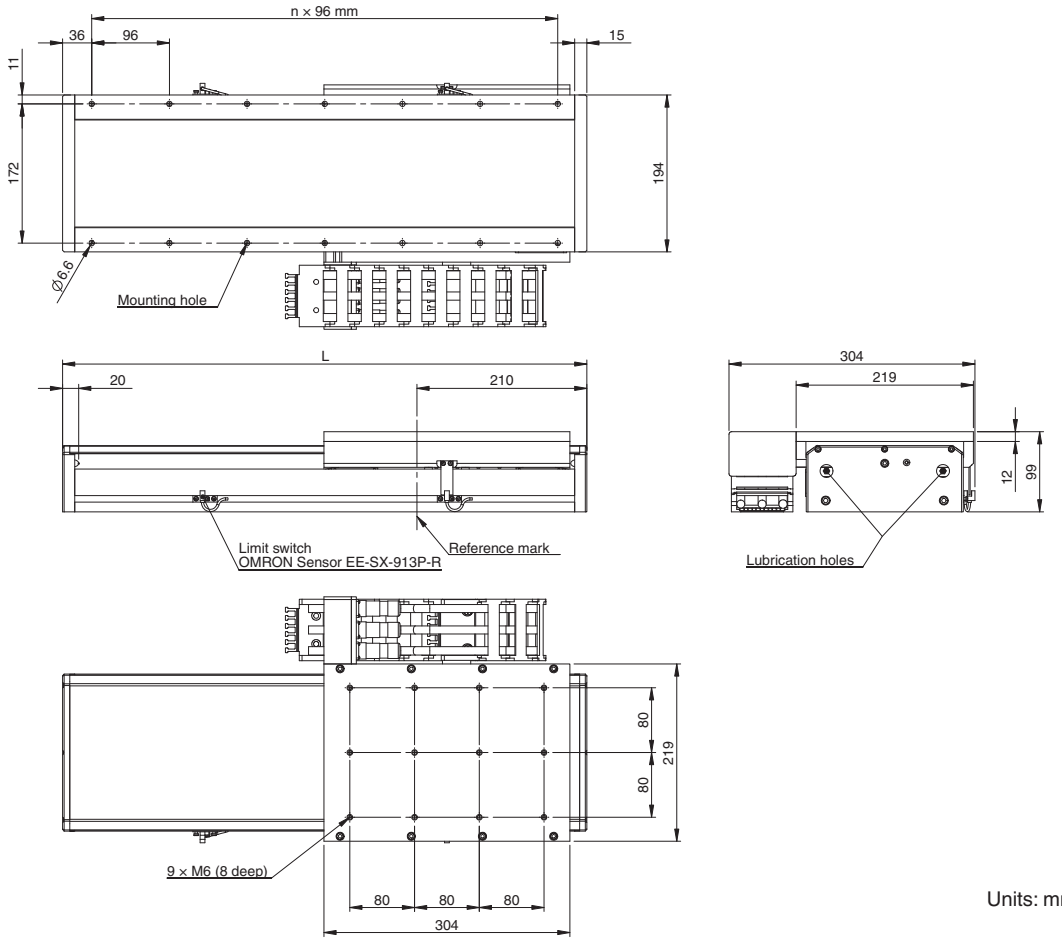


Mating connector:
Plug type: LPRA06BFRBN170

Pin No.	Name
1	Phase U
2	Phase V
3	Ground
4	Phase W
5	Not used
6	Not used

R88L-EA-AF-06012-□ (230/400 VAC)

Linear axis model	Effective stroke in mm	L in mm	n	Nº of mounting holes	Weight of moving table including motor coil (kg)	Weight of the complete axis (kg)
R88L-EA-AF-0612-0110-0005	110	456	4	10	7.9	18.3
R88L-EA-AF-0612-0206-0005	206	552	5	12	7.9	20.0
R88L-EA-AF-0612-0302-0005	302	648	6	14	7.9	21.7
R88L-EA-AF-0612-0398-0005	398	744	7	16	7.9	23.4
R88L-EA-AF-0612-0494-0005	494	840	8	18	7.9	25.2
R88L-EA-AF-0612-0590-0005	590	936	9	20	7.9	26.9
R88L-EA-AF-0612-0686-0005	686	1032	10	22	7.9	28.6
R88L-EA-AF-0612-0782-0005	782	1128	11	24	7.9	30.4
R88L-EA-AF-0612-0878-0005	878	1224	12	26	7.9	32.1
R88L-EA-AF-0612-0974-0005	974	1320	13	28	7.9	33.8
R88L-EA-AF-0612-1070-0005	1070	1416	14	30	7.9	35.6
R88L-EA-AF-0612-1166-0005	1166	1512	15	32	7.9	37.3
R88L-EA-AF-0612-1262-0005	1262	1608	16	34	7.9	39.0
R88L-EA-AF-0612-1358-0005	1358	1704	17	36	7.9	40.8
R88L-EA-AF-0612-1454-0005	1454	1800	18	38	7.9	42.5
R88L-EA-AF-0612-1550-0005	1550	1896	19	40	7.9	44.2
R88L-EA-AF-0612-1646-0005	1646	1992	20	42	7.9	46.0
R88L-EA-AF-0612-1742-0005	1742	2088	21	44	7.9	47.7
R88L-EA-AF-0612-1838-0005	1838	2184	22	46	7.9	49.4
R88L-EA-AF-0612-1934-0005	1934	2280	23	48	7.9	50.2
R88L-EA-AF-0612-2030-0005	2030	2376	24	50	7.9	52.9



Units: mm

Hall sensor & temperature cable

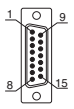
Cable length 500 mm approx.
Connector D-Sub 9 pins (male)



Pin No.	Name
1	5 V
2	Hall U
3	Hall V
4	Hall W
5	GND
6	PTC
7	PTC
8	KTY
9	KTY
Case	Shield

Encoder cable

Cable length 500 mm approx.
Connector D-Sub 15 pins (male)



Pin No.	Signal
1	SDA*
2	SCL*
3	Not used
4	/Ref signal (U_{0-})
5	/Cos signal (U_{2-})
6	/Sin signal (U_{1-})
7	Not used
8	5 V
9	0 V
10	Not used
11	Not used
12	Ref signal (U_0)
13	Cos signal (U_2)
14	Sin signal (U_1)
15	Inner shield (IS)
Case	Shield

*Reserved. Please do not use

Power cable

Cable length 500 mm approx.
Connector Hypertac
LRRA06AMRPN182 (male)
Pin article code: 021.279.1020

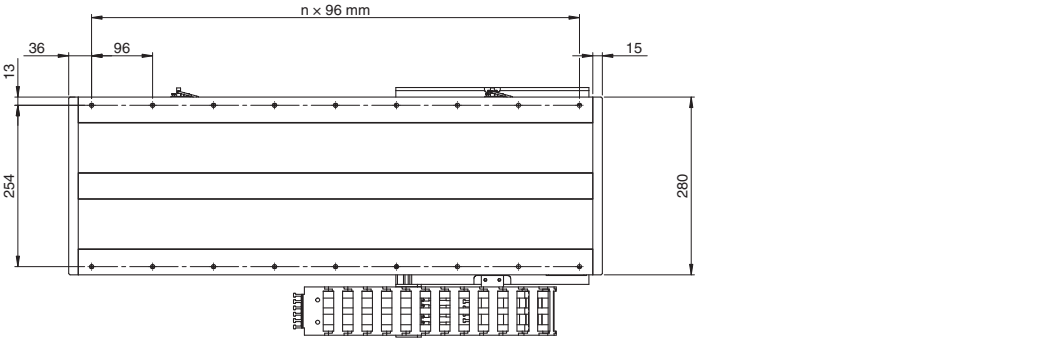


Mating connector:
Plug type: LPRA06BFRBN170

Pin No.	Name
1	Phase U
2	Phase V
3	Ground
4	Phase W
5	Not used
6	Not used

R88L-EA-AF-1112-□ (230/400 VAC)

Linear axis model	Effective stroke in mm	L in mm	n	Nº of mounting holes	Weight of moving table including motor coil (kg)	Weight of the complete axis (kg)
R88L-EA-AF-1112-0110-0005	110	456	4	10	13.7	31.9
R88L-EA-AF-1112-0206-0005	206	552	5	12	13.7	35.2
R88L-EA-AF-1112-0302-0005	302	648	6	14	13.7	38.5
R88L-EA-AF-1112-0398-0005	398	744	7	16	13.7	41.7
R88L-EA-AF-1112-0494-0005	494	840	8	18	13.7	45.0
R88L-EA-AF-1112-0590-0005	590	936	9	20	13.7	48.3
R88L-EA-AF-1112-0686-0005	686	1032	10	22	13.7	51.5
R88L-EA-AF-1112-0782-0005	782	1128	11	24	13.7	54.8
R88L-EA-AF-1112-0878-0005	878	1224	12	26	13.7	58.1
R88L-EA-AF-1112-0974-0005	974	1320	13	28	13.7	61.3
R88L-EA-AF-1112-1070-0005	1070	1416	14	30	13.7	64.6
R88L-EA-AF-1112-1166-0005	1166	1512	15	32	13.7	67.9
R88L-EA-AF-1112-1262-0005	1262	1608	16	34	13.7	71.1
R88L-EA-AF-1112-1358-0005	1358	1704	17	36	13.7	74.4
R88L-EA-AF-1112-1454-0005	1454	1800	18	38	13.7	77.7
R88L-EA-AF-1112-1550-0005	1550	1896	19	40	13.7	80.9
R88L-EA-AF-1112-1646-0005	1646	1992	20	42	13.7	84.2
R88L-EA-AF-1112-1742-0005	1742	2088	21	44	13.7	87.5
R88L-EA-AF-1112-1838-0005	1838	2184	22	46	13.7	90.8
R88L-EA-AF-1112-1934-0005	1934	2280	23	48	13.7	94.0
R88L-EA-AF-1112-2030-0005	2030	2376	24	50	13.7	97.3
R88L-EA-AF-1112-2126-0005	2126	2472	25	52	13.7	100.6



Units: mm

Hall sensor & temperature cable

Cable length 500 mm approx.
Connector D-Sub 9 pins (male)



Pin No.	Name
1	5 V
2	Hall U
3	Hall V
4	Hall W
5	GND
6	PTC
7	PTC
8	KTY
9	KTY
Case	Shield

Encoder cable

Cable length 500 mm approx.
Connector D-Sub 15 pins (male)



Pin No.	Signal
1	SDA*
2	SCL*
3	Not used
4	/Ref signal (U_{0-})
5	/Cos signal (U_{2-})
6	/Sin signal (U_{1-})
7	Not used
8	5 V
9	0 V
10	Not used
11	Not used
12	Ref signal (U_0)
13	Cos signal (U_2)
14	Sin signal (U_1)
15	Inner shield (IS)
Case	Shield

*Reserved. Please do not use

Power cable

Cable length 500 mm approx.
Connector Hypertac
LRRA06AMRPN182 (male)
Pin article code: 021.279.1020

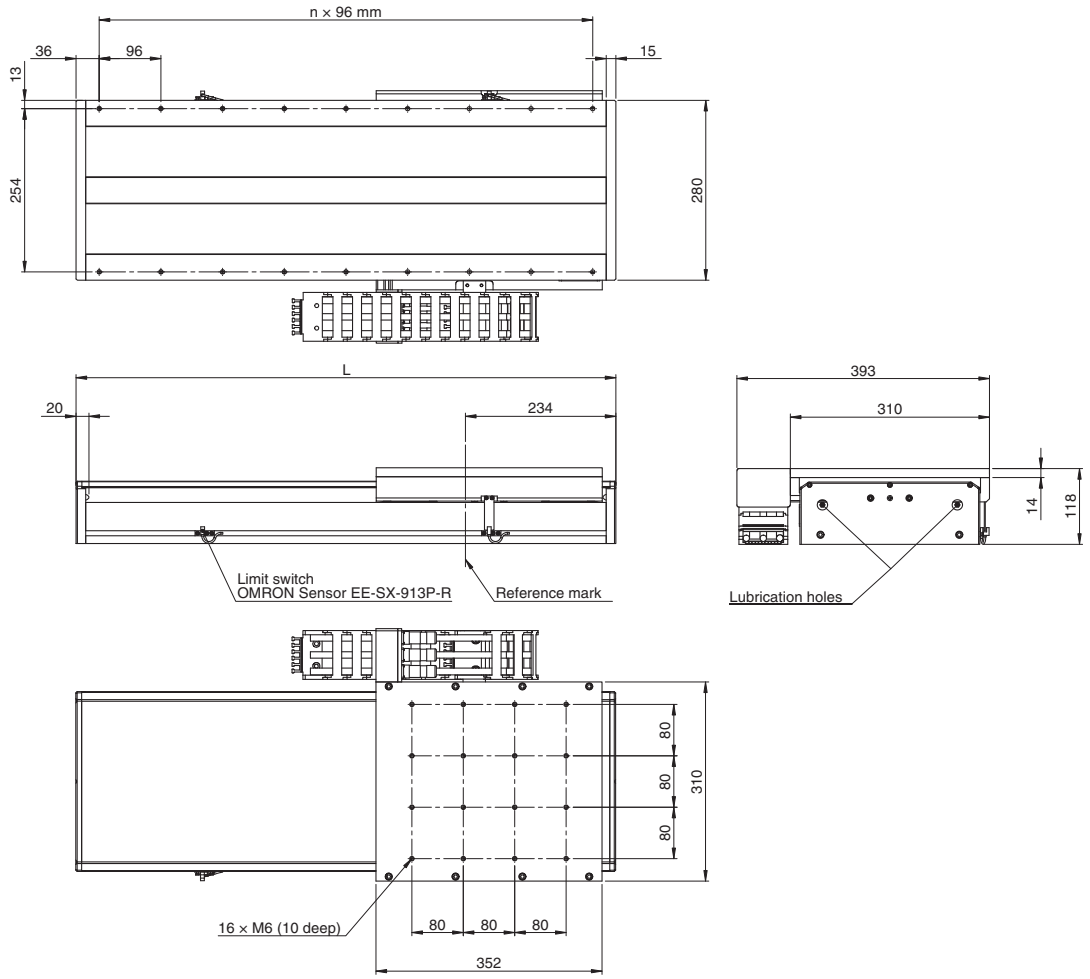


Pin No.	Name
1	Phase U
2	Phase V
3	Ground
4	Phase W
5	Not used
6	Not used

Mating connector:
Plug type: LPRA06BFRBN170

R88L-EA-AF-1115-□ (230/400 VAC)

Linear axis model	Effective stroke in mm	L in mm	n	Nº of mounting holes	Weight of moving table including motor coil (kg)	Weight of the complete axis (kg)
R88L-EA-AF-1115-0158-0005	158	552	5	12	15.9	37.4
R88L-EA-AF-1115-0254-0005	254	648	6	14	15.9	40.6
R88L-EA-AF-1115-0350-0005	350	744	7	16	15.9	43.9
R88L-EA-AF-1115-0446-0005	446	840	8	18	15.9	47.2
R88L-EA-AF-1115-0542-0005	542	936	9	20	15.9	50.4
R88L-EA-AF-1115-0638-0005	638	1032	10	22	15.9	53.7
R88L-EA-AF-1115-0734-0005	734	1128	11	24	15.9	57.0
R88L-EA-AF-1115-0830-0005	830	1224	12	26	15.9	60.2
R88L-EA-AF-1115-0926-0005	926	1320	13	28	15.9	63.5
R88L-EA-AF-1115-1022-0005	1022	1416	14	30	15.9	66.8
R88L-EA-AF-1115-1118-0005	1118	1512	15	32	15.9	70.0
R88L-EA-AF-1115-1214-0005	1214	1608	16	34	15.9	73.3
R88L-EA-AF-1115-1310-0005	1310	1704	17	36	15.9	76.6
R88L-EA-AF-1115-1406-0005	1406	1800	18	38	15.9	79.8
R88L-EA-AF-1115-1502-0005	1502	1896	19	40	15.9	83.1
R88L-EA-AF-1115-1598-0005	1598	1992	20	42	15.9	86.4
R88L-EA-AF-1115-1694-0005	1694	2088	21	44	15.9	89.6
R88L-EA-AF-1115-1790-0005	1790	2184	22	46	15.9	92.9
R88L-EA-AF-1115-1886-0005	1886	2280	23	48	15.9	96.2
R88L-EA-AF-1115-1982-0005	1982	2376	24	50	15.9	99.4
R88L-EA-AF-1115-2078-0005	2078	2472	25	52	15.9	102.7
R88L-EA-AF-1115-2174-0005	2174	2568	26	54	15.9	106.0



Hall sensor & temperature cable

Cable length 500 mm approx.
Connector D-Sub 9 pins (male)



Pin No.	Name
1	5 V
2	Hall U
3	Hall V
4	Hall W
5	GND
6	PTC
7	PTC
8	KTY
9	KTY
Case	Shield

Encoder cable

Cable length 500 mm approx.
Connector D-Sub 15 pins (male)



Pin No.	Signal
1	SDA*
2	SCL*
3	Not used
4	/Ref signal (U_{0-})
5	/Cos signal (U_{2-})
6	/Sin signal (U_{1-})
7	Not used
8	5 V
9	0 V
10	Not used
11	Not used
12	Ref signal (U_0)
13	Cos signal (U_2)
14	Sin signal (U_1)
15	Inner shield (IS)
Case	Shield

*Reserved. Please do not use

Power cable

Cable length 500 mm approx.
Connector Hypertac
LRRA06AMRPN182 (male)
Pin article code: 021.279.1020



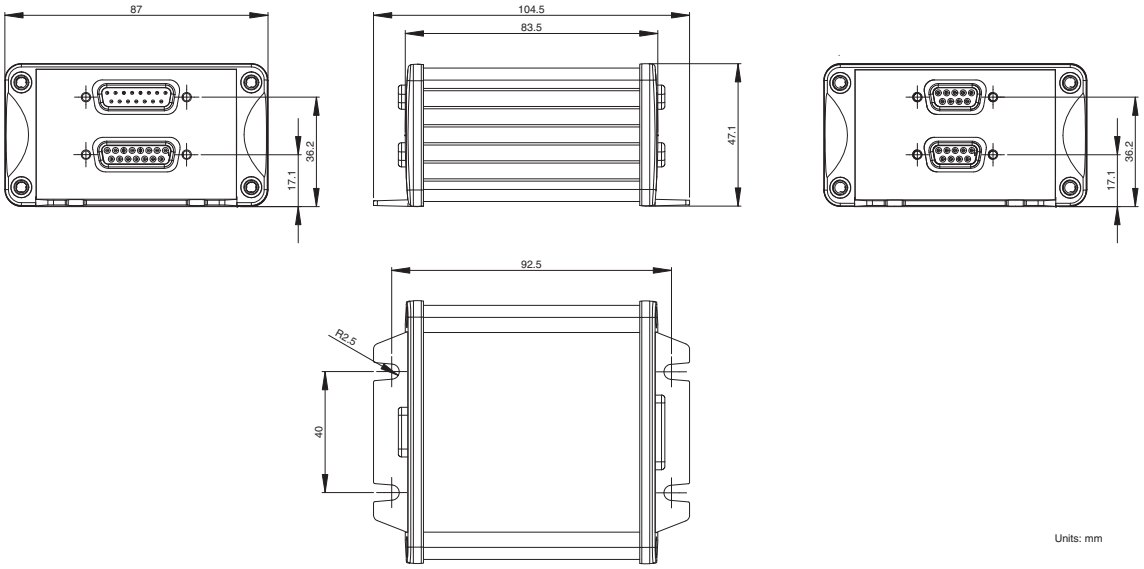
Pin No.	Name
1	Phase U
2	Phase V
3	Ground
4	Phase W
5	Not used
6	Not used

Mating connector:
Plug type: LPRA06BFRBN170

Optional serial converter unit

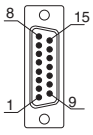
Specifications

Serial converter model R88A-		SC01K-E	SC02K-E
Description		Serial converter from 1 Vpp to G5 serial data transmission and with hall sensor input	
Temperature sensor		KTY sensor detection of iron-core motor coil	NTC sensor detection of ironless motor coil
Electrical characteristics	Power supply voltage	5 VDC, max. 250 mA supplied by the drive	
	Standard resolution	Interpolation factor 100 plus quadrature count	
	Max. input frequency	400 kHz 1 Vpp	
	Analog input signals (cos, sin, Ref)	Differential input amplitude: 0.4 V to 1.2 V Input signal level: 1.5 V to 3.5 V	
	Output signals	Position data, hall & temperature sensor information, and alarms	
	Output method	Serial data transmission	
	Transmission cycle	<42 µs	
Mechanical characteristics	Vibration resistance	98 m/s^2 max. (1 to 2500 Hz) in three directions	
	Shock resistance	980 m/s^2, (11 ms) two times in three directions	
Environmental conditions	Operating temperature	0 to 55°C	
	Storage temperature	–20 to 80°C	
	Humidity	20% to 90% relative humidity (without condensation)	



Units: mm

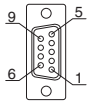
CN4
Serial data output to linear servo drive



Connector D-Sub 15-pin (male)

Pin No.	Signal
1	PS
2	/PS
3	Not used
4	Not used
5	Not used
6	Not used
7	Not used
8	5 V
9	0 V
10	Not used
11	Not used
12	Not used
13	Not used
14	Not used
15	Inner shield
Case	Shield

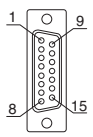
CN3
Temperature sensor interface without h all sensor



Connector D-Sub 9-pin (female)

Pin No.	Signal
1	Not used
2	Not used
3	Not used
4	Not used
5	Not used
6	PTC
7	PTC
8	KTY/ NTC
9	KTY/NTC
Case	Shield

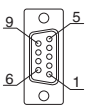
CN1
Encoder input 1Vpp with programmable lines NUMERIK JENA standard



Connector D-Sub 15-pin (female)

Pin No.	Signal
1	SDA*
2	SCL*
3	Not used
4	/Ref signal (U_{0-})
5	/Cos signal (U_{2-})
6	/Sin signal (U_{1-})
7	Not used
8	5 V
9	0 V
10	Not used
11	Not used
12	Ref signal (U_0)
13	Cos signal (U_2)
14	Sin signal (U_1)
15	Inner shield (IS)
Case	Shield

CN2
Hall & temperature sensors interface



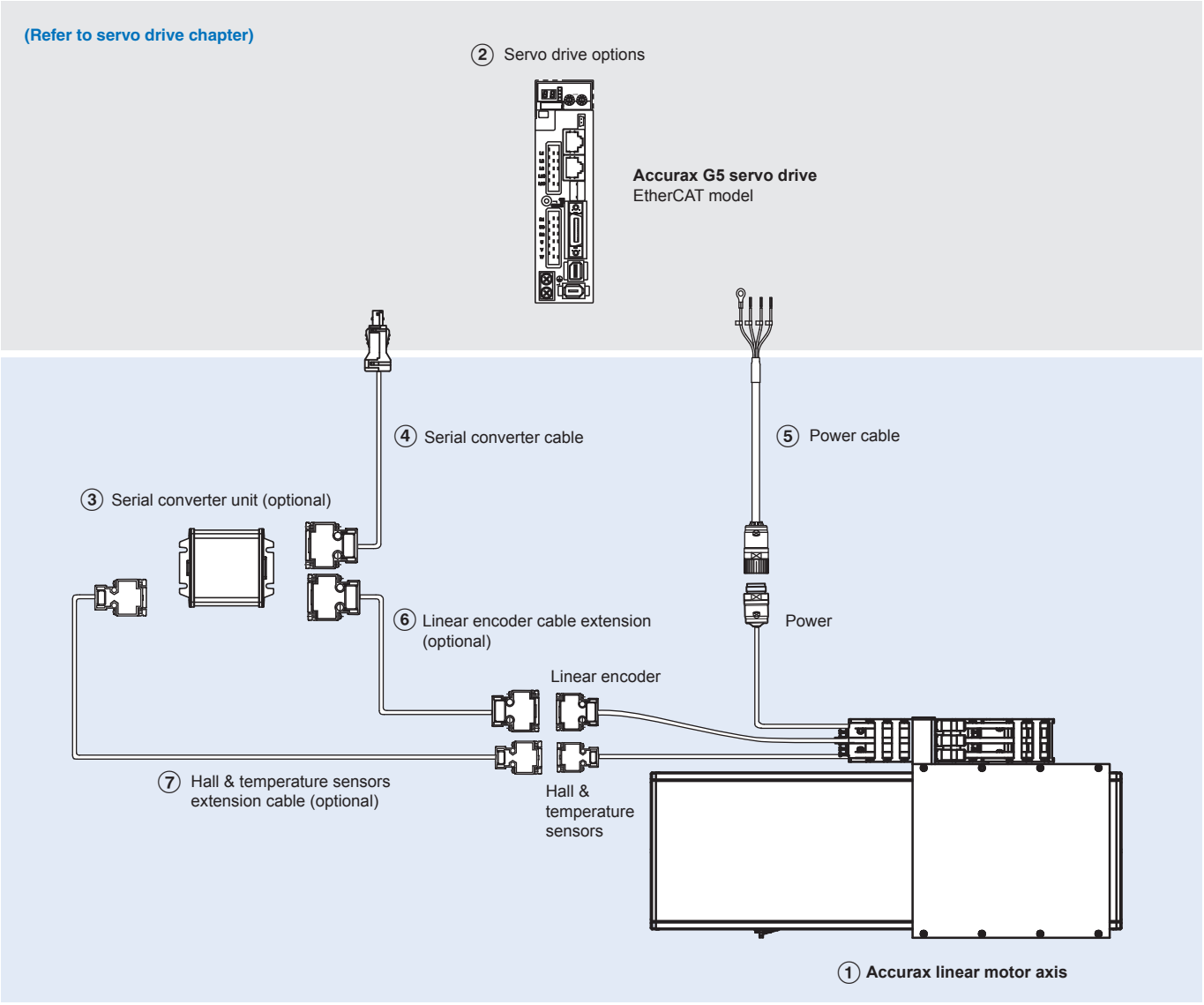
Connector D-Sub 9-pin (female)

Pin No.	Signal
1	5 V
2	Hall U
3	Hall V
4	Hall W
5	GND
6	PTC
7	PTC
8	KTY/ NTC
9	KTY/ NTC
Case	Shield

*Reserved. Please do not use

Note: As the 6, 7, 8, 9 pins in the CN2 and CN3 connectors are internally wired, the temperature sensor can be connected to both connectors. When the hall sensor is also required, use the same cable for hall & temperature signals and the CN2 connector.

Ordering information



Note: The symbols ①②③... show the recommended sequence to select the servomotor, cables and serial converter for a linear motors system.

Linear motor axis

R88L-EA-AF-□

230 VAC single phase/400 VAC three phase

Symbol	Specifications		① Linear motor axis model	② Linear servo drive	
	Rated force	Peak force		Accurax G5 EtherCAT	
				230 V	400 V
①②	48 N	120 N	R88L-EA-AF-0303-□□□□-0005	R88D-KN02H-ECT-L	R88D-KN06F-ECT-L
	96 N	240 N	R88L-EA-AF-0306-□□□□-0005	R88D-KN04H-ECT-L	R88D-KN10F-ECT-L
	160 N	450 N	R88L-EA-AF-0606-□□□□-0005	R88D-KN08H-ECT-L	R88D-KN15F-ECT-L
	240 N	675 N	R88L-EA-AF-0609-□□□□-0005	R88D-KN10H-ECT-L	R88D-KN20F-ECT-L
	320 N	900 N	R88L-EA-AF-0612-□□□□-0005	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	608 N	1800 N	R88L-EA-AF-1112-□□□□-0005	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	760 N	2250 N	R88L-EA-AF-1115-□□□□-0005	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L

Note: For effective stroke distances available see dimensions section.

Servo drive

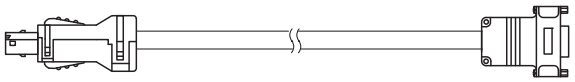
② Refer to Accurax G5 servo drive chapter for detailed drive specifications and selection of drive accessories.

Serial converter unit

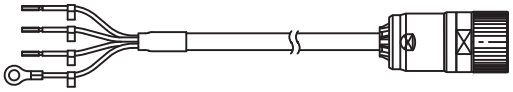
Symbol	Specifications	Model
③	Serial converter unit from 1 Vpp to G5 serial data transmission (with KTY sensor detection of iron-core motor coil)	R88A-SC01K-E
	Serial converter unit from 1 Vpp to G5 serial data transmission (with NTC sensor detection of ironless motor coil)	R88A-SC02K-E

Note: If no temperature sensor is needed, then it does not matter which converter you use.

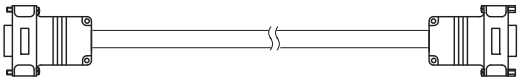
Serial converter cable to servo drive

Symbol	Specifications		Model	Appearance
④	Accurax G5 drive to serial converter cable. (Connectors R88A-CNK41L and DB-15)	1.5 m	R88A-CRKN001-5CR-E	
		3 m	R88A-CRKN003CR-E	
		5 m	R88A-CRKN005CR-E	
		10 m	R88A-CRKN010CR-E	
		15 m	R88A-CRKN015CR-E	
		20 m	R88A-CRKN020CR-E	

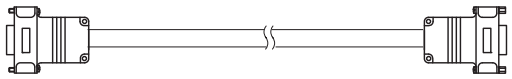
Power cable

Symbol	Specifications		Model	Appearance
⑤	For linear motor axis R88L-EA-AF-0303-□ R88L-EA-AF-0306-□	1.5 m	R88A-CAWK001-5S-DE	
		3 m	R88A-CAWK003S-DE	
		5 m	R88A-CAWK005S-DE	
		10 m	R88A-CAWK010S-DE	
		15 m	R88A-CAWK015S-DE	
		20 m	R88A-CAWK020S-DE	
	For linear motor axis R88L-EA-AF-0606-□ R88L-EA-AF-0609-□ R88L-EA-AF-0612-□ R88L-EA-AF-1112-□ R88L-EA-AF-1115-□	1.5 m	R88A-CAWL001-5S-DE	
		3 m	R88A-CAWL003S-DE	
		5 m	R88A-CAWL005S-DE	
		10 m	R88A-CAWL010S-DE	
		15 m	R88A-CAWL015S-DE	
		20 m	R88A-CAWL020S-DE	

Linear encoder cable to serial converter

Symbol	Specifications		Model	Appearance
⑧	Extension cable from linear encoder to serial converter. (Connector DB-15) (This extension cable is optional)	1.5 m	R88A-CFKA001-5CR-E	
		3 m	R88A-CFKA003CR-E	
		5 m	R88A-CFKA005CR-E	
		10 m	R88A-CFKA010CR-E	
		15 m	R88A-CFKA015CR-E	

Hall and temperature sensors cable to serial converter

Symbol	Specifications		Model	Appearance
⑦	Extension cable from hall and temperature sensors to serial converter. (Connector DB-9) (This extension cable is optional)	1.5 m	R88A-CFKB001-5CR-E	
		3 m	R88A-CFKB003CR-E	
		5 m	R88A-CFKB005CR-E	
		10 m	R88A-CFKB010CR-E	
		15 m	R88A-CFKB015CR-E	

Connectors

Specification	Model
Accurax G5 servo drive encoder connector (for CN4)	R88A-CNK41L
Hypertac power cable connector IP67	LPRA-06B-FRBN170

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I161E-EN-04 In the interest of product improvement, specifications are subject to change without notice.

3G3RX□

RX frequency inverter



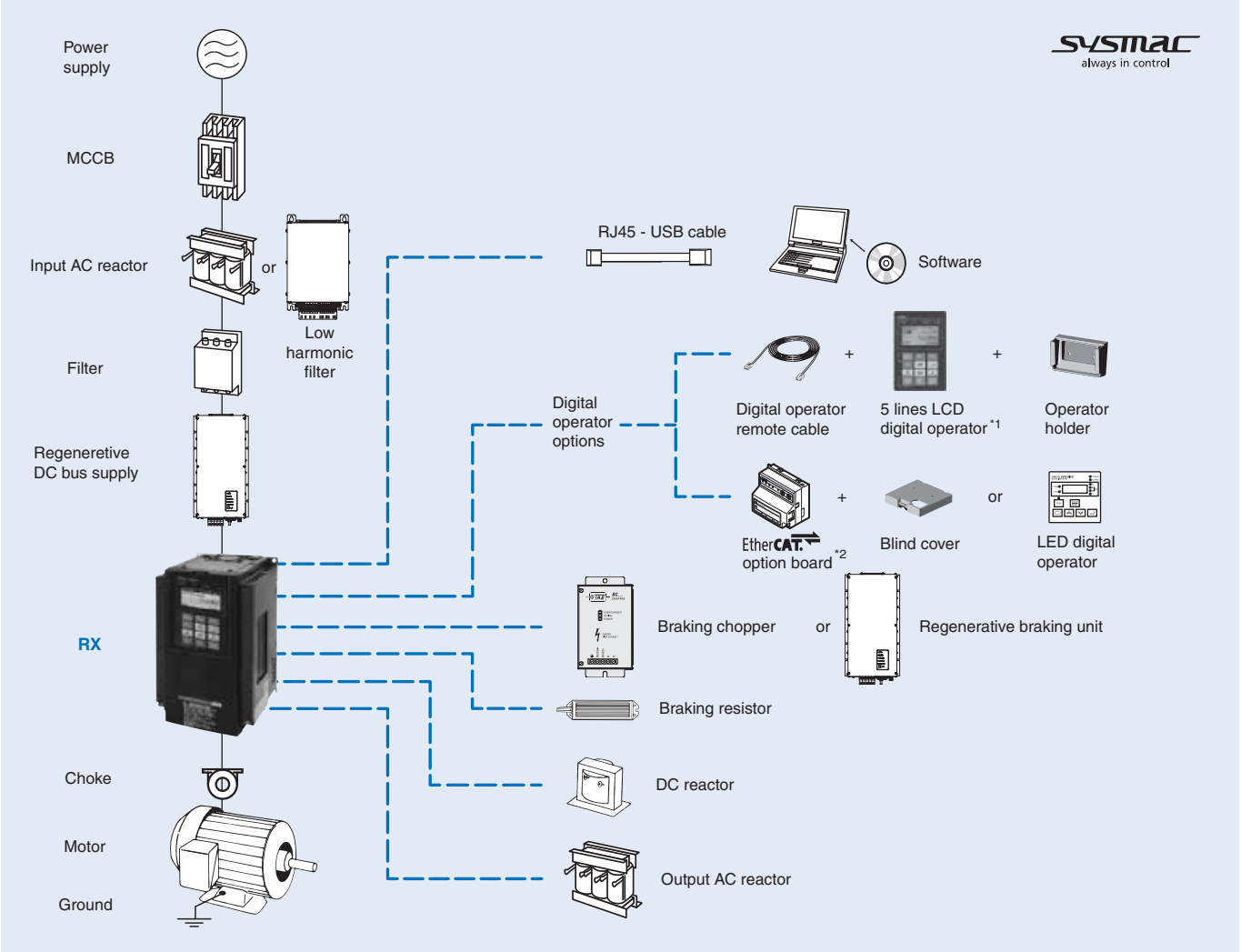
Customised to your machine

- High starting torque in open loop: 200% at 0.3 Hz, Full torque at 0 Hz in closed loop
- Sensor-less and vector closed-loop control
- Double rating VT 120%/1 min and CT 150%/1 min
- Built-in EMC filter and application functionality
- Indexer functionality
- Automatic energy saving
- Micro-surge voltage suppression
- Regenerative solutions as option
- CE, cULus, RoHS

Ratings

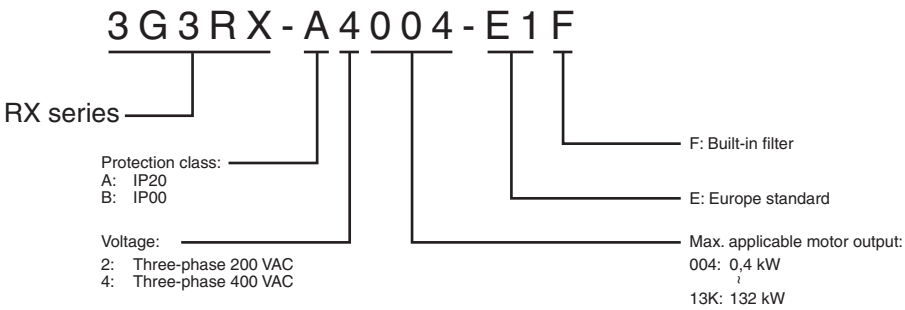
- 200 V class three-phase: 0.4 to 55 kW
- 400 V class three-phase: 0.4 to 132 kW

System configuration



*1 The 5 lines LCD digital operator is provided with the inverter from factory.
*2 When a communication option board is mounted, there are two options: mount a blind cover or a LED digital operator.

Type designation



Specifications

Common specifications

	Model number: 3G3RX	Specifications
General functions	Control methods	Phase-to-phase sinusoidal pulse with modulation PWM (Sensorless vector control, close loop vector with motor feedback, V/F)
	Output frequency range	0.10 to 400.00 Hz
	Frequency precision	Digital set value: ±0.01% of the max. frequency
		Analogue set value: ±0.2% of the max. frequency (25 ±10ºC)
	Resolution of frequency set value	Digital set value: 0.01 Hz
		Analog input: 12 bit
	Resolution of output frequency	0.01 Hz
	Starting torque	150%/0.3 Hz (under sensor-less vector control or sensor-less vector control at 0 Hz)
		200%/Torque at 0 Hz (under sensor-less vector control at 0Hz, when a motor size one rank lower than specified is connected)
	Overload capability	150%/60 s, 200%/3 s for CT; 120%/60 s VT
	Frequency set value	0 to 10 VDC (10 KΩ), –10 to 10 VDC (10 KΩ), 4 to 20 mA (100 Ω), RS485 Modbus, Network options
	V/f Characteristics	V/f optionally changeable at base frequencies of 30 to 400 Hz, V/f braking constant torque, reduction torque, sensor-less vector control, sensor-less vector control at 0 Hz
Functionality	Input signals	8 terminals, NO/NC switchable, sink/source logic switchable [Terminal function] 8 functions can be selected from among 61. Reverse (RV), Multi-step speed setting binary 1 (CF1), Multi-step speed setting binary 2 (CF2), Multi-step speed setting binary 3 (CF3), Multi-step speed setting binary 4 (CF4), Jogging (JG), DC injection braking (DB), 2nd control (SET), 2-step acceleration/deceleration (2CH), Free-run stop (FRS), External trip (EXT), USP function (USP), Commercial switching (CS), Soft lock (SFT), Analog input switching (AT), 3rd control (SET3), Reset (RS), 3-wire start (STA), 3-wire stop (STP), 3-wire forward/reverse (F/R), PID enabled/disabled (PID), PID integral reset (PIDC), Control gain switching (CAS), UP/DWN function accelerated (UP), UP/DWN function decelerated (DWN), UP/DWN function data clear (UDC), Forced operator (OPE), Multi-step speed setting bit 1 (SF1), Multi-step speed setting bit 2 (SF2), Multi-step speed setting bit 3 (SF3), Multi-step speed setting bit 4 (SF4), Multi-step speed setting bit 5 (SF5), Multi-step speed setting bit 6 (SF6), Multi-step speed setting bit 7 (SF7), Overload limit switching (OLR), Torque limit enabled (TL), Torque limit switching 1 (TRQ1), Torque limit switching 2 (TRQ2), P/PI switching (PPI), Brake confirmation (BOK), Orientation (ORT), LAD cancel (LAC), Position deviation clear (PCLR), Pulse train position command input permission (STAT), Frequency addition function (ADD), Forced terminal block (F-TM), Torque reference input permission (ATR), Integrated power clear (KHC), Servo ON (SON), Preliminary excitation (FOC), Analog command on hold (AHD), Position command selection 1 (CP1), Position command selection 2 (CP2), Position command selection 3 (CP3), Zero return limit signal (ORL), Zero return startup signal (ORG), Forward driving stop (FOT), Reverse driving stop (ROT), Speed/Position switching (SPD), Pulse counter (PCNT), Pulse counter clear (PCC), No allocation (no)
	Output signals	5 open collector output terminals: NO/NC switchable, sink/source logic switchable 1 relay (SPDT contact) output terminal: NO/NC switchable [Terminal function] 6 functions can be selected from among 45. Signal during RUN (RUN), Constant speed arrival signal (FA1), Over set frequency arrival signal (FA2), Overload warning (OL), Excessive PID deviation (OD), Alarm signal (AL), Set-frequency-only arrival signal (FA3), Overtorque (OTQ), Signal during momentary power interruption (IP), Signal during undervoltage (UV), Torque limit (TRQ), RUN time exceeded (RNT), Power ON time exceeded (ONT), Thermal warning (THM), Brake release (BRK), Brake error (BER), 0-Hz signal (ZS), Excessive speed deviation (DSE), Position ready (POK), Set frequency exceeded 2 (FA4), Set frequency only 2 (FA5), Overload warning 2 (OL2), Analog FV disconnection detection (FVDc), Analog FI disconnection detection (FIDc), Analog FE disconnection detection (FEDc), PID FB status output (FBV), Network error (NDc), Logic operation output 1 (LOG1), Logic operation output 2 (LOG2), Logic operation output 3 (LOG3), Logic operation output 4 (LOG4), Logic operation output 5 (LOG5), Logic operation output 6 (LOG6), Capacitor life warning (WAC), Cooling fan life warning (WAF), Starting contact signal (FR), Fin overheat warning (OHF), Light load detection signal (LOC), Operation ready (IRDY), Forward run (FWR), Reverse run (RVR), Fatal fault (MJA), Window comparator FV (WCFV), Window comparator FI (WCFI), Window comparator FE (WCFE), Alarm codes 0 to 3 (AC0 to AC3)
	Standard functions	V/f free setting (7), Upper/lower frequency limit, Frequency jump, Curve acceleration/deceleration, Manual torque boost level/break, Energy-saving operation, Analog meter adjustment, Starting frequency, Carrier frequency adjustment, Electronic thermal function, (free setting available), External start/end (frequency/rate), Analog input selection, Trip retry, Restart during momentary power interruption, Various signal outputs, Reduced voltage startup, Overload limit, Initialization value setting, Automatic deceleration at power-off, AVR function, Automatic acceleration/deceleration, Auto tuning (Online/Offline), High torque multi-motor operation control (sensor-less vector control of two monitors with one inverter)
	Analogue inputs	Analogue inputs 0 to 10 V and –10 to 10 V (10 KΩ), 4 to 20 mA (100 Ω)
	Analogue outputs	Analog voltage output, Analog current output, Pulse train output
	Accel/Decel times	0.01 to 3,600.0 s (line/curve selection)
	Display	Status indicator LED's Run, Program, Power, Alarm, Hz, Amps, Volts,%
		Digital operator: Available to monitor 23 items, output current, output frequency...

Model number: 3G3RX		Specifications
Protection functions	Motor overload protection	Electronic Thermal overload relay and PTC thermistor input
	Instantaneous overcurrent	200% of rated current for 3 seconds
	Overload	150% for 1 minute
	Overvoltage	800 V for 400 V type and 400 V for 200 V type
	Momentary power loss	Decelerates to stop with DC bus controlled, coast to stop
	Cooling fin overheat	Temperature monitor and error detection
	Stall prevention level	Stall prevention during acceleration, deceleration and constant speed
	Ground fault	Detection at power on
	Power charge indication	On when voltage between P and N is higher than 45V
Ambient conditions	Degree of protection	IP20/IP00
	Ambient humidity	90% RH or less (without condensation)
	Storage temperature	–20 to 65°C (short-term temperature during transportation)
	Ambient temperature	–10 to 50°C
	Installation	Indoor (no corrosive gas, dust, etc.)
	Installation height	Max. 1,000 m
	Vibration	3G3RX-A□004 to A□220, 5.9 m/s^2 (0.6G), 10 to 55 Hz 3G3RX-A□300 to B□13K, 2.94 m/s^2 (0.3G), 10 to 55 Hz

3G3RX 200 V class

Three-phase: 3G3RX-□				A2004	A2007	A2015	A2022	A2037	A2055	A2075	A2110	A2150	A2185	A2220	A2300	A2370	A2450	A2550
Max. applicable motor 4P kW*1			at CT	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55
			at VT	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Output characteristics	Inverter capacity kVA	200 V	at CT	1.0	1.7	2.5	3.6	5.7	8.3	11.0	15.9	22.1	26.3	32.9	41.9	50.2	63.0	76.2
			at VT	1.3	2.1	3.2	4.1	6.7	10.4	15.2	20.0	26.3	29.4	39.1	49.5	59.2	72.7	93.5
		240 V	at CT	1.2	2.0	3.1	4.3	6.8	9.9	13.3	19.1	26.6	31.5	39.4	50.2	60.2	75.6	91.4
			at VT	1.5	2.6	3.9	5.0	8.1	12.4	18.2	24.1	31.5	35.3	46.9	59.4	71.0	87.2	112.2
	Rated output current (A)		at CT	3.0	5.0	7.5	10.5	16.5	24	32	46	64	76	95	121	145	182	220
			at VT	3.7	6.3	9.4	12	19.6	30	44	58	73	85	113	140	169	210	270
	Max. output voltage			Proportional to input voltage: 0 to 240 V														
	Max. output frequency			400 Hz														
Power supply	Rated input voltage and frequency			3-phase 200 to 240 V 50/60 Hz														
	Allowable voltage fluctuation			–15% to 10%														
	Allowable frequency fluctuation			5%														
Power supply	Regenerative braking			Internal BRD circuit (external discharge resistor)											External regenerative braking unit			
	Minimum connectable resistance			50	50	35	35	35	16	10	10	7.5	7.5	5				
Degree of protection				IP20														
Cooling method				Forced air cooling														

*1 Based on a standard 3-Phase motor.

3G3RX 400 V class

Three-phase: 3G3RX-□				A4004	A4007	A4015	A4022	A4040	A4055	A4075	A4110	A4150	A4185	A4220	A4300	A4370	A4450	A4550	B4750	B4900	B411K	B413K
Max. applicable motor 4P kW*1			at CT	0.4	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132
			at VT	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160
Output characteristics	Inverter capacity kVA	400 V	at CT	1.0	1.7	2.5	3.6	6.2	9.7	13.1	17.3	22.1	26.3	33.2	40.1	51.9	63.0	77.6	103.2	121.9	150.3	180.1
			at VT	1.3	2.1	3.3	4.6	7.7	11.0	15.2	20.9	25.6	30.4	39.4	48.4	58.8	72.7	93.5	110.8	135	159.3	200.9
		480 V	at CT	1.2	2.0	3.1	4.3	7.4	11.6	15.8	20.7	26.6	31.5	39.9	48.2	62.3	75.6	93.1	123.8	146.3	180.4	216.1
			at VT	1.5	2.5	4.0	5.5	9.2	13.3	18.2	24.1	30.7	36.5	47.3	58.1	70.6	87.2	112.2	133	162.1	191.2	241.1
	Rated output current (A)		at CT	1.5	2.5	3.8	5.3	9.0	14	19	25	32	38	48	58	75	91	112	149	176	217	260
			at VT	1.9	3.1	4.8	6.7	11.1	16	22	29	37	43	57	70	85	105	135	160	195	230	290
	Max. output voltage			Proportional to input voltage: 0 to 480 V																		
	Max. output frequency			400 Hz																		
Power supply	Rated input voltage and frequency			3-phase 380 to 480 V 50/60 Hz																		
	Allowable voltage fluctuation			–15% to 10%																		
	Allowable frequency fluctuation			5%																		
Power supply	Regenerative braking			Internal BRD circuit (external discharge resistor)										External regenerative braking unit								
	Minimum connectable resistance			100	100	100	100	70	70	35	35	24	24	20								
Degree of protection				IP20															IP00			
Cooling method				Forced air cooling																		

*1 Based on a standard 3-Phase motor.

Dimensions

3G3RX inverter

Figure 1

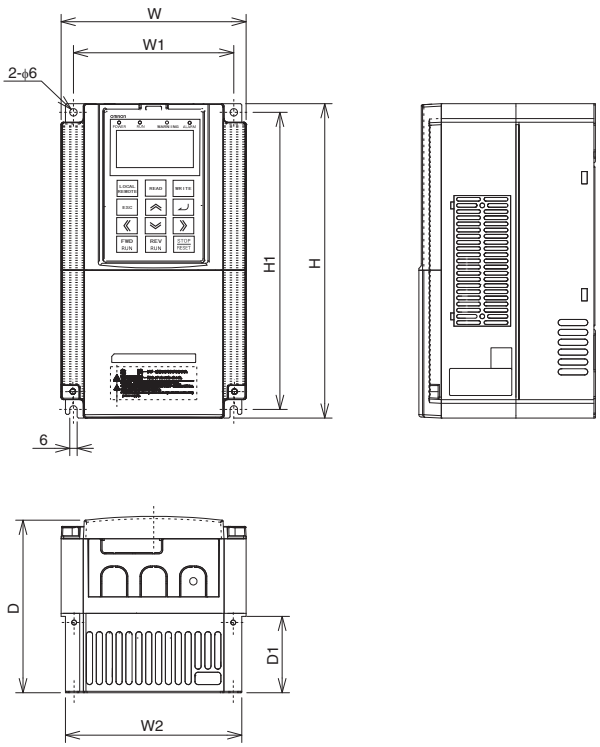


Figure 2

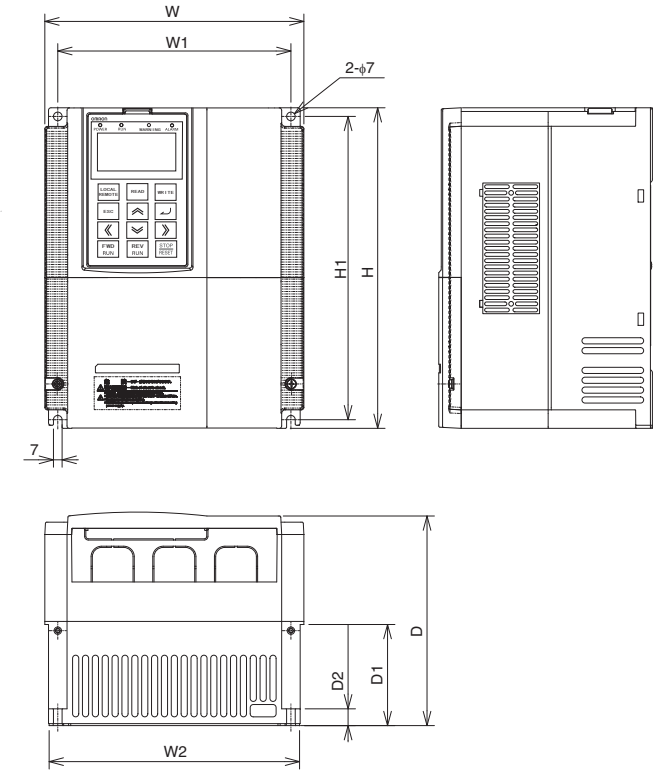


Figure 3

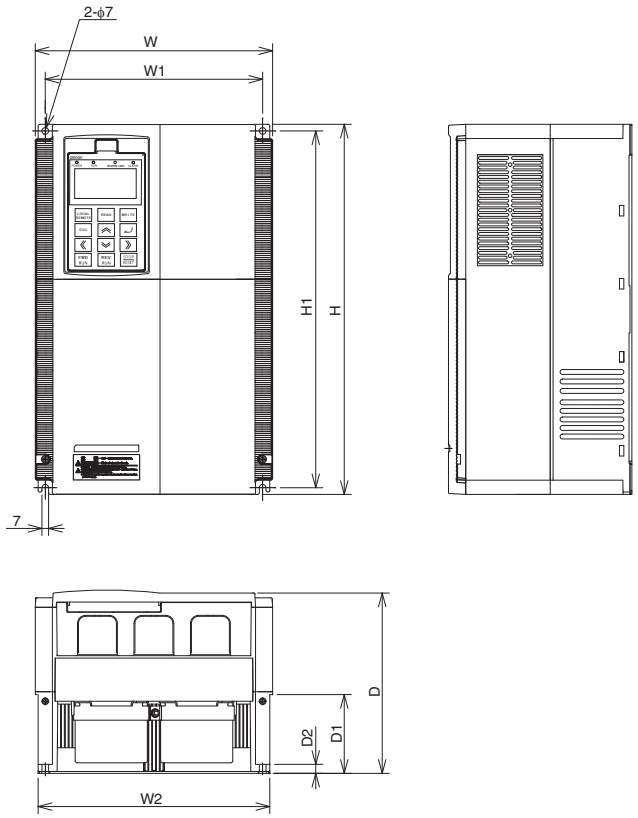


Figure 4

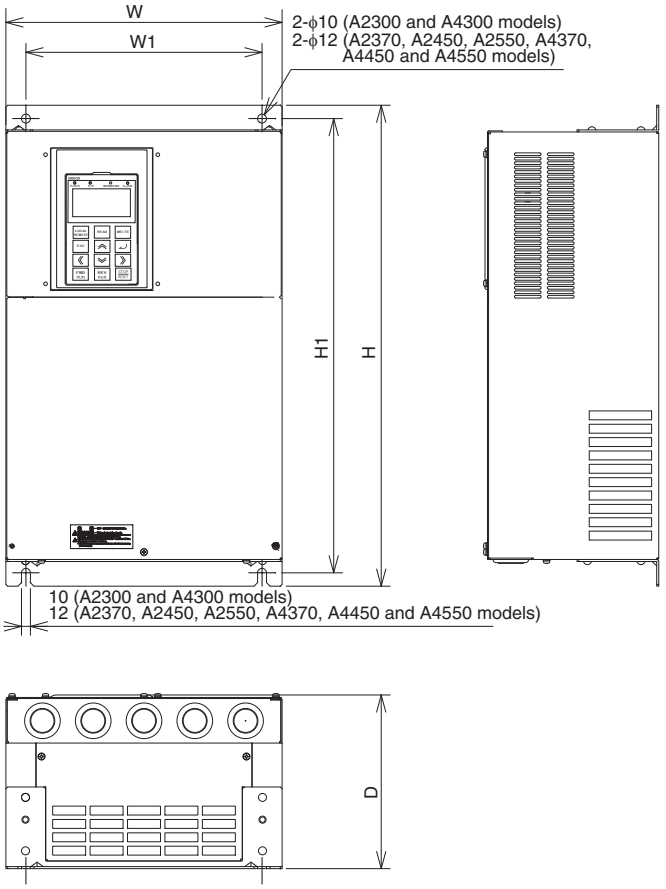
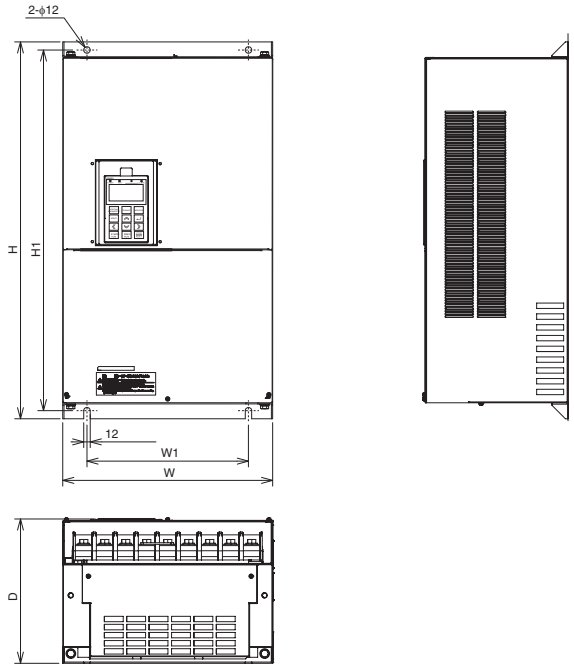


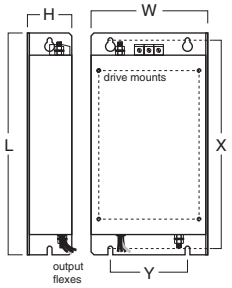
Figure 5



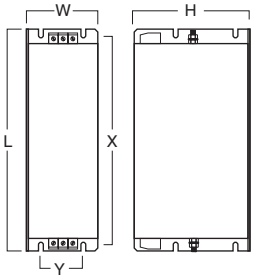
Voltage class	Inverter model	Figure	Dimensions in mm								
			W	W1	W2	H	H1	D	D1	D2	Weight (kg)
Three-phase 200 V	3G3RX-A2004	1	150	130	143	255	241	140	62	–	3.5
	3G3RX-A2007										
	3G3RX-A2015										
	3G3RX-A2022										
	3G3RX-A2037										
	3G3RX-A2055	2	210	189	203	260	246	170	82	13.6	6
	3G3RX-A2075										
	3G3RX-A2110										
	3G3RX-A2150	3	250	229	244	390	376	190	83	9.5	14
	3G3RX-A2185										
	3G3RX-A2220										
	3G3RX-A2300	4	310	265	–	540	510	195	–	–	20
	3G3RX-A2370		390	300	–	550	520	250	–	–	30
	3G3RX-A2450										
	3G3RX-A2550		480	380	–	700	670	250	–	–	43
Three-phase 400 V	3G3RX-A4004	1	150	130	143	255	241	140	62	–	3.5
	3G3RX-A4007										
	3G3RX-A4015										
	3G3RX-A4022										
	3G3RX-A4040										
	3G3RX-A4055	2	210	189	203	260	246	170	82	13.6	6
	3G3RX-A4075										
	3G3RX-A4110										
	3G3RX-A4150	3	250	229	244	390	376	190	83	9.5	14
	3G3RX-A4185										
	3G3RX-A4220										
	3G3RX-A4300	4	310	265	–	540	510	195	–	–	22
	3G3RX-A4370		390	300	–	550	520	250	–	–	30
	3G3RX-A4450										
	3G3RX-A4550										
	3G3RX-B4750	5	390	300	–	700	670	270	–	–	60
	3G3RX-B4900										
	3G3RX-B411K		480	380	–	740	710	270	–	–	80
	3G3RX-B413K										

Rasmi filters

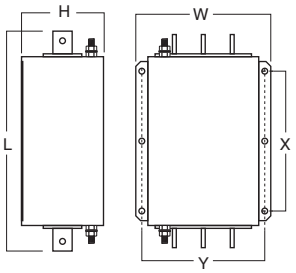
Footprint dimensions



Book type dimensions

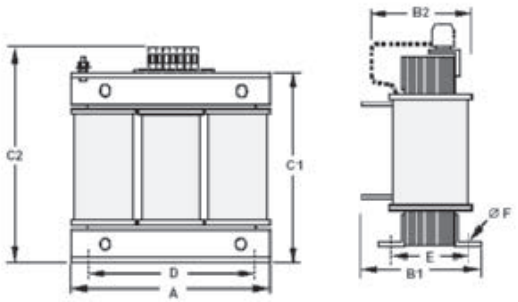


Block type dimensions



Voltage class	Inverter model	Rasmi model	Filter type	Dimensions in mm						
				L	W	H	X	Y	M	Weight (kg)
3-phase 200 V	3G3RX-A2004	AX-FIR2018-RE	Footprint	305	152	45	290	110	M5	2.0
	3G3RX-A2007									
	3G3RX-A2015									
	3G3RX-A2022									
	3G3RX-A2037									
	3G3RX-A2055	AX-FIR2053-RE		320	212	56	296	189	M6	2.5
	3G3RX-A2075									
	3G3RX-A2110									
	3G3RX-A2150	AX-FIR2110-RE	Book	455	110	240	414	80		8.0
	3G3RX-A2185									
	3G3RX-A2220									
	3G3RX-A2300	AX-FIR2145-RE								8.6
	3G3RX-A2370	AX-FIR3250-RE	Block	386	260	135	240	235	–	13
	3G3RX-A2450									
	3G3RX-A2550	AX-FIR3320-RE								13.2
3-phase 400 V	3G3RX-A4004	AX-FIR3010-RE	Footprint	305	152	45	290	110	M5	1.4
	3G3RX-A4007									
	3G3RX-A4015									
	3G3RX-A4022									
	3G3RX-A4040									
	3G3RX-A4055	AX-FIR3030-RE		312	212	50	296	189	M6	2.2
	3G3RX-A4075									
	3G3RX-A4110									
	3G3RX-A4150	AX-FIR3053-RE		451	252	60	435	229	M6	4.5
	3G3RX-A4185									
	3G3RX-A4220									
	3G3RX-A4300	AX-FIR3064-RE		598	310	70	578	265	M8	7.0
	3G3RX-A4370	AX-FIR3100-RE	Book	486	110	240	414	80	–	8.0
	3G3RX-A4450	AX-FIR3130-RE								8.6
	3G3RX-A4550									
	3G3RX-B4750	AX-FIR3250-RE	Block	386	260	135	240	235	–	13.0
	3G3RX-B4900									
	3G3RX-B411K	AX-FIR3320-RE								13.2
	3G3RX-B413K									

Input AC reactor



Voltage class	Reference	Dimensions in mm								
		A	B1	B2	C1	C2	D	E	F	Weight (kg)
3-phase 200 V	AX-RAI02800080-DE	120	–	70	–	120	80	52	5.5	1.78
	AX-RAI00880200-DE			80				62		2.35
	AX-RAI00350335-DE	180		85		190	140	55	6	5.5
	AX-RAI00180670-DE									
	AX-RAI00091000-DE					205				6.5
	AX-RAI00071550-DE			105				85		11.7
	AX-RAI00042300-DE		120	–	150	–				
3-phase 400 V	AX-RAI07700050-DE	120	–	70	–	120	80	52	5.5	1.78
	AX-RAI03500100-DE			80				62		2.35
	AX-RAI01300170-DE	180		75		195	140	55	6	5.5
	AX-RAI00740335-DE			85		190				
	AX-RAI00360500-DE					205				6.5
	AX-RAI00290780-DE			105				75		11.2
	AX-RAI00191150-DE	240		110		275	200			16.0
	AX-RAI00111850-DE									
	AX-RAI00072700-DE		180	–	210	–		110		25.4

DC reactor

Figure 1

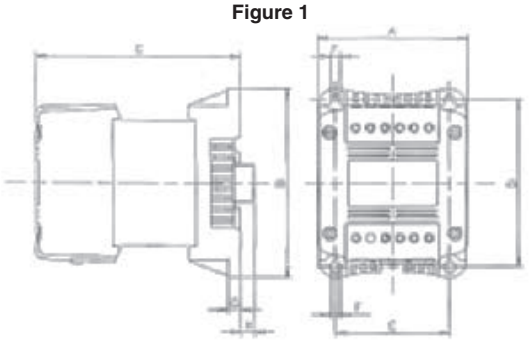
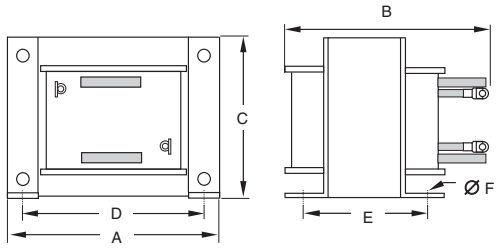


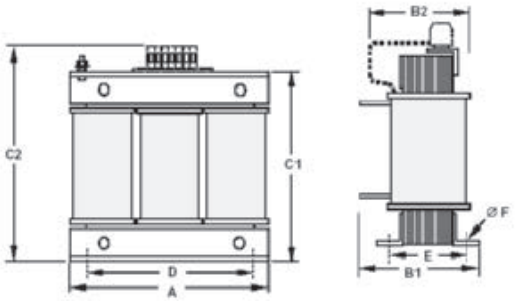
Figure 2



Voltage class	Reference	Fig	Dimensions in mm								
			A	B	C	D	E	F	G	H	Weight (kg)
3-phase 200 V	AX-RC10700032-DE	1	84	113	96	101	66	5	7.5	2	1.22
	AX-RC06750061-DE				105						1.60
	AX-RC03510093-DE										
	AX-RC02510138-DE				116						1.95
	AX-RC01600223-DE		108	135	124	120	82	6.5	9.5	9.5	3.20
	AX-RC01110309-DE		120	152	136	135	94	7		–	5.20
	AX-RC00840437-DE				146						6.00
	AX-RC00590614-DE		150	177	160	160	115		2		11.4
	AX-RC00440859-DE				183						14.3
	AX-RC00301275-DE	2	195	161	163	185	88	10	–	–	17.0
	AX-RC00231662-DE			196			123				25.5
	AX-RC00192015-DE		240	188	200	228	109	12			34.0
	AX-RC00162500-DE			198			119				38.0
	AX-RC00133057-DE			228			149				42.0

Voltage class	Reference	Fig	Dimensions in mm								
			A	B	C	D	E	F	G	H	Weight (kg)
3-phase 400 V	AX-RC43000020-DE	1	84	113	96	101	66	5	7.5	2	1.22
	AX-RC27000030-DE				105						1.60
	AX-RC14000047-DE										
	AX-RC10100069-DE				116						1.95
	AX-RC06400116-DE		108	135	133	120	82	6.5	9.5	9.5	3.70
	AX-RC04410167-DE		120	152	136	135	94	7		–	5.20
	AX-RC03350219-DE				146						6.00
	AX-RC02330307-DE		150	177	160	160	115	7	2		11.4
	AX-RC01750430-DE				183						14.3
	AX-RC01200644-DE	2	195	161	163	185	88	10	–	–	17.0
	AX-RC00920797-DE			196			123				25.5
	AX-RC00741042-DE		240	188	200	228	109	12			34.0
	AX-RC00611236-DE			198			119				38.0
	AX-RC00501529-DE			228			149				48.0
	AX-RC00372094-DE										
	AX-RC00312446-DE		300	230	256	250	160				49.0
	AX-RC00252981-DE			245							52.5
	AX-RC00213613-DE			250			180				79.0

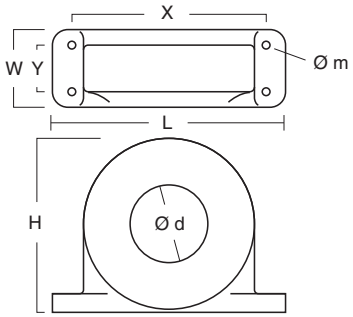
Output AC reactor



Voltage class	Reference	Dimensions in mm								
		A	B1	B2	C1	C2	D	E	F	Weight (kg)
3-phase 200 V	AX-RAO11500026-DE	120	–	70	–	120	80	52	5.5	1.78
	AX-RAO07600042-DE	120	–	70	–	120	80	52	5.5	1.78
	AX-RAO04100075-DE	120	–	80	–	120	80	62	5.5	2.35
	AX-RAO03000105-DE	120	–	80	–	120	80	62	5.5	2.35
	AX-RAO01830160-DE	180	–	85	–	190	140	55	6	5.5
	AX-RAO01150220-DE	180	–	85	–	190	140	55	6	5.5
	AX-RAO00950320-DE	180	–	85	–	205	140	55	6	6.5
	AX-RAO00630430-DE	180	–	95	–	205	140	65	6	9.1
	AX-RAO00490640-DE	180	–	95	–	205	140	65	6	9.1
	AX-RAO00390800-DE	240	–	110	–	275	200	75	6	16.0
	AX-RAO00330950-DE	240	–	110	–	275	200	75	6	16.0
	AX-RAO00251210-DE	240	–	110	–	275	200	75	6	16.0
	AX-RAO00191450-DE	240	–	120	–	275	200	85	6	18.6
	AX-RAO00161820-DE	240	–	150	–	275	200	110	6	27.0
	AX-RAO00132200-DE	300	–	145	–	320	200	125	6	33.5
3-phase 400 V	AX-RAO16300038-DE	120	–	80	–	120	80	62	5.5	2.35
	AX-RAO11800053-DE	120	–	80	–	120	80	62	5.5	2.35
	AX-RAO07300080-DE	180	–	85	–	190	140	55	6	5.5
	AX-RAO04600110-DE	180	–	85	–	190	140	55	6	5.5
	AX-RAO03600160-DE	180	–	85	–	205	140	55	6	6.5
	AX-RAO02500220-DE	180	–	95	–	205	140	65	6	9.1
	AX-RAO02000320-DE	240	–	110	–	275	200	75	6	16.0
	AX-RAO01650400-DE	240	–	110	–	275	200	75	6	16.0
	AX-RAO01300480-DE	240	–	110	–	275	200	75	6	16.0
	AX-RAO01030580-DE	240	–	110	–	275	200	75	6	16.0
	AX-RAO00800750-DE	240	–	120	–	275	200	85	6	18.6
	AX-RAO00680900-DE	240	–	150	–	275	200	110	6	27.0
	AX-RAO00531100-DE	300	–	125	–	330	200	105	6	27.9
	AX-RAO00401490-DE	300	–	165	–	330	200	125	6	44.0
	AX-RAO00331760-DE	300	–	165	–	330	200	125	6	44.0
	AX-RAO00262170-DE	360	230	–	315	–	300	150	8	55.0
	AX-RAO00212600-DE	420	255	–	360	–	300	145	8	102.0

Chokes

Reference	Diame-ter	Motor kW	Dimensions in mm						
			L	W	H	X	Y	m	Weight (kg)
AX-FER2102-RE	21	<2.2	85	22	46	70	–	5	0.1
AX-FER2515-RE	25	<15	105	25	62	90	–	5	0.2
AX-FER5045-RE	50	<45	150	50	110	125	30	5	0.7
AX-FER6055-RE	60	<55	200	65	170	180	45	6	1.7



DC Supply with Regenerative Active Front End

Regenerative DC bus supply

Figure 1

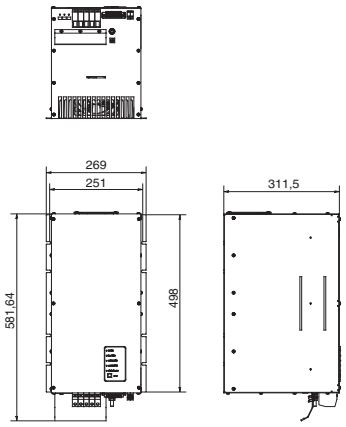


Figure 2

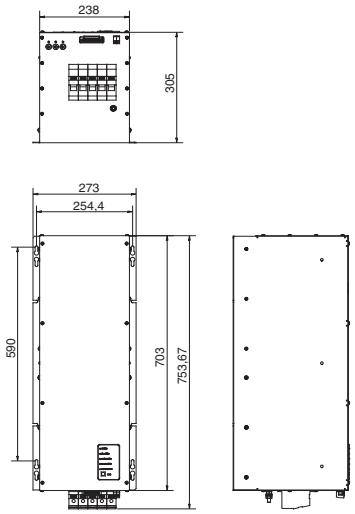
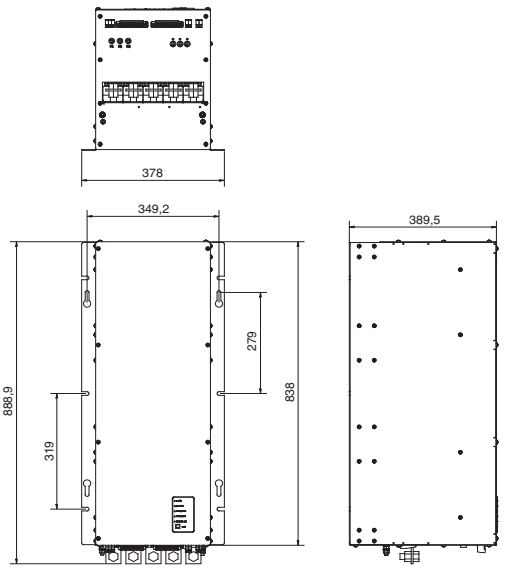


Figure 3



Reference	Fig	Weight (kg)
RFE-B3 30-400-50-230-A-RVE	1	37
RFE-B3 45-400-50-230-A-RVE		38
RFE-B3 60-400-50-230-A-RVE	2	45
RFE-B3 80-400-50-230-A-RVE		52
RFE-B3 100-400-50-230-A-RVE		65
RFE-B3 125-400-50-230-A-RVE	3	87
RFE-B3 150-400-50-230-A-RVE		89
RFE-B3 200-400-50-230-A-RVE		100

Low harmonic filter

Figure 1

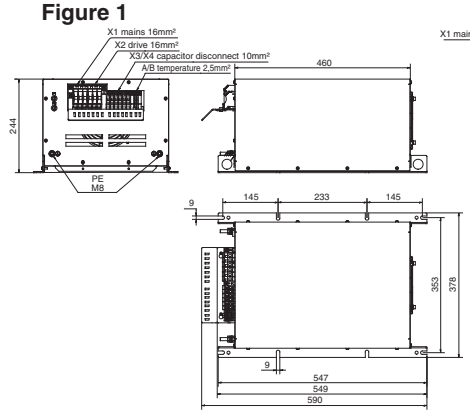


Figure 2

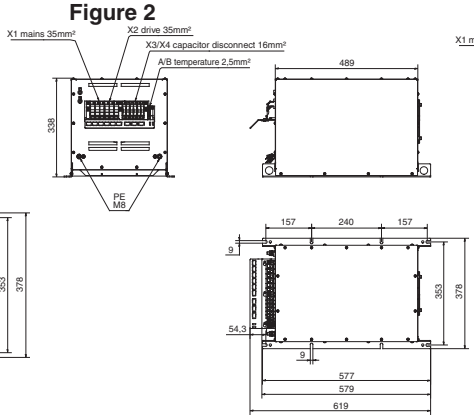


Figure 3

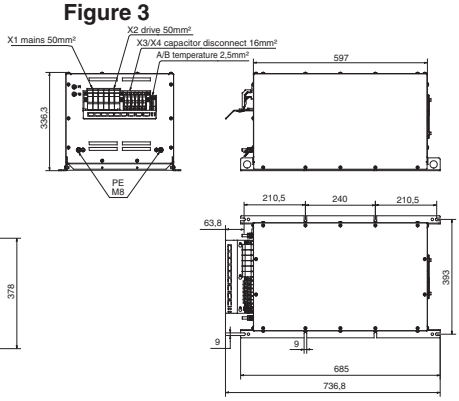


Figure 4

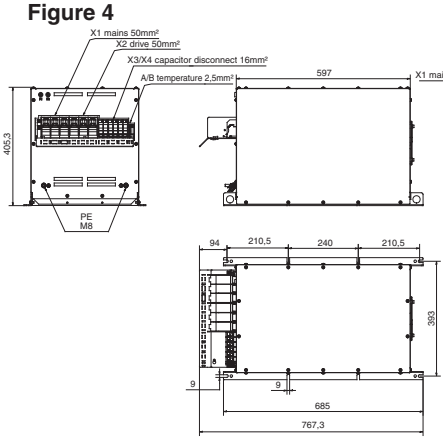
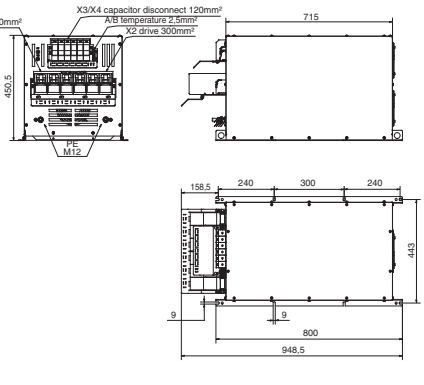


Figure 5



Reference	Fig	Weight (kg)
RHF-RA 43-400-50-20-A-RVE	1	39
RHF-RA 72-400-50-20-A-RVE	2	56
RHF-RA 86-400-50-20-A-RVE	3	62
RHF-RA 144-400-50-20-A-RVE	4	85
RHF-RA 180-400-50-20-A-RVE		102
RHF-RA 217-400-50-20-A-RVE	5	119
RHF-RA 304-400-50-20-A-RVE		142

EMC filter

Figure 1

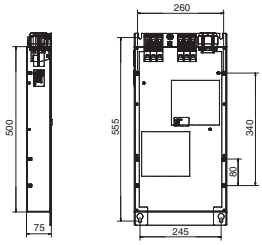


Figure 2

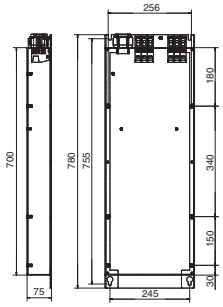


Figure 3

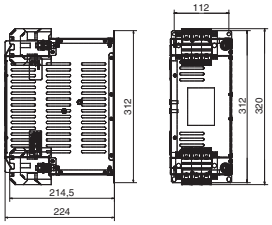
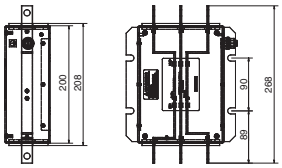


Figure 4



Reference	Fig	Filter type	Weight (kg)
RFI-RA 12-RVE	1	Footprint	11,1
RFI-RA 23-RVE	2		15,1
RFI-RA X5-RVE	3	Book	4,9
RFI-RA X6-RVE	4	Block	3,9

Regenerative Braking unit

Figure 1

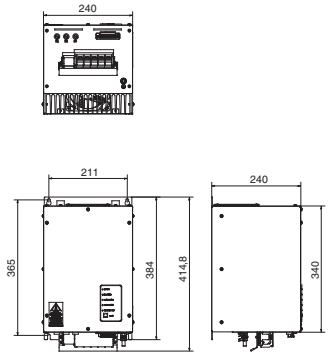


Figure 2

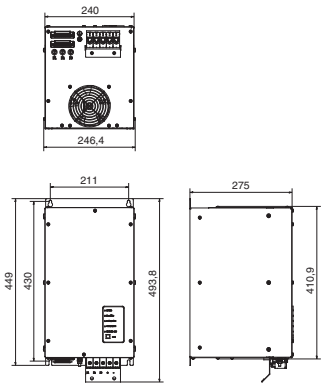


Figure 3

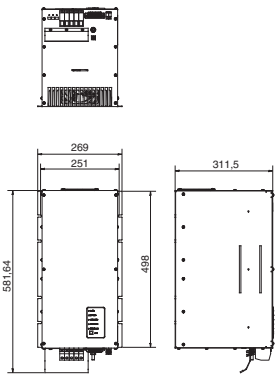


Figure 4

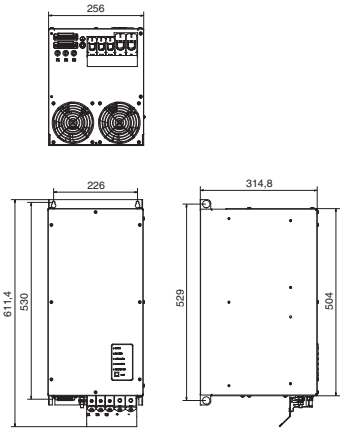


Figure 5

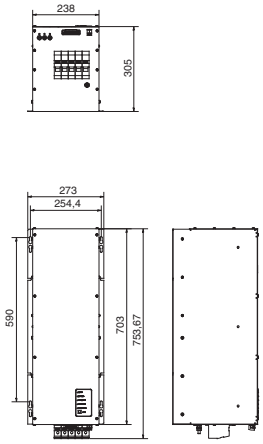


Figure 6

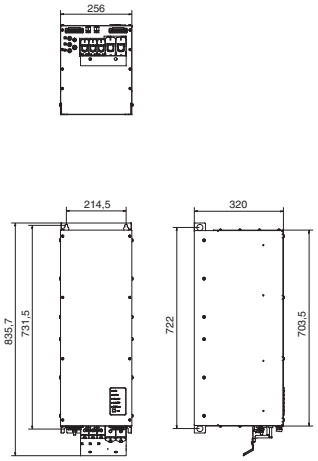
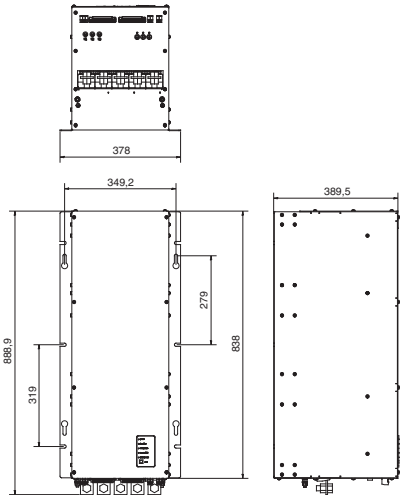


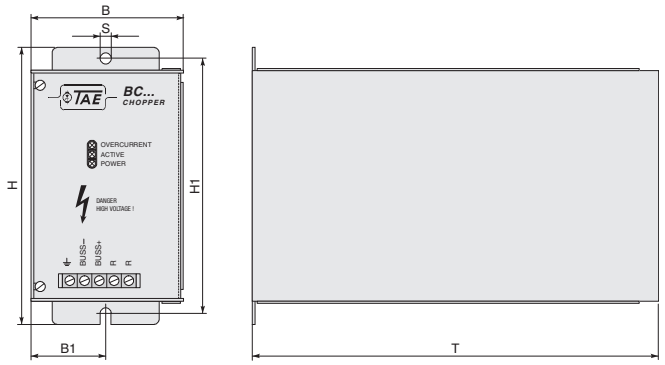
Figure 7



Models for Low Duty applications (50%)	Fig	Weight (kg)	Models for High Duty applications	Fig	Weight (kg)
RLD-E0 8-400-50-0-A-RVE	1	16	RHD-B0 7-400-50-0-A-RVE	1	17
RLD-E0 12-400-50-0-A-RVE		17	RHD-B0 13-400-50-0-A-RVE		18
RLD-E0 16-400-50-0-A-RVE		18	RHD-B0 18-400-50-0-A-RVE		20
RLD-E0 20-400-50-0-A-RVE			RHD-B0 24-400-50-0-A-RVE	3	32,5
RLD-E0 24-400-50-0-A-RVE	2		RHD-B0 30-400-50-230-A-RVE		
RLD-E0 32-400-50-0-A-RVE		22	RHD-B0 50-400-50-230-A-RVE	5	40
RLD-E0 40-400-50-0-A-RVE		23	RHD-B0 70-400-50-230-A-RVE		51
RLD-E0 48-400-50-0-A-RVE	4	27	RHD-B0 100-400-50-230-A-RVE	7	85
RLD-E0 58-400-50-0-A-RVE		28	RHD-B0 125-400-50-230-A-RVE		91
RLD-E0 80-400-50-0-A-RVE		30	RHD-B0 150-400-50-230-A-RVE		100
RLD-E0 95-400-50-0-A-RVE		35			
RLD-E0 116-400-50-0-A-RVE		38			
RLD-E0 140-400-50-0-A-RVE	6	52			
RLD-E0 170-400-50-230-A-RVE		60			
RLD-E0 200-400-50-230-A-RVE		68			

Braking unit

Reference	Dimensions in mm					
	B	B1	H	H1	T	S
AX-BCR4015045-TE	82.5	40.5	150	138	220	6
AX-BCR4017068-TE						
AX-BCR2035090-TE	130	64.5	205	193	208	6
AX-BCR2070130-TE						
AX-BCR4035090-TE						
AX-BCR4070130-TE						
AX-BCR4090240-TE	131	64.5	298	280	300	9



Resistor

AX-REM00K15xxx

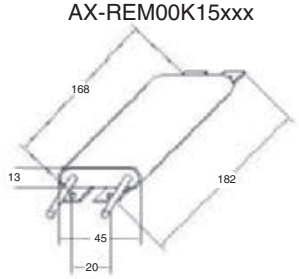


Fig 1

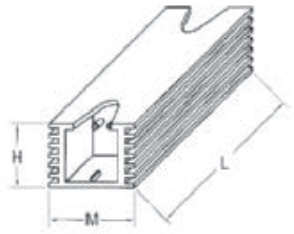


Fig 2

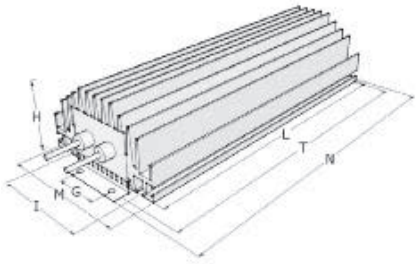


Fig 3

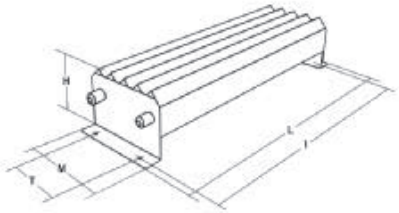


Fig 4

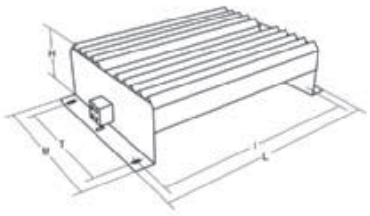
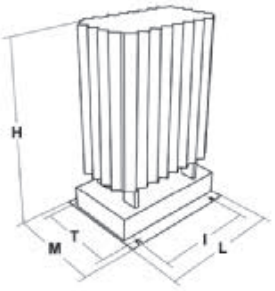


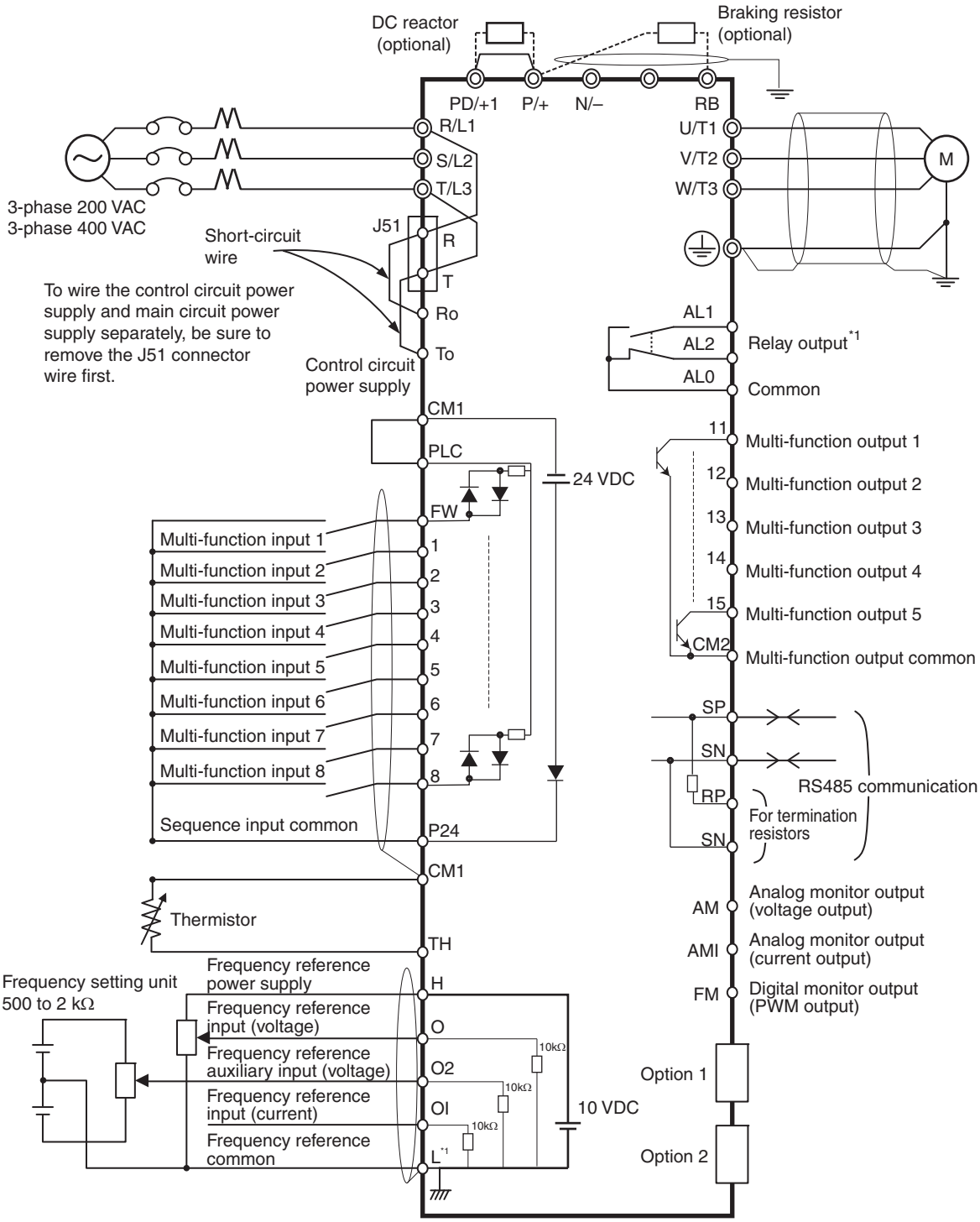
Fig 5



Reference	Fig	Dimensions in mm							
		L	H	M	I	T	G	N	Weight (kg)
AX-REM00K2070-IE	1	105	27	36	94	–	–	–	0.2
AX-REM00K2120-IE									
AX-REM00K2200-IE									
AX-REM00K4075-IE		200	27	36	189	–	–	–	0.425
AX-REM00K4035-IE									
AX-REM00K4030-IE									
AX-REM00K5120-IE		260	27	36	249	–	–	–	0.58
AX-REM00K6100-IE		320	27	36	309	–	–	–	0.73
AX-REM00K6035-IE									
AX-REM00K9070-IE	2	200	61	100	74.5	216	40	230	1.41
AX-REM00K9020-IE									
AX-REM00K9017-IE									
AX-REM01K9070-IE	3	365	73	105	350	70	–	–	4
AX-REM01K9017-IE									
AX-REM02K1070-IE	4	310	100	240	295	210	–	–	7
AX-REM02K1017-IE									
AX-REM03K5035-IE		365	100	240	350	210	–	–	8
AX-REM03K5010-IE									
AX-REM19K0006-IE	5	206	350	140	190	50	–	–	8.1
AX-REM19K0008-IE									
AX-REM19K0020-IE									
AX-REM19K0030-IE									
AX-REM38K0012-IE		306	350	140	290	50	–	–	14.5

Installation

Standard connections



*1 L is the common reference for analog input and also for the analog output.

Terminal connections

Terminal	Name	Function (signal level)
R/L1, S/L2, T/L3	Main circuit power supply input	Used to connect line power to the drive
U/T1, V/T2, W/T3	Inverter output	Used to connect the motor
PD/+1, P/+	External DC reactor terminal	Normally connected by the short-circuit bar. Remove the short-circuit bar between +1 and P/+2 when a DC reactor is connected
P/+, RB	Braking resistor connection terminal	Connect option braking resistor (if a braking torque is required)
P/+, N/-	Regenerative braking unit connection terminal	Connect optional regenerative braking units
PE	Grounding	For grounding (grounding should conform to the local grounding code)

Control circuit

Type	No.	Signal name	Function (default)	Signal level
Frequency reference input	H	Frequency reference power supply	10 VDC 20 mA max	
	O	Voltage frequency reference input	0 to 12 VDC (10 kΩ)	
	O2	Voltage auxiliary frequency reference	0 to ±12 VDC (10 kΩ)	
	OI	Current frequency reference input	4 to 20 mA (100 Ω)	
	L	Frequency reference common	Common terminal for analog monitor (AM, AMI) terminals	
Monitor output	AM	Multi-function analog voltage output	Factory setting: Output frequency	2 mA max
	AMI	Multi-function analog current output	Factory setting: Output frequency	4 to 20 mA (max imp 250 Ω)
	FM	PWM monitor output	Factory setting: Output frequency	0 to 10 VDC (max 3.6 kHz)
Power supply	P24	Internal 24 VDC	Power supply for contact input signal	100 mA max
	CM1	Input common	Common terminal for P24, TH and FM digital monitor	
Function selection	FW	Forward rotation command terminal	Motor runs in forwards direction when FW is ON	27 VDC max Input imped 4.7 kΩ max current 5.6 mA On: 18 VDC or more
	1	Multi-function input	Factory setting: Reverse (RV)	
	2		Factory setting: External trip (EXT)	
	3		Factory setting: Reset (RS)	
	4		Factory setting: Multi-step speed reference 1 (CF1)	
	5		Factory setting: Multi-step speed reference 2 (CF2)	
	6		Factory setting: Jogging (JG)	
	7		Factory setting: Second control (SET)	
	8		Factory setting: No allocation (NO)	
	PLC	Multi-function input common	Sink logic: Short-circuiting P24 and PLC Source logic: Short-circuiting PLC and CM1 With external supply remove short-circuit bar	
Status/Factor	11	Multi-function output	Factory setting: During Run (RUN)	27 VDC max 50 mA max
	12		Factory setting: 0 Hz signal (ZS)	
	13		Factory setting: Overload warning (OL)	
	14		Factory setting: Overtorque (OTQ)	
	15		Factory setting: Constant speed arrival (FA1)	
	CM2	Multi-function output common	Common terminal for multi-function output terminals 11 to 15	
Relay output	AL1	Relay output (Normally close)	Factory setting: Alarm output (AL) Under normal operation MA-MC open MB-MC close	R load AL1-AL0 250 VAC 2 A AL2-AL0 250 VAC 1 A I load 250 VAC 0.2 A
	AL2	Relay output (Normally open)		
	AL0	Relay output common		
Sensor	TH	External thermistor input terminal	SC terminal functions as the common terminal 100 mW minimum Impedance at temperature error: 3 kΩ	0 to 8 VDC
Comms	SP	RS485 Modbus terminals	–	Differential input
	SN			
	RP	RS485 terminating resistor terminals	–	–
	SN			

Inverter heat loss

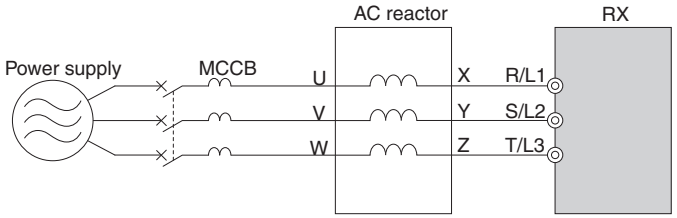
3G3RX 200 V class

Three-phase: 3G3RX-□		A2004	A2007	A2015	A2022	A2037	A2055	A2075	A2110	A2150	A2185	A2220	A2300	A2370	A2450	A2550
Inverter capacity kVA	200 V	1.0	1.7	2.5	3.6	5.7	8.3	11.0	15.9	22.1	26.3	32.9	41.9	50.2	63.0	76.2
	400 V	1.2	2.0	3.1	4.3	6.8	9.9	13.3	19.1	26.6	31.5	39.4	50.2	60.2	75.6	91.4
Rated output current A		3.0	5.0	7.5	10.5	16.5	24	32	46	64	76	95	121	145	182	220
Heat loss W	Losses at 70% load	64	76	102	127	179	242	312	435	575	698	820	1,100	1,345	1,625	1,975
	Losses at 100% load	70	88	125	160	235	325	425	600	800	975	1,150	1,550	1,900	2,300	2,800
Efficiency at rated output		85.1	89.5	92.3	93.2	94.0	94.4	94.6	94.8	94.9	95.0	95.0	95.0	95.1	95.1	95.1
Cooling method		Forced air cooling														

3G3RX 400 V class

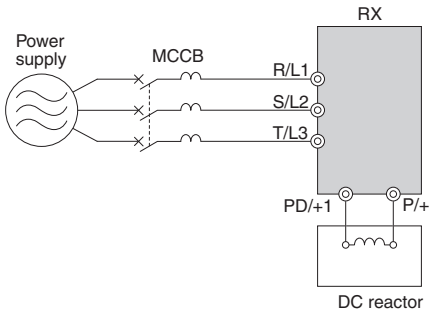
Three-phase: 3G3RX-□		A4004	A4007	A4015	A4022	A4040	A4055	A4075	A4110	A4150	A4185	A4220	A4300	A4370	A4450	A4550	B4750	B4900	B411K	B413K
Inverter capacity kVA	200 V	1.0	1.7	2.5	3.6	6.2	9.7	13.1	17.3	22.1	26.3	33.2	40.1	51.9	63.0	77.6	103.2	121.9	150.3	180.1
	400 V	1.2	2.0	3.1	4.3	7.4	11.6	15.8	20.7	26.6	31.5	39.9	48.2	62.3	75.6	93.1	123.8	146.3	180.4	216.1
Rated output current A		1.5	2.5	3.8	5.3	9.0	14	19	25	32	38	48	58	75	91	112	149	176	217	260
Heat loss W	Losses at 70% load	64	76	102	127	179	242	312	435	575	698	820	1,100	1,345	1,625	1,975	2,675	3,375	3,900	4,670
	Losses at 100% load	70	88	125	160	235	325	425	600	800	975	1,150	1,550	1,900	2,300	2,800	3,800	4,800	5,550	6,650
Efficiency at rated output		85.1	89.5	92.3	93.2	94.0	64.4	94.6	94.8	94.9	95.0	95.0	95.0	95.1	95.1	95.1	95.2	95.2	95.2	95.2
Cooling method		Forced air cooling																		

Input AC reactor



3-phase 200 V				3-phase 400 V			
Max. applicable motor output kW	Reference	Current value A	Inductance mH	Max. applicable motor output kW	Reference	Current value A	Inductance mH
0.4 to 1.5	AX-RAI02800080-DE	8.0	2.8	0.4 to 1.5	AX-RAI07700050-DE	5.0	7.7
2.2 to 3.7	AX-RAI00880200-DE	20.0	0.88	2.2 to 4.0	AX-RAI03500100-DE	10.0	3.5
5.5 to 7.5	AX-RAI00350335-DE	33.5	0.35	5.5 to 7.5	AX-RAI01300170-DE	17.0	1.3
11.0 to 15.0	AX-RAI00180670-DE	67.0	0.18	11.0 to 15.0	AX-RAI00740335-DE	33.5	0.74
18.5 to 22.0	AX-RAI00091000-DE	100.0	0.09	18.5 to 22.0	AX-RAI00360500-DE	50.0	0.36
30.0 to 37.0	AX-RAI00071550-DE	155.0	0.07	30.0 to 37.0	AX-RAI00290780-DE	78.0	0.29
45.0 to 55.0	AX-RAI00042300-DE	230.0	0.04	45.0 to 55.0	AX-RAI00191150-DE	115.0	0.19
				75.0 to 90.0	AX-RAI00111850-DE	185.0	0.11
				110.0 to 132.0	AX.RAI00072700-DE	270.0	0.07

DC reactor



3-phase 200 V				3-phase 400 V			
Max. applicable motor output kW	Reference	Current value A	Inductance mH	Max. applicable motor output kW	Reference	Current value A	Inductance mH
0.4	AX-RC10700032-DE	3.2	10.70	0.4	AX-RC43000020-DE	2.0	43.00
0.7	AX-RC06750061-DE	6.1	6.75	0.7	AX-RC27000030-DE	3.0	27.00
1.5	AX-RC03510093-DE	9.3	3.51	1.5	AX-RC14000047-DE	4.7	14.00
2.2	AX-RC02510138-DE	13.8	2.51	2.2	AX-RC10100069-DE	6.9	10.10
3.7	AX-RC01600223-DE	22.3	1.60	4.0	AX-RC06400116-DE	11.6	6.40
5.5	AX-RC01110309-DE	30.9	1.11	5.5	AX-RC04410167-DE	16.7	4.41
7.5	AX-RC00840437-DE	43.7	0.84	7.5	AX-RC03350219-DE	21.9	3.35
11.0	AX-RC00590614-DE	61.4	0.59	11.0	AX-RC02330307-DE	30.7	2.33
15.0	AX-RC00440859-DE	85.9	0.44	15.0	AX-RC01750430-DE	43.0	1.75
18.5 to 22	AX-RC00301275-DE	127.5	0.30	18.5 to 22	AX-RC01200644-DE	64.4	1.20
30	AX-RC00231662-DE	166.2	0.23	30	AX-RC00920797-DE	79.7	0.92
37	AX-RC00192015-DE	201.5	0.19	37	AX-RC00741042-DE	104.2	0.74
45	AX-RC00162500-DE	250.0	0.16	45	AX-RC00611236-DE	123.6	0.61
55	AX-RC00133057-DE	305.7	0.13	55	AX-RC00501529-DE	152.9	0.50
				75	AX-RC00372094-DE	209.4	0.37
				90	AX-RC00312446-DE	244.6	0.31
				110	AX-RC00252981-DE	298.1	0.25
				132	AX-RC00213613-DE	361.3	0.21

Output AC reactor

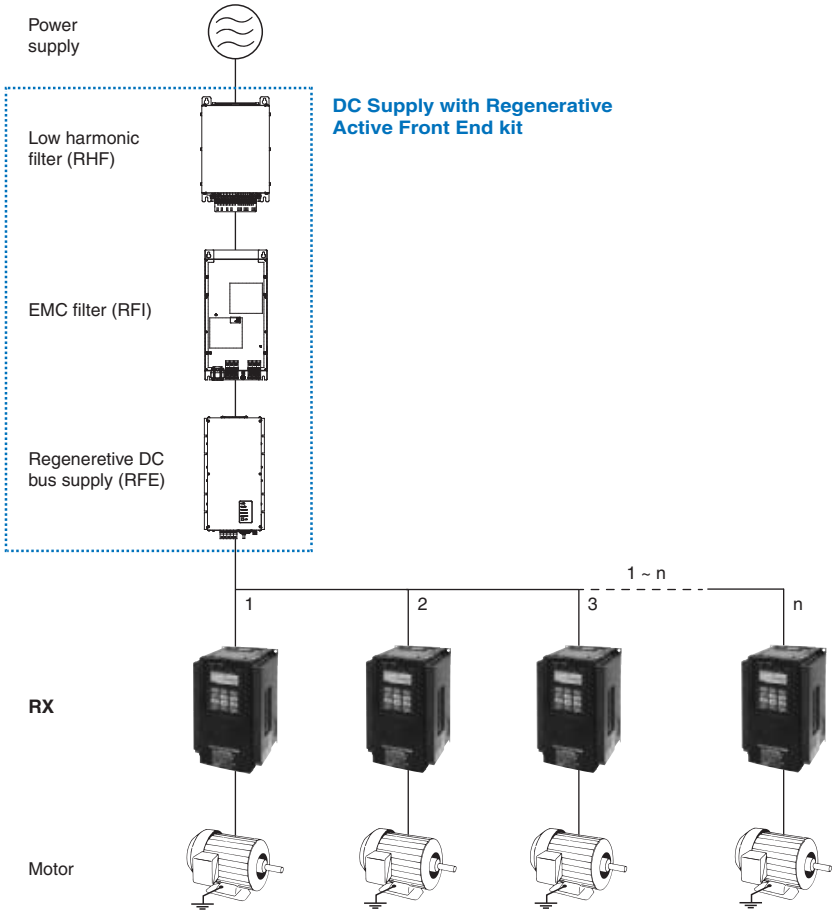
3-phase 200 V				3-phase 400 V			
Max. applicable motor output kW*1	Reference	Current value A	Inductance mH	Max. applicable motor output kW*1	Reference	Current value A	Inductance mH
0.4	AX-RAO11500026-DE	2.6	11.50	0.4 to 1.5	AX-RAO16300038-DE	3.8	16.30
0.75	AX-RAO07600042-DE	4.2	7.60				
1.5	AX-RAO04100075-DE	7.5	4.10				
2.2	AX-RAO03000105-DE	10.5	3.00	2.2	AX-RAO11800053-DE	5.3	11.80
3.7	AX-RAO01830160-DE	16.0	1.83	4.0	AX-RAO07300080-DE	8.0	7.30
5.5	AX-RAO01150220-DE	22.0	1.15	5.5	AX-RAO04600110-DE	11.0	4.60
7.5	AX-RAO00950320-DE	32.0	0.95	7.5	AX-RAO03600160-DE	16.0	3.60
11	AX-RAO00630430-DE	43.0	0.63	11	AX-RAO02500220-DE	22.0	2.50
15	AX-RAO00490640-DE	64.0	0.49	15	AX-RAO02000320-DE	32.0	2.00
18.5	AX-RAO00390800-DE	80.0	0.39	18.5	AX-RAO01650400-DE	40.0	1.65
22	AX-RAO00330950-DE	95.0	0.33	22	AX-RAO01300480-DE	48.0	1.30
30	AX-RAO00251210-DE	121.0	0.25	30	AX-RAO01030580-DE	58.0	1.03
37	AX-RAO00191450-DE	145.0	0.19	37	AX-RAO00800750-DE	75.0	0.80
45	AX-RAO00161820-DE	182.0	0.16	45	AX-RAO00680900-DE	90.0	0.68
55	AX-RAO00132200-DE	220.0	0.13	55	AX-RAO00531100-DE	110.0	0.53
				75	AX-RAO00401490-DE	149.0	0.40
				90	AX-RAO00331760-DE	176.0	0.33
				110	AX-RAO00262170-DE	217.0	0.26
				132	AX-RAO00212600-DE	260.0	0.21

*1 These motor sizes are for heavy duty applications.

Braking unit

Voltage	Reference	Specifications				
		Permanent		Peak (5 s max)		Minimum connectable resistor (Ohms)
		Current value A	Brake power kVA	Current value A	Brake power kVA	
3-phase 200 V	AX-BCR2035090-TE	35	13	90	32	4
	AX-BCR2070130-TE	70	25	130	47	2.8
3-phase 400 V	AX-BCR4015045-TE	15	11	45	33	16
	AX-BCR4017068-TE	17	13	68	51	11
	AX-BCR4035090-TE	35	26	90	67	8.5
	AX-BCR4070130-TE	70	52	130	97	5.5
	AX-BCR4090240-TE	90	67	240	180	3.2

DC Supply with Regenerative Active Front End system



Regenerative DC bus supply

Reference: RFE-B3□			30	45	60	80	100	125	150	200
Max. input power kW			30	45	60	80	100	125	150	200
DC capacity μF			100		220			440	660	
Max. input current A*1	Driving	AC	65	98	130	173	217	271	325	433
		DC	78	118	156	208	260	325	390	520
	Braking	AC	52	78	104	139	173	217	260	346
		DC	62	97	125	167	208	260	312	415
Rated input voltage			3-phase 400 V							
Allowable voltage fluctuation			-15% to 10%							
Mains frequency			40 to 60 Hz							
Efficiency η			98%							
Degree of protection			IP20							
Ambient humidity			85% RH or less (without condensation)							
Storage temperature			–25 to 55°C							
Ambient temperature			5 to 40°C							

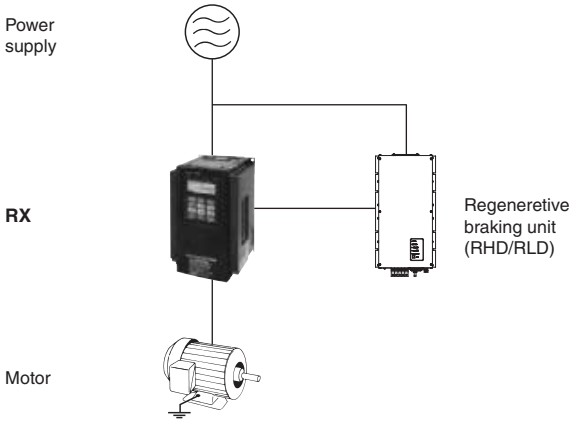
*1 At nominal voltage 400 V, 1 min in 10 min.

Low harmonic filter

Reference: RHF-RA□		43	72	86	144	180	217	304
I_{RMS} current A*1	100% AC	43	72	86	144	180	217	304
	150% AC 1 min in 10 min	64,5	108	129	216	270	325,5	456
Heat loss W*1		242	352	374	488	692	743	905
Allowable voltage fluctuation		-15% to 10%						
Power frequency		50 Hz						
Efficiency η		98,5-99,5%						
Degree of protection		IP20						
Ambient humidity		85% RH or less (without condensation)						
Storage temperature		–25 to 55°C						
Ambient temperature		–20 to 45°C						

*1 At nominal voltage 400 V, 50 Hz.

Regenerative Braking unit system



Regenerative Braking unit for Low Duty applications (50%)

Reference: RLD-E0□		8	12	16	20	24	32	40	48	58	80	95	116	140	170	200
Max. regenerative power kW		8	12	16	20	24	32	40	48	58	80	95	116	140	170	200
DC capacity µF		20		40		220			440					660		
Max. current A[*1]	DC	14	20	28	35	42	55	70	83	101	139	165	202	242	295	348
	AC	12	17	23	29	35	46	58	69	84	116	137	168	202	246	290
Allowable voltage fluctuation		-15% to 10%														
Mains frequency		50 to 60 Hz														
Efficiency η		98%														
Degree of protection		IP20														
Ambient humidity		85% RH or less (without condensation)														
Storage temperature		–25 to 55°C														
Ambient temperature		5 to 40°C														

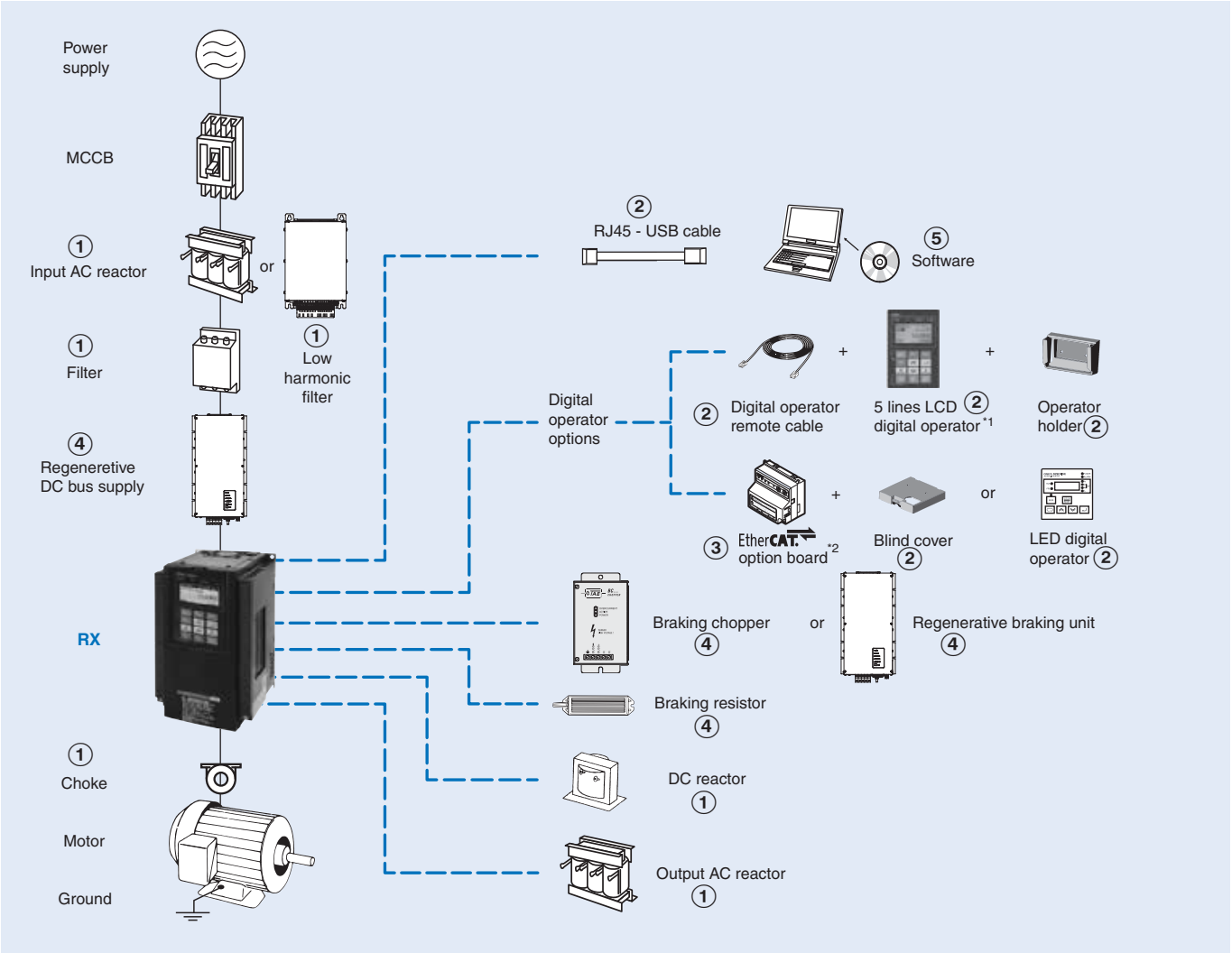
[*1] At nominal voltage 400 V.

Regenerative Braking unit for High Duty applications

Reference: RHD-B0□		7	13	18	24	30	50	70	100	125	150
Max. regenerative power kW		7	13	18	24	30	50	70	100	125	150
DC capacity µF		20		100	40		220		660	440	660
Max. current A[*1]	DC I 100%	12	23	31	42	52	87	122	174	218	260
	AC I_{eff} 100%	10	19	26	35	43	72	101	144	180	217
	AC I_{eff} 60 s in 10 min	12	23	31	42	52	86	121	173	216	260
Allowable voltage fluctuation		-15% to 10%									
Mains frequency		40 to 60 Hz									
Efficiency η		98%									
Degree of protection		IP20									
Ambient humidity		85% RH or less (without condensation)									
Storage temperature		–25 to 55°C									
Ambient temperature		5 to 40°C									

[*1] At nominal voltage 400 V.

Ordering information



*1 The 5 lines LCD digital operator is provided with the inverter from factory.
*2 When a communication option board is mounted, there are two options: mount a blind cover or a LED digital operator.

3G3RX inverter

Specifications					Model	Specifications					Model
Voltage	Constant torque		Variable torque			Voltage	Constant torque		Variable torque		
	Max motor kW	Rated current A	Max motor kW	Rated current A			Max motor kW	Rated current A	Max motor kW	Rated current A	
Three-phase 200 V	0.4	3.0	0.75	3.7	3G3RX-A2004-E1F	Three-phase 400 V	0.4	1.5	0.75	1.9	3G3RX-A4004-E1F
	0.75	5.0	1.5	6.3	3G3RX-A2007-E1F		0.75	2.5	1.5	3.1	3G3RX-A4007-E1F
	1.5	7.5	2.2	9.4	3G3RX-A2015-E1F		1.5	3.8	2.2	4.8	3G3RX-A4015-E1F
	2.2	10.5	4.0	12	3G3RX-A2022-E1F		2.2	5.3	4.0	6.7	3G3RX-A4022-E1F
	4.0	16.5	5.5	19.6	3G3RX-A2037-E1F		4.0	9.0	5.5	11.1	3G3RX-A4040-E1F
	5.5	24	7.5	30	3G3RX-A2055-E1F		5.5	14	7.5	16	3G3RX-A4055-E1F
	7.5	32	11	44	3G3RX-A2075-E1F		7.5	19	11	22	3G3RX-A4075-E1F
	11	46	15	58	3G3RX-A2110-E1F		11	25	15	29	3G3RX-A4110-E1F
	15	64	18.5	73	3G3RX-A2150-E1F		15	32	18.5	37	3G3RX-A4150-E1F
	18.5	76	22	85	3G3RX-A2185-E1F		18.5	38	22	43	3G3RX-A4185-E1F
	22	95	30	113	3G3RX-A2220-E1F		22	48	30	57	3G3RX-A4220-E1F
	30	121	37	140	3G3RX-A2300-E1F		30	58	37	70	3G3RX-A4300-E1F
	37	145	45	169	3G3RX-A2370-E1F		37	75	45	85	3G3RX-A4370-E1F
	45	182	55	210	3G3RX-A2450-E1F		45	91	55	105	3G3RX-A4450-E1F
	55	220	75	270	3G3RX-A2550-E1F		55	112	75	135	3G3RX-A4550-E1F
							75	149	90	160	3G3RX-B4750-E1F
							90	176	110	195	3G3RX-B4900-E1F
							110	217	132	230	3G3RX-B411K-E1F
							132	260	160	290	3G3RX-B413K-E1F

① Line filter

Rasmi line filter									
3-phase 200 V					3-phase 400 V				
Model 3G3RX-□	Model	Rated current A	Leakage Nom/Max	Weight (kg)	Model 3G3RX-□	Model	Rated current A	Leakage Nom/Max	Weight (kg)
A2004/A2007/A2015/A2022/A2037	AX-FIR2018-RE	18	0.7/40 mA	2.0	A4004/A4007/A4015/A4022/A4040	AX-FIR3010-RE	10	0.3/40 mA	1.9
A2055/A2075/A2110	AX-FIR2053-RE	53	0.7/40 mA	2.5	A4055/A4075/A4110	AX-FIR3030-RE	30	0.3/40 mA	2.2
A2150/A2185/A2220	AX-FIR2110-RE	110	1.2/70 mA	8.0	A4150/A4185/A4220	AX-FIR3053-RE	53	0.8/70 mA	4.5
A2300	AX-FIR2145-RE	145	1.2/70 mA	8.6	A4300	AX-FIR3064-RE	64	3/160 mA	7.0
A2370/A2450	AX-FIR3250-RE	250	6/300 mA	13.0	A4370	AX-FIR3100-RE	100	2/130 mA	8.0
A2550	AX-FIR3320-RE	320	6/300 mA	13.2	A4450/A4550	AX-FIR3130-RE	130	2/130 mA	8.6
					B4750/B4900	AX-FIR3250-RE	250	10/500 mA	13.0
					B411K/B413K	AX-FIR3320-RE	320	10/500 mA	13.2

① Input AC reactor

3-phase 200 V		3-phase 400 V	
Model 3G3RX-□	Model	Model 3G3RX-□	Model
A2004/A2007/A2015	AX-RAI02800100-DE	A4004/A4007/A4015	AX-RAI07700050-DE
A2022/A2037	AX-RAI00880200-DE	A4022/A4040	AX-RAI03500100-DE
A2055/A2075	AX-RAI00350335-DE	A4055/A4075	AX-RAI01300170-DE
A2110 /A2150	AX-RAI00180670-DE	A4110/A4150	AX-RAI00740335-DE
A2185/A2220	AX-RAI00091000-DE	A4185/A4220	AX-RAI00360500-DE
A2300/A2370	AX-RAI00071550-DE	A4300/A4370	AX-RAI00290780-DE
A2450/A2550	AX-RAI00042300-DE	A4450/A4550	AX-RAI00191150-DE
		B4750/B4900	AX-RAI00111850-DE
		B411K/B413K	AX-RAI00072700-DE

① DC reactor

3-phase 200 V		3-phase 400 V	
Model 3G3RX-□	Model	Model 3G3RX-□	Model
A2004	AX-RC10700032-DE	A4004	AX-RC43000020-DE
A2007	AX-RC06750061-DE	A4007	AX-RC27000030-DE
A2015	AX-RC03510093-DE	A4015	AX-RC14000047-DE
A2022	AX-RC02510138-DE	A4022	AX-RC10100069-DE
A2037	AX-RC01600223-DE	A4040	AX-RC06400116-DE
A2055	AX-RC01110309-DE	A4055	AX-RC04410167-DE
A2075	AX-RC00840437-DE	A4075	AX-RC03350219-DE
A2110	AX-RC00590614-DE	A4110	AX-RC02330307-DE
A2150	AX-RC00440859-DE	A4150	AX-RC01750430-DE
A2185/A2220	AX-RC00301275-DE	A4185/A4220	AX-RC01200644-DE
A2300	AX-RC00231662-DE	A4300	AX-RC00920797-DE
A2370	AX-RC00192015-DE	A4370	AX-RC00741042-DE
A2450	AX-RC00162500-DE	A4450	AX-RC00611236-DE
A2500	AX-RC00133057-DE	A4550	AX-RC00501529-DE
		B4750	AX-RC00372094-DE
		B4900	AX-RC00312446-DE
		B411K	AX-RC00252981-DE
		B413K	AX-RC00213613-DE

① Chokes

Diameter	Description	Model
21	For 2.2 kW motors or below	AX-FER2102-RE
25	For 15 kW motors or below	AX-FER2515-RE
50	For 45 kW motors or below	AX-FER5045-RE
60	For 55 kW motors or above	AX-FER6055-RE

① Output AC reactor

3-phase 200 V		3-phase 400 V	
Model 3G3RX-□	Model	Model 3G3RX-□	Model
A2004	AX-RAO11500026-DE	A4004/A4007/A4015	AX-RAO16300038-DE
A2007	AX-RAO07600042-DE		
A2015	AX-RAO04100075-DE		
A2022	AX-RAO03000105-DE	A4022	AX-RAO11800053-DE
A2037	AX-RAO01830160-DE	A4040	AX-RAO07300080-DE
A2055	AX-RAO01150220-DE	A4055	AX-RAO04600110-DE
A2075	AX-RAO00950320-DE	A4075	AX-RAO03600160-DE
A2110	AX-RAO00630430-DE	A4110	AX-RAO02500220-DE
A2150	AX-RAO00490640-DE	A4150	AX-RAO02000320-DE
A2185	AX-RAO00390800-DE	A4185	AX-RAO01650400-DE

3-phase 200 V		3-phase 400 V	
Model 3G3RX-□	Model	Model 3G3RX-□	Model
A2220	AX-RAO00330950-DE	A4220	AX-RAO01300480-DE
A2300	AX-RAO00251210-DE	A4300	AX-RAO01030580-DE
A2370	AX-RAO00191450-DE	A4370	AX-RAO00800750-DE
A2450	AX-RAO00161820-DE	A4450	AX-RAO00680900-DE
A2500	AX-RAO00132200-DE	A4550	AX-RAO00531100-DE
		B4750	AX-RAO00401490-DE
		B4900	AX-RAO00331760-DE
		B411K	AX-RAO00262170-DE
		B413K	AX-RAO00212600-DE

Note: This table corresponds with HD rating. When ND is used, please choose the reactor for the next size inverter.

② Accessories

Type	Appearance	Description	Model
Remote digital operator		5 Line LCD digital operator with copy function*1	3G3AX-OP05
		Operator holder (for inside cabinet mounting)	3G3AX-OP05-H-E
		LED remote digital operator	3G3AX-OP01
		Mounting kit	4X-KITmini
LED digital operator		To be used in combination with communication option boards	3G3AX-OP03
Blind cover			3G3AX-OP05-B-E
Cables		3 m remote digital operator cable	3G3AX-CAJOP300-EE
		RJ45 to USB connection cable	USB-CONVERTERCABLE
			3G3AX-PCACN2

*1 This digital operator is provided with the RX inverter from factory.

③ Option board

Type	Description	Function	Model
Encoder feedback	PG speed controller option card	Phase A,B and Z pulse (differential pulse) inputs (RS-422) Pulse train position command input (RS-422) Pulse monitor output (RS-422) PG frequency range: 100 kHz max	3G3AX-PG
Communication option board	EtherCAT option card	Used for running or stopping the inverter, setting or referencing parameters, and monitoring output frequency, output current... through communications with the host controller	3G3AX-RX-ECT

④ DC Supply with Regenerative Active Front End

Max. input power kW	Stand-alone			Kit
	Regenerative DC bus supply	Low harmonic filter	EMC filter	
30	RFE-B3 30-400-50-230-A-RVE	RHF-RA 43-400-50-20-A-RVE	RFI-RA 12-RVE	RFE-B3 30-400-50-230-IF-RVE
45	RFE-B3 45-400-50-230-A-RVE	RHF-RA 72-400-50-20-A-RVE		RFE-B3 45-400-50-230-IF-RVE
60	RFE-B3 60-400-50-230-A-RVE	RHF-RA 86-400-50-20-A-RVE	RFI-RA 23-RVE	RFE-B3 60-400-50-230-IF-RVE
80	RFE-B3 80-400-50-230-A-RVE	RHF-RA 144-400-50-20-A-RVE		RFE-B3 80-400-50-230-IF-RVE
100	RFE-B3 100-400-50-230-A-RVE		RFI-RA X5-RVE	RFE-B3 100-400-50-230-IF-RVE
125	RFE-B3 125-400-50-230-A-RVE	RHF-RA 180-400-50-20-A-RVE	RFI-RA X6-RVE	RFE-B3 125-400-50-230-IF-RVE
150	RFE-B3 150-400-50-230-A-RVE	RHF-RA 217-400-50-20-A-RVE		RFE-B3 150-400-50-230-IF-RVE
200	RFE-B3 200-400-50-230-A-RVE	RHF-RA 304-400-50-20-A-RVE		RFE-B3 200-400-50-230-IF-RVE

Note: The DC Supply with Regenerative Active Front End kit includes a Regenerative DC bus supply, low harmonic filter and EMC filter.

④ Regenerative Braking unit

Low Duty applications (50%)		High Duty applications	
Max. regenerative power kW	Regenerative braking unit	Max. regenerative power kW	Regenerative braking unit
8	RLD-E0 8-400-50-0-A-RVE	7	RHD-B0 7-400-50-0-A-RVE
12	RLD-E0 12-400-50-0-A-RVE	13	RHD-B0 13-400-50-0-A-RVE
16	RLD-E0 16-400-50-0-A-RVE	18	RHD-B0 18-400-50-0-A-RVE
20	RLD-E0 20-400-50-0-A-RVE	24	RHD-B0 24-400-50-0-A-RVE
24	RLD-E0 24-400-50-0-A-RVE	30	RHD-B0 30-400-50-230-A-RVE
32	RLD-E0 32-400-50-0-A-RVE	50	RHD-B0 50-400-50-230-A-RVE
40	RLD-E0 40-400-50-0-A-RVE	70	RHD-B0 70-400-50-230-A-RVE
48	RLD-E0 48-400-50-0-A-RVE	100	RHD-B0 100-400-50-230-A-RVE
58	RLD-E0 58-400-50-0-A-RVE	125	RHD-B0 125-400-50-230-A-RVE
80	RLD-E0 80-400-50-0-A-RVE	150	RHD-B0 150-400-50-230-A-RVE
95	RLD-E0 95-400-50-0-A-RVE		
116	RLD-E0 116-400-50-0-A-RVE		
140	RLD-E0 140-400-50-0-A-RVE		
170	RLD-E0 170-400-50-230-A-RVE		
200	RLD-E0 200-400-50-230-A-RVE		

④ Braking unit, braking resistor unit

Inverter					Braking resistor unit					
Voltage	Max. motor kW	Model 3G3RX-□ 3-phase	Braking unit AX-BCR□	Connectable min. resistance	Inverter mounted type (3%ED, 10 sec max)		Braking torque %	External resistor 10%ED, 10 sec max for built-in, 5 sec for braking unit		Braking torque %
					Type AX-□	Resistance		Type AX-□	Resistance	
200 V (single-phase/ three-phase)	0.55	A2004	Built-in	50 Ω	REM00K1200-IE	200 Ω	180	REM00K1200-IE	200 Ω	180
	1.1	A2007					100	REM00K2070-IE	70 Ω	200
	1.5	A2015		35 Ω	REM00K2070-IE	70 Ω	140	REM00K4075-IE	75 Ω	130
	2.2	A2022					90	REM00K4035-IE	35 Ω	180
	4.0	A2037			REM00K4075-IE	75 Ω	50	REM00K6035-IE		100
	5.5	A2055		16 Ω	REM00K4035-IE	35 Ω	75	REM00K9020-IE	20 Ω	150
	7.5	A2075		10 Ω			55	REM01K9017-IE	17 Ω	110
	11.0	A2110			REM00K6035-IE		40	REM02K1017-IE		75
	15.0	A2150		7.5 Ω	REM00K9017-IE	17 Ω	55	REM03K5010-IE	10 Ω	95
	18.5	A2185			REM03K5010-IE	10 Ω	75	REM19K0008-IE	8 Ω	95
	22.0	A2220		5 Ω			65			80
	30.0	A2300	2035090-TE	4 Ω				REM19K0006-IE	6 Ω	80
	37.0	A2370								60
	45.0	A2450	2070130-TE	2.8 Ω				2 × REM19K0006-IE	3 Ω	105
	55.0	A2550								85
400 V (three-phase)	0.55	A4004	Built-in	100 Ω	REM00K1400-IE	400 Ω	200	REM00K1400-IE	400 Ω	200
	1.1	A4007					200			200
	1.5	A4015			REM00K1200-IE	200 Ω	190	REM00K2200-IE	200 Ω	190
	2.2	A4022			REM00K2200-IE		130	REM00K5120-IE	120 Ω	200
	4.0	A4040		70 Ω	REM00K2120-IE	120 Ω	120	REM00K6100-IE	100 Ω	140
	5.5	A4055			REM00K4075-IE	75 Ω	140	REM00K9070-IE	70 Ω	150
	7.5	A4075		35 Ω			100	REM01K9070-IE		110
	11.0	A4110			REM00K6100-IE	100 Ω	50	REM02K1070-IE		75
	15.0	A4150		24 Ω	REM00K9070-IE	70 Ω	55	REM03K5035-IE	35 Ω	110
	18.5	A4185			REM03K5035-IE	35 Ω	90	REM19K0030-IE	30 Ω	100
	22.0	A4220		20 Ω			75			85
	30.0	A4300	4015045-TE	16 Ω				REM19K0020-IE	20 Ω	95
	37.0	A4370	4017068-TE	11 Ω				REM38K0012-IE	15 Ω	125
	45.0	A4450								100
	55.0	A4550	4035090-TE	8.5 Ω				2 × REM19K0020-IE	10 Ω	100
	75.0	B4750						3 × REM19K0030-IE		75
	90.0	B4900	4070130-TE	5.5 Ω				2 × REM38K0012-IE	6 Ω	105
	110.0	B411K	4090240-TE	3.2 Ω				3 × REM38K0012-IE	4 Ω	125
	132.0	B413K								105

⑤ Computer software

Type	Description	Model
Computer software	Configuration and monitoring software tool	CX-Drive
		CX-One
	Software tool for energy saving calculation	€Saver

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I116E-EN-06A In the interest of product improvement, specifications are subject to change without notice.

MX2 frequency inverter



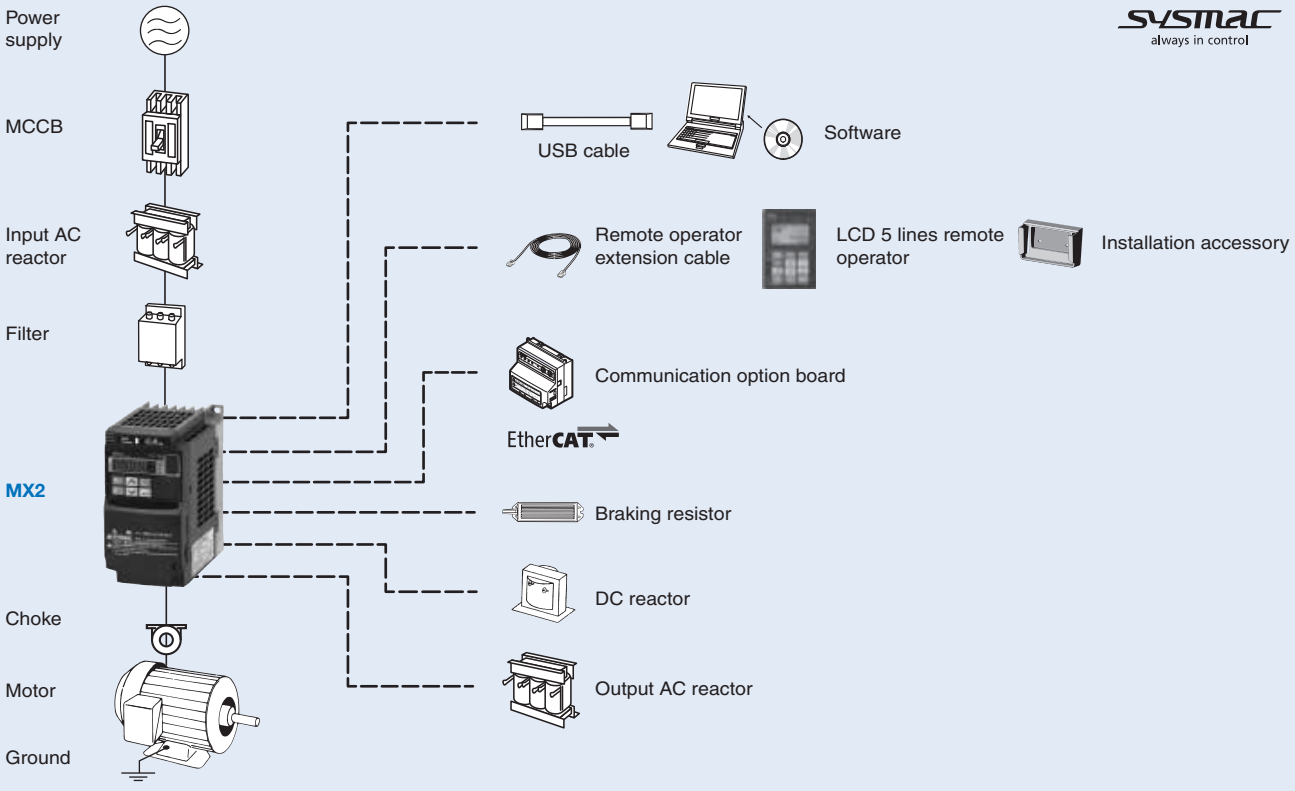
Born to drive machines

- Current vector control
- High starting torque: 200% at 0.5 Hz
- Double rating VT 120%/1 min and CT 150%/1 min
- IM & PM motor control
- Torque control in open loop vector
- Positioning functionality
- Built-in application functionality (i.e. Brake control)
- Safety embedded compliant with ISO13849-1 (double input circuit and external device monitor EDM)
- USB port for PC programming
- 24 VDC backup supply for control board
- RoHS, CE, cULus

Ratings

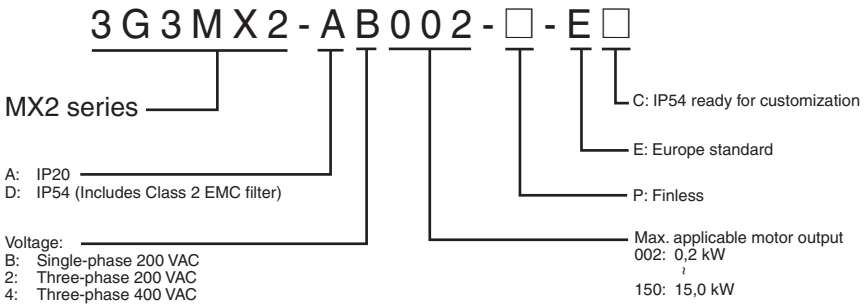
- 200 V Class single-phase 0.1 to 2.2 kW
- 200 V Class three-phase 0.1 to 15.0 kW
- 400 V Class three-phase 0.4 to 15.0 kW

System configuration



Specifications

Type designation



200 V class

Single-phase: 3G3MX2-□			B001	B002	B004	B007*1	B015	B022	–	–	–	–	–
Three-phase: 3G3MX2-□			2001	2002	2004	2007	2015	2022	2037	2055	2075	2110	2150
Motor kW*2	For VT setting		0.2	0.4	0.55	1.1	2.2	3.0	5.5	7.5	11	15	18.5
	For CT setting		0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15
Output characteristics	Inverter capacity kVA	200 VT	0.4	0.6	1.2	2.0	3.3	4.1	6.7	10.3	13.8	19.3	23.9
		200 CT	0.2	0.5	1.0	1.7	2.7	3.8	6.0	8.6	11.4	16.2	20.7
		240 VT	0.4	0.7	1.4	2.4	3.9	4.9	8.1	12.4	16.6	23.2	28.6
		240 CT	0.3	0.6	1.2	2.0	3.3	4.5	7.2	10.3	13.7	19.5	24.9
	Rated output current (A) at VT		1.2	1.9	3.5	6.0	9.6	12.0	19.6	30.0	40.0	56.0	69.0
	Rated output current (A) at CT		1.0	1.6	3.0	5.0	8.0	11.0	17.5	25.0	33.0	47.0	60.0
	Max. output voltage		Proportional to input voltage: 0 to 240 V										
	Max. output frequency		400 Hz										
Power supply	Rated input voltage and frequency		Single-phase 200 to 240 V 50/60 Hz 3-phase 200 to 240 V 50/60 Hz										
	Allowable voltage fluctuation		–15% to +10%										
	Allowable frequency fluctuation		5%										
Braking torque		At short-time deceleration At capacitor feedback	100%: <50Hz 50%: <60Hz				70%: <50Hz 50%: <60Hz	Approx 20%	–				
Cooling method			Self cooling*3				Forced-air-cooling						

*1 Three phase model use forced-air-cooling but single phase model is self cooling.
*2 Based on a standard 3-Phase standard motor.
*3 Forced air cooling for IP54 models.

400 V class

Three-phase: 3G3MX2-□			4004	4007	4015	4022	4030	4040	4055	4075	4110	4150
Motor kW*1	For VT setting		0.75	1.5	2.2	3.0	4.0	5.5	7.5	11	15	18.5
	For CT setting		0.4	0.75	1.5	2.2	3.0	4.0	5.5	7.5	11	15
Output characteristics	Inverter capacity kVA	380 VT	1.3	2.6	3.5	4.5	5.7	7.3	11.5	15.1	20.4	25.0
		380 CT	1.1	2.2	3.1	3.6	4.7	6.0	9.7	11.8	15.7	20.4
		480 VT	1.7	3.4	4.4	5.7	7.3	9.2	14.5	19.1	25.7	31.5
		480 CT	1.4	2.8	3.9	4.5	5.9	7.6	12.3	14.9	19.9	25.7
	Rated output current (A) at VT		2.1	4.1	5.4	6.9	8.8	11.1	17.5	23.0	31.0	38.0
	Rated output current (A) at CT		1.8	3.4	4.8	5.5	7.2	9.2	14.8	18.0	24.0	31.0
	Max. output voltage		Proportional to input voltage: 0 to 480 V									
	Max. output frequency		400 Hz									
Power supply	Rated input voltage and frequency		3-phase 380 to 480 V 50/60 Hz									
	Allowable voltage fluctuation		–15% to +10%									
	Allowable frequency fluctuation		5%									
Braking torque		At short-time deceleration *2 At capacitor feedback	100%: <50Hz 50%: <60Hz				70%: <50Hz 50%: <60Hz	–				
Cooling method			Self cooling*2		Forced-air-cooling							

*1 Based on a standard 3-Phase standard motor.
*2 Forced air cooling for IP54 models.

Common specifications

	Model number 3G3MX2	Specifications
Control functions	Control methods	Phase-to-phase sinusoidal pulse with modulation PWM (Sensorless vector control, V/F)
	Output frequency range	0.10 to 400.00 Hz
	Frequency precision	Digital set value: ±0.01% of the max. frequency
		Analogue set value: ±0.2% of the max. frequency (25±10°C)
	Resolution of frequency set value	Digital set value: 0.01 Hz
		Analogue set value: 1/1000 of maximum frequency
	Resolution of output frequency	0.01Hz
	Starting torque	200%/0.5 Hz
	Overload capability	Dual rating: Heavy duty (CT): 150% for 1 minute Normal Duty (VT): 120% for 1 minute
	Frequency set value	0 to 10 VDC (10 KΩ), 4 to 20 mA (100 Ω), RS485 Modbus, Network options
	V/f Characteristics	Constant/ reduced torque, free V/f
Functionality	Inputs signals	FW (forward run command), RV (reverse run command), CF1~CF4 (multi-stage speed setting), JG (jog command), DB (external braking), SET (set second motor), 2CH (2-stage accel./decel. command), FRS (free run stop command), EXT (external trip), USP (startup function), CS (commercial power switchover), SFT (soft lock), AT (analog input selection), RS (reset), PTC (thermistor thermal protection), STA (start), STP (stop), F/R (forward/reverse), PID (PID disable), PIDC (PID reset), UP (remote control up function), DWN (remote control down function), UDC (remote control data clear), OPE (operator control), SF1~SF7 (multi-stage speed setting; bit operation), OLR (overload restriction), TL (torque limit enable), TRQ1 (torque limit changeover1), TRQ2 (torque limit changeover2), BOK (Braking confirmation), LAC (LAD cancellation), PCLR (position deviation clear), ADD (add frequency enable), F-TM (force terminal mode), ATR (permission of torque command input), KHC (Cumulative power clear), MI1~MI7 (general purpose inputs for Drive Programming), AHD (analog command hold), CP1~CP3 (multistage-position switches), ORL (limit signal of zero-return), ORC (trigger signal of zero-return), SPD (speed/position changeover), GS1~GS2 (STO inputs, safety related signals), 485 (Starting communication signal), PRG (executing Drive Programming), HLD (retain output frequency), ROK (permission of run command), EB (rotation direction detection of B-phase), DISP (display limitation), OP (option control signal), NO (no function), PSET (preset position)
	Output signals	RUN (run signal), FA1~FA5 (frequency arrival signal), OL,OL2 (overload advance notice signal), OD (PID deviation error signal), AL (alarm signal), OTQ (over/under torque threshold), UV (under-voltage), TRQ (torque limit signal), RNT (run time expired), ONT (power ON time expired), THM (thermal warning), BRK (brake release), BER (brake error), ZS (0Hz detection), DSE (speed deviation excessive), POK (positioning completion), ODc (analog voltage input disconnection), OIDc (analog current input disconnection), FBV (PID second stage output), NDc (network disconnect detection), LOG1~LOG3 (Logic output signals), WAC (capacitor life warning), WAF (cooling fan warning), FR (starting contact), OHF (heat sink overheat warning), LOC (Low load), MO1~MO3 (general outputs for Drive Programming), IRDY (inverter ready), FWR (forward operation), RVR (reverse operation), MJA (major failure), WCO (window comparator O), WCOI (window comparator OI), FREF (frequency command source), REF (run command source), SETM (second motor in operation), EDM (STO (safe torque off) performance monitor), OP (option control signal), NO (no function)
	Standard functions	Free-V/f, manual/automatic torque boost, output voltage gain adjustment, AVR function, reduced voltage start, motor data selection, auto-tuning, motor stabilization control, reverse running protection, simple position control, simple torque control, torque limiting, automatic carrier frequency reduction, energy saving operation, PID function, non-stop operation at instantaneous power failure, brake control, DC injection braking, dynamic braking (BRD), frequency upper and lower limiters, jump frequencies, curve accel and decel (S, U, inversed U,EL-S), 16-stage speed profile, fine adjustment of start frequency, accel and decel stop, process jogging, frequency calculation, frequency addition, 2-stage accel/decel, stop mode selection, start/end freq., analog input filter, window comparators, input terminal response time, output signal delay/hold function, rotation direction restriction, stop key selection, software lock, safe stop function, scaling function, display restriction, password function, user parameter, initialization, initial display selection, cooling fan control, warning, trip retry, frequency pull-in restart, frequency matching, overload restriction, over current restriction, DC bus voltage AVR
	Analogue inputs	2 analogue inputs 0 to 10 V (10 KΩ), 4 to 20 mA (100 Ω)
	Pulse train input terminal	0 to 24 V, up to 32 kHz
	Accel/Decel times	0.01 to 3,600.0 s (line/curve selection), 2nd accel/decel setting available
	Display	Status indicator LED's Run, Program, Alarm, Power, Hz, Amps
		Digital operator: Available to monitor 32 items: frequency reference, output current, output frequency…
Protection functions	Motor overload protection	Electronic Thermal overload relay and PTC thermistor input
	Instantaneous overcurrent	200% of rated current
	Overload	Dual rating: Heavy duty (CT): 150% for 1 minute Normal Duty (VT): 120% for 1 minute
	Overvoltage	800 V for 400 V type and 400 V for 200 V type
	Undervoltage	345 V for 400 V type and 172.5 V for 200 V type
	Momentary power loss	Following items are selectable: Alarm, decelerates to stop, decelerates to stop with DC bus controlled, restart
	Cooling fin overheat	Temperature monitor and error detection
	Stall prevention level	Stall prevention during acceleration/deceleration and constant speed
	Ground fault	Detection at power-on
	Power charge indication	On when power is supplied to the control part
Ambient conditions	Degree of protection	IP20, Varnish coating on PCB & IP54 (For 3G3MX2-D□ type)
	Ambient humidity	90% RH or less (without condensation)
	Storage temperature	–20°C to 65°C (short-term temperature during transportation)
	Ambient temperature*1	–10°C to 50°C (Both the carrier frequency and output current need to be reduced over 40°C)
	Installation	Indoor (no corrosive gas, dust, etc.)
	Installation height	Max. 1,000 m
	Vibration	5.9 m/s^2 (0.6G), 10 to 55 Hz

*1 Some types of 3G3MX2-D requires special derating depending on installation conditions and carrier frequency selected. Check the manual for details.

Dimensions

Standard models (IP20)

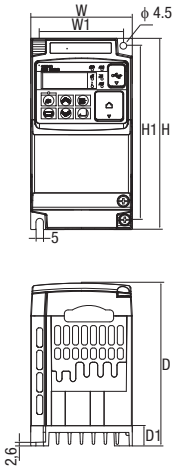
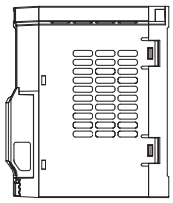
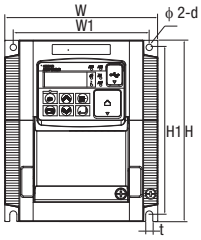
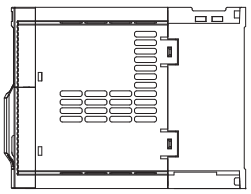


Figure 1







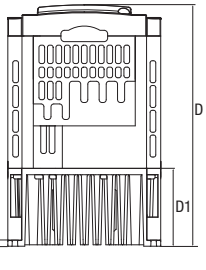
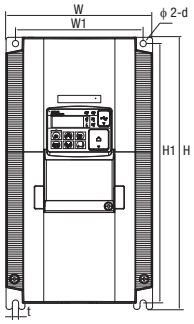
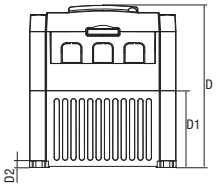


Figure 2





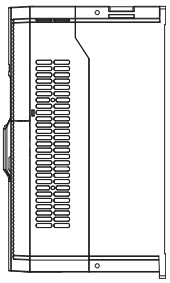
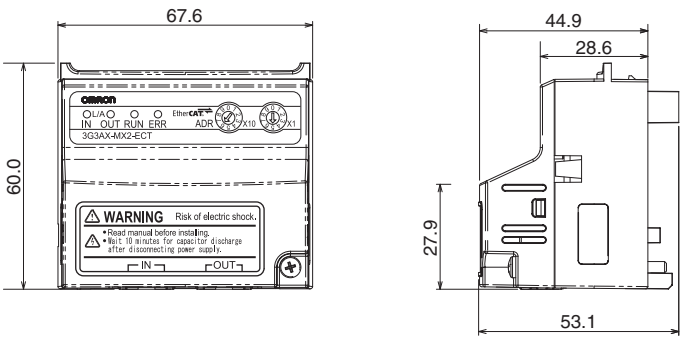


Figure 3

Voltage class	Inverter model 3G3MX2-A□	Figure	Dimensions in mm									
			W	W1	H	H1	t	D	D1	D2	d	Weight (kg)
Single-phase 200 V	B001-E	1	68	56	128	118	–	109	13.5	–	–	1.0
	B002-E											1.0
	B004-E							122.5	27			1.1
	B007-E	2	108	96	128	118		170.5	55	4.4	4.5	1.4
	B015-E											1.8
	B022-E											1.8
Three-phase 200 V	2001-E	1	68	56	128	118	–	109	13.5	–	–	1.0
	2002-E											1.0
	2004-E							122.5	27			1.1
	2007-E							145.5	50			1.2
	2015-E	2	108	96	128	118		170.5	55	4.4	4.5	1.6
	2022-E											1.8
	2037-E	3	140	128	128	118	5	170.5	55	4.4		2.0
	2055-E		140	122	260	248	6	155	73.3	6	6	3.0
	2075-E											3.4
	2110-E		180	160	296	284	7	175	97	5	7	5.1
	2150-E		220	192	350	336	7	175	84	5	7	7.4
Three-phase 400 V	4004-E	2	108	96	128	118	–	143.5	28	–	–	1.5
	4007-E							170.5	55			1.6
	4015-E							170.5				1.8
	4022-E											1.9
	4030-E											1.9
	4040-E	3	140	128	128	118	5	170.5	55	4.4	4.5	2.1
	4055-E			122	260	248	6	155	73.3	6	6	3.5
	4075-E											3.5
	4110-E		180	160	296	284	7	175	97	5	7	4.7
	4150-E											5.2

Option board



Note: Option boards could be fitted inside the IP54 model.

Finless models

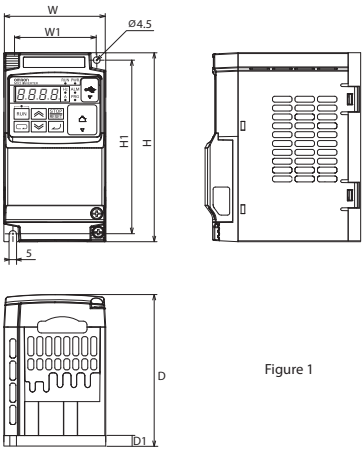


Figure 1

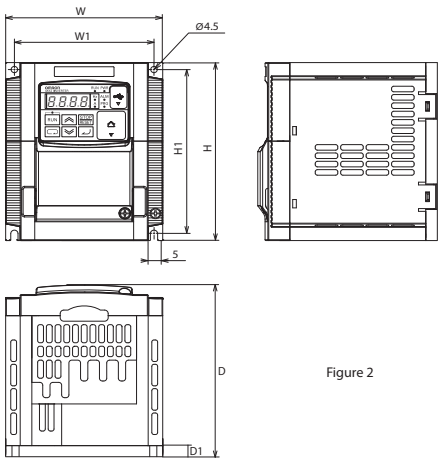


Figure 2

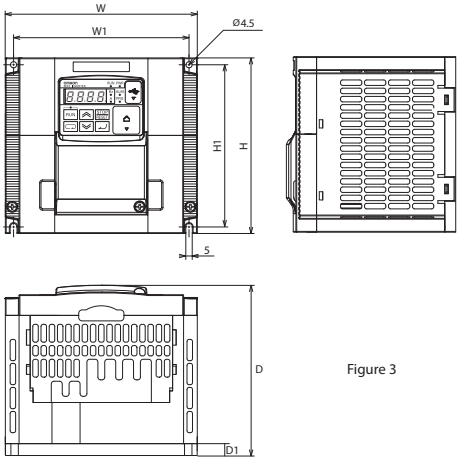


Figure 3

Voltage class	Inverter model 3G3MX2-A□	Figure	Dimensions in mm						
			W	W1	H	H1	D	D1	Weight (kg)
Single-phase 200 V	B001-P-E	1	68	56	128	118	103	7.5	1.1
	B002-P-E								
	B004-P-E								
	B007-P-E	2	108	96	128	118	123	7.5	1.8
	B015-P-E								
	B022-P-E								
Three-phase 200 V	2001-P-E	1	68	56	128	118	103	7.5	1.1
	2002-P-E								
	2004-P-E								
	2007-P-E								
	2015-P-E	2	108	96	128	118	123	7.5	1.8
	2022-P-E								
	2037-P-E	3	140	128	128	118	123	7.5	2.1
Three-phase 400 V	4004-P-E	2	108	96	128	118	123	7.5	1.8
	4007-P-E								
	4015-P-E								
	4022-P-E								
	4030-P-E								
	4040-P-E	3	140	128	128	118	123	7.5	2.1

IP54 models

Figure 1

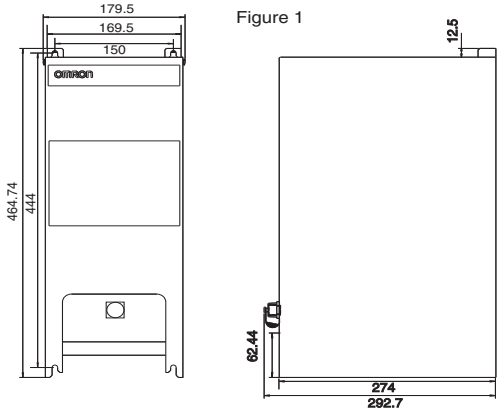


Figure 2

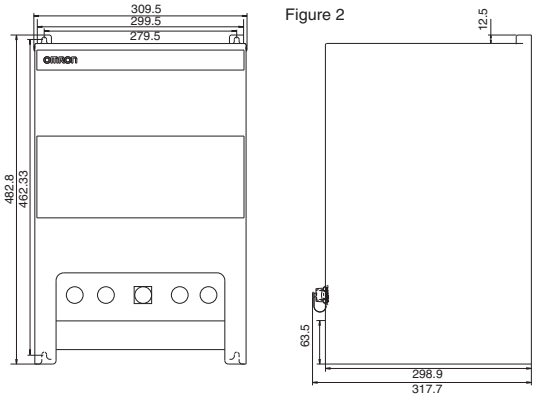


Figure 3

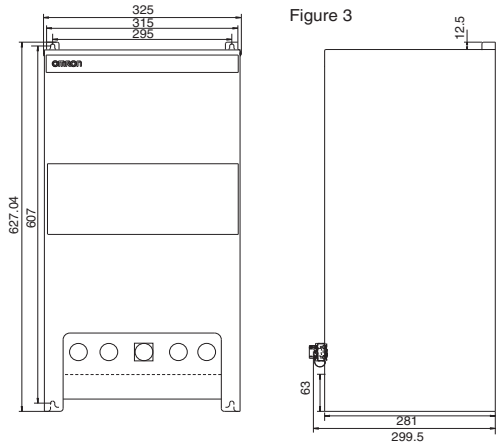


Figure 4

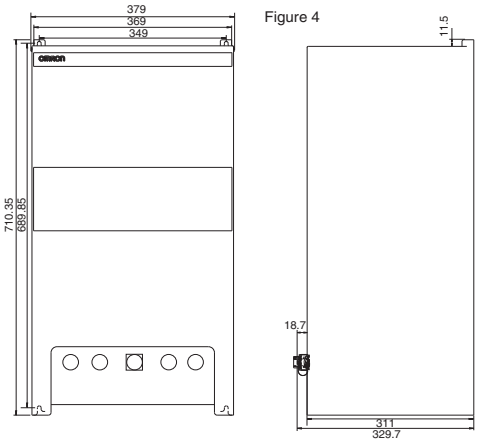
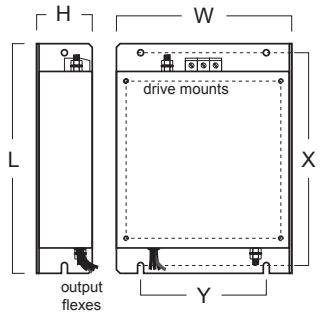


Figure 1	Figure 2	Figure 3	Figure 4
3G3MX2-DB001-E	3G3MX2-DB001-EC	3G3MX2-D2055-EC	3G3MX2-D2110-EC
3G3MX2-DB002-E	3G3MX2-DB002-EC	3G3MX2-D2075-EC	3G3MX2-D2150-EC
3G3MX2-DB004-E	3G3MX2-DB004-EC	3G3MX2-D4055-EC	3G3MX2-D4110-EC
3G3MX2-D2001-E	3G3MX2-DB007-EC	3G3MX2-D4075-EC	3G3MX2-D4150-EC
3G3MX2-D2002-E	3G3MX2-DB015-EC		
3G3MX2-D2004-E	3G3MX2-DB022-EC		
3G3MX2-D2007-E	3G3MX2-D2001-EC		
	3G3MX2-D2002-EC		
	3G3MX2-D2004-EC		
	3G3MX2-D2007-EC		
	3G3MX2-D2015-EC		
	3G3MX2-D2022-EC		
	3G3MX2-D2037-EC		
	3G3MX2-D4004-EC		
	3G3MX2-D4007-EC		
	3G3MX2-D4015-EC		
	3G3MX2-D4022-EC		
	3G3MX2-D4030-EC		
	3G3MX2-D4040-EC		

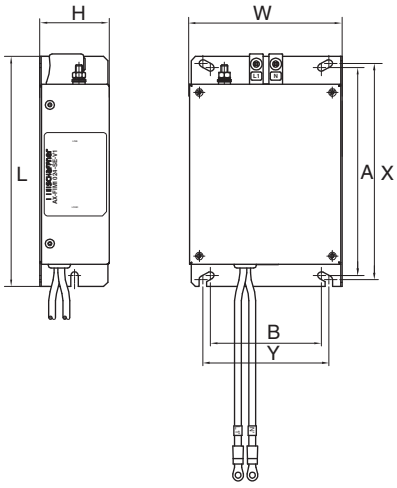
Rasmi footprint filters

Rasmi model		Dimensions					
		W	H	L	X	Y	M
1×200 V	AX-FIM1010-RE□	71	45	169	156	51	M4
	AX-FIM1014-RE□	111	50	169	156	91	M4
	AX-FIM1024-RE□	111	50	169	156	91	M4
3×200 V	AX-FIM2010-RE□	82	50	194	181	62	M4
	AX-FIM2020-RE□	111	50	169	156	91	M4
	AX-FIM2030-RE□	144	50	174	161	120	M4
	AX-FIM2060-RE□	150	52	320	290	122	M5
	AX-FIM2080-RE□	188	62	362	330	160	M5
	AX-FIM2100-RE□	220	62	415	380	192	M6
3×400 V	AX-FIM3005-RE□	114	46	169	156	96	M4
	AX-FIM3010-RE□	114	46	169	156	96	M4
	AX-FIM3014-RE□	144	50	174	161	120	M4
	AX-FIM3030-RE□	150	52	306	290	122	M5
	AX-FIM3050-RE□	182	62	357	330	160	M5



Schaffner footprint filters

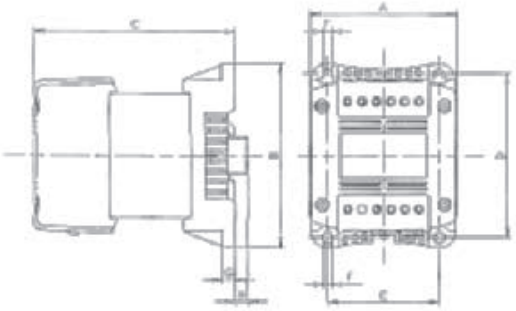
Schaffner model		Dimensions							
		W	H	L	X	Y	A	B	M
1×200 V	AX-FIM1010-SE□	70	40	166	156	51	150	50	M5
	AX-FIM1014-SE□	110	45	166	156	91	150	80	M5
	AX-FIM1024-SE□	110	50	166	156	91	150	80	M5
3×200 V	AX-FIM2010-SE□	80	40	191	181	62	150	50	M5
	AX-FIM2020-SE□	110	50	166	156	91	150	80	M5
	AX-FIM2030-SE□	142	50	171	161	120	150	112	M5
	AX-FIM2060-SE□	140	55	304	290	122	286	112	M5
	AX-FIM2080-SE□	180	55	344	330	160	323	140	M5
	AX-FIM2100-SE□	220	65	394	380	192	376	180	M5
3×400 V	AX-FIM3005-SE□	110	50	166	156	91	150	80	M5
	AX-FIM3010-SE□	110	50	166	156	91	150	80	M5
	AX-FIM3014-SE□	142	50	171	161	120	150	112	M5
	AX-FIM3030-SE□	140	55	304	290	122	286	112	M5
	AX-FIM3050-SE□	180	55	344	330	160	323	140	M5



Input AC Reactor

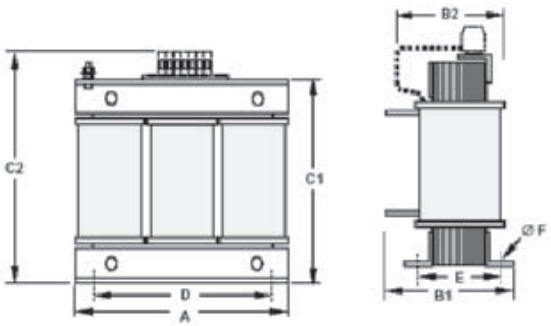
Single-phase

Voltage	Reference	Dimensions								Weight kg
		A	B	C	D	E	F	G	H	
200 V	AX-RAI02000070-DE	84	113	96	101	66	5	7.5	2	1.22
	AX-RAI01700140-DE	84	113	116	101	66	5	7.5	2	1.95
	AX-RAI01200200-DE	84	113	131	101	66	5	7.5	2	2.55
	AX-RAI00630240-DE	84	113	116	101	66	5	7.5	2	1.95



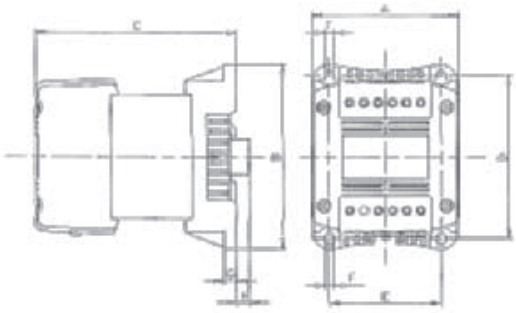
Three-phase

Voltage	Reference	Dimensions						Weight kg
		A	B2	C2	D	E	F	
200 V	AX-RAI02800080-DE	120	70	120	80	52	5.5	1.78
	AX-RAI00880200-DE	120	80	120	80	62	5.5	2.35
	AX-RAI00350335-DE	180	85	190	140	55	6	5.5
	AX-RAI00180670-DE	180	85	190	140	55	6	5.5
400 V	AX-RAI07700050-DE	120	70	120	80	52	5.5	1.78
	AX-RAI03500100-DE	120	80	120	80	62	5.5	2.35
	AX-RAI01300170-DE	120	80	120	80	62	5.5	2.50
	AX-RAI00740335-DE	180	85	190	140	55	6	5.5



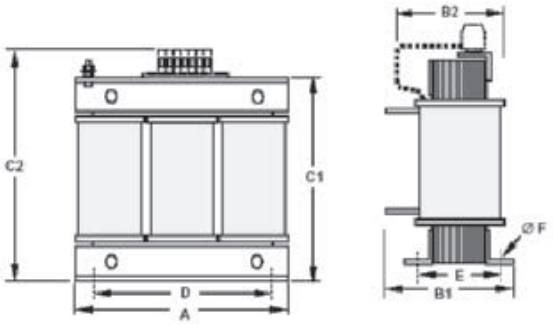
DC Reactor

Voltage	Reference	Dimensions								Weight kg
		A	B	C	D	E	F	G	H	
200 V	AX-RC21400016-DE	84	113	96	101	66	5	7.5	2	1.22
	AX-RC10700032-DE									
	AX-RC06750061-DE			105						1.60
	AX-RC03510093-DE									
	AX-RC02510138-DE			116						1.95
	AX-RC01600223-DE	108	135	124	120	82	6.5	9.5	9.5	3.20
	AX-RC01110309-DE	120	152	136	135	94	7		–	5.20
	AX-RC00840437-DE			146						6.00
	AX-RC00590614-DE	150	177	160	160	115		2		11.4
	AX-RC00440859-DE			182.6						14.3
400 V	AX-RC43000020-DE	84	113	96	101	66	5	7.5	2	1.22
	AX-RC27000030-DE			105						1.60
	AX-RC14000047-DE									
	AX-RC10100069-DE			116						1.95
	AX-RC08250093-DE			131						2.65
	AX-RC06400116-DE	108	135	133	120	82	6.5	9.5	9.5	3.70
	AX-RC04410167-DE	120	152	136	135	94	7		–	5.20
	AX-RC03350219-DE			146						6.00
	AX-RC02330307-DE	150	177	160	160	115	7	2		11.4
	AX-RC01750430-DE			182.6						14.3



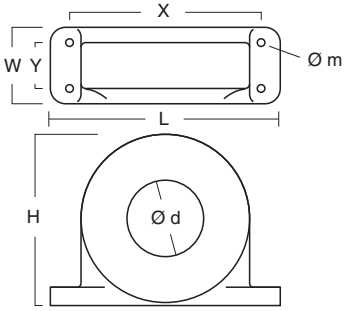
Output AC Reactor

Voltage	Reference	Dimensions						Weight kg
		A	B2	C2	D	E	F	
200 V	AX-RAO11500026-DE	120	70	120	80	52	5.5	1.78
	AX-RAO07600042-DE	120	70	120	80	52	5.5	1.78
	AX-RAO04100075-DE	120	80	120	80	62	5.5	2.35
	AX-RAO03000105-DE	120	80	120	80	62	5.5	2.35
	AX-RAO01830180-DE	180	85	190	140	55	6	5.5
	AX-RAO01150220-DE	180	85	190	140	55	6	5.5
	AX-RAO00950320-DE	180	85	205	140	55	6	6.5
	AX-RAO00630430-DE	180	95	205	140	65	6	9.1
	AX-RAO00490640-DE	180	95	205	140	65	6	9.1
400 V	AX-RAO16300038-DE	120	70	120	80	52	5.5	1.78
	AX-RAO11800053-DE	120	80	120	80	52	5.5	2.35
	AX-RAO07300080-DE	120	80	120	80	62	5.5	2.35
	AX-RAO04600110-DE	180	85	190	140	55	6	5.5
	AX-RAO03600160-DE	180	85	205	140	55	6	6.5
	AX-RAO02500220-DE	180	95	205	140	55	6	9.1
	AX-RAO02000320-DE	180	105	205	140	85	6	11.7



Chokes

Reference	D diameter	Motor kW	Dimensions						Weight kg
			L	W	H	X	Y	m	
AX-FER2102-RE	21	< 2.2	85	22	46	70	–	5	0.1
AX-FER2515-RE	25	< 15	105	25	62	90	–	5	0.2
AX-FER5045-RE	50	< 45	150	50	110	125	30	5	0.7



Resistor dimensions

AX-REM00K15xxx

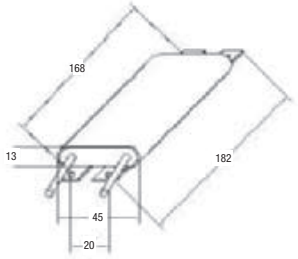


Fig 1

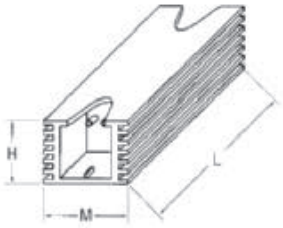


Fig 2

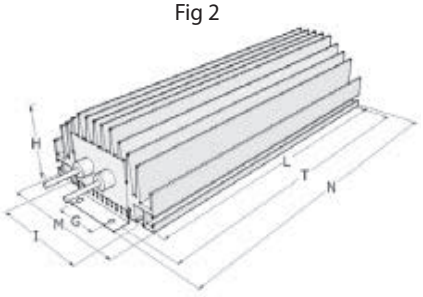


Fig 3

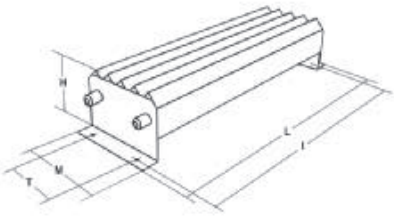
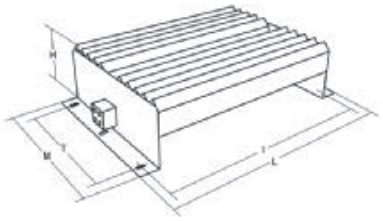
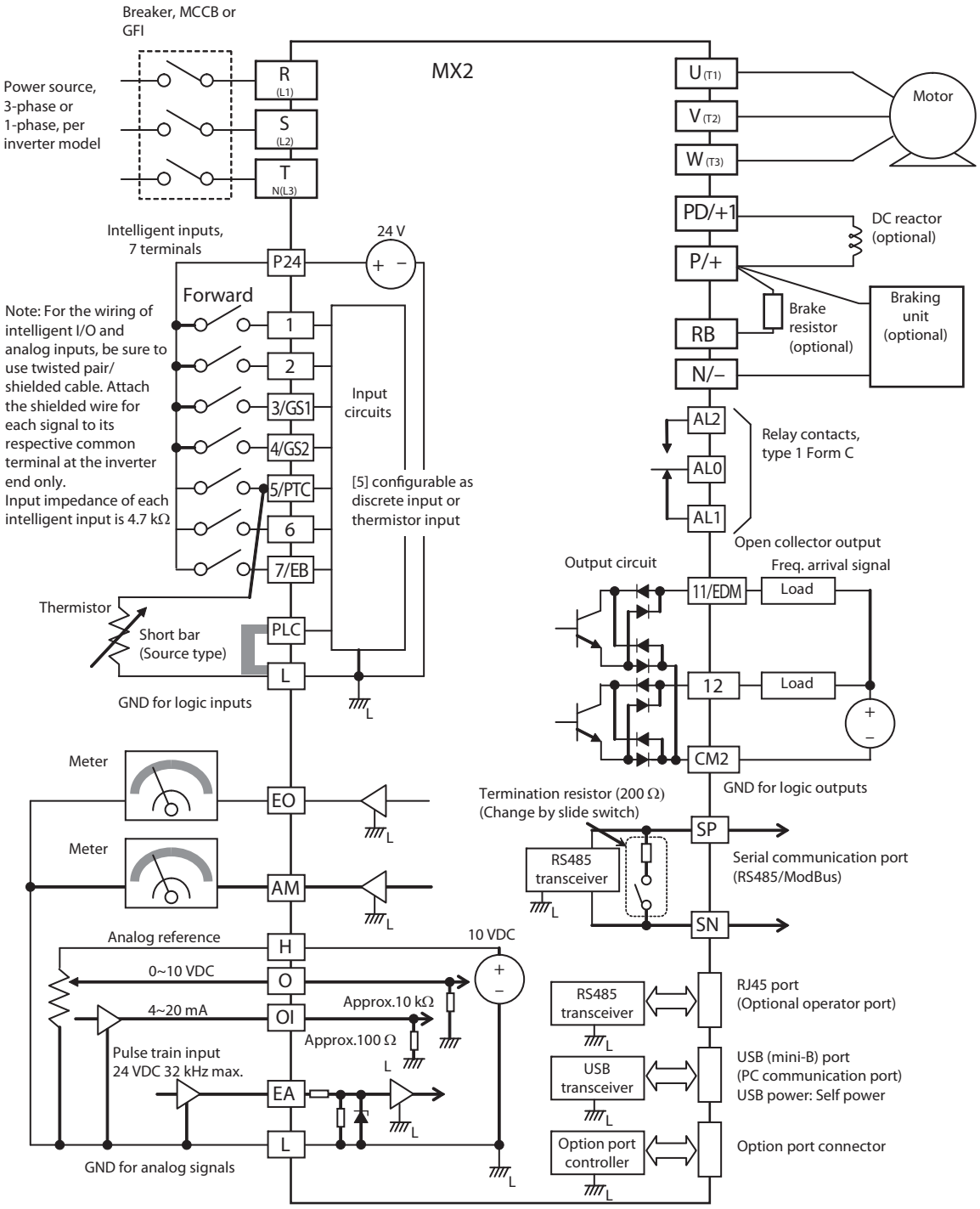


Fig 4



Type	Fig.	Dimensions							Weight
		L	H	M	I	T	G	N	kg
AX-REM00K1400-IE	1	105	27	36	94	-	-	-	0.2
AX-REM00K2070-IE									
AX-REM00K2120-IE									
AX-REM00K2200-IE									
AX-REM00K4075-IE		200	27	36	189	-	-	-	0.425
AX-REM00K4035-IE									
AX-REM00K4030-IE									
AX-REM00K5120-IE		260	27	36	249	-	-	-	0.58
AX-REM00K6100-IE		320	27	36	309	-	-	-	0.73
AX-REM00K6035-IE									
AX-REM00K9070-IE	2	200	61	100	74.5	216	40	230	1.41
AX-REM00K9020-IE									
AX-REM00K9017-IE									
AX-REM01K9070-IE	3	365	73	105	350	70	-	-	4
AX-REM01K9017-IE									
AX-REM02K1070-IE	4	310	100	240	295	210	-	-	7
AX-REM02K1017-IE									
AX-REM03K5035-IE		365	100	240	350	210	-	-	8
AX-REM03K5010-IE									

Standard connections



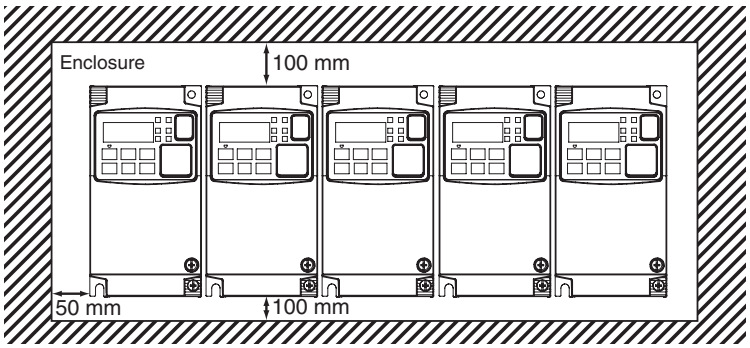
Terminal Block Specifications

Terminal	Name	Function (signal level)
R/L1, S/L2, T/L3	Main circuit power supply input	Used to connect line power to the drive. Drives with single-phase 200 V input power use only terminals R/L1 and N (T/L3), terminal S/L2 is not available for these units
U/T1, V/T2, W/T3	Inverter output	Used to connect the motor
PD/+1, P/+	External DC reactor terminal	Normally connected by the short-circuit bar. Remove the short-circuit bar between +1 and P/+2 when a DC reactor is connected.
P/+, N/-	Regenerative braking unit terminal	Connect optional regenerative braking units (If a braking torque is required)
P/+, RB	Braking resistor terminals	Connect option braking resistor (if a braking torque is required)
⏚	Grounding	For grounding (Grounding should conform to the local grounding code.)

Control Circuit

Type	No.	Signal name	Function	Signal level
Digital input signals	PLC	Intelligent input common	Source type: connecting [P24] to [1]-[7] turns inputs ON Sink type: connecting [L] to [1]-[7] turns inputs ON	–
	P24	Internal 24 VDC	24 VDC, 30mA	24 VDC, 100 mA
	1	Multi-function Input selection 1	Factory setting: Forward/Stop	27 VDC max
	2	Multi-function Input selection 2	Factory setting: Reverse/Stop	
	3/GS1	Multi-function Input selection 3/safe stop input 1	Factory setting: External trip	
	4/GS2	Multi-function Input selection 4/safe stop input 2	Factory setting: Reset	
	5/PTC	Multi-function Input selection 5/PTC thermistor input	Factory setting: Multi-step speed reference 1	
	6	Multi-function input selection 6	Factory setting: Multi-step speed reference 2	
	7/EB	Multi-function input selection 7/Pulse train input B	Factory setting: Jog	
	L	Multi-function Input selection common (in upper row)	–	–
Pulse train	EA	Pulse train input A	Factory setting: Speed reference	32 kHz max 5 to 24 VDC
	EO	Pulse train output	LAD frequency	10 VDC 2 mA 32 kHz max
Analog input signal	H	Frequency reference power supply	10 VDC 10 mA max	
	O	Voltage frequency reference signal	0 to 10 VDC (10 kΩ)	
	OI	Current frequency reference signal	4 to 20 mA (250 Ω)	
	L	Frequency reference common (bottom row)	–	–
Digital output signals	11/EDM	Discrete logic output 1/EDM output	Factory setting: During Run	27 VDC, 50 mA max EDM based on ISO13849-1
	12	Discrete logic output 2	Factory setting: Frequency arrival type 1	
	CM2	GND logic output	–	
	AL0	Relay commom contact	Factory setting: Alarm signal Under normal operation AL1 - AL0 Closed AL2 - AL0 Open	R load 250 VAC 2.5 A 30 VDC 3.0 A I load 250 VAC 0.2 A 30 VDC 0.7 A
	AL1	Relay contact, normally open		
	AL2	Relay contact, normally closed		
Monitor signal	AM	Analog voltage output	Factory setting: LAD frequency	0 to 10 VDC 1 mA
Comms	SP	Serial communication terminal	RS485 Modbus communication	
	SN			

Side by side mounting



Inverter heat loss

Single-phase 200 V class

Model 3G3MX2		AB001	AB002	AB004	AB007	AB015	AB022
Inverter capacity kVA	200V VT	0.4	0.6	1.2	2.0	3.3	4.1
	200V CT	0.2	0.5	1.0	1.7	2.7	3.8
	240V VT	0.4	0.7	1.4	2.4	3.9	4.9
	240V CT	0.3	0.6	1.2	2.0	3.3	4.5
Rated current (A) VT		1.2	1.9	3.4	6.0	9.6	12.0
Rated current (A) CT		1.0	1.6	3.0	5.0	8.0	11.0
Total heat loss		12	22	30	48	79	104
Efficiency at rated load		89.5	90	93	94	95	95.5
Cooling method		Self cooling				Forced-air-cooling	

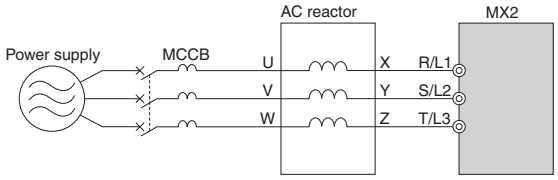
Three-phase 200 V class

Model 3G3MX2		A2001	A2002	A2004	A2007	A2015	A2022	A2037	A2055	A2075	A2110	A2150
Inverter capacity kVA	200 VT	0.4	0.6	1.2	2.0	3.3	4.1	6.7	10.3	13.8	19.3	23.9
	200 CT	0.2	0.5	1.0	1.7	2.7	3.8	6.0	8.6	11.4	16.2	20.7
	240 VT	0.4	0.7	1.4	2.4	3.9	4.9	8.1	12.4	16.6	23.2	28.6
	240 CT	0.3	0.6	1.2	2.0	3.3	4.5	7.2	10.3	13.7	19.5	24.9
Rated current (A) VT		1.2	1.9	3.4	6.0	9.6	12.0	19.6	30.0	40.0	56.0	69.0
Rated current (A) CT		1.0	1.6	3.0	5.0	8.0	11.0	17.5	25.0	33.0	47.0	60.0
Total heat loss		12	22	30	48	79	104	154	229	313	458	625
Efficiency at rated load		89.5	90	93	94	95	95.5	96	96	96	96	96
Cooling method		Self cooling			Forced-air-cooling							

Three-phase 400 V class

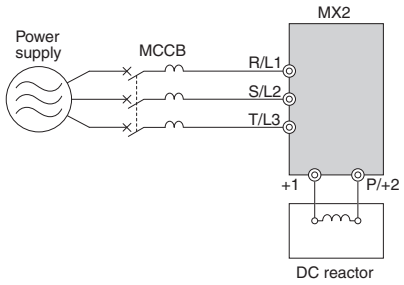
Model 3G3MX2		A4004	A4007	A4015	A4022	A4030	A4040	A4055	A4075	A4110	A4150
Inverter capacity kVA	380V VT	1.3	2.6	3.5	4.5	5.7	7.3	11.5	15.1	20.4	25.0
	380V CT	1.1	2.2	3.1	3.6	4.7	6.0	9.7	11.8	15.7	20.4
	480V VT	1.7	3.4	4.4	5.7	7.3	9.2	14.5	19.1	25.7	31.5
	480V CT	1.4	2.8	3.9	4.5	5.9	7.6	12.3	14.9	19.9	25.7
Rated current (A) VT		2.1	4.1	5.4	6.9	8.8	11.1	17.5	23.0	31.0	38.0
Rated current (A) CT		1.8	3.4	4.8	5.5	7.2	9.2	14.8	18.0	24.0	31.0
Total heat loss		35	56	96	116	125	167	229	296	411	528
Efficiency at rated load		92	93	94	95	96	96	96	96.2	96.4	96.6
Cooling method		Self cooling		Forced-air-cooling							

Input AC Reactor



1-phase 200 V class				3-phase 200 V class				400 V class			
Max. applicable motor output kW	Reference	Current value A	Inductance mH	Max. applicable motor output kW	Reference	Current value A	Inductance mH	Max. applicable motor output kW	Reference	Current value A	Inductance mH
0.4	AX-RAI02000070-DE	7.0	2.0	1.5	AX-RAI02800080-DE	8.0	2.8	1.5	AX-RAI07700050-DE	5.0	7.7
0.75	AX-RAI01700140-DE	14.0	1.7	3.7	AX-RAI00880200-DE	20.0	0.88	4.0	AX-RAI03500100-DE	10.0	3.5
1.5	AX-RAI01200200-DE	20.0	1.2	7.5	AX-RAI00350335-DE	33.5	0.35	7.5	AX-RAI01300170-DE	17.0	1.3
2.2	AX-RAI00630240-DE	24.0	0.63	15	AX-RAI00180670-DE	67.0	0.18	15	AX-RAI00740335-DE	33.5	0.74

DC Reactor

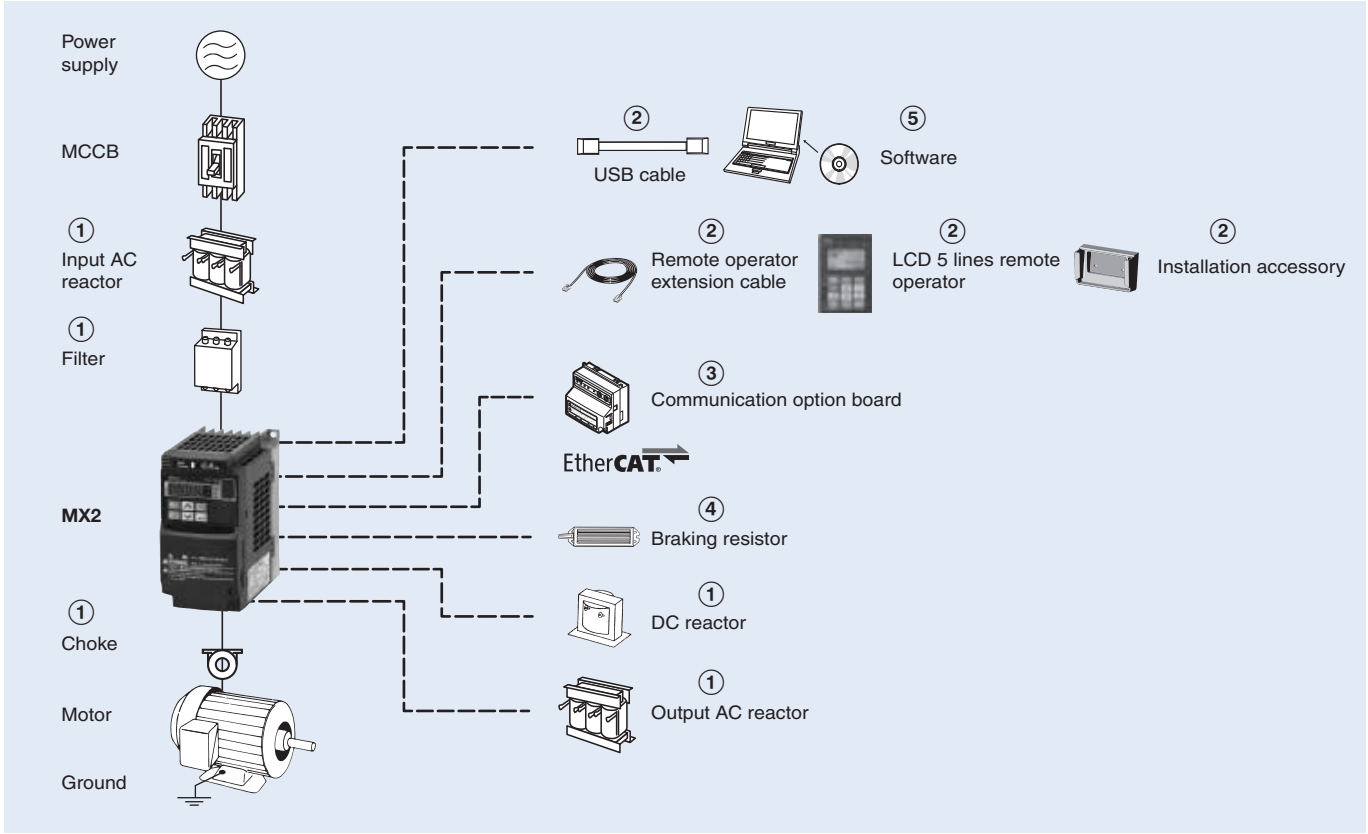


200 V class				400 V class			
Max. applicable motor output kW	Reference	Current value A	Inductance mH	Max. applicable motor output kW	Reference	Current value A	Inductance mH
0.2	AX-RC21400016-DE	1.6	21.4	0.4	AX-RC43000020-DE	2.0	43.0
0.4	AX-RC10700032-DE	3.2	10.7	0.7	AX-RC27000030-DE	3.0	27.0
0.7	AX-RC06750061-DE	6.1	6.75	1.5	AX-RC14000047-DE	4.7	14.0
1.5	AX-RC03510093-DE	9.3	3.51	2.2	AX-RC10100069-DE	6.9	10.1
2.2	AX-RC02510138-DE	13.8	2.51	3.0	AX-RC08250093-DE	9.3	8.25
3.7	AX-RC01600223-DE	22.3	1.60	4.0	AX-RC06400116-DE	11.6	6.40
5.5	AX-RC01110309-DE	30.9	1.11	5.5	AX-RC04410167-DE	16.7	4.41
7.5	AX-RC00840437-DE	43.7	0.84	7.5	AX-RC03350219-DE	21.9	3.35
11.0	AX-RC00590614-DE	61.4	0.59	11.0	AX-RC02330307-DE	30.7	2.33
15.0	AX-RC00440859-DE	85.9	0.44	15.0	AX-RC01750430-DE	43.0	1.75

Output AC Reactor

200 V class				400 V class			
Max. applicable motor output kW	Reference	Current value A	Inductance mH	Max. applicable motor output kW	Reference	Current value A	Inductance mH
0.4	AX-RAO11500026-DE	2.6	11.50	1.5	AX-RAO16300038-DE	3.8	16.30
0.75	AX-RAO07600042-DE	4.2	7.60				
1.5	AX-RAO04100075-DE	7.5	4.10				
2.2	AX-RAO03000105-DE	10.5	3.00	2.2	AX-RAO11800053-DE	5.3	11.80
3.7	AX-RAO01830160-DE	16.0	1.83	4.0	AX-RAO07300080-DE	8.0	7.30
5.5	AX-RAO01150220-DE	22.0	1.15	5.5	AX-RAO04600110-DE	11.0	4.60
7.5	AX-RAO00950320-DE	32.0	0.95	7.5	AX-RAO03600160-DE	16.0	3.60
11	AX-RAO00630430-DE	43.0	0.63	11	AX-RAO02500220-DE	22.0	2.50
15	AX-RAO00490640-DE	64.0	0.49	15	AX-RAO02000320-DE	32.0	2.00

Ordering information



3G3MX2

Specifications					Model		
Voltage class	Constant torque		Variable torque		Standard (IP20)	Finless	IP54
	Max motor kW	Rated current A	Max motor kW	Rated current A			
Single-phase 200 V	0.1	1.0	0.2	1.2	3G3MX2-AB001-E	3G3MX2-AB001-P-E	3G3MX2-DB001-E/EC
	0.2	1.6	0.4	1.9	3G3MX2-AB002-E	3G3MX2-AB002-P-E	3G3MX2-DB002-E/EC
	0.4	3.0	0.55	3.5	3G3MX2-AB004-E	3G3MX2-AB004-P-E	3G3MX2-DB004-E/EC
	0.75	5.0	1.1	6.0	3G3MX2-AB007-E	3G3MX2-AB007-P-E	3G3MX2-DB007-EC
	1.5	8.0	2.2	9.6	3G3MX2-AB015-E	3G3MX2-AB015-P-E	3G3MX2-DB015-EC
	2.2	11.0	3.0	12.0	3G3MX2-AB022-E	3G3MX2-AB022-P-E	3G3MX2-DB022-EC
Three-phase 200 V	0.1	1.0	0.2	1.2	3G3MX2-A2001-E	3G3MX2-A2001-P-E	3G3MX2-D2001-E/EC
	0.2	1.6	0.4	1.9	3G3MX2-A2002-E	3G3MX2-A2002-P-E	3G3MX2-D2002-E/EC
	0.4	3.0	0.55	3.5	3G3MX2-A2004-E	3G3MX2-A2004-P-E	3G3MX2-D2004-E/EC
	0.75	5.0	1.1	6.0	3G3MX2-A2007-E	3G3MX2-A2007-P-E	3G3MX2-D2007-E/EC
	1.5	8.0	2.2	9.6	3G3MX2-A2015-E	3G3MX2-A2015-P-E	3G3MX2-D2015-EC
	2.2	11.0	3.0	12.0	3G3MX2-A2022-E	3G3MX2-A2022-P-E	3G3MX2-D2022-EC
	3.7	17.5	5.5	19.6	3G3MX2-A2037-E	3G3MX2-A2037-P-E	3G3MX2-D2037-EC
	5.5	25.0	7.5	30.0	3G3MX2-A2055-E	-	3G3MX2-D2055-EC
	7.5	33.0	11	40.0	3G3MX2-A2075-E	-	3G3MX2-D2075-EC
	11	47.0	15	56.0	3G3MX2-A2110-E	-	3G3MX2-D2110-EC
	15	60.0	18.5	69.0	3G3MX2-A2150-E	-	3G3MX2-D2150-EC
Three-phase 400 V	0.4	1.8	0.75	2.1	3G3MX2-A4004-E	3G3MX2-A4004-P-E	3G3MX2-D4004-EC
	0.75	3.4	1.5	4.1	3G3MX2-A4007-E	3G3MX2-A4007-P-E	3G3MX2-D4007-EC
	1.5	4.8	2.2	5.4	3G3MX2-A4015-E	3G3MX2-A4015-P-E	3G3MX2-D4015-EC
	2.2	5.5	3.0	6.9	3G3MX2-A4022-E	3G3MX2-A4022-P-E	3G3MX2-D4022-EC
	3.0	7.2	4.0	8.8	3G3MX2-A4030-E	3G3MX2-A4030-P-E	3G3MX2-D4030-EC
	4.0	9.2	5.5	11.1	3G3MX2-A4040-E	3G3MX2-A4040-P-E	3G3MX2-D4040-EC
	5.5	14.8	7.5	17.5	3G3MX2-A4055-E	-	3G3MX2-D4055-EC
	7.5	18.0	11	23.0	3G3MX2-A4075-E	-	3G3MX2-D4075-EC
	11	24.0	15	31.0	3G3MX2-A4110-E	-	3G3MX2-D4110-EC
	15	31.0	18.5	38.0	3G3MX2-A4150-E	-	3G3MX2-D4150-EC

① Line filters

Inverter		Standard line filter				Low leakage line filter			
		Rasmi		Schaffner		Rasmi		Schaffner	
Voltage	Model 3G3MX2-□	Reference AX-FIM	Current (A)	Reference AX-FIM	Current (A)	Reference AX-FIM	Current (A)	Reference AX-FIM	Current (A)
1Phase 200 VAC	AB001 / AB002 / AB004	1010-RE	10	1010-SE-V1	8	1010-RE-LL	10	1010-SE-LL	10
	AB007	1014-RE	14	1014-SE-V1	14	1014-RE-LL	14	1014-SE-LL	14
	AB015 / AB022	1024-RE	24	1024-SE-V1	27	1024-RE-LL	24	1024-SE-LL	24
3Phase 200 VAC	A2001 / A2002 / A2004 / A2007	2010-RE	10	2010-SE-V1	7.8	2010-RE-LL	10	-	-
	A2015 / A2022	2020-RE	20	2020-SE-V1	16	2020-RE-LL	20	2020-SE-LL	20
	A2037	2030-RE	30	2030-SE-V1	25	2030-RE-LL	30	2030-SE-LL	30
	A2055 / A2075	2060-RE	60	2060-SE-V1	50	2060-RE-LL	60	2060-SE-LL	50
	A2110	2080-RE	80	2080-SE-V1	70	2080-RE-LL	80	-	-
	A2150	2100-RE	100	2100-SE-V1	75	2100-RE-LL	100	-	-
3Phase 400 VAC	A4004 / A4007	3005-RE	5	3005-SE-V1	6	3005-RE-LL	5	3005-SE-LL	5
	A4015 / A4022 / A4030	3010-RE	10	3010-SE-V1	12	3010-RE-LL	10	3010-SE-LL	10
	A4040	3014-RE	14	3014-SE-V1	15	3014-RE-LL	14	3014-SE-LL	15
	A4055 / A4075	3030-RE	30	3030-SE-V1	29	3030-RE-LL	30	3030-SE-LL	30
	A4110 / A4150	3050-RE	50	3050-SE-V1	48	3050-RE-LL	50	3050-SE-LL	50

① Input AC reactors

Inverter		AC Reactor
Voltage	Model 3G3MX2-□	Reference
1-Phase 200 VAC	AB002 / AB004	AX-RAI02000070-DE
	AB007	AX-RAI01700140-DE
	AB015	AX-RAI01200200-DE
	AB022	AX-RAI00630240-DE
3-Phase 200 VAC	A2002 / A2004 / A2007	AX-RAI02800080-DE
	A2015 / A2022 / A2037	AX-RAI00880200-DE
	A2055 / A2075	AX-RAI00350335-DE
	A2110 / A2150	AX-RAI00180670-DE
3-Phase 400 VAC	A4004 / A4007 / A4015	AX-RAI07700050-DE
	A4022 / A4030 / A4040	AX-RAI03500100-DE
	A4055 / A4075	AX-RAI01300170-DE
	A4110 / A4150	AX-RAI00740335-DE

① DC reactors

200V 1-phase		200V 3-phase		400V 3-phase	
Inverter	DC Reactor	Inverter	DC Reactor	Inverter	DC Reactor
3G3MX2-AB001	AX-RC10700032-DE	3G3MX2-A2001	AX-RC21400016-DE	3G3MX2-A4004	AX-RC43000020-DE
3G3MX2-AB002		3G3MX2-A2002		3G3MX2-A4007	AX-RC27000030-DE
3G3MX2-AB004	AX-RC06750061-DE	3G3MX2-A2004	AX-RC10700032-DE	3G3MX2-A4015	AX-RC14000047-DE
3G3MX2-AB007	AX-RC03510093-DE	3G3MX2-A2007	AX-RC06750061-DE	3G3MX2-A4022	AX-RC10100069-DE
3G3MX2-AB015	AX-RC02510138-DE	3G3MX2-A2015	AX-RC03510093-DE	3G3MX2-A4030	AX-RC08250093-DE
3G3MX2-AB022	AX-RC01600223-DE	3G3MX2-A2022	AX-RC02510138-DE	3G3MX2-A4040	AX-RC06400116-DE
–		3G3MX2-A2037	AX-RC01600223-DE	3G3MX2-A4055	AX-RC04410167-DE
		3G3MX2-A2055	AX-RC01110309-DE	3G3MX2-A4075	AX-RC03350219-DE
		3G3MX2-A2075	AX-RC00840437-DE	3G3MX2-A4110	AX-RC02330307-DE
		3G3MX2-A2110	AX-RC00590614-DE	3G3MX2-A4150	AX-RC01750430-DE
		3G3MX2-A2150	AX-RC00440859-DE	–	

① Chokes

Model	Diameter	Description
AX-FER2102-RE	21	For 2.2 KW motors or below
AX-FER2515-RE	25	For 15 KW motors or below
AX-FER5045-RE	50	For 45 KW motors or below

① Output AC reactor

Inverter		AC Reactor
Voltage	Model 3G3MX2-□	Reference
200 VAC	AB001 / AB002 / AB004 A2001 / A2002 / A2004	AX-RAO11500026-DE
	AB007 / A2007	AX-RAO07600042-DE
	AB015 / A2015	AX-RAO04100075-DE
	AB022 / A2022	AX-RAO03000105-DE
	A2037	AX-RAO01830160-DE
	A2055	AX-RAO01150220-DE
	A2075	AX-RAO00950320-DE
	A2110	AX-RAO00630430-DE
	A2150	AX-RAO00490640-DE
400 VAC	A4004 / A4007 / A4015	AX-RAO16300038-DE
	A4022	AX-RAO11800053-DE
	A4030 / A4040	AX-RAO07300080-DE
	A4055	AX-RAO04600110-DE
	A4075	AX-RAO03600160-DE
	A4110	AX-RAO02500220-DE
	A4150	AX-RAO02000320-DE

② Accessories

Types	Model	Description	Functions
Digital operator	AX-OP05-E	LCD remote operator	5 Line LCD remote operator with copy function, cable length max. 3m.
	3G3AX-CAJOP300-EE	Remote operator cable	3 meters cable for connecting remote operator
	3G3AX-OP01	LED remote operator	LED remote operator, cable length max. 3m
	4X-KITMINI	Mounting kit for LED operator	Mounting kit for LED operator on panel
	3G3AX-OP05-H-E	Operator holder	Holder to put the AX-OP05-E inside of the cabinet
Accessories	AX-CUSBM002-E	PC configuration cable	Mini USB to USB connector cable

③ Communication option boards

Model	Description	Functions
3G3AX-MX2-ECT	EtherCAT option card	Used for running or stopping the inverter, setting or referencing parameters, and monitoring output frequency, output current, or similar items through communications with the host controller.

④ Braking unit, braking resistor unit

Inverter					Braking resistor unit					
Voltage	Max. motor kW	Inverter 3G3MX2□		Connectable min. resistance Ω	Inverter mounted type (3% ED, 10 sec max)		Braking torque %	Inverter mounted type (10% ED, 10 sec max)		Braking torque %
		1-phase	3-phase		Type AX-	Resist Ω		Type AX-	Resist Ω	
200 V (Single-/ Three-phase)	0.12	B001	2001	100	REM00K1400-IE	400	200	REM00K1400-IE	400	200
	0.25	B002	2002				180			180
	0.55	B004	2004		REM00K1200-IE	200	180	REM00K1200-IE	200	180
	1.1	B007	2007	50			100	REM00K2070-IE	70	200
	1.5	B015	2015		REM00K2070-IE	70	140	REM00K4075-IE	75	130
	2.2	B022	2022	35			90	REM00K4035-IE	35	180
	4.0	–	2040		REM00K4075-IE	75	50	REM00K6035-IE	35	100
	5.5	–	2055	20	REM00K4035-IE	35	75	REM00K9020-IE	20	150
	7.5	–	2075	17			55	REM01K9017-IE	17	110
	11	–	2110		REM00K6035-IE	35	40	REM02K1017-IE	17	75
	15	–	2150	10	REM00K9017-IE	17	55	REM03K5010-IE	10	95
400 V (Three-phase)	0.55	–	4004	180	REM00K1400-IE	400	200	REM00K1400-IE	400	200
	1.1	–	4007				200			200
	1.5	–	4015		REM00K1200-IE	200	190	REM00K2200-IE	200	190
	2.2	–	4022	100	REM00K2200-IE	200	130	REM00K5120-IE	120	200
	3.0	–	4030		REM00K2120-IE	120	160			160
	4.0	–	4040				120	REM00K6100-IE	100	140
	5.5	–	4055	70	REM00K4075-IE	75	140	REM00K9070-IE	70	150
	7.5	–	4075				100	REM01K9070-IE	70	110
	11	–	4110		REM00K6100-IE	100	50	REM02K1070-IE	70	75
	15	–	4150	35	REM00K9070-IE	70	55	REM03K5035-IE	35	110

⑤ Computer software

Types	Model	Description	Specification
Software	CX-Drive	Computer software	Configuration and monitoring software tool
	CX-One	Computer software	Configuration and monitoring software tool
	€Saver	Computer software	Software tool for Energy Saving calculation

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I113E-EN-05A In the interest of product improvement, specifications are subject to change without notice.

FH series

Vision system

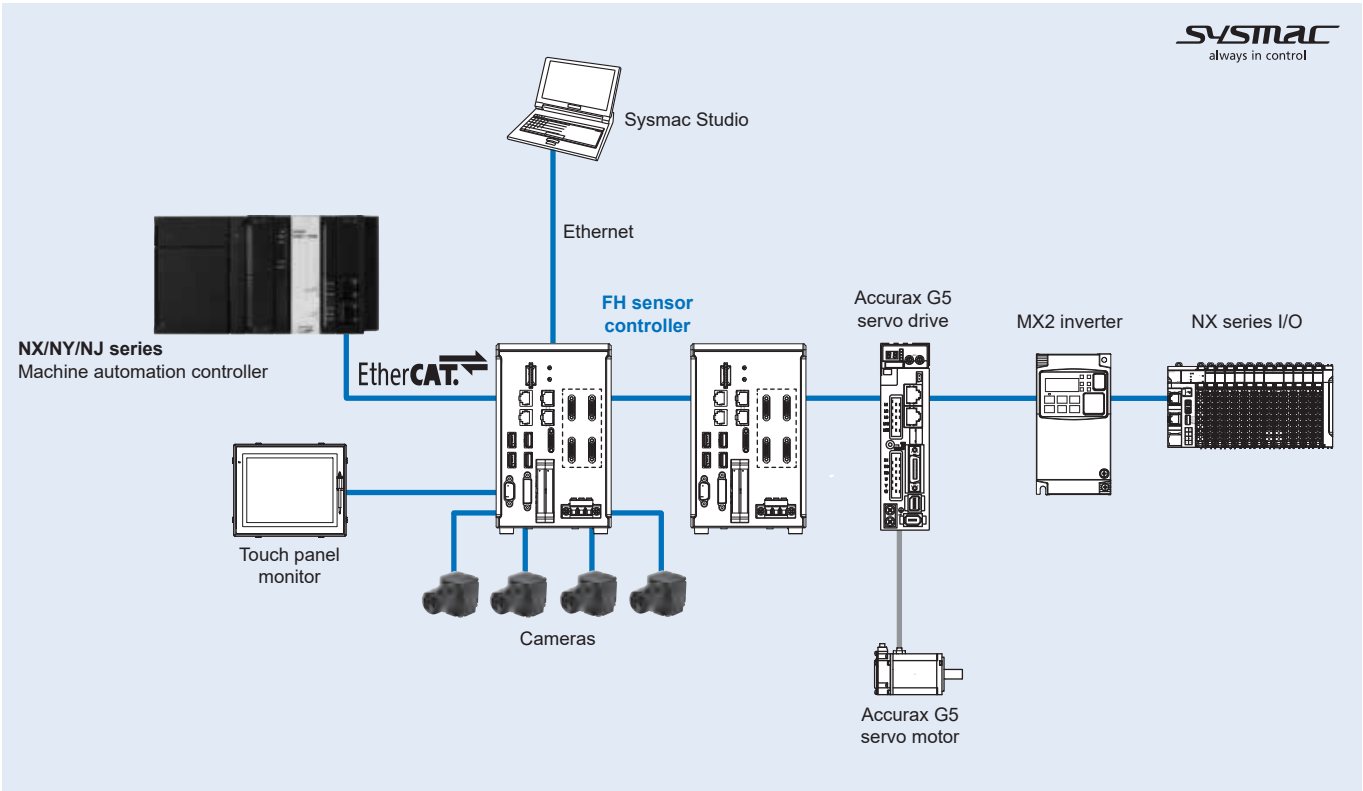


Flexible solution for machine vision

The FH vision systems are specifically intended for seamless integration with PLC's, motion controllers and robotic control systems increasing the overall machine performance.

- Powerful 4-core i7 parallel processor
- Fast EtherCAT communications
- The new Shape Search III processing item enables fast, precise and stable measurements
- 26 types of camera with up to 12 Mpixel
- Over 100 processing items including 1D code, 2D code and OCR
- Easy integration into an machine monitor with .NET user interface controls

System configuration



Specifications

FH sensor controller specifications

Type				High-speed controllers (4 core)			Standard controllers (2 core)		
Model			NPN / PNP	FH-3050	FH-3050-10	FH-3050-20	FH-1050	FH-1050-10	FH-1050-20
Controller type				Box-type controllers					
Parallel I/O				NPN/PNP (common)					
Main functions	Operation mode	Standard		Yes					
		Double speed multi-input		Yes					
		Non-stop adjustment mode		Yes					
		Multi-line random-trigger mode		Yes (maximum 8 lines)					
	Parallel processing			Yes					
	No. of cameras			2	4	8*1	2	4	8*1
	Camera I/F			OMRON I/F					
	Processing resolution	Connected to a 300,000-pixel camera		640 (H) x 480 (V)					
		Connected to a 2 million-pixel camera		2040 (H) x 1088 (V)					
		Connected to a 4 million-pixel camera		2040 (H) x 2048 (V)					
		Connected to a 5 million-pixel camera		2448 (H) x 2044 (V)					
		Connected to a 12 million-pixel camera		4084 (H) x 3072 (V)					
	Number of logged images*2	Connected to a intelligent compact camera*3		Connected to 1 camera (color): 232, Connected to 2 camera (color): 116 Connected to 3 camera (color): 77, Connected to 4 camera (color): 58 Connected to 5 camera (color): 46, Connected to 6 camera (color): 38 Connected to 7 camera (color): 33, Connected to 8 camera (color): 29					
		Connected to a 300,000-pixel camera		Connected to 1 camera (color): 270, Connected to 1 camera (monochrome): 272 Connected to 2 camera (color): 135, Connected to 2 camera (monochrome): 136 Connected to 3 camera (color/monochrome): 90 Connected to 4 camera (color): 67, Connected to 4 camera (monochrome): 68 Connected to 5 camera (color/monochrome): 54 Connected to 6 camera (color/monochrome): 45 Connected to 7 camera (color/monochrome): 38 Connected to 8 camera (color): 33, Connected to 8 camera (monochrome): 34					
		Connected to a 2 million-pixel CMOS camera		Connected to 1 camera (color/monochrome): 37, Connected to 2 camera (color/monochrome): 18 Connected to 3 camera (color/monochrome): 12, Connected to 4 camera (color/monochrome): 9 Connected to 5 camera (color/monochrome): 7, Connected to 6 camera (color/monochrome): 6 Connected to 7 camera (color/monochrome): 5, Connected to 8 camera (color/monochrome): 4					
		Connected to a 2 million-pixel CCD camera		Connected to 1 camera (color/monochrome): 43, Connected to 2 camera (color/monochrome): 21 Connected to 3 camera (color/monochrome): 14, Connected to 4 camera (color/monochrome): 10 Connected to 5 camera (color/monochrome): 8, Connected to 6 camera (color/monochrome): 7 Connected to 7 camera (color/monochrome): 6, Connected to 8 camera (color/monochrome): 5					
		Connected to a 4 million-pixel camera		Connected to 1 camera (color/monochrome): 20, Connected to 2 camera (color/monochrome): 10 Connected to 3 camera (color/monochrome): 6, Connected to 4 camera (color/monochrome): 5 Connected to 5 camera (color/monochrome): 4, Connected to 6 camera (color/monochrome): 3 Connected to 7 camera (color/monochrome): 2, Connected to 8 camera (color/monochrome): 2					
		Connected to a 5 million-pixel camera		Connected to 1 camera (color/monochrome): 16, Connected to 2 camera (color/monochrome): 8 Connected to 3 camera (color/monochrome): 5, Connected to 4 camera (color/monochrome): 4 Connected to 5 camera (color/monochrome): 3, Connected to 6 camera (color/monochrome): 2 Connected to 7 camera (color/monochrome): 2, Connected to 8 camera (color/monochrome): 2					
		Connected to a 12 million-pixel camera		Connected to 1 camera (color/monochrome): 6, Connected to 2 camera (color/monochrome): 3 Connected to 3 camera (color/monochrome): 2, Connected to 4 camera (color/monochrome): 2					
	Max. number of loading images during multi-input*4	Connected to a intelligent compact camera		256					
		Connected to a 300,000-pixel camera		256					
		Connected to a 2 million-pixel CMOS camera		51					
		Connected to a 2 million-pixel CCD camera		64					
		Connected to a 4 million-pixel camera		32					
		Connected to a 5 million-pixel camera		25					
		Connected to a 12 million-pixel camera		10					
	No. of scenes			128					
	Operation	USB mouse		Yes (wired USB and driver is unnecessary type)					
		Touch panel		Yes (RS-232C/USB connection: FH-MT12)					
	Setup			Create the processing flow using Flow editing					
	Languages			Japanese, English, Simplified Chinese, Traditional Chinese, Korean, German, French, Italian, Spanish					
External interface	Serial communications			RS-232C x 1					
	Ethernet communications		Protocol	Non-procedure (TCP/UDP) 1000BASE-T					
			No. of port	1 port	2 port		1 port	2 port	
	EtherNet/IP communications			Ethernet port (transmission rate: 1 Gbps)					
	EtherCAT communications			Yes (slave)					

Type				High-speed controllers (4 core)			Standard controllers (2 core)		
Model			NPN / PNP	FH-3050	FH-3050-10	FH-3050-20	FH-1050	FH-1050-10	FH-1050-20
External interface	Parallel I/O			12 inputs/31 outputs • Use 1 Line • Operation mode: Except Multi-line random-trigger mode					
				17 inputs/37 outputs • Use 2 Lines • Operation mode: Multi-line random-trigger mode					
				14 inputs/29 outputs • Use 3 to 4 Lines • Operation mode: Multi-line random-trigger mode					
				19 inputs/34 outputs • Use 5 to 8 Lines • Operation mode: Multi-line random-trigger mode					
	Encoder interface			Input voltage: 5 V ±5% Signal: RS-422A LineDriver Level Phase A/B/Z: 1 MHz					
	Monitor interface			DVI-I output (analog RGB & DVI-D single link) x 1					
	USB I/F			USB2.0 host x 4 (BUS power: Port 5 V/0.5 A)					
	SD card I/F			SDHC x 1					
Indicator lamps	Main			POWER: Green ERROR: Red RUN: Green ACCESS: Yellow					
	Ethernet			NET RUN: Green NET LINK ACT: Yellow	NET RUN1: Green NET LINK ACK1: Yellow NET RUN2: Green NET LINK ACK2: Yellow		NET RUN: Green NET LINK ACT: Yellow	NET RUN1: Green NET LINK ACK1: Yellow NET RUN2: Green NET LINK ACK2: Yellow	
	SD card			SD POWER: Green SD BUSY: Yellow					
	EtherCAT			EtherCAT RUN LED: Green EtherCAT ERR LED: Red EtherCAT LINK/ACT IN LED: Green EtherCAT LINK/ACT OUT LED: Green					
Ratings	Power supply voltage			20.4 to 26.4 VDC					
	Current consumption	When connected to a controller	2 cameras	5.0 A max.	5.4 A max.	6.4 A max.	4.7 A max.	5.0 A max.	5.9 A max.
			4 cameras	-	7.0 A max.	8.1 A max.	-	6.5 A max.	7.5 A max.
			8 cameras	-	-	11.5 A max.	-	-	10.9 A max.
		When not connected to a controller	2 cameras	4.1 A max.	4.2 A max.	5.2 A max.	3.6 A max.	3.7 A max.	4.5 A max.
			4 cameras	-	4.8 A max.	5.6 A max.	-	4.3 A max.	5.0 A max.
			8 cameras	-	-	6.8 A max.	-	-	6.2 A max.
Built-in fan				Yes					
Operation environment	Noise immunity	Fast transient burst	DC power supply	Direct infusion: 2 KV, Pulse rising: 5 ns, Pulse width: 50 ns Burst continuation time: 15 ms/0.75 ms, Period: 300 ms, Application time: 1 min					
			I/O line	Direct infusion: 1 KV, Pulse rising: 5 ns, Pulse width: 50 ns Burst continuation time: 15 ms/0.75 ms, Period: 300 ms, Application time: 1 min					
	Ambient temperature range			Operating: 0 to 50ºC Storage: -20 to 65ºC (with no icing or condensation)					
	Ambient humidity range			Operating and storage: 35% to 85% (with no condensation)					
	Ambient atmosphere			No corrosive gases					
	Vibration tolerance			Oscillation frequency: 10 to 150 Hz Half amplitude: 0.1 mm Acceleration: 15 m/s^2 Sweep time: 8 minute/count Sweep count: 10 Vibration direction: up and down/front and behind/left and right					
	Shock resistance			Impact force: 150 m/s^2 Test direction: up and down/front and behind/left and right					
	Grounding			Type D grounding (100 Ω or less grounding resistance) Conventional type 3 grounding					
	Degree of protection			IEC60529 IP20					
Structure	Dimensions			190 x 115 x 182.5 mm					
	Weight			Approx. 3.2 kg	Approx. 3.4 kg		Approx. 3.2 kg	Approx. 3.4 kg	
	Case materials			Cover: zinc-plated steel plate, side plate: aluminium (A6063)					
Accessories				Instruction manual (Japanese and English) / Instruction installation manual for FH series / General compliance information and instructions for EU / Power source (FH-XCN) (male) / Ferrite core for camera cable (2 for FH-3050 and FH-1050), (4 for FH-3050-10 and FH-1050-10), (8 for FH-3050-20 and FH-1050-20)					

*1. Can be connected to up to four 12 million-pixel cameras or up to eight cameras other than 12 million-pixels cameras.
*2. Maximum number of saveable logging images differ depending on scene settings. Please, refer to the FH/FZ5 Vision System Users Manual (Cat. No. Z340) for more detailed information.
*3. The multi-input function cannot be used when the built-in lighting of an intelligent compact camera is used.
*4. When using two camera cables for connection, the maximum number of loaded images during multi-input is twice the number given in the table.

Camera specifications

High-speed CMOS camera

Model	FH-SM	FH-SC	FH-SM02	FH-SC02	FH-SM04	FH-SC04	FH-SM12	FH-SC12
Image elements	1/3-inch CMOS image elements		2/3-inch CMOS image elements		1-inch CMOS image elements		1.76-inch CMOS image elements	
Color/Monochrome	Monochrome	Color	Monochrome	Color	Monochrome	Color	Monochrome	Color
Effective pixels	640 (H) x 480 (V)		2040 (H) x 1088 (V)		2040 (H) x 2048 (V)		4084 (H) x 3072 (V)	
Imaging area H x V (opposing corner)	4.8 x 3.6 (6.0 mm)		11.26 x 5.98 (12.76 mm)		11.26 x 11.26 (15.93 mm)		22.5 x 16.9 (28.14 mm)	
Pixel size	7.4 (μm) x 7.4 (μm)		5.5 (μm) x 5.5 (μm)					
Electronic shutter function	Shutter speeds can be set from 20 μs to 100 ms		Shutter speeds can be set from 25 μs to 100 ms				Shutter speeds can be set from 60 μs to 100 ms	
Partial function	1 to 480 lines	2 to 480 lines	1 to 1088 lines	2 to 1088 lines	1 to 2048 lines	2 to 2048 lines	4 to 3072 lines (4-line increments)	
Frame rate (image read time)	308 fps (3.3 ms)		219 fps (4.6 ms)*1		118 fps (8.5 ms)*1		38.9 fps (25.7 ms)*1	
Lens mounting	C mount						M42 mount	
Field of vision, installation distance	Selecting a lens according to the field of vision and installation distance							
Ambient temperature range	Operating: 0 to 40ºC Storage: -25 to 65ºC (with no icing or condensation)							
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)							
Weight	Approx. 105 g		Approx. 110 g				Approx. 320 g	
Accessories	Instruction manual							

*1. Frame rate in high speed mode when the camera is connected using two camera cables.

Digital CMOS camera

Model	FH-SM05R	FH-SC05R
Image elements	1/2.5-inch CMOS image elements	
Color/Monochrome	Monochrome	Color
Effective pixels	2592 (H) x 1944 (V)	
Imaging area H x V (opposing corner)	5.7 x 4.28 (7.13 mm)	
Pixel size	2.2 (μm) x 2.2 (μm)	
Scan type	Progressive	
Shutter method	Rolling shutter	
Electronic shutter function	Shutter speeds can be set from 500 ms to 10000 ms in multiples of 50 μs	
Frame rate (image read time)	14 fps (71.7 ms)	
Lens mounting	C mount	
Field of vision, installation distance	Selecting a lens according to the field of vision and installation distance	
Ambient temperature range	Operating: 0 to 40ºC Storage: -30 to 65ºC (with no icing or condensation)	
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)	
Weight	Approx. 52 g	
Accessories	Instruction manual	

Digital CCD camera

Model	FZ-S	FZ-SC	FZ-S2M	FZ-SC2M	FZ-S5M2	FZ-SC5M2
Image elements	Interline transfer reading all pixels 1/3-inch CCD image elements		Interline transfer reading all pixels 1/1.8-inch CCD image elements		Interline transfer reading all pixels 2/3-inch CCD image elements	
Color/Monochrome	Monochrome	Color	Monochrome	Color	Monochrome	Color
Effective pixels	640 (H) x 480 (V)		1600 (H) x 1200 (V)		2448 (H) x 2044 (V)	
Imaging area H x V (opposing corner)	4.8 x 3.6 (6.0 mm)		7.1 x 5.4 (8.9 mm)		8.4 x 7.1 (11 mm)	
Pixel size	7.4 (μm) x 7.4 (μm)		4.4 (μm) x 4.4 (μm)		3.45 (μm) x 3.45 (μm)	
Electronic shutter function	Select shutter speeds from 20 μs to 100 ms					
Partial function	12 to 480 lines		12 to 1200 lines		12 to 2044 lines	
Frame rate (image read time)	80 fps (12.5 ms)		30 fps (33.3 ms)		16 fps (62.5 ms)	
Lens mounting	C mount					
Field of vision, installation distance	Selecting a lens according to the field of vision and installation distance					
Ambient temperature range	Operating: 0 to 50ºC Storage: -25 to 65ºC (with no icing or condensation)		Operating: 0 to 40ºC Storage: -25 to 65ºC (with no icing or condensation)			
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)					
Weight	Approx. 55 g		Approx. 76 g		Approx. 140 g	
Accessories	Instruction manual					

Small digital CCD camera

Model	FZ-SF	FZ-SFC	FZ-SP	FZ-SPC
Image elements	Interline transfer reading all pixels, 1/3-inch CCD image elements			
Color/Monochrome	Monochrome	Color	Monochrome	Color
Effective pixels	640 (H) x 480 (V)			
Imaging area H x V (opposing corner)	4.8 x 3.6 (6.0 mm)			
Pixel size	7.4 (μm) x 7.4 (μm)			
Electronic shutter function	Select shutter speeds from 20 μs to 100 ms			
Partial function	12 to 480 lines			
Frame rate (image read time)	80 fps (12.5 ms)			
Lens mounting	Special mount (M10.5 P0.5)			
Field of vision, installation distance	Selecting a lens according to the field of vision and installation distance			
Ambient temperature range	Operating: 0 to 50ºC (camera amp), 0 to 45ºC (camera head) Storage: -25 to 65ºC (with no icing or condensation)			
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)			
Weight	Approx. 150 g			
Accessories	Instruction manual, installation bracket, four mounting brackets (M2)		Instruction manual	

High-speed CCD camera

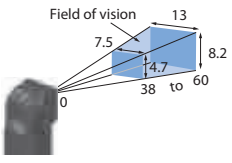
Model	FZ-SH	FZ-SHC
Image elements	Interline transfer reading all pixels, 1/3-inch CCD image elements	
Color/Monochrome	Monochrome	Color
Effective pixels	640 (H) x 480 (V)	
Imaging area H x V (opposing corner)	4.8 x 3.6 (6.0 mm)	
Pixel size	7.4 (μm) x 7.4 (μm)	
Electronic shutter function	Select shutter speeds from 1/10 to 1/50,000 s	
Partial function	12 to 480 lines	
Frame rate (image read time)	204 fps (4.9 ms)	
Field of vision, installation distance	Selecting a lens according to the field of vision and installation distance	
Ambient temperature range	Operating: 0 to 40ºC Storage: -25 to 65ºC (with no icing or condensation)	
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)	
Weight	Approx. 105 g	
Accessories	Instruction manual	

Intelligent compact CMOS camera

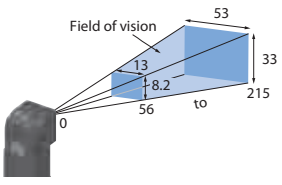
Model	FZ-SQ010F	FZ-SQ050F	FZ-SQ100F	FZ-SQ100N
Image elements	1/3-inch CMOS image elements			
Color/Monochrome	Color			
Effective pixels	752 (H) x 480 (V)			
Imaging area H x V (opposing corner)	4.51 x 2.88 (5.35 mm)			
Pixel size	6.0 (μm) x 6.0 (μm)			
Shutter function	1/250 to 1/32,258			
Partial function	8 to 480 lines			
Frame rate (image read time)	60 fps (16.7 ms)			
Field of vision	7.5 x 4.7 to 13 x 8.2 mm	13 x 8.2 to 53 x 33 mm	53 x 33 to 240 x 153 mm	29 x 18 to 300 x 191 mm
Installation distance	38 to 60 mm	56 to 215 mm	220 to 970 mm	32 to 380 mm
LED class*1	Risk Group 2			
Ambient temperature range	Operating: 0 to 50ºC Storage: -25 to 65ºC			
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)			
Weight	Approx. 150 g		Approx. 140 g	
Accessories	Instruction manual, mounting bracket (FQ-XL), polarizing filter attachment (FQ-XF1) and warning label			

*1. Applicable standards: IEC62471-2.

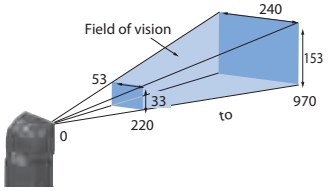
- **Narrow View**
  FZ-SQ010F



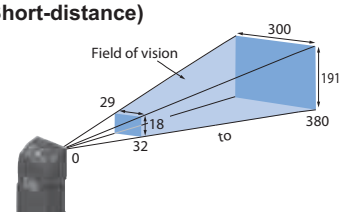
- **Standard**
  FZ-SQ050F



- **Wide View (Long-distance)**
  FZ-SQ100F



- **Wide View (Short-distance)**
  FZ-SQ100N



Touch panel monitor specifications

Model		FH-MT12
Major function	Display area	12.1 inches
	Resolution	1,024 (V) x 768 (H)
	Number of colors	16,700,000 colors (8 bit/color)
	Brightness	500cd/m^2 (Typ)
	Contrast ratio	600:1 (Typ)
	Viewing angle	Left and right: each 80º, upward: 80º, downward: 60º
	Backlight unit	LED, edge-light
	Backlight lifetime	About 100,000 hours
	Touch panel	4-wire resistive touch screen
External interface	Video input	Analog RGB
	Touch panel signal	USB, RS-232C
Ratings	Power supply voltage	24 VDC (21.6 to 26.4 VDC)
	Current consumption	0.5 A
	Insulation resistance	Between DC power supply and touch panel monitor FG: 20 MΩ or higher (rated voltage 250 V)
Operating environment	Ambient temperature range	Operating: 0 to 50ºC, Storage: -20 to 65ºC (with no icing or condensation)
	Ambient humidity range	Operating and storage: 20 to 85% RH (with no icing or condensation)
	Ambient environment	No corrosive gas
	Vibration resistance	10 to 150 Hz, one-side amplitude 0.1 mm (max. acceleration 15 m/s^2) 10 times for 8 minutes for each three directions
	Degree of protection	Panel mounting: IP65 on the front
Operation		Touch pen
Structure	Mounting	Panel mounting, VESA mounting
	Weight	Approx. 2.6 kg
	Material	Front panel: PC/PBT, Front sheet: PET, Rear case: SUS

Note: The Touch panel monitor is supported only by the FH sensor controller version 5.32 or higher.

LCD monitor specifications

Model	FZ-M08
Size	8.4 inches
Type	Liquid crystal color TFT
Resolution	1,024 x 768 dots
Input signal	Analog RGB video input, 1 channel
Power supply voltage	21.6 to 26.4 VDC
Current consumption	Approx. 0.7 A max.
Ambient temperature range	Operating: 0 to 50ºC Storage: -25 to 65ºC (with no icing or condensation)
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)
Weight	Approx. 1.2 kg
Accessories	Instruction sheet and 4 mounting brackets

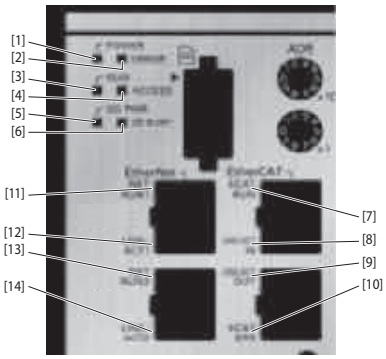
EtherCAT communication specifications

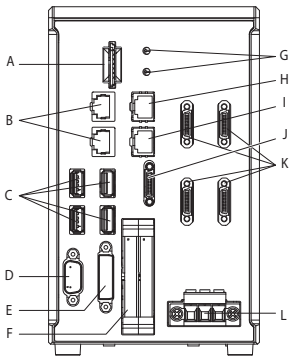
Item		Specifications
Communications standard		IEC61158 Type 12
Physical layer		100 BASE-TX (IEEE802.3)
Modulation		Base band
Baud rate		100 Mbps
Topology		Depends on the specifications of the EtherCAT master
Transmission media		Twisted-pair cable of category 5 or higher (double-shielded straight cable with aluminum type and braiding)
Transmission distance		Distance between nodes: 100 m or less
Node address setting		00 to 9
External connection terminals		RJ45 x 2 (shielded), IN: EtherCAT input data, OUT: EtherCAT output data
Send/receive PDO data sizes	Input	56 to 280 bytes/line (including input data, status and unused areas). Up to 8 lines can be set*1
	Output	28 bytes/line (including output data and unused areas). Up to 8 lines can be set*1
Mailbox data size	Input	512 bytes
	Output	512 bytes
Mailbox		Emergency messages, SDO requests and SDO information
Refreshing methods		I/O-synchronized refreshing (DC)

*1. This depends on the upper limit of the master.

Nomenclature

FH sensor controller (4 camera type)





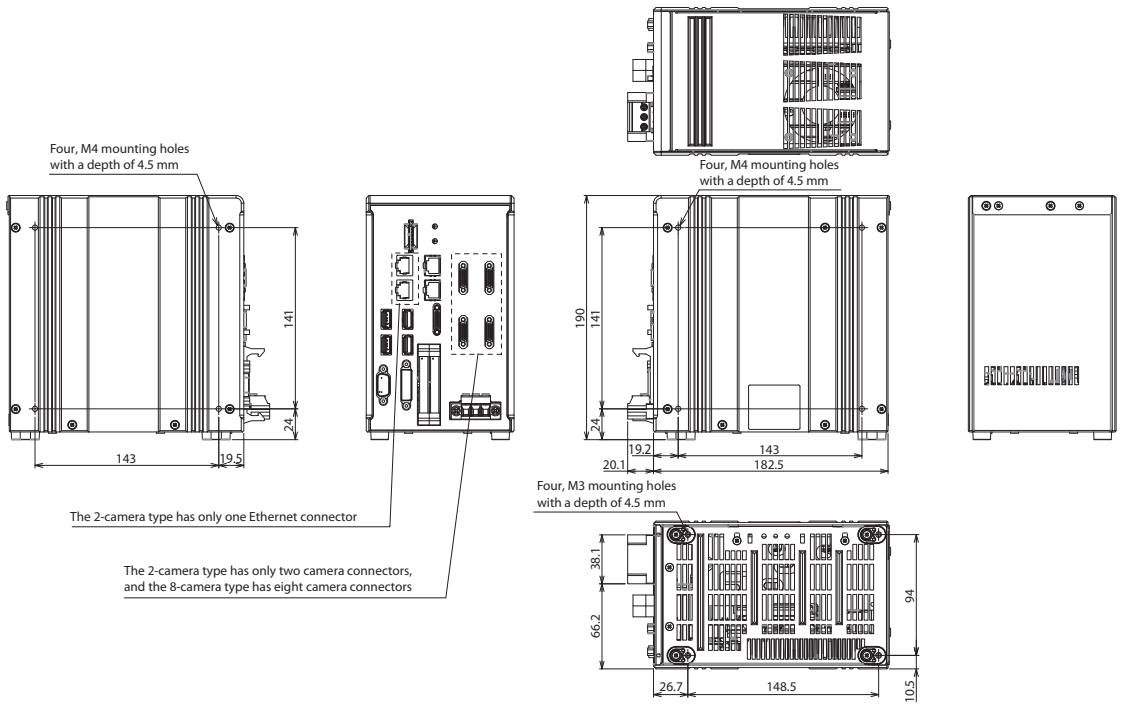
Symbol	Signal name	Description
1	POWER LED	Lit while power is ON
2	ERROR LED	Lit when an error has occurred
3	RUN LED	Lit while the layout turned on output setting is displayed
4	ACCESS LED	Blinks while the internal nonvolatile memory is accessed
5	SD POWER LED	Blinks while power is supplied to the SD memory card and the card is usable
6	SD BUSY LED	Blinks while the SD memory card is accessed
7	EtherCAT RUN LED	Lit while EtherCAT communications are usable
8	EtherCAT LINK/ACT IN LED	Lit when connected with an EtherCAT device, and blinks while performing communications
9	EtherCAT LINK/ACT OUT LED	Lit when connected with an EtherCAT device, and blinks while performing communications
10	EtherCAT ERR LED	Lit when EtherCAT communications have become abnormal
11	EtherNet NET RUN1 LED	Lit while EtherNet communications are usable
12	EtherNet NET LINK/ACK1 LED	Lit when connected with an EtherNet device, and blinks while performing communications
13	EtherNet NET RUN2 LED	Lit when EtherNet communications are usable
14	EtherNet NET LINK/ACK2 LED	Lit when connected with an EtherNet device, and blinks while performing communications

Symbol	Signal name	Description
A	SD memory card installation connector	Install the SD memory card. Do not plug or unplug the SD memory card during measurement operation. Otherwise measurement time may be affected or data may be destroyed
B	EtherNet connector	Connect an EtherNet device
C	USB connector	Connect a USB device. Do not plug or unplug it card during measurement operation Otherwise measurement time may be affected or data may be destroyed
D	RS-232C connector	Connect an external device such as a programmable controller
E	DVI-I connector	Connect a monitor
F	I/O connector (control lines, data lines)	Connect the controller to external devices such as a sync sensor and PLC
G	EtherCAT address setup volume	Used to set a node address (00 to 99) as an EtherCAT communication device
H	EtherCAT communication connector (IN)	Connect the opposed EtherCAT device
I	EtherCAT communication connector (OUT)	Connect the opposed EtherCAT device
J	Encoder connector	Connect an encoder
K	Camera connector	Connect cameras
L	Power supply terminal connector	Connect a DC power supply. Wire*1 the controller independently on other devices. Wire the ground line. Be sure to ground the controller alone

*1. Use the attachment power terminal connector (male) of FH-XCN series.

Dimensions

FH sensor controller

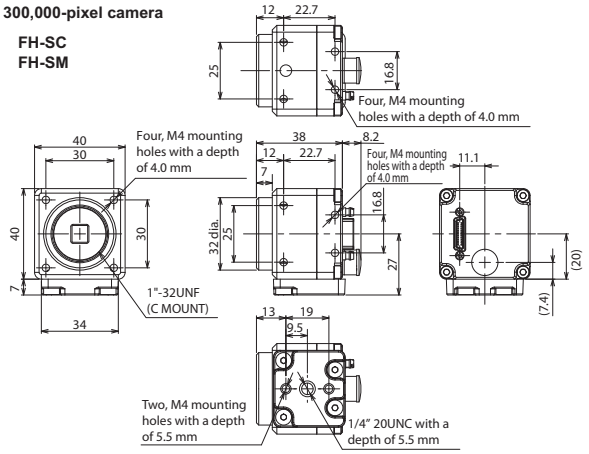


Camera

High-speed CMOS camera

300,000-pixel camera

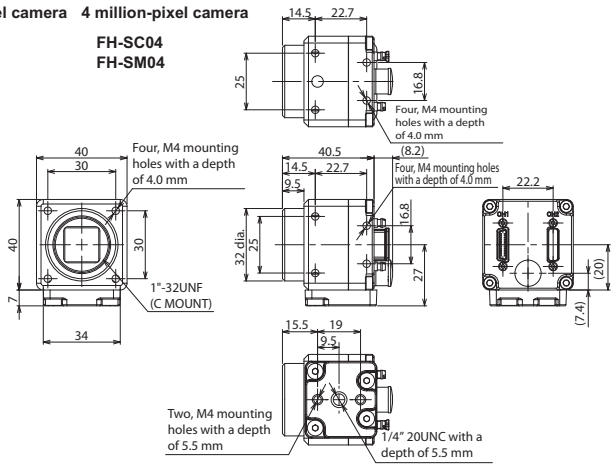
FH-SC
FH-SM



2 million-pixel camera **4 million-pixel camera**

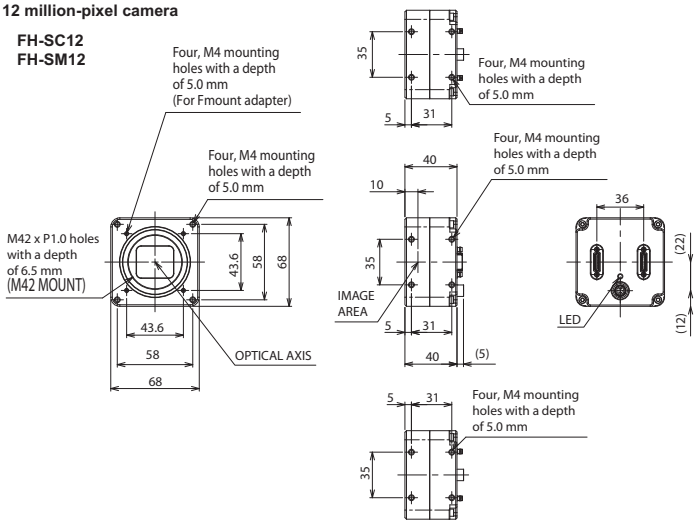
FH-SC02
FH-SM02

FH-SC04
FH-SM04



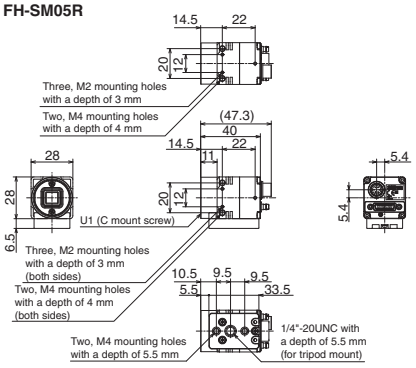
12 million-pixel camera

FH-SC12
FH-SM12



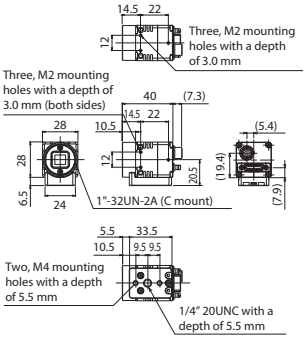
Digital CMOS camera

5 million-pixel camera
FH-SC05R
FH-SM05R

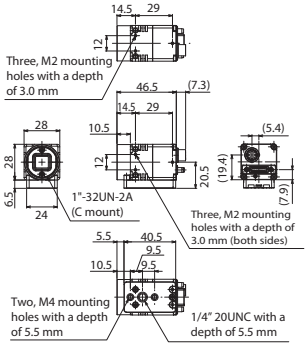


Digital CCD camera

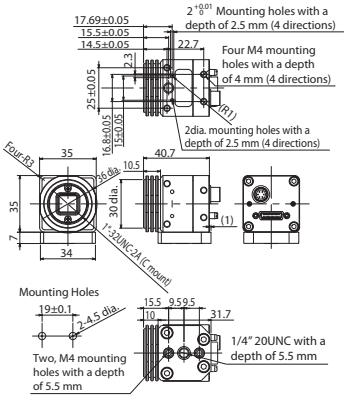
300,000-pixel camera
FZ-SC
FZ-S



2 million-pixel camera
FZ-SC2M
FZ-S2M



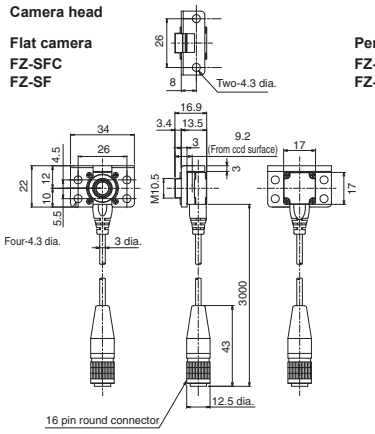
5 million-pixel camera
FZ-SC5M2
FZ-S5M2



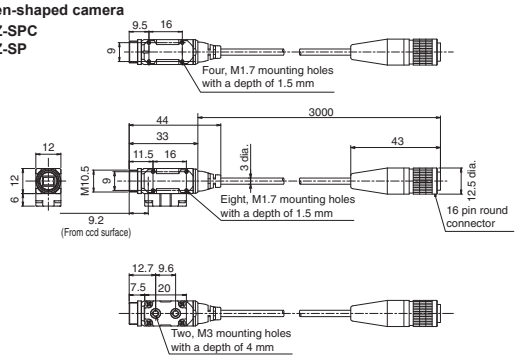
Small digital CCD camera

Camera head

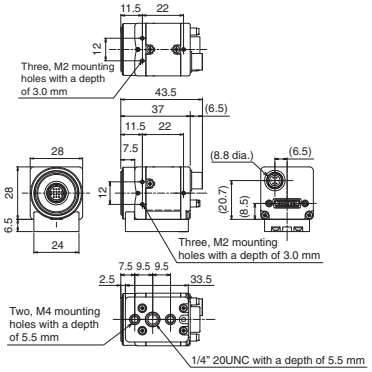
Flat camera
FZ-SFC
FZ-SF



Pen-shaped camera
FZ-SPC
FZ-SP

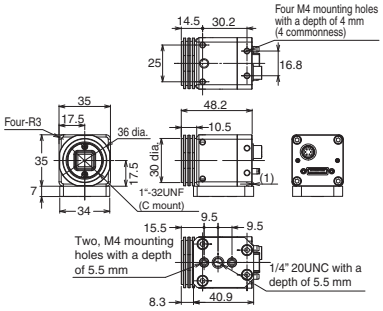


Camera amplifier
Can be used for both flat cameras and pen-shaped cameras



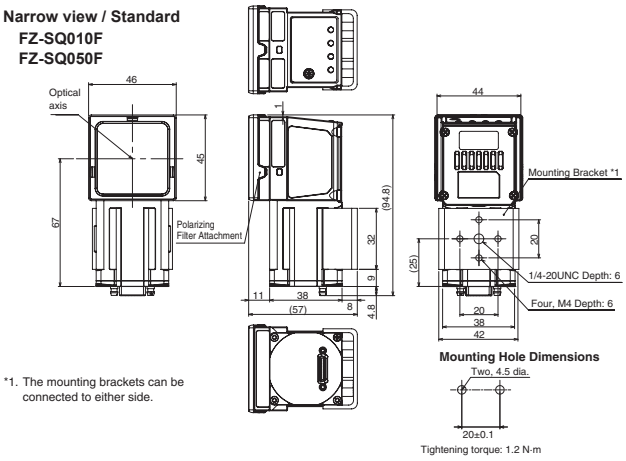
High-speed CCD camera

FZ-SHC
FZ-SH



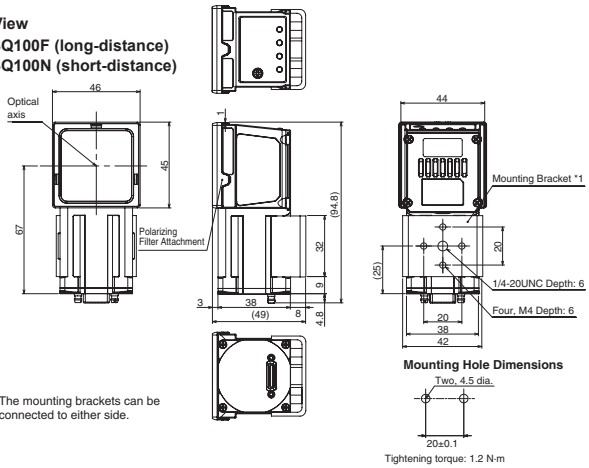
Intelligent compact CMOS camera

Narrow view / Standard
FZ-SQ010F
FZ-SQ050F



*1. The mounting brackets can be connected to either side.

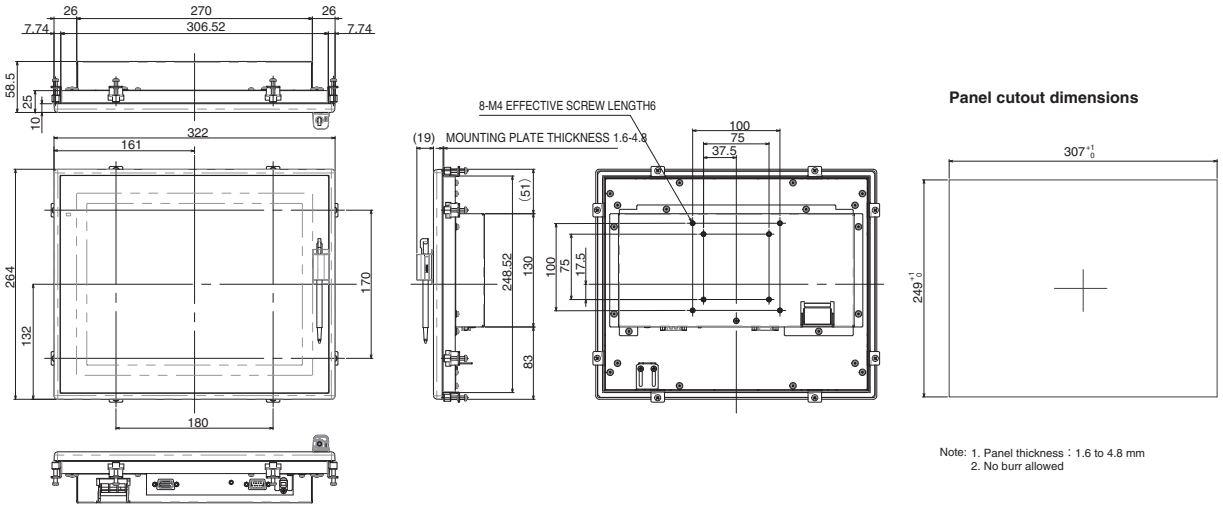
Wide View
FZ-SQ100F (long-distance)
FZ-SQ100N (short-distance)



*1. The mounting brackets can be connected to either side.

Touch panel monitor

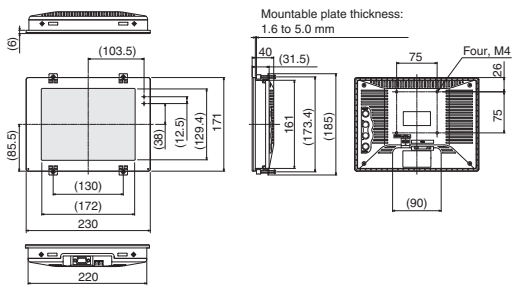
FH-MT12



Note: 1. Panel thickness：1.6 to 4.8 mm
2. No burr allowed

LCD monitor

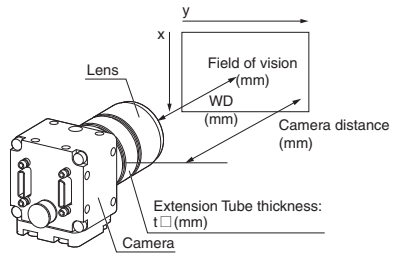
FZ-M08



Optical chart

Meaning of optical chart

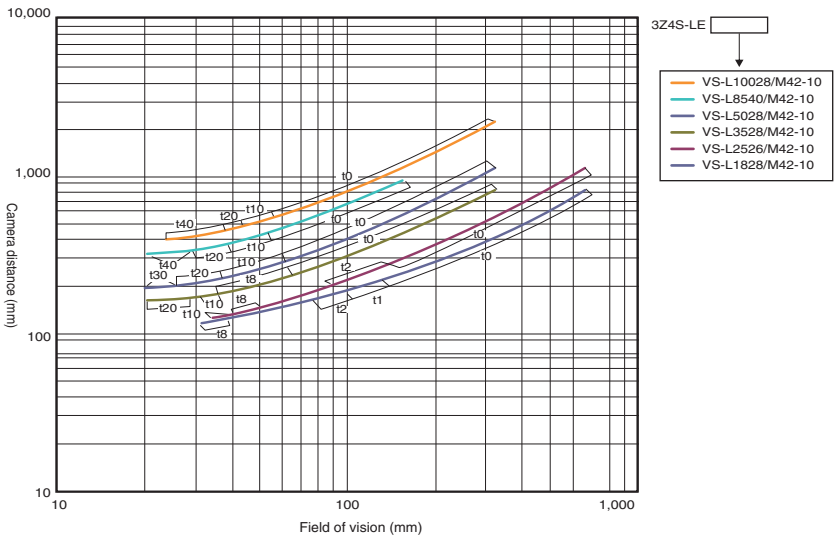
The X axis of the optical chart shows the field of vision (mm)*1, and the Y axis of the optical chart shows the camera installation distance (mm).*2



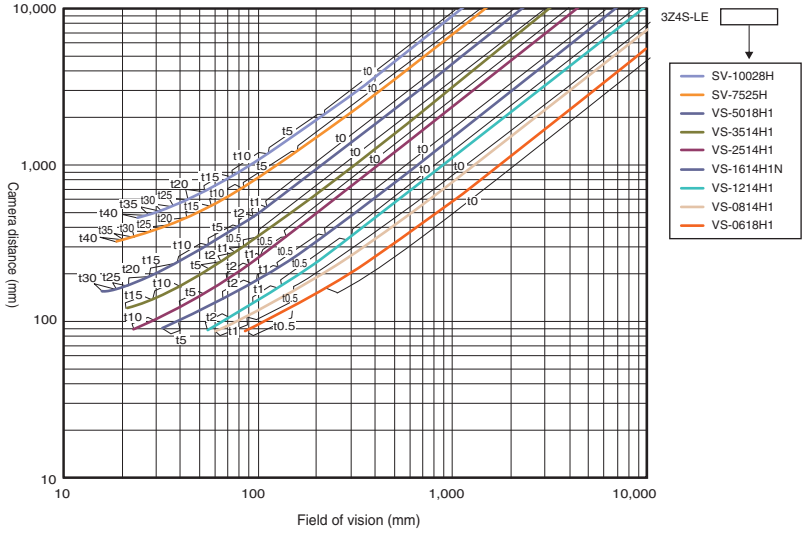
*1. The lengths of the fields of vision given in the optical charts are the lengths of the Y axis.
*2. The vertical axis represents WD for small cameras.

Normal lenses

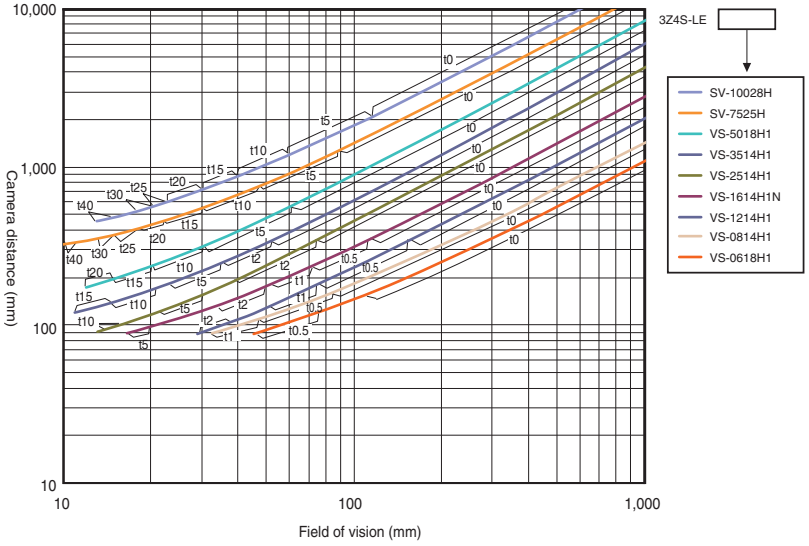
High-speed CMOS camera FH-S□12, 12-million pixel (using 3Z4S-LE VS-L/M42 series)



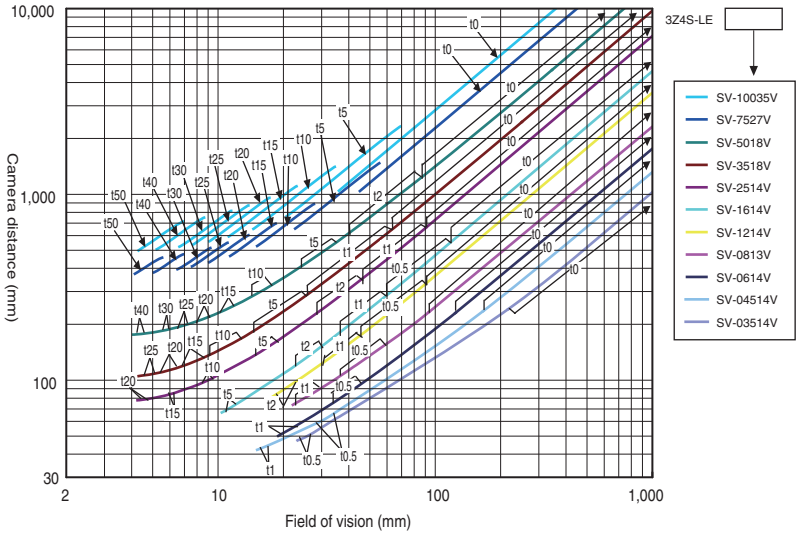
High-speed CMOS camera FH-S□04, 4 million-pixel (using 3Z4S-LE VS-H1 series)



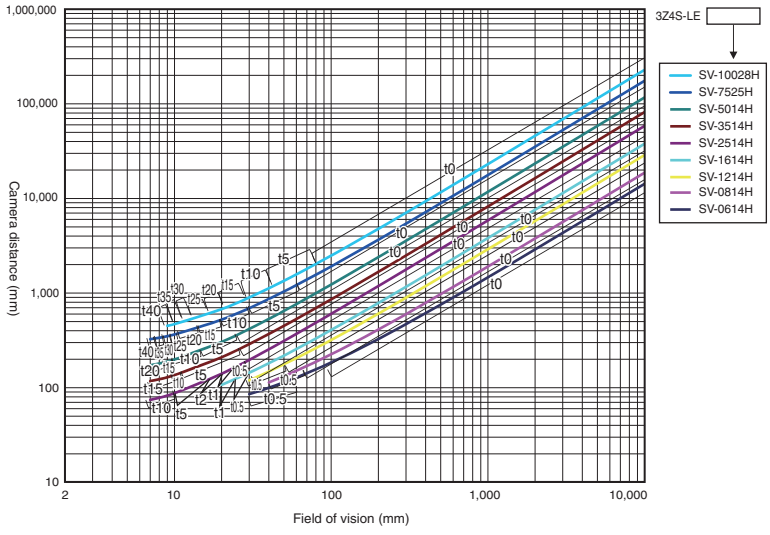
High-speed CMOS camera FH-S□02, 2 million-pixel (using 3Z4S-LE VS-H1 series)



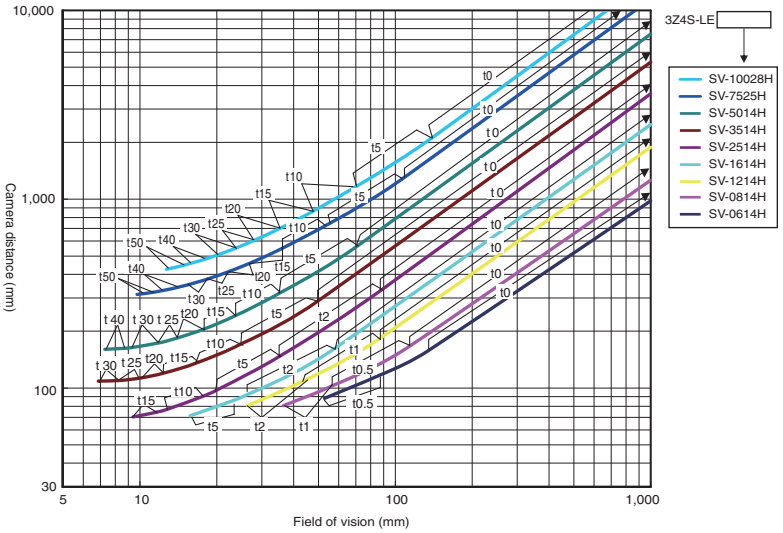
High-speed CMOS camera FH-S□ / High-speed CCD camera FZ-SH□ / Digital CCD camera FZ-S□, 300,000-pixel (using 3Z4S-LE SV-V series)



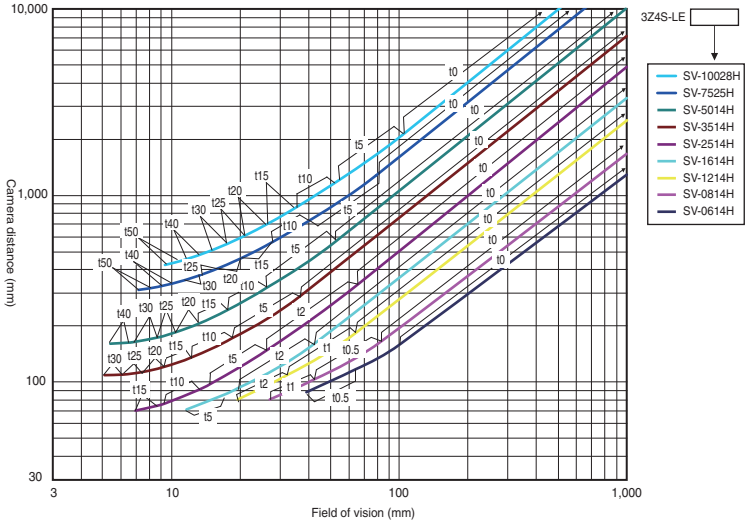
Digital CMOS camera (standalone) FH-S□05R, 5 million-pixel (using 3Z4S-LE SV-H series)



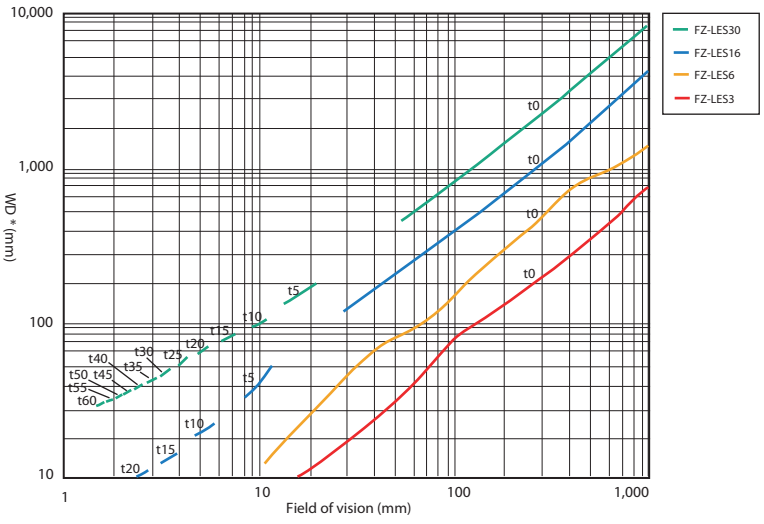
Digital CCD camera FZ-S□5M2, 5 million-pixel (using 3Z4S-LE SV-H series)



Digital CCD camera FZ-S□2M, 2 million-pixel (using 3Z4S-LE SV-H series)



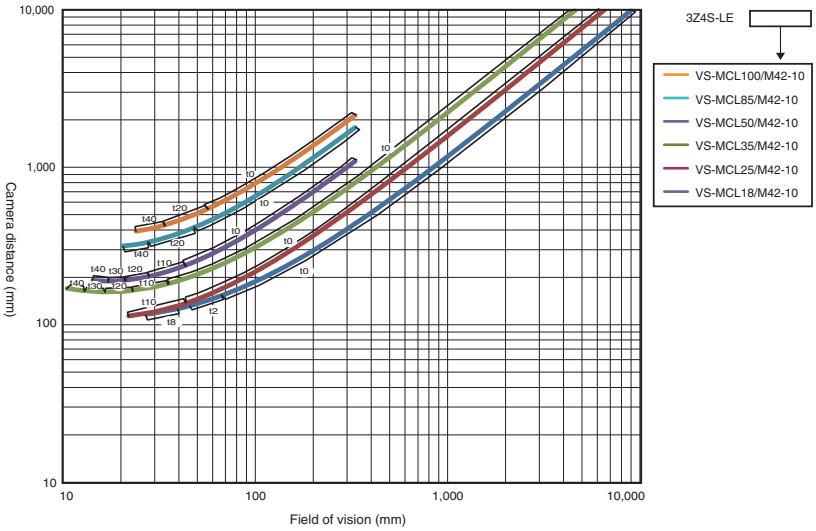
Small digital CCD camera FZ-SF□, FZ-SP□, 300,000-pixel (using FZ-LES series)



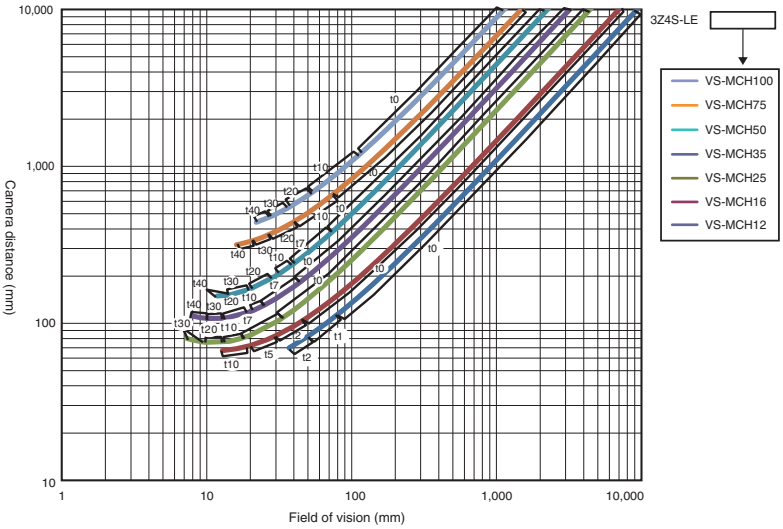
* The vertical axis represents WD, not installation distance.

Vibration and shock resistance lenses

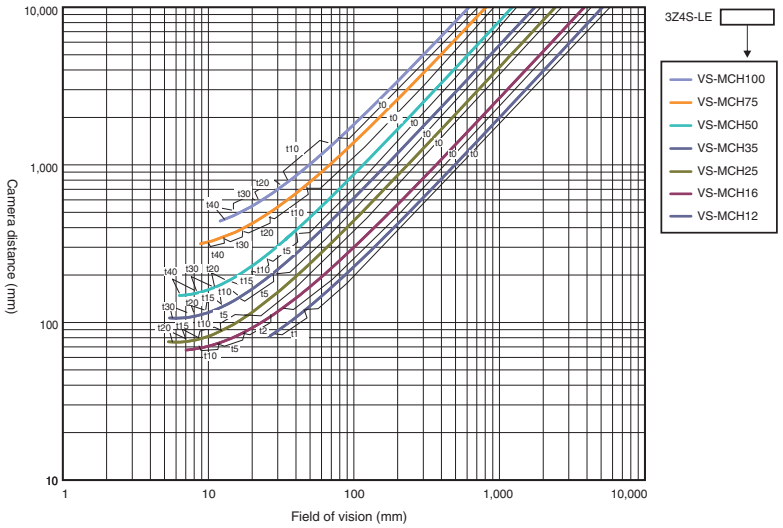
High-speed CMOS camera (standalone) FH-S□12, 12 million-pixel (using 3Z4S-LE VS-MCL/M42 series)



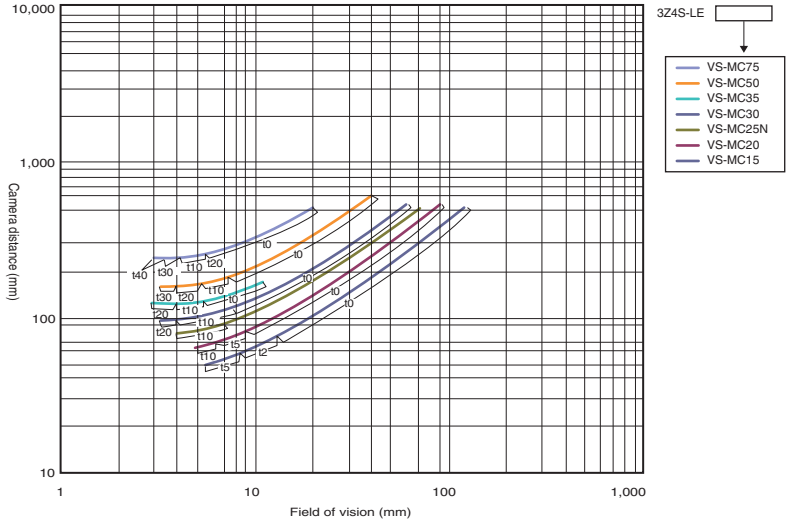
High-speed CMOS camera (standalone) FH-S□04, 4 million-pixel (using 3Z4S-LE VS-MCH series)



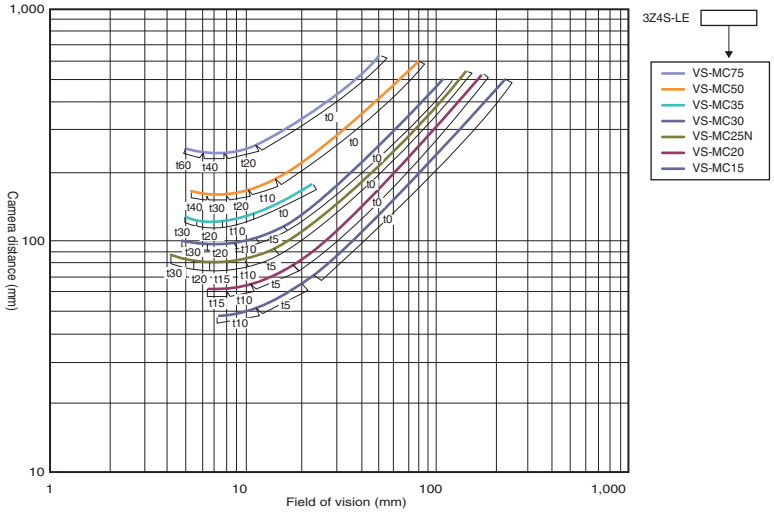
High-speed CMOS camera (standalone) FH-S□02, 2 million-pixel (using 3Z4S-LE VS-MCH series)



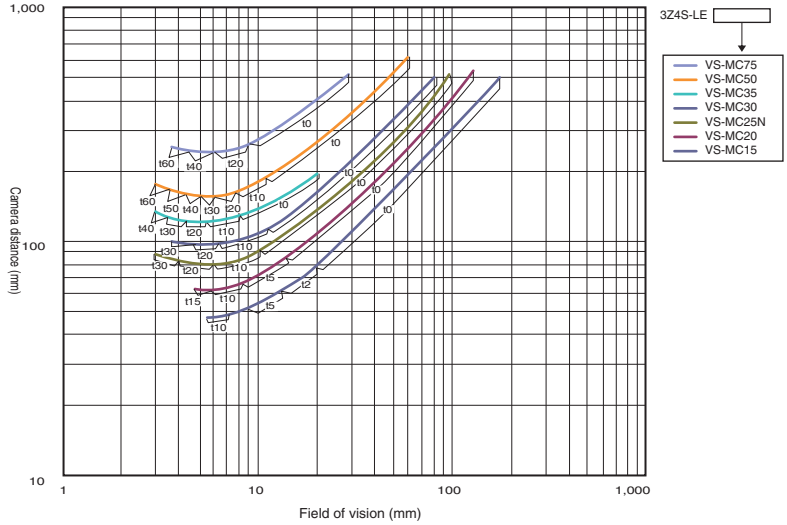
High-speed CMOS camera FH-S□ / High-speed CCD camera FZ-SH□ / Digital CCD camera FZ-S□, 300,000-pixel (using 3Z4S-LE VS-MC series)



Digital CCD camera FZ-S□5M2, 5 million-pixel (using 3Z4S-LE VS-MC series)



Digital CCD camera FZ-S□2M, 2 million-pixel (using 3Z4S-LE VS-MC series)



Ordering information

Sensor controller

Type	CPU	No. of cameras	Output	Model	Appearance
Box-type controllers	High-speed controllers (4 core)	2	NPN/PNP	FH-3050	
		4	NPN/PNP	FH-3050-10	
		8*1	NPN/PNP	FH-3050-20	
	Standard controllers (2 core)	2	NPN/PNP	FH-1050	
		4	NPN/PNP	FH-1050-10	
		8*1	NPN/PNP	FH-1050-20	

*1. Can be connected to up to four 12 million-pixel cameras or up to eight cameras other than 12 million-pixel cameras.

Camera

Type	Specifications		Image read time	Model	Appearance
High-speed CMOS camera (Lens required)	12 million-pixel	Color	25.7 ms*	FH-SC12	
		Monochrome		FH-SM12	
	4 million-pixel	Color	8.5 ms*	FH-SC04	
		Monochrome		FH-SM04	
	2 million-pixel	Color	4.6 ms*	FH-SC02	
		Monochrome		FH-SM02	
	300,000-pixel	Color	3.3 ms	FH-SC	
		Monochrome		FH-SM	
Digital CMOS camera	5 million-pixel	Color	71.7 ms	FH-SC05R	
		Monochrome		FH-SM05R	
Digital CCD camera (Lens required)	5 million-pixel	Color	62.5 ms	FZ-SC5M2	
		Monochrome		FZ-S5M2	
	2 million-pixel	Color	33.3 ms	FZ-SC2M	
		Monochrome		FZ-S2M	
	300,000-pixel	Color	12.5 ms	FZ-SC	
		Monochrome		FZ-S	
Small digital CCD camera (Lenses for small camera required)	300,000-pixel flat type	Color	12.5 ms	FZ-SFC	
		Monochrome		FZ-SF	
	300,000-pixel pen type	Color		FZ-SPC	
		Monochrome		FZ-SP	
High-speed CCD camera (Lens required)	300,000-pixel	Color	4.9 ms	FZ-SHC	
		Monochrome		FZ-SH	
Intelligent compact CMOS camera (Camera + manual focus lens + high power lighting)	Narrow view	Color	16.7 ms	FZ-SQ010F	
	Standard view			FZ-SQ050F	
	Wide view (long-distance)			FZ-SQ100F	
	Wide view (short-distance)			FZ-SQ100N	

* Frame rate in high speed mode when the camera is connected using two camera cables. For other conditions, please refer to the below chart:

Model			FH-SC12	FH-SM12	FH-SC04	FH-SM04	FH-SC02	FH-SM02
Image acquisition time	2 cables*1	High speed mode*2	25.7 ms		8.5 ms		4.6 ms	
		Standard mode	51.3 ms		17.9 ms		9.7 ms	
	1 cable	High speed mode*2	51.3 ms		17.0 ms		9.2 ms	
		Standard mode	102.0 ms		35.8 ms		19.3 ms	

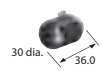
*1. Two camera ports of the controller are used per one camera.
*2. Maximum up to 5 m camera cable length.

Lenses

C-mount lens for 1/3-inch image sensor

Type	Specifications					Model	Appearance/Dimensions (mm)
	Focal length	Aperture (F No.)	Filter size	Max. sensor size	Mount		
C-mount lens for 1/3-inch image sensor (Recommend: FZ-S□/ FZ-SH□/FH-S□)	3.5 mm	1.4 to close	-	1/3 inch	C-mount	3Z4S-LE SV-03514V	
	4.5 mm	1.4 to close	-			3Z4S-LE SV-04514V	
	6 mm	1.4 to close	M27.0 P0.5			3Z4S-LE SV-0614V	
	8 mm	1.3 to close	M25.5 P0.5			3Z4S-LE SV-0813V	
	12 mm	1.4 to close	M27.0 P0.5			3Z4S-LE SV-1214V	
	16 mm	1.4 to close	M27.0 P0.5			3Z4S-LE SV-1614V	
	25 mm	1.4 to close	M27.0 P0.5			3Z4S-LE SV-2514V	
	35 mm	1.8 to close	M27.0 P0.5			3Z4S-LE SV-3518V	
	50 mm	1.8 to close	M30.5 P0.5			3Z4S-LE SV-5018V	
	75 mm	2.7 to close	M30.5 P0.5			3Z4S-LE SV-7527V	
	100 mm	3.5 to close	M30.5 P0.5			3Z4S-LE SV-10035V	

C-mount lens for 2/3-inch image sensor

Type	Specifications					Model	Appearance/Dimensions (mm)
	Focal length	Aperture (F No.)	Filter size	Max. sensor size	Mount		
C-mount lens for 2/3-inch image sensor (Recommend: FZ-S□2M/ FZ-S□5M2)	6 mm	1.4 to 16	M40.5 P0.5	2/3 inch	C-mount	3Z4S-LE SV-0614H	
	8 mm	1.4 to 16	M35.5 P0.5			3Z4S-LE SV-0814H	
	12 mm	1.4 to 16	M27.0 P0.5			3Z4S-LE SV-1214H	
	16 mm	1.4 to 16	M27.0 P0.5			3Z4S-LE SV-1614H	
	25 mm	1.4 to 16	M27.0 P0.5			3Z4S-LE SV-2514H	
	35 mm	1.4 to 16	M35.5 P0.5			3Z4S-LE SV-3514H	
	50 mm	1.4 to 16	M40.5 P0.5			3Z4S-LE SV-5014H	

Type	Specifications					Model	Appearance/Dimensions (mm)
	Focal length	Aperture (F No.)	Filter size	Max. sensor size	Mount		
C-mount lens for 2/3-inch image sensor (Recommend: FZ-S□2M/ FZ-S□5M2)	75 mm	2.5 to close	M34.0 P0.5	1 inch	C-mount	3Z4S-LE SV-7525H*1	
	100 mm	2.8 to close	M37.5 P0.5			3Z4S-LE SV-10028H*1	

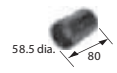
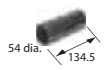
*1. 3Z4S-LE SV-7525H and 3Z4S-LE SV-10028H can also be used for FH-S□02/FH-S□04.

C-mount lens for 1-inch image sensor

Type	Specifications					Model	Appearance/Dimensions (mm)
	Focal length	Aperture (F No.)	Filter size	Max. sensor size	Mount		
C-mount lens for 1-inch image sensor (Recommend: FH-S□02/ FH-S□04*1)	6 mm	1.8 to 16	-	1 inch	C-mount	3Z4S-LE VS-0618H1	
	8 mm	1.4 to 16	M55.0 P0.75			3Z4S-LE VS-0814H1	
	12 mm	1.4 to 16	M35.5 P0.5			3Z4S-LE VS-1214H1	
	16 mm	1.4 to 16	M30.5 P0.5			3Z4S-LE VS-1614H1N	
	25 mm	1.4 to 16	M30.5 P0.5			3Z4S-LE VS-2514H1	
	35 mm	1.4 to 16	M30.5 P0.5			3Z4S-LE VS-3514H1	
	50 mm	1.8 to 16	M40.5 P0.5			3Z4S-LE VS-5018H1	

*1. 3Z4S-LE SV-7525H with focal length of 75 mm and 3Z4S-LE SV-10028H with local length of 100 mm are also available.

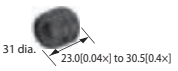
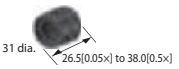
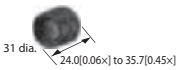
M42-mount lens for large image sensor

Type	Specifications					Model	Appearance/Dimensions (mm)
	Focal length	Aperture (F No.)	Filter size	Max. sensor size	Mount		
M42-mount lens for large image sensor (Recommend: FH-S□12)	18 mm	2.8 to 16	M55.0 P0.75	1.8 inch	M42-mount	3Z4S-LE VS-L1828/M42-10	
	25 mm	2.6 to 16	M55.0 P0.75			3Z4S-LE VS-L2526/M42-10	
	35 mm	2.8 to 16	M62.0 P0.75			3Z4S-LE VS-L3528/M42-10	
	50 mm	2.8 to 16	M62.0 P0.75			3Z4S-LE VS-L5028/M42-10	
	85 mm	4.0 to 16	M52.0 P0.75			3Z4S-LE VS-L8540/M42-10	
	100 mm	2.8 to 16	M52.0 P0.75			3Z4S-LE VS-L10028/M42-10	

Lens for small camera

Type	Specifications		Model	Appearance/Dimensions (mm)
	Focal length	Aperture (F No.)		
Lens for small camera	3 mm	2.0 to 16	FZ-LES3	
	6 mm	2.0 to 16	FZ-LES6	
	16 mm	3.4 to 16	FZ-LES16	
	30 mm	3.4 to 16	FZ-LES30	

Vibrations and shocks resistant, C-mount lens for 2/3-inch image sensor

Type	Specifications						Model[*1]	Appearance/ Dimensions (mm)
	Focal length	Filter size	Optical magnification	Aperture (F No.)[*2]/ Depth of field (mm)[*3]	Max.sensor size	Mount		
Vibrations and shocks resistant C-mount lens for 2/3-inch image sensor (Recommend: FZ-S□/ FZ-S□2M/FZ-S□5M2/ FZ-SH□/FH-S□)	15 mm	M27.0 P0.5	0.03 x	**F2:** 183.1 **F5.6:** 512.7 **F8:** 732.4	2/3 inch	C-mount	3Z4S-LE VS-MC15-□	
			0.2 x	**F2:** 4.8 **F5.6:** 13.4 **F8:** 19.2				
			0.3 x	**F2:** 2.3 **F5.6:** 6.5 **F8:** 9.2				
	20 mm	M27.0 P0.5	0.04 x	**F2:** 110.8 **F5.6:** 291.2 **F8:** 416.0			3Z4S-LE VS-MC20-□	
			0.25 x	**F2:** 3.4 **F5.6:** 9.0 **F8:** 12.8				
			0.4 x	**F2:** 1.5 **F5.6:** 3.9 **F8:** 5.6				
	25 mm	M27.0 P0.5	0.05 x	**F2:** 67.2 **F5.6:** 188.2 **F8:** 268.8			3Z4S-LE VS-MC25N-□	
			0.25 x	**F2:** 3.2 **F5.6:** 9.0 **F8:** 12.8				
			0.5 x	**F2:** 1.0 **F5.6:** 2.7 **F8:** 3.8				
	30 mm	M27.0 P0.5	0.06 x	**F2:** 47.1 **F5.6:** 131.9 **F8:** 188.4			3Z4S-LE VS-MC30-□	
			0.15 x	**F2:** 8.2 **F5.6:** 22.9 **F8:** 32.7				
			0.45 x	**F2:** 1.1 **F5.6:** 3.2 **F8:** 4.6				
	35 mm	M27.0 P0.5	0.26 x	**F2: 2.8** **F5.6:** 8.4 **F8:** 11.9			3Z4S-LE VS-MC35-□	
			0.3 x	**F2:** 2.2 **F5.6:** 6.5 **F8:** 9.2				
			0.65 x	**F2:** 0.6 **F5.6:** 1.7 **F8:** 2.5				
	50 mm	M27.0 P0.5	0.08 x	**F2:** 33.8 **F5.6:** 75.6 **F8:** 108.0			3Z4S-LE VS-MC50-□	
			0.2 x	**F2:** 6.0 **F5.6:** 13.4 **F8:** 19.2				
			0.48 x	**F2:** 1.3 **F5.6:** 2.9 **F8:** 4.1				

Type	Specifications						Model*1	Appearance/ Dimensions (mm)
	Focal length	Filter size	Optical magnification	Aperture (F No.)*2/ Depth of field (mm)*3	Max.sensor size	Mount		
Vibrations and shocks resistant C-mount lens for 2/3-inch image sensor (Recommend: FZ-S□/ FZ-S□2M/FZ-S□5M2/ FZ-SH□/FH-S□)	75 mm	M27.0 P0.5	0.14 x	**F3.8:** 17.7 **F5.6:** 26.1 **F8:** 37.2	2/3 inch	C-mount	3Z4S-LE VS-MC75-□	
			0.2 x	**F3.8:** 9.1 **F5.6:** 13.4 **F8:** 19.2				
			0.62 x	**F3.8:** 1.3 **F5.6:** 1.9 **F8:** 2.7				

*1. Insert the iris range into □ in the model number as follows:
F = 1.9 to 3.8: Blank
F = 5.6: FN056
F = 8: FN080
*2. F-number can be selected from maximum aperture, 5.6 and 8.0.
*3. When circle of least confusion is 40 μm.

High-resolution telecentric lens, C-mount lens for 2/3-inch image sensor

Type	Specifications								Model*1
	Optical magnification (±5%)	Field of view (±5%) (VxH) (mm)	WD (mm)*2	Effective FNO	Depth of field (mm)*3	Resolution*4	TV distortion	Max. sensor size	
High-resolution telecentric lens C-mount lens for 2/3-inch image sensor (Recommend: FZ-S□/ FZ-SH□/FZ-S□2M/ FZ-S□5M2/FH-S□)	0.5x	1/3 inch (FH-SC/FH-SM/ FZ-SC/FZ-S): 9.6x7.2 1/1.8 inch (FZ-SC2M/ FZ-S2M): 14.0x10.6 2/3 inch (FH-SC2M/FH-SM2M): 22.4x12 2/3 inch (FZ-SC5M□/ FZ-S5M□): 16.8x14.2	75.3	9.42	3	12.43	0.02%	2/3 inch	3Z4S-LE VS-TCH05-65□
			110.8	9.49	3.04	12.9	0.02%		3Z4S-LE VS-TCH05-110□
	1.0x	1/3 inch (FH-SC/FH-SM/ FZ-SC/FZ-S): 4.8x3.6 1/1.8 inch (FZ-SC2M/ FZ-S2M): 7.0x5.3 2/3 inch (FH-SC2M/FH-SM2M): 11.2x6.0 2/3 inch (FZ-SC5M□/ FZ-S5M□): 8.4x7.1	68.8	9.94	0.8	6.71	0.01%		3Z4S-LE VS-TCH1-65□
			110.3	10.49	0.84	6.99	0.02%		3Z4S-LE VS-TCH1-110□
	1.5x	1/3 inch (FH-SC/FH-SM/ FZ-SC/FZ-S): 3.2x2.4 1/1.8 inch (FZ-SC2M/ FZ-S2M): 4.7x3.5 2/3 inch (FH-SC2M/FH-SM2M): 7.5x4.0 2/3 inch (FZ-SC5M□/ FZ-S5M□): 5.6x4.7	65	11.8	0.4	5.24	0.01%		3Z4S-LE VS-TCH1.5-65□
			110.8	11.97	0.43	5.33	0.02%		3Z4S-LE VS-TCH1.5-110□
	2.0x	1/3 inch (FH-SC/FH-SM/ FZ-SC/FZ-S): 2.4x1.8 1/1.8 inch (FZ-SC2M/ FZ-S2M): 3.5x2.7 2/3 inch (FH-SC2M/FH-SM2M): 5.6x3.0 2/3 inch (FZ-SC5M□/ FZ-S5M□): 4.2x3.6	65	13.6	0.3	4.53	0.03%		3Z4S-LE VS-TCH2-65□
			110.8	13.5	0.27	4.53	0.03%		3Z4S-LE VS-TCH2-110□
	4.0x	1/3 inch (FH-SC/FH-SM/ FZ-SC/FZ-S): 1.2x0.9 1/1.8 inch (FZ-SC2M/ FZ-S2M): 1.8x1.3 2/3 inch (FH-SC2M/FH-SM2M): 2.8x3.0 2/3 inch (FZ-SC5M□/ FZ-S5M□): 2.1x1.8	65	17.91	0.09	3	0.02%		3Z4S-LE VS-TCH4-65□
			110.8	22.2	0.11	3.73	0.03%		3Z4S-LE VS-TCH4-110□

*1. Insert the shape into □ in the model number as follows:
-O: Straight
CO-O: Coaxial
*2. The working distance is the distance from the end of the lens to the sensor.
*3. The depth of field is calculated using a permissible circle of confusion diameter of 0.04 mm.
*4. The resolution is calculated using a wavelength of 550 nm.

Note: Fixing the lens or other reinforcement may be required depending on the installation angle or operating environment (vibration/shock). When fixing the lens, insulate the lens from the fixture. The above specifications are values calculated from the optical design and can vary depending on installation conditions.

Extension tubes

Type	Specifications	Model
For M42-mount lens*1	Set of 5 tubes: 20 mm, 10 mm, 8 mm, 2 mm and 1 mm Maximum outer diameter: 47.5 mm dia.	3Z4S-LE VS-EXR/M42
For C-mount lens*1	Set of 7 tubes: 40 mm, 20 mm, 10 mm, 5 mm, 2.0 mm, 1.0 mm and 0.5 mm Maximum outer diameter: 30 mm dia.	3Z4S-LE SV-EXR
For small digital CCD camera	Set of 3 tubes: 15 mm, 10 mm and 5 mm Maximum outer diameter: 12 mm dia.	FZ-LESR

*1. Do not use the 0.5 mm, 1.0 mm and 2.0 mm extension tubes attached to each other. Since these extension tubes are placed over the threaded section of the lens or other extension tube, the connection may loosen when more than one 0.5 mm, 1.0 mm or 2.0 mm extension tube are used together. Reinforcement is required to protect against vibration when extension tubes exceeding 30 mm are used. When using the extension tube, check it on the actual device before using it.

Camera accessories

Type	Specifications		Model	Appearance
Calibration plate			FZD-CAL	-
External lighting			FLV Series*1	
			FL Series*1	
Lighting controller (Required to control external lighting from a controller)	For FLV-Series	Camera mount lighting controller	FLV-TCC Series*1	
		Analog lighting controller	FLV-ATC Series*1	
	For FL-Series	Camera mount lighting controller	FL-TCC Series*1	
For intelligent compact camera	Mounting bracket		FQ-XL	
	Mounting brackets		FQ-XL2	
	Polarizing filter attachment		FQ-XF1	
Mounting bracket	For FZ-S□		FZ-S-XLC	-
	For FZ-S□2M		FZ-S2M-XLC	
	For FH-S□/FZ-S□5M2		FH-SM-XLC	
	For FZ-SH□		FZ-SH-XLC	
	For FH-S□12		FH-SM12-XLC	

*1. Refer to the Vision Accessory catalogue (Cat. No. Q198) for more detailed information.

Cables

Type	Specifications	Cable length	Model	Appearance
Camera cable	Standard camera cable*1	2 m	FZ-VS3 2M	
		3 m	FZ-VS3 3M	
		5 m	FZ-VS3 5M	
		10 m	FZ-VS3 10M	
	Bend resistant camera cable*1	2 m	FZ-VSB3 2M	
		3 m	FZ-VSB3 3M	
		5 m	FZ-VSB3 5M	
		10 m	FZ-VSB3 10M	
	Right-angle camera cable*1*2	2 m	FZ-VSL3 2M	
		3 m	FZ-VSL3 3M	
		5 m	FZ-VSL3 5M	
		10 m	FZ-VSL3 10M	
	Bend resistant right-angle camera cable*1*2	2 m	FZ-VSLB3 2M	
		3 m	FZ-VSLB3 3M	
		5 m	FZ-VSLB3 5M	
		10 m	FZ-VSLB3 10M	
	Long distance camera cable*1	15 m	FZ-VS4 15M	
	Long distance right-angle camera cable*1	15 m	FZ-VSL4 15M	
Cable extension unit	Up to two extension units and three cables can be connected (Maximum cable length: 45 m*1)		FZ-VSJ	
Touch panel monitor cable	DVI-analog conversion cable	2 m	FH-VMDA 2M	
		5 m	FH-VMDA 5M	
		10 m	FH-VMDA 10M	
	RS-232C cable	2 m	XW2Z-200PP-1	
		5 m	XW2Z-500PP-1	
		10 m	XW2Z-010PP-1	
	USB cable	2 m	FH-VUAB 2M	
		5 m	FH-VUAB 5M	

Type	Specifications		Cable length	Model	Appearance
Monitor cable	LED monitor cable (When you connect a LCD monitor FZ-M08 to FH sensor controller, please use it in combination with a DVI-I-RGB conversion connector FH-VMRGB)		2 m	FZ-VM 2M	
			5 m	FZ-VM 5M	
DVI-I-RGB conversion connector				FH-VMRGB	
Parallel I/O cable*3			2 m	XW2Z-S013-2	
			5 m	XW2Z-S013-5	
			15 m	XW2Z-S013-15	
Parallel I/O cable for connector-terminal conversion unit*3			0.5 m	XW2Z-050EE	
			1 m	XW2Z-100EE	
			1.5 m	XW2Z-150EE	
			2 m	XW2Z-200EE	
			3 m	XW2Z-300EE	
			5 m	XW2Z-500EE	
Parallel converter cable*4	FZ□ series	Do not use RESET signal*5 Use with COMIN and COMUT are same power source		FH-VPX-FZ	
	FZ□-L35x series	Do not use RESET signal*5		FH-VPX-FZL	
	F160 series*6 (F160-C10)	Do not use RESET signal*5 Use with COMIN and COMUT are same power source Do not use DI5 and DI6		FH-VPX-F160	
	F210 series (F210-C10/ F210-C10-ETN)	Do not use RESET signal*5 Use with COMIN and COMUT are same power source Do not use DI8 and DI9		FH-VPX-F210	
	F500 series (F500-C10)				
Connector-terminal block conversion units, general-purpose devices	Wiring method: Phillips screw			XW2R-J34GD-T	
	Wiring method: Slotted screw (rise up)			XW2R-E34GD-T	
	Wiring method: Push-in spring			XW2R-P34GD-T	
Encoder cable for line-driver			1.5 m	FH-VR 1.5M	

*1. The maximum cable length depends on the camera being connected, and the model and length of the cable being used. When a high-speed CMOS camera FH-S□02/-S□04/-S□12 is used in the high speed mode of transmission speed, two camera cables are required.

*2. This cable has an L-shaped connector on the camera end.

*3. 2 cables are required for all I/O signals.

*4. When you change to connect the F series, FZ5 series or FZ5-L series to FH sensor controller, you can convert by using the appropriate parallel converter cable of FH-VPX series under the usable condition.

*5. Even if RESET signal cannot be use by conversion, conversion is possible to convert satisfying other usable condition.

*6. Cannot be used for the F160-C10CP and F160-C10CF.

Accessories

Type	Specifications	Model	Appearance
Touch panel monitor	12.1-inches	FH-MT12*1	
LCD monitor	8.4-inches	FZ-M08	
USB memory	2 GB	FZ-MEM2G	
	8 GB	FZ-MEM8G	
SD card	2 GB	HMC-SD291	
	4 GB	HMC-SD491	
Display / USB switcher		FZ-DU	

*1. Supported only by the FH sensor controller version 5.32 or higher.

Development environment

Please purchase a CD-ROM and licenses the first time you purchase the Application Producer. CD-ROM's and licenses are available individually.
The license does not include the CD-ROM.

Product	Specifications			Model
	Description	Number of licenses	Media	
Application Producer	Software components that provide a development environment to further customize the standard controller features of the FH series. System requirements: • CPU: Intel Pentium Processor (SSE2 or higher) • OS: Windows 7/8/8.1 (32-bit/64-bit version) • .NET Framework: .NET Framework 3.5 or higher • Memory: At least 2 GB RAM, at least 2 GB available disk space • Browser: Microsoft® Internet Explorer 6.0 or higher • Display: XGA (1024 x 768), true color (32-bit) or higher • Optical drive: CD/DVD drive The following software is required to customize the software: Microsoft® Visual Studio® 2012/2010/2008 Professional	- (Media only)	CD-ROM	FH-AP1
		1 license	-	FH-AP1L

Computer software

Item	Model
Sysmac Studio version 1.07 or higher	SYSMAC-SE2□□□

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat.No. SysCat_Q031-E2-04 In the interest of product improvement, specifications are subject to change without notice.

FQ-M series

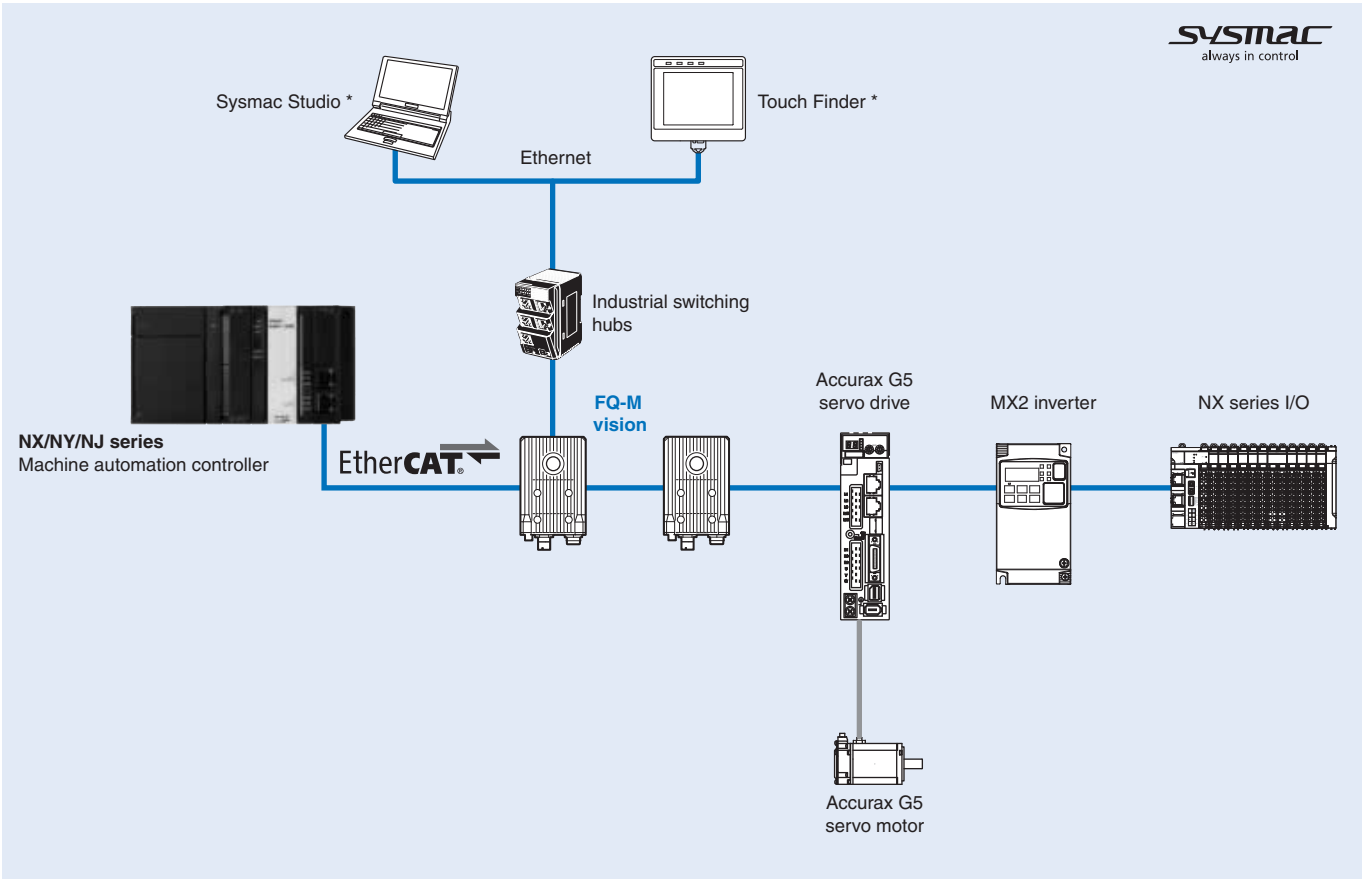


Designed for object tracking

The FQ-M series is a vision sensor designed specifically for Pick&Place applications.

- Camera, image processing and connectivity in one
- Shape based object detection
- Connectivity with EtherCAT/Ethernet
- Encoder input for object tracking and easy calibration
- Up to 5,000 pieces per minute with 360º rotation
- Flexible data output depending on the output devices

System configuration



* Sysmac Studio and Touch Finder can not be used together. When both are connected, Sysmac Studio will have priority. When you use the Sysmac Studio Standard Edition and connect the FQ-M series and the machine automation controller NX/NY/NJ-series, connect them with a general-purpose Ethernet cable or a USB cable.

Note: **1.** EtherCAT and Ethernet (PLC Link) can not be used simultaneously.
2. It is not possible to configure and adjust the FQ-M via an NX/NY/NJ-series controller, when they are connected via an EtherCAT network. For configuration and adjustment of FQ-M, connect the FQ-M and a computer or a Touch Finder via an Ethernet network.

Specifications

Sensor specifications

Item		EtherCAT communication provided	
		Color	Monochrome
Model	NPN	FQ-MS120-ECT	FQ-MS120-M-ECT
	PNP	FQ-MS125-ECT	FQ-MS125-M-ECT
Field of vision, installation distance		Selecting a lens according to the field of vision and installation distance. Refer to "*Optical Chart*" section.	
Main functions	Inspection items	Shape search, Search, Labeling, Edge position	
	Number of simultaneous inspections	32	
	Number of registered scenes	32*1	
Image input	Image processing method	Real color	Monochrome
	Image elements	1/3-inch color CMOS	1/3-inch monochrome CMOS
	Image filter	High dynamic range (HDR) and white balance	High dynamic range (HDR)
	Shutter	Electronic shutter; select shutter speeds from 1/10 to 1/30,000 (sec)	
	Processing resolution	752 (H) x 480 (V)	
	Pixel size	6.0 (μm) x 6.0 (μm)	
	Frame rate (image read time)	60 fps (16.7 ms)	
External lighting	Connection method	Connection via a strobe light controller	
	Connectable lighting	FL series	
Data logging	Measurement data	In sensor: max. 32,000 items*2	
	Images	In sensor: max. 2 images*2	
Measurement trigger		I/O trigger, Encoder trigger, Communications trigger (Ethernet No-protocol, PLC Link or EtherCAT)	
I/O specifications	Input signals	9 signals • Single measurement input (TRIIG) • Error clear input (IN0) • Error counter reset input (IN1) • Encoder input (A±, B±, Z±)*3	
	Output signals	5 signals*4 • OUT0 overall judgment output (OR) • OUT1 control output (BUSY) • OUT2 error output (ERROR) • OUT3 shutter output (SHTOUT) • OUT4 strobe trigger output (STGOUT)	
	Ethernet specifications	100BASE-TX/10BASE-TX	
	EtherCAT specifications	Dedicated protocol for EtherCAT 100BASE-TX	
	Connection method	Special connector cables • Power supply and I/O: 1 special connector I/O cable • Touch Finder, Computer and Ethernet: 1 Ethernet cable • EtherCAT: 2 EtherCAT cable	
LED display	LED display	• OR: Judgment result indicator • ERR: Error indicator • BUSY: Busy indicator • ETN: Ethernet communication indicator	
	EtherCAT display	• L/A IN (Link/Activity IN) x 1 • L/A OUT (Link/Activity OUT) x 1 • RUN x 1 • ERR x 1	
Ratings	Power supply voltage	21.6 to 26.4 VDC (including ripple)	
	Insulation resistance	Between all lead wires and case: 0.5 MΩ (at 250 V)	
	Current consumption	450 mA max. (when the FL series strobe controller and lighting are used. 250 mA max. (when external lighting is not used)	
Environmental immunity	Ambient temperature range	Operating: 0 to 50 °C, Storage: -20 to 65 °C (with no icing or condensation)	
	Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)	
	Ambient atmosphere	No corrosive gas	
	Vibration resistance (destruction)	10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions, 8 min each, 10 times	
	Shock resistance (destruction)	150 m/s^2 3 times each in 6 direction (up, down, right, left, forward, and backward)	
	Degree of protection	IEC 60529 IP40	
Materials		Case: aluminium die casting, Rear cover: aluminium plate	
Weight		Approx. 480 g (sensor only)	
Accessories		Instruction manual	

*1. The maximum number of registered scenes depends on settings due to restrictions on memory.
*2. If a Touch Finder is used, results can be saved up to the capacity of an SD card.
*3. See Encoder input specifications section.
*4. The five output signals can be allocated for the judgements of individual inspection items.

Encoder input specifications

Pulse input specifications (when an open collector type encoder is used)

Item		Specifications		
Input voltage		24 VDC ±10%	12 VDC ±10%	5 VDC ±5%
Input current		4.8 mA (at 24 VDC, typical value)	2.4 mA (at 12 VDC, typical value)	1.0 mA (at 5 VDC, typical value)
NPN	ON voltage*1	4.8 V max.	2.4 V max.	1.0 V max.
	OFF voltage*2	19.2 V min.	9.6 V min.	4.0 V min.
PNP	ON voltage*1	19.2 V min.	9.6 V min.	4.0 V min.
	OFF voltage*2	4.8 V max.	2.4 V max.	1.0 V max.
Maximum response frequency*3		50 kHz (I/O cable: when the FQ-MWD005 or FQ-MWDL005 cable is used) 20 kHz (I/O cable: when the FQ-MWD010 or FQ-MWDL010 cable is used)		
Input impedance		5.1 KΩ		

*1. ON voltage: Voltage to change from OFF to ON state. The ON voltage is the difference of voltages between the GND terminal of the encoder power terminals and each input terminal.
*2. OFF voltage: Voltage to change from ON to OFF state. The ON voltage is the difference of voltages between the GND terminal of the encoder power terminals and each input terminal.
*3. Select maximum response frequency depending on length of the encoder cable and response frequency of the encoder.

Pulse input specifications (when a line-driver output type encoder is used)

Item	Specifications
Input voltage	EIA standard RS-422-A line driver level
Input impedance*1	120 Ω ±5%
Differential input voltage	0.2 V min.
Hysteresis voltage	50 mV
Maximum response frequency*2	200 kHz (I/O cable: when the FQ-MWD005, FQ-MWDL005, FQ-MWD010 or FQ-MWDL010 cable is used)

*1. When terminating resistance function is used.
*2. Select maximum response frequency depending on length of the encoder cable and response frequency of the encoder.

Touch Finder specifications

Item			Model with DC power supply	Model with AC/DC/battery power supply
			FQ-MD30	FQ-MD31
Number of connectable sensors			2 max.	
Main functions	Type of measurement displays		Last result display, last NG display, trend monitor, histograms	
	Type of display images		Through, frozen, zoom-in and zoom-out images	
	Data logging		Measurement results, measured images	
	Menu language		English, Japanese	
Indications	LCD	Display device	3-5-inch TFT color LCD	
		Pixels	320 x 240	
		Display colors	16,777,216	
	Backlight	Life expectancy*1	50,000 hours at 25ºC	
		Brightness adjustment	Provided	
		Screen saver	Provided	
	Indicators	Power indicator (GREEN)	POWER	
		Error indicator (RED)	ERROR	
		SD card access indicator (YELLOW)	SD ACCESS	
		Charge indicator (ORANGE)	-	CHARGE
Operation interface	Touch screen	Method	Resistance film	
		Life expectancy*2	1,000,000 operations	
External interface	Ethernet		100 BASE-TX/10 BASE-T	
	SD card		Omron SD card (model: HMC-SD291/SD491) or a SDHC card of Class4 or higher rating is recommended	
Ratings	Power supply voltage	DC power connection	20.4 to 26.4 VDC (including ripple)	
		AC adapter connection	-	100 to 240 VAC, 50/60 Hz
		Battery connection	-	FQ-BAT1 battery (1 cell, 3.7 V)
	Continuous operation on battery*3		-	1.5 h
	Current consumption		DC power connection: 0.2 A	
	Insulation resistance		Between all lead wires and case: 0.5 MΩ (at 250 V)	
Environmental immunity	Ambient temperature range		Operating: 0 to 50 °C Storage: -25 to 65 °C (with no icing or condensation)	Operating: 0 to 50 °C when mounted to DIN track or panel, 0 to 40ºC when operated on a battery Storage: -25 to 65 °C (with no icing or condensation)
	Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)	
	Ambient atmosphere		No corrosive gas	
	Vibration resistance (destruction)		10 to 150 Hz, single amplitude: 0.35 mm, X/Y/Z directions, 8 min each, 10 times	
	Shock resistance (destruction)		150 m/s^2 3 times each in 6 direction (up, down, right, left, forward, and backward)	
	Degree of protection		IEC 60529 IP20	
Dimensions			95 x 85 x 33 mm	
Materials			Case: ABS	
Weight			Approx. 270 g (without battery and hand strap)	
Accessories			Touch Pen (FQ-XT), Instruction manual	

*1. This is a guideline for the time required for the brightness to diminish to have the initial brightness at room temperature and humidity. No guarantee is implied. The life of the backlight is greatly affected by the ambient temperature and humidity. It will be shorter at lower or higher temperature.
*2. This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions.
*3. This value is only a guideline. No guarantee is implied. The value will be affected by the operating environment and operating conditions.

Battery specifications

Item	FQ-BAT1
Battery type	Secondary lithium ion battery
Nominal capacity	1,800 mAh
Rated voltage	3.7 V
Dimensions	35.3 x 53.1 x 11.4 mm
Ambient temperature range	Operating: 0 to 40 °C Storage: -25 to 65 °C (with no icing or condensation)
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)
Charging method	Charged in Touch Finder (FQ-MD31) AC adapter (FQ-AC_) is required
Charging time*1	2.0 h
Battery backup life*2	300 charging cycles
Weight	50 g max.

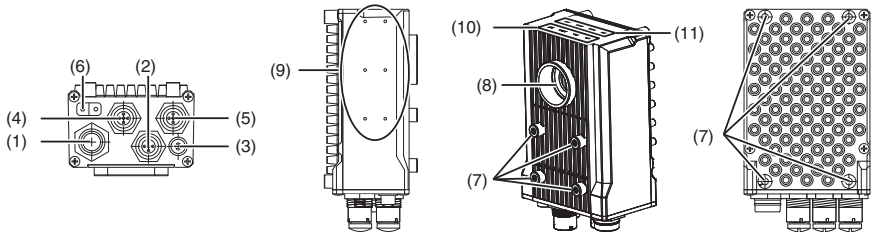
*1. This value is only a guideline. No guarantee is implied. The value will be affected by operating conditions.
*2. This is a guideline for the time required for the capacity of the battery to be reduced to 60% of the initial capacity. No guarantee is implied. The value will be affected by the operating environment and operating conditions.

EtherCAT communication specifications

Item	Specifications
Communication standard	IEC 61158 Type 12
Physical layer	100BASE-TX (IEEE802.3)
Connector	M12 x 2: • E-CAT IN: EtherCAT (IN) • E-CAT OUT: EtherCAT (OUT)
Communications media	Use the cables for FQ-MWN_ or FQ-WN_ series
Communications distance	Use the communication cable within the length of FQ-MWN_ or FQ-WN_ series cables
Process data	Variable PDO Mapping
Mailbox (CoE)	Emergency messages, SDO requests. SDO responses and SDO information
Distributed clock	Synchronization with DC mode 1
LED display	• L/A IN (Link/Activity IN) x 1 • L/A OUT (Link/Activity OUT) x 1 • RUN x 1 • ERR x 1

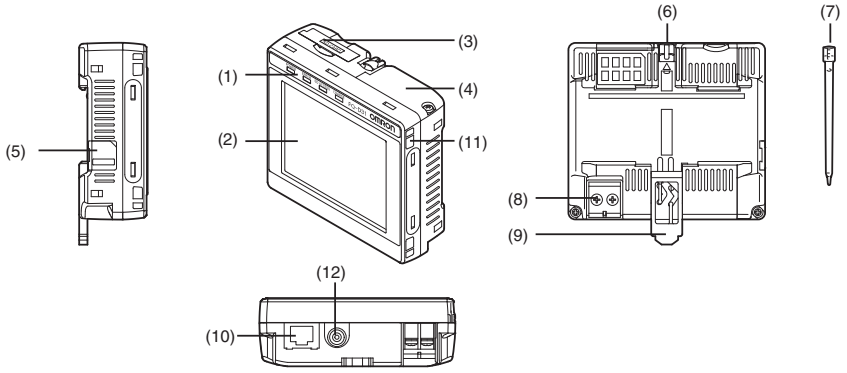
Nomenclature

Sensor



No.	Name	Description
1	I/O cable connector	An I/O cable is used to connect the sensor to the power supply and external I/O.
2	Ethernet connector	An Ethernet cable is used to connect the sensor to external devices such as PLCs, the Touch Finder or computers.
3	Lighting connector	Connect and external lighting (strobe controller).
4	EtherCAT connector (IN)	Connect an EtherCAT compatible device.
5	EtherCAT connector (OUT)	Connect an EtherCAT compatible device.
6	Node address switch	Set the node address for EtherCAT communications.
7	Installation holes	Holes to install and secure the camera.
8	C-mount lens connection part	Install the C-mount lens in this part. Determine the field of view depending on the measurement target and select a suitable CCTV lens (C-mounting lens).
9	Strobe controller connection holes	Install the strobe controller in this part. FL-TCC1 can be mounted.
10	Measurement process operation indicators	OR: Lit in orange while OR signal is ON. ETN: Lit in orange while in Ethernet communications. ERROR: Lit in red when an error occurs. BUSY: Lit in green while the sensor is processing.
11	EtherCAT operation indicators	L/A IN: Lit in green when Link with EtherCAT device is established and flickers in green when communicating (data IN). L/A OUT: Lit in green when Link with EtherCAT device is established and flickers in green when communicating (data OUT). ECAT RUN: Lit in green when EtherCAT communication is available. ECAT ERR: Lit in red when an EtherCAT communication error occurs.

Touch Finder



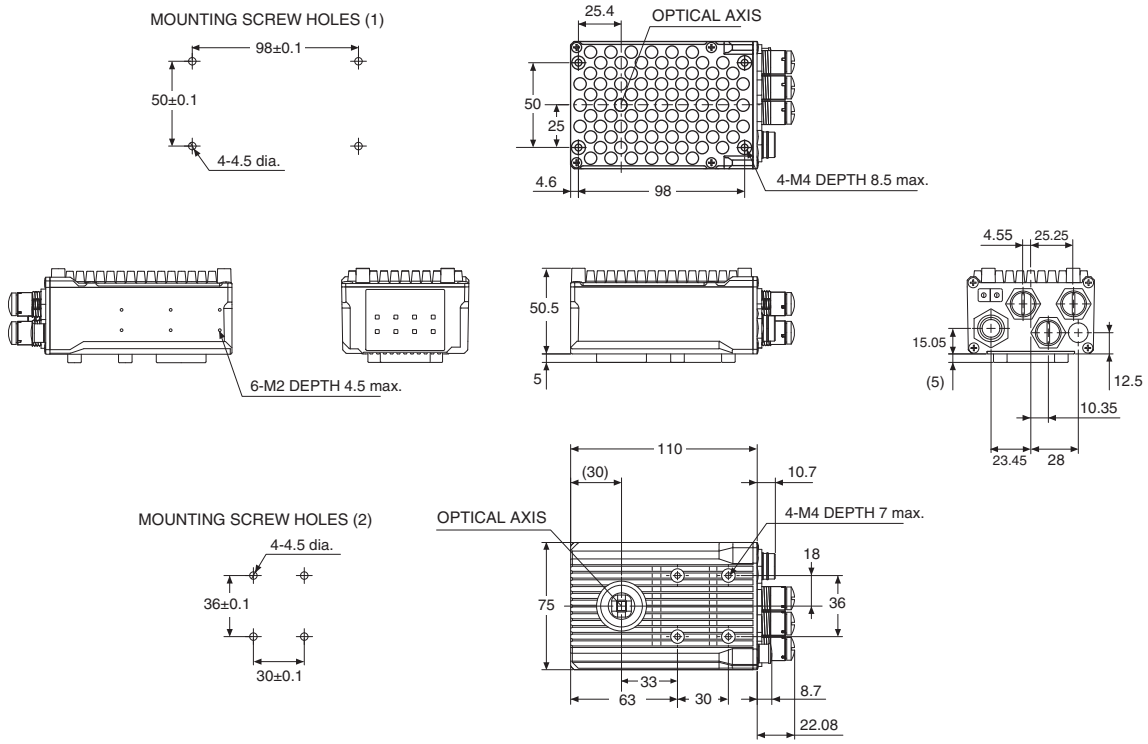
No.	Name	Description
1	Operation indicators	POWER: Lights green when the Touch Finder is turned ON. ERROR: Lights red when an error occurs. SD ACCESS: Lights yellow when an SD card is inserted. Flashes yellow when the SD card is being accessed. CHARGE[*1]: Lights orange when the battery is charging.
2	LCD/touch panel	Displays the setting menu, measurement results and images input by the camera.
3	SD card slot	An SD card can be inserted.
4	Battery cover[*1]	The battery is inserted behind this cover. Remove the cover when mounting or removing the battery.
5	Power supply switch	Turns on the Touch Finder.
6	Touch pen holder	The touch pen can be stored here when it is not being used.
7	Touch pen	Used to operate the touch panel.
8	DC power supply connector	Used to connect a DC power supply.
9	Slider	Used to mount the Touch Finder to a DIN track.
10	Ethernet port	Used when connecting the Touch Finder to the sensor with an Ethernet cable. Insert the connector until it locks in place.
11	Strap holder	This is a holder for attaching the strap.
12	AC power supply connector[*1]	Used to connect the AC adapter.

[*1.] Applicable only to the FQ-MD31 model.

Dimensions

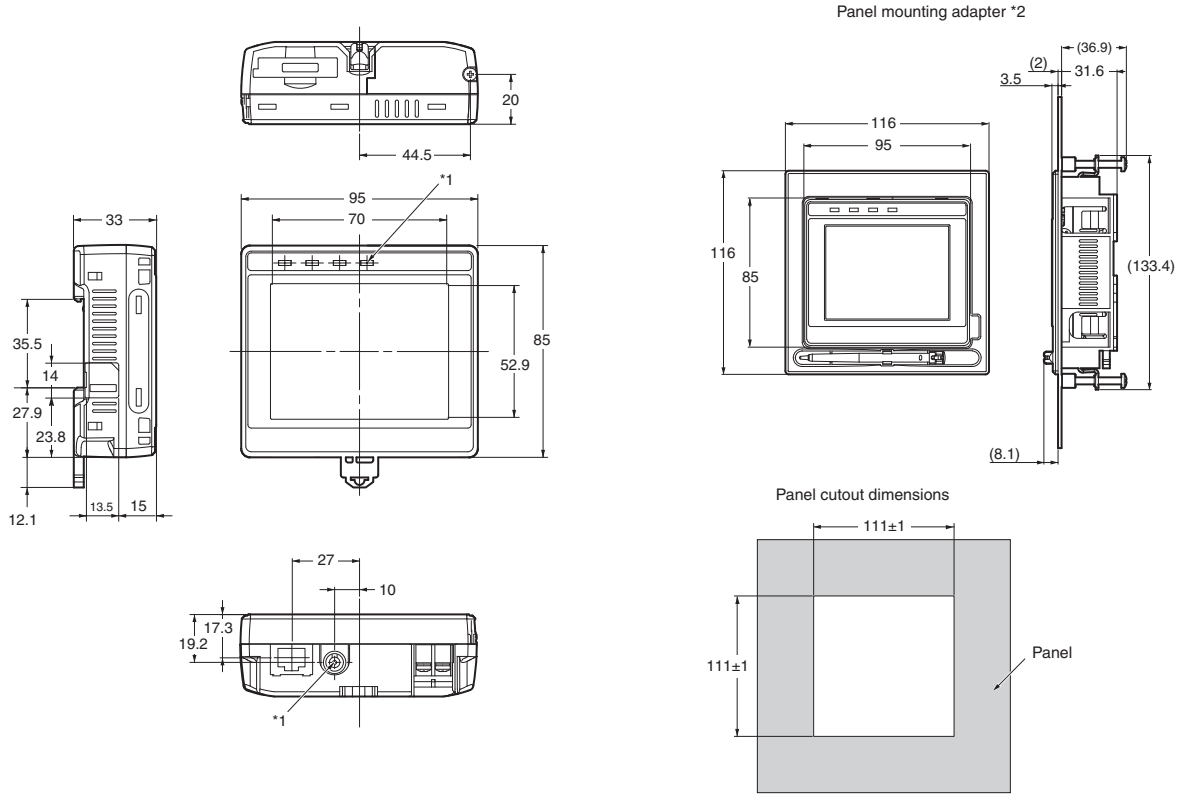
Sensor

FQ-MS12_-ECT/MS12_-M-ECT



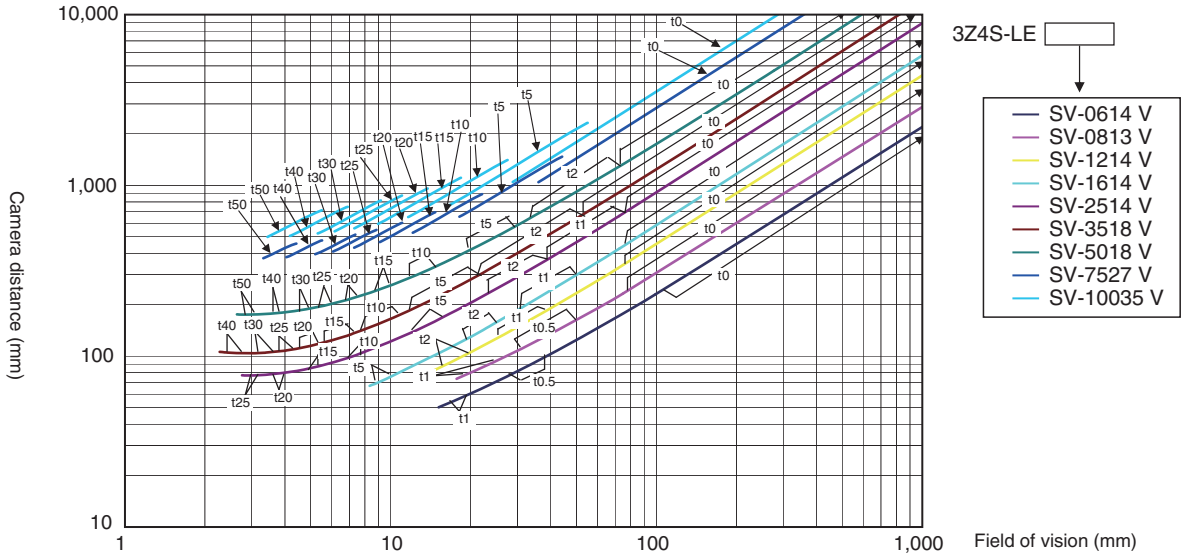
Touch Finder

FQ-MD30/MD31



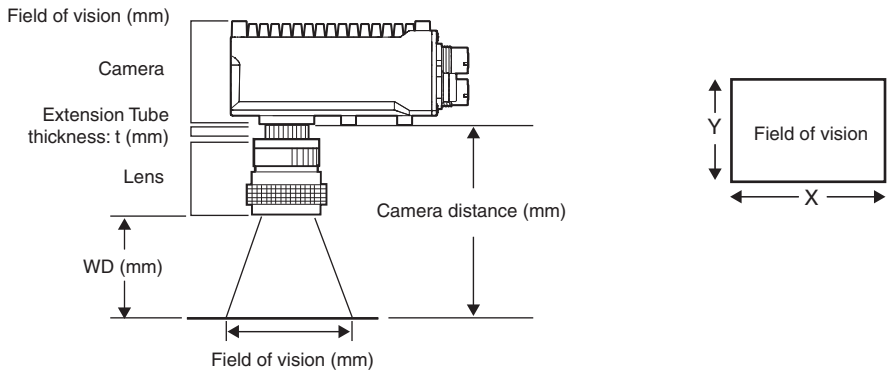
*1. Provided only with the FQ-MD31 model.
*2. The dimensions of the panel mounting adapter does not include that of a FQ-MD_.

Optical chart



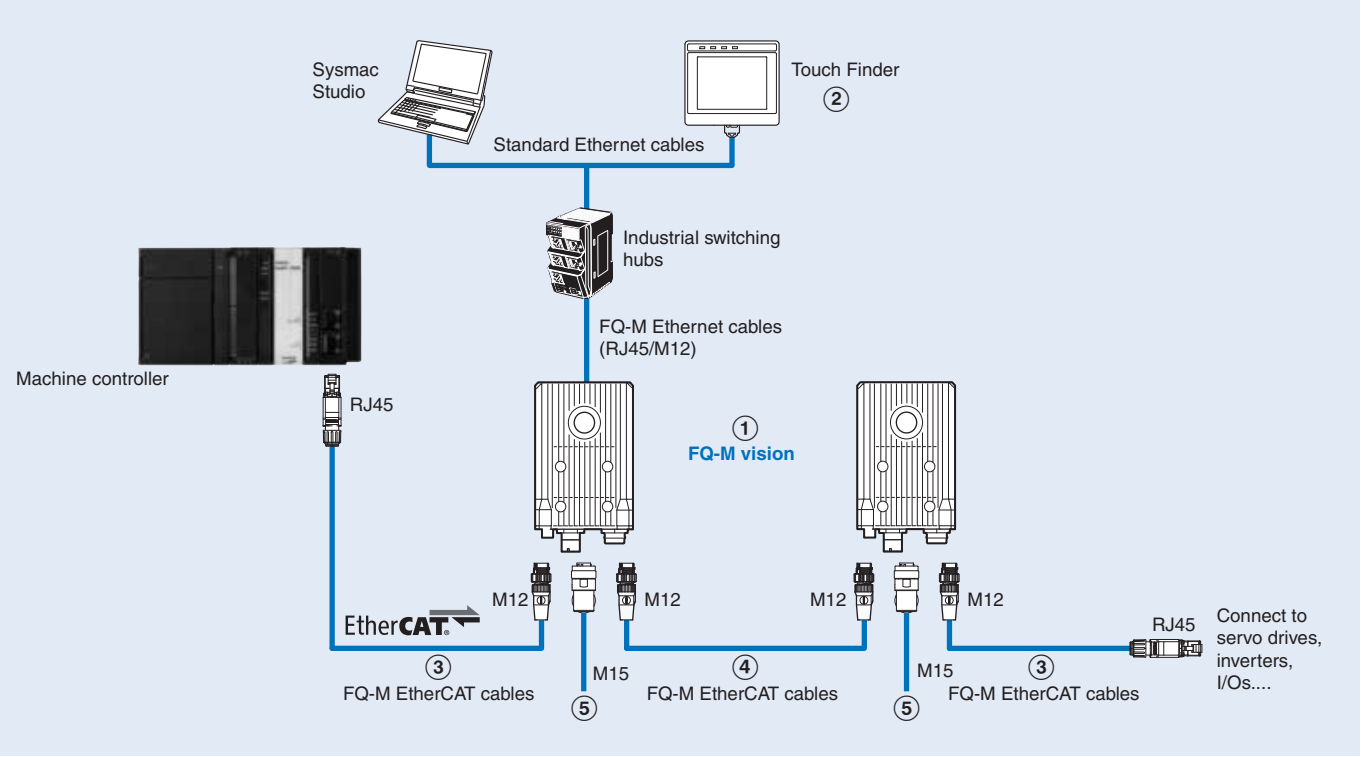
Meaning of optical chart

The X axis of the optical chart shows the field of vision (mm)*1, and the Y axis of the optical chart shows the camera installation distance (mm)*2.



*1. The lengths of the fields of vision given in the optical charts are the lengths of the Y axis.
*2. The vertical axis represents WD for small cameras.

Ordering information



Sensors

Sym-bol	Type			Model	Appearance
①	Color	NPN	EtherCAT communication function provided	FQ-MS120-ECT	
		PNP		FQ-MS125-ECT	
	Monochrome	NPN		FQ-MS120-M-ECT	
		PNP		FQ-MS125-M-ECT	

Touch Finder

Sym-bol	Type	Model	Appearance
②	DC power supply	FQ-MD30	
	AC/DC/battery*1	FQ-MD31	

*1. AC adapter and battery are sold separately.

Bend resistant cables for FQ-M series

Symbol	Type		Cable length	Model	Appearance
③	EtherCAT and Ethernet cable (M12/RJ45)	Angle: M12 / Straight: RJ45	5 m	FQ-MWNL005	
			10 m	FQ-MWNL010	
		Straight type	5 m	FQ-WN005-E	
			10 m	FQ-WN010-E	
④	EtherCAT cable (M12/M12)	Angle type	5 m	FQ-MWNEL005	
			10 m	FQ-MWNEL010	
		Straight type	5 m	FQ-MWNE005	
			10 m	FQ-MWNE010	
⑤	I/O cable	Angle type	5 m	FQ-MWDL005	
			10 m	FQ-MWDL010	
		Straight type	5 m	FQ-MWD005	
			10 m	FQ-MWD010	

Accessories for Touch Finder

Type		Model	Appearance
Panel mounting adapter		FQ-XPM	
AC adapter (for Touch Finder models with DC/AC/battery)	Plug type A, 125 V max. (PSE standard)	FQ-AC1	
	Plug type A, 125 V max. (UL/CSA standard)	FQ-AC2	
	Plug type A, 250 V max. (CCC mark standard)	FQ-AC3	
	Plug type C, 250 V max.	FQ-AC4	
	Plug type BF, 250 V max.	FQ-AC5	
	Plug type O, 250 V max.	FQ-AC6	
Battery (for Touch Finder models with DC/AC/battery)		FQ-BAT1	
Touch pen (enclosed with Touch Finder)		FQ-XT	
Strap		FQ-XH	
SD card	2 GB	HMC-SD291	
	4 GB	HMC-SD491	

Camera peripheral devices

Specifications	Model
CCTV lenses	3Z4S-LE series
External lightings	FLV series
	FL series

Note: Please, refer to the Vision Accessories Catalogue (Cat. No. Q198) for more detailed information about camera peripheral devices.

Computer software

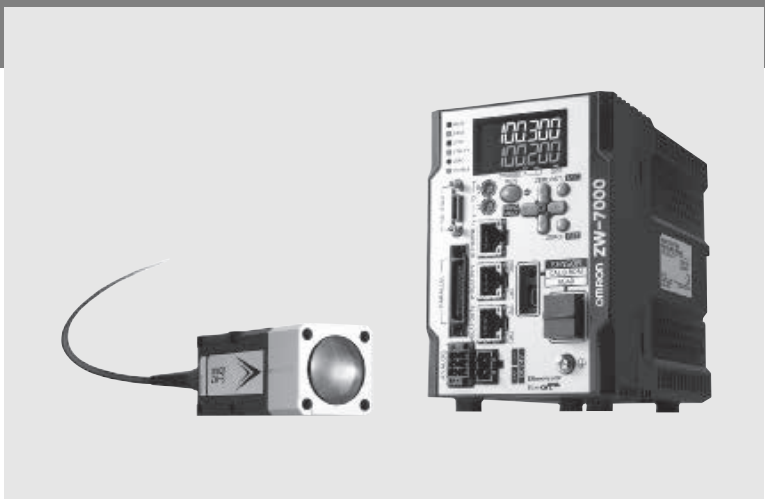
Specifications	Model
Sysmac Studio version 1.01 or higher	SYSMAC-SE2□□□

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_Q183-E2-02 In the interest of product improvement, specifications are subject to change without notice.

ZW-7000T, ZW-S70□

Fiber displacement sensor

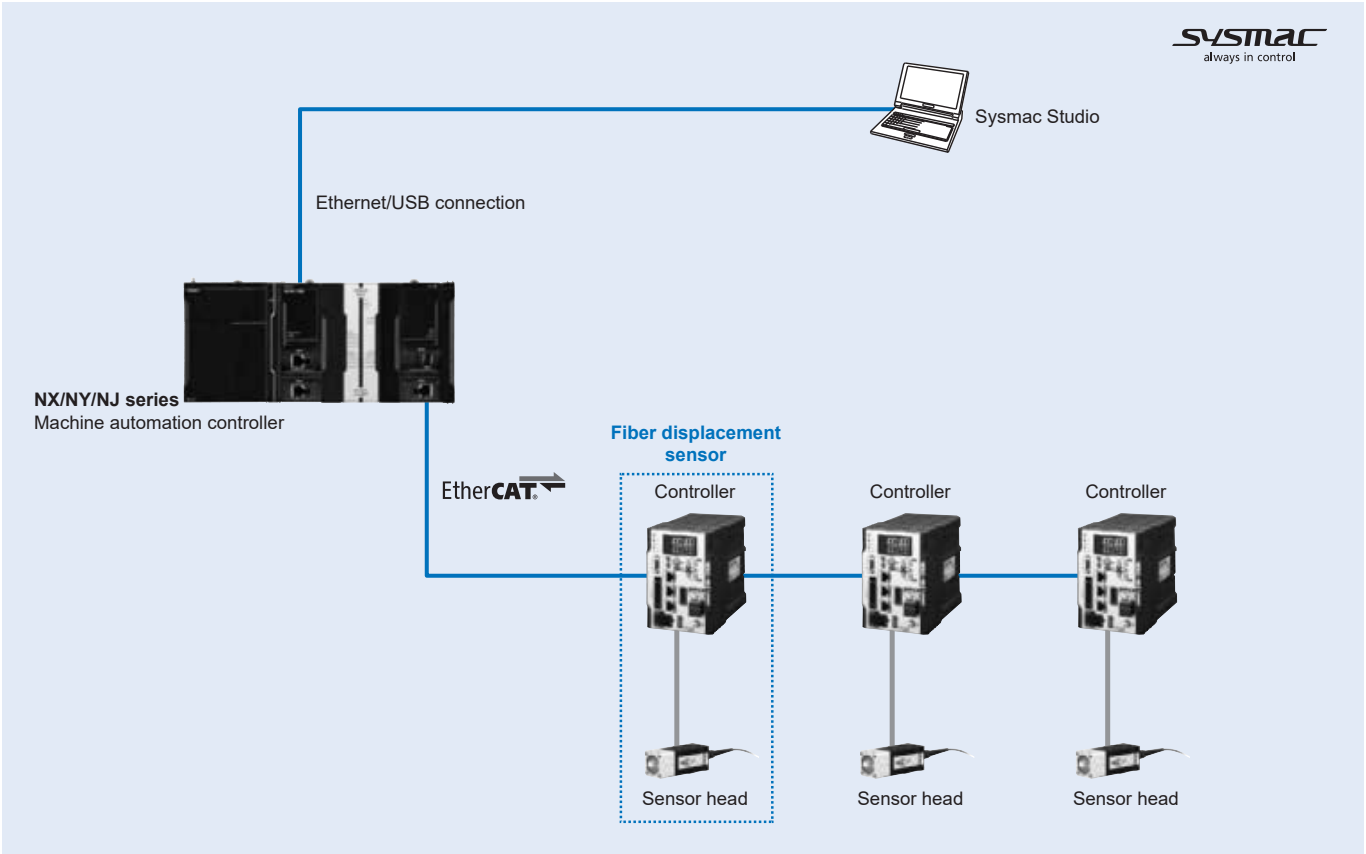


Reliable measurements for any material and surface types

- Measuring shiny objects with an inclination of ±25°*
- ±0.5 μm or less linearity for various materials*
- Sampling rate as fast as 20 μs
- Small size and ultra-lightweight fiber displacement sensor
- Robust sensor head structure
- Synchronous measurements with EtherCAT

* Typical value of the ZW-S7010 sensor head

System configuration



Specifications

Sensor head specifications

Item	ZW-S7010	ZW-S7020	ZW-S7030
Applicable controller	ZW-7000T		
Measuring center distance	10 mm	20 mm	30 mm
Measuring range[*1]	±0.5 mm	±1 mm	±2 mm
Static resolution[*2]	0.25 μm		
Linearity[*3]	±0.45 μm	±0.9 μm	±2.0 μm
Spot diameter (total measurement range)[*4]	50 μm dia.	70 μm dia.	100 μm dia.
Measurement cycle	20 μs to 400 μs		
Operating ambient illumination	Illumination on object surface max. 30000: (incandescence light)		
Ambient temperature range	Operating: 0 to 50ºC, Storage: -15 to 60ºC (with no icing or condensation)		
Ambient humidity range	Operating and storage: 35 to 85% (with no condensation)		
Degree of protection	IP40 (IEC60529)		
Vibration resistance (destructive)	10 to 150 Hz, 0.35 mm half amplitude, 80 min each in X, Y and Z directions		
Shock resistance (destructive)	150 m/s^2 3 times each in six directions (up/down, left/right, forward/backward)		
Temperature characteristic[*5]	0.6 μm/ºC	1.1 μm/ºC	1.8 μm/ºC
LED Safety	Risk Group 3 (IEC62471)		
Materials	Chassis: aluminum die cast / Fiber cable sheat: PVC / Calibration ROM: PC		
Fiber cable length	0.3 m, 2 m (flex-resistant cable)		
Fiber cable minimum bending radius	20 mm		
Insulation resistance (calibration ROM)	Between case and all terminals: 20 MΩ (by 250 V megger)		
Dielectric strength (calibration ROM)	Between case and all terminals: 1000 VAC, 50/60 Hz, 1 min		
Weight	With fiber cable length of 0.3 m: Approx. 170 g With fiber cable length of 2 m: Approx. 180 g		
Accessories	Instruction manual, 2 straps, calibration ROM fixing screws (M2), precautions for correct use		

[*1] The measurement range is based on 28 μs or higher, measurement cycle.
[*2] Capacity value when OMRON standard mirror surface target is measured at the measurement center distance as the average of 16,384 times. The value when the ZW-7000T controller is connected.
[*3] Material setting for the OMRON standard mirror surface target: error from an ideal straight line when measuring on mirror surface.
[*4] Capacity value defined by 1/e^2 (13.5%) of the peak optical intensity of the measurement wavelength.
[*5] Temperature characteristic at the measurement center distance when fastened with an aluminum jig between the sensor head and the target and the sensor head and the controller are set in the same temperature environment.

Controller specifications

Item			ZW-7000T
Input/output type			NPN/PNP dual type
Number of connected sensor heads			1 per controller
Sensor head compatibility			ZW-S70□
Light source for measurement			White LED
LED Safety			Risk Group 3 (IEC62471)
Segment display	Main display		11-segment white display, 6 digits
	Sub-display		11-segment green display, 6 digits
LED display	Status indicators		HIGH (orange), PASS (green), LOW (orange), STABILITY (green), ZERO (green), ENABLE (green), THRESHOLD-H (orange), THRESHOLD-L (orange), RUN (green)
	EtherCAT indicators		L/A IN (Link/Activity IN) (green), L/A OUT (Link/Activity OUT) (green), ECAT RUN (green), ECAT ERR (red),
External I/F	Ethernet		100BASE-TX/10BASE-T
	EtherCAT		EtherCAT exclusive protocol 100BASE-TX
	RS-232C		Max. 115,200 bps
	Analog output terminal block	Analog voltage output (OUT V)	-10 to 10 V, output impedance: 100 Ω
		Analog current output (OUT A)	4 to 20 mA, max. load resistance: 300 Ω
	32-pole expansion connector	Judgment output (HIGH/PASS/LOW)	Transistor output system Output voltage: 21.6 to 30 VDC Load current: 50 mA max. Residual voltage when turning ON: 1.2 V max. Leakage current when turning OFF: 0.1 mA max.
		Busy output (BUSY)	
		Alarm output (ALARM)	
		Enable output (ENABLE 1)	
		Sync flag output (SYNFLG)	
		Trigger busy output (TRIGBUSY)	
		Logging state output (LOGSTAT)	
		Logging error output (LOGERR)	
		Stability output (STABILITY)	
		Task state output (TASKSTAT)	
		LIGHT OFF input (LIGHT OFF 1)	DC input system Input voltage: 24 VDC ±10% (21.6 to 26.4 VDC) Input current: 7 mA Type. (24 VDC) Voltage/current when turning ON: 19 V/3 mA min. Voltage/current when turning OFF: 5 V/1 mA max.
		Zero reset input (ZERO 1)	
		Timing input (TIMING 1)	
		Reset input (RESET 1)	
		Sync input (SYNC)	
		Trigger input (TRIG)	
		Logging input (LOGGING)	

Item				ZW-7000T
External I/F	32-pole expansion connector	Bank	Currently selected bank output (BANK_OUT 1 to 3)	Transistor output system Output voltage: 21.6 to 30 VDC Load current: 50 mA max. Residual voltage when turning ON: 2 V max. Leakage current when turning OFF: 0.1 mA max.
			Bank selection input (BANK_SEL 1 to 3)	DC input system Input voltage: 24 VDC ±10% (21.6 to 26.4 VDC) Input current: 7 mA Type. (24 VDC) Voltage/current when turning ON: 19 V/3 mA min. Voltage/current when turning OFF: 5 V/1 mA max.
Main functions	Exposure time			Automatic/Fixed
	Measuring cycle			20 μs to 10 ms
	Material setting			Standard/Mirror/Rough surfaces
	Measurement item			Height/Thickness of transparent object/Calculation
	Filtering			Median/Average/Differentiation/High pass/Low pass/Band pass
	Output			Scaling/Different holds/Zero reset/Logging for a measured value
	Display			Measured value/Threshold value/Analog output voltage or current value/Judgment result/Resolution/Exposure time/Internal logging condition/Peak amount or received light
	Number of configurable banks			8 banks max.
	Tasks process			Multi-task (up to 4 tasks per bank)
	System			Save/Initialization/Display measured information/Communication settings/Sensor head calibration/Key-lock/Zero reset memory/Timing input
Rating	Power supply voltage			21.6 to 26.4 VDC (including ripple)
	Current consumption			800 mA max.
	Insulation resistance			Across all lead wires and FG terminal: 20 MΩ (by 250 V megger)
	Dielectric strength			Between all lead wires and FG terminal: 500 VAC, 50/60 Hz, 1 min
Environmental surface	Degree of protection			IP20 (IEC60529)
	Vibration resistance (destructive)			10 to 55 Hz, 0.35 mm half amplitude, 50 min each in X, Y and Z directions
	Shock resistance (destructive)			150 m/s^2 3 times each in six directions (up/down, left/right, forward/backward)
	Ambient temperature range			Operating: 0 to 40ºC, Storage: -15 to 60ºC (with no icing or condensation)
	Ambient humidity range			Operating and storage: 35 to 85% (with no condensation)
Grounding				D-type grounding (Grounding resistance of 100 Ω max.) **Note:** For conventional Class D grounding.
Materials				Chassis: PC
Weight				Main unit only: Approx. 900 g Parallel cable: Approx. 150 g
Accessories				Instruction manual, member registration sheet, parallel cable (ZW-XCP2E), 10 fiber cleaners (ZW-XCL)

Note: Material setting for the OMRON standard mirror surface target: error from an ideal straight line when measuring on mirror surface. The reference values for linearity when targets to measure are other than the above are as in the below table.

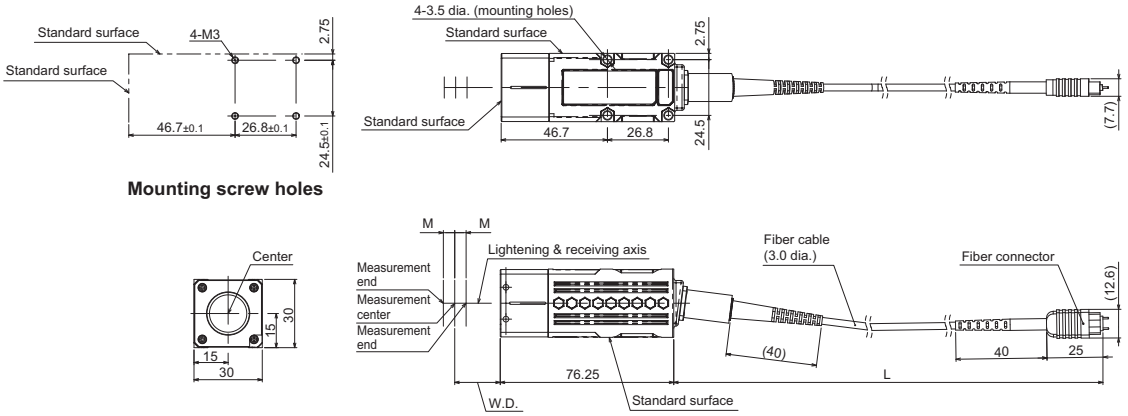
EtherCAT communication specifications

Item	Specifications
Communication standard	IEC61158 Type 12
Physical layer	100BASE-TX (IEEE802.3)
Connectors	RJ45 x 2 ECAT IN: EtherCAT input ECAT OUT: EtherCAT output
Communication media	Category 5 or higher (cable with double, aluminum tape and braided shielding) is recommended
Communication distance	Distance between nodes: 100 m max.
Process data	Variable PDO mapping
Mailbox (CoE)	Emergency messages, SDO requests, SDO responses and SDO information
Distributed clock	Synchronization in DC mode
LED display	L/A IN (Link/Activity IN) x 1 L/A OUT (Link/Activity OUT) x 1 ECAT RUN x 1 ECAT ERR x 1

Dimensions

Sensor head

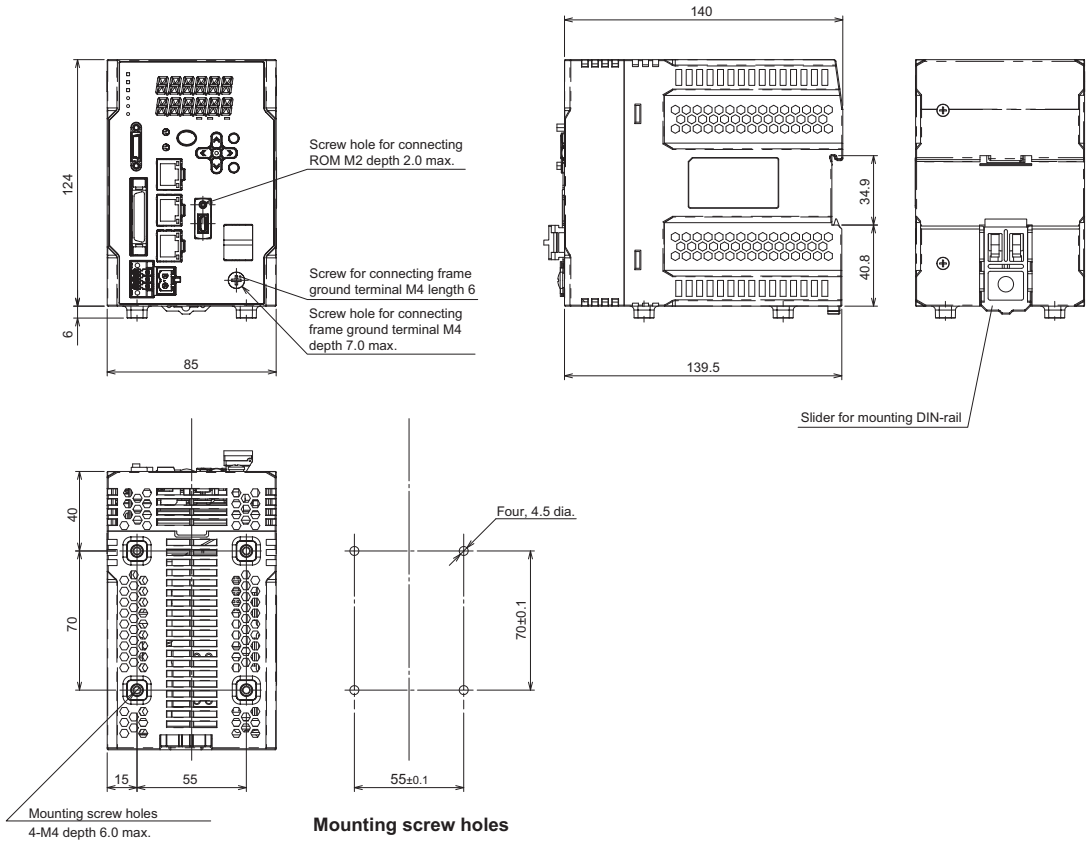
ZW-S7010/S7020/S7030



Model	W.D.	M	L
ZW-S7010 2M	10	0.5	2000
ZW-S7010 0.3M			300
ZW-S7020 2M	20	1	2000
ZW-S7020 0.3M			300
ZW-S7030 2M	30	2	2000
ZW-S7030 0.3M			300

Controller

ZW-7000T



Ordering information

Sensor head

Measuring range	Spot diameter	Static resolution[*1]	Cable length	Model	Appearance
10 ±0.5 mm	<50 μm dia.	0.25 μm	2 m	ZW-S7010 2M	
			0.3 m	ZW-S7010 0.3M	
20 ±1 mm	<70 μm dia.		2 m	ZW-S7020 2M	
			0.3 m	ZW-S7020 0.3M	
30 ±2 mm	<100 μm dia.		2 m	ZW-S7030 2M	
			0.3 m	ZW-S7030 0.3M	

[*1] Values when the ZW-7000T controller is used.

Controller

Power supply voltage	Output type	Model	Appearance
24 VDC	NPN/PNP	ZW-7000T	

Cables

Item	Cable length	Model	Appearance
Extension fiber cable (Sensor head to controller) (Fiber adapter ZW-XFCM is included)	2 m	ZW-XF7002R[*1]	
	5 m	ZW-XF7005R[*1]	
Fiber adapter (used between sensor head pre-wired cable and extension fiber cable)	-	ZW-XFCM	
Parallel cable for ZW-7000T 32-pole (included with ZW-7000T controller)	2 m	ZW-XCP2E	
RS-232C cable for personal computer	2 m	ZW-XRS2	
RS-232C cable for PLC/programmable terminal	2 m	ZW-XPT2	

[*1] Ask your OMRON representative if you require a cable longer than 5 m.

Accessories

Item	Model
Fiber connector cleaner	ZW-XCL[*1]

[*1] Place orders in units of boxes (contacting 10 units).

Computer software

Item	Model
Sysmac Studio version 1.15 or higher	SYSMAC-SE2□□□

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_Q250-E2-01 In the interest of product improvement, specifications are subject to change without notice.

E3NW-□, E3NX-□, E3NC-□, E9NC-□

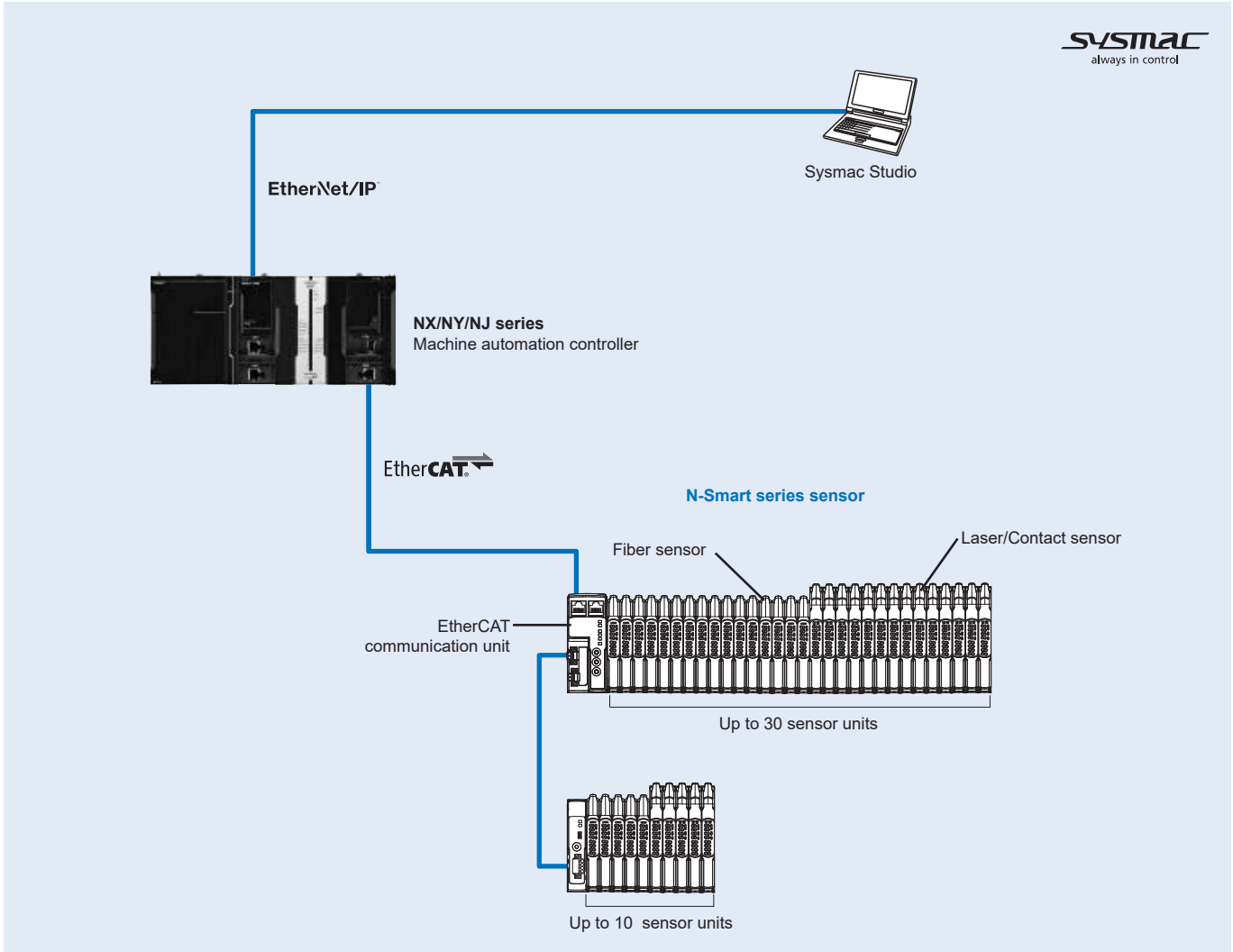
N-Smart series sensor



Easily connect fiber sensors, laser sensors and contact sensors to EtherCAT

- **E3NX-FA fiber sensors:** High performance fiber amplifier with increased dynamic range, resolution and sensing distance
- **E3NX-CA color mark fiber sensors:** High color discrimination capability with easy operation
- **E3NC-L compact laser sensors:** 3 types of head are available for long distance and variable spot type and minute spot type
- **E3NC-S ultra-compact CMOS laser sensors:** Stable detection from to glossy workpieces to black rubber with the industry's smallest body
- **E9NC-T contact sensors:** Unique ball spline mechanism for resistance to vibration and shock

System configuration



Specifications

Sensor communication unit and distributed sensor unit specifications

Item	Specifications	
	Sensor communication unit	Distributed sensor unit
Model	E3NW-ECT	E3NW-DS
Power supply voltage	24 VDC (20.4 to 26.4 V)	
Power and current consumption	2.4 W max./100 mA max.	2 W max./80 mA max.
Indicators	L/A IN indicator (green), L/A OUT indicator (green), PWR indicator (green), RUN indicator (green), ERROR indicator (red) and SS (sensor status) indicator (green/red)	RUN indicator (green) and SS (sensor status) indicator (green/red)
Vibration resistance (destruction)	10 to 60 Hz with a 0.7 mm double amplitude, 50 m/s^2 at 60 to 150 Hz, for 1.5 hours each in X, Y and Z directions	
Shock resistance (destruction)	150 m/s^2 for 3 times each in X, Y and Z directions	
Ambient temperature range	Operating: 0 to 55ºC*1, Storage: –30 to 70ºC (with no icing or condensation)	
Ambient humidity range	Operating and storage: 25% to 85% (with no condensation)	
Max. connectable sensors	30*2	10
Max. connectable distributed sensor	8	–
Insulation resistance	20 MΩ min. (at 500 VDC)	
Dielectric strength	500 VAC at 50/60 Hz for 1 minute	
Mounting method	35-mm DIN track-mounting	
Weight (packed state/unit only)	Approx. 185 g / approx. 95 g	Approx. 160 g / approx. 40 g
Materials	Polycarbonate (PC)	
Accessories	Power supply connector, communication connector for E3NW-DS connection, DIN track end plates (2 pcs) and instruction manual	Power supply/communication connector, DIN track end plates (2 pcs), ferrite cores (2 pcs) and instruction manual

*1 Temperature limitations based on number of connected amplifier units: groups of 1 or 2 amplifier units: 0 to 55ºC, groups of 3 to 10 amplifier units: 0 to 50ºC, groups of 11 to 16 amplifier units: 0 to 45ºC, groups of 17 to 30 amplifier units: 0 to 40ºC.

*2 You can connect up to 30 sensors total to the sensor communication units and distributed sensor units.

Fiber amplifier unit specifications

Item		Specifications	
Model		E3NX-FA0	E3NX-CA0
Connection method		Connector for sensor communication unit	
Light source (wavelength)		Red, 4-element LED (625 nm)	White LED (420 to 700 nm)
Power supply voltage		Supplied from the connector through the sensor communication unit	
Power consumption (at 24 VDC)*1*2		Normal mode: 920 mW max. (current consumption: 38 mA max.) Eco ON: 680 mW max. (current consumption: 28 mA max.) Eco LO: 800 mW max. (current consumption: 33 mA max.)	Normal mode: 960 mW max. (current consumption: 40 mA max.) Eco ON: 720 mW max. (current consumption: 30 mA max.) Eco LO: 800 mW max. (current consumption: 33 mA max.)
Protection circuits		Power supply reverse polarity protection and output short-circuit protection	Power supply reverse polarity protection
Sensing method		–	Contrast mode: Light intensity discrimination for RGB (initial state/after 2-point tuning) (R+G+B light intensity discrimination for 1-point tuning) Color mode: RGB ratio discrimination
Response time	Super-high speed mode (SHS)*3	Operate or reset: 32 μs	Operate or reset: 50 μs (only in Contrast mode)
	High-speed mode (HS)	Operate or reset: 250 μs	
	Standard mode (Stnd)	Operate or reset: 1 ms	
	Giga-power mode (GIGA)	Operate or reset: 16 ms	
Max. connectable units		30*4	
Sensitivity adjustment		Smart tuning (2-point tuning, full autotuning, position tuning, maximum sensitivity tuning, power tuning or 1-point tuning (1% to 99%)) or manual adjustment	Smart tuning (2-point tuning, full autotuning or 1-point tuning (1% to 99%)) or manual adjustment
No. of unit for mutual interference prevention	Super-high speed mode (SHS)*3	0	
	High-speed mode (HS)	10	
	Standard mode (Stnd)	10	
	Giga-power mode (GIGA)	10	
Functions	Auto power control (APC)	Always enabled	–
	Dynamic power control (DPC)	Provided	–
	Operation mode	–	Contrast mode: NO (Light-ON) or NC (Dark-ON) Color mode: NO (ON for match: ON for same color as registered color) or NC (ON for mismatch: ON for different color from registered color)
	Timer	Select from timer disabled, OFF-delay, ON-delay, one-shot or ON-delay + OFF-delay timer: 1 to 9,999 ms	Select from timer disabled, OFF-delay, ON-delay, one-shot or ON-delay + OFF-delay timer (Counted by 0.1 s in a range of 0.1 to 0.5 ms, by 0.5 ms for 0.5 to 5 ms and by 1 ms for 5 to 9999 ms. Default: 10 ms. Error: 0.1 ms)
	Zero reset	Negative values can be displayed (threshold value is shifted)	Contrast mode only: Negative values can be displayed (threshold value is shifted)
	Resetting settings*5	Select from initial reset (default settings) or user reset (saved settings)	Select from initial reset (default settings), user reset (saved settings) or bank reset
	Eco mode	Select from OFF (digital display lit), Eco ON (digital display no lit) or Eco LO (digital display dimmed)	
	Bank switching	Select from banks 1 to 4	Select from banks 1 to 8
	Power tuning	Select from ON or OFF	Select from 100 to 9,999 (the RGB maximum incident level at Smart tuning is adjusted to the power tuning level)
	Output 1	Select from normal detection mode or area detection mode	–

Item		Specifications	
Model		E3NX-FA0	E3NX-CA0
Functions	Output 2	Select from normal detection mode, alarm output mode or error output mode	–
	Hysteresis width	Select from standard setting or user setting. For a user setting, the hysteresis width can be set from 0 to 9,999	–
Ambient illumination (receiver side)		Incandescent lamp: 20,000 lx max., Sunlight: 30,000 lx max.	
Ambient operating temperature range		Groups of 1 or 2 amplifier units: 0 to 55ºC Groups of 3 to 10 amplifier units: 0 to 50ºC Groups of 11 to 16 amplifier units: 0 to 45ºC Groups of 17 to 30 amplifier units: 0 to 40ºC	
Ambient storage temperature range		–30 to 70ºC (with no icing or condensation)	
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)	
Installation environment		Pollution degree 3 (as per IEC 60947-1)	
Insulation resistance		20 MΩ min. (at 500 VDC)	
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute	
Vibration resistance (destruction)		10 to 55 Hz with a 1.5 mm double amplitude for 2 hours each in X, Y and Z directions	
Shock resistance (destruction)		150 m/s^2 for 3 times each in X, Y and Z directions	
Weight (packed state/sensor only)		Approx. 65 g / approx. 25 g	
Materials		Polycarbonate (PC)	
Accessories		Instruction manual	

*1 **E3NX-FA0 amplifier:** At power supply voltage of 10 to 30 VDC: Normal mode: 1.020 mW max. (current consumption: 34 mA max. at 30 VDC, 67 mA max. at 10 VDC). Eco ON mode: 810 mW max. (current consumption: 27 mA max. at 30 VDC, 44 mA max. at 10 VDC). Eco LO mode: 870 mW max. (current consumption: 29 mA max. at 30 VDC, 55 mA max. at 10 VDC).

*2 **E3NX-CA0 amplifier:** At power supply voltage of 10 to 30 VDC: Normal mode: 1.080 mW max. (current consumption: 36 mA max. at 30 VDC, 74 mA max. at 10 VDC). Eco ON mode: 840 mW max. (current consumption: 28 mA max. at 30 VDC, 50 mA max. at 10 VDC). Eco LO mode: 930 mW max. (current consumption: 31 mA max. at 30 VDC, 48 mA max. at 10 VDC).

*3 The mutual interference prevention function is disabled if the detection mode is set to Super-high speed mode.

*4 When the sensors are connected to the NJ-series machine controller.

*5 The bank is not reset by the user reset function or saved by the user save function.

Fiber sensor head unit for E3NC-CA0 amplifier

Item		Specifications	
Model		Hex-shaped model	Through-beam model
		E32-C91N 2M	E32-G16 2M
Type		Sensing method: Reflective Size: M6 Aperture angle: 60º	Array
Sensing width		–	10 mm
Bending radius of cable (mm)		Flexible, R4	R5
Sensing distance	Giga-power mode (GIGA)	White paper: 90 mm 12-color discrimination: 18 mm	Opaque/translucent object: 10 mm
	Standard mode (Stnd)	White paper: 45 mm 12-color discrimination: 9 mm	Opaque/translucent object: 10 mm
	High-speed mode (HS)	White paper: 30 mm 12-color discrimination: 6 mm	Opaque/translucent object: 10 mm
	Super-high speed mode (SHS)	White paper: 13 mm 12-color discrimination: 4 mm	Opaque/translucent object: 10 mm
Optical axis diameter (minimum sensing object - mm)		0.05 dia.	–
Installation	Ambient temperature	–40 to 70ºC	
	Tightening torque	0.98 N·m	0.53 N·m
	Mounting hole	6.2 dia.	–
Cable	Bending radius	R4	R5
	Unbendable length (mm)	0	0*1
	Tensile strength	29.4 N	
	Sheath material	Polyethylene	
	Core material	Plastic	
	Emitter/receiver differentiation	White line on emitter cable	–
Weight (packet state)		36 g	51 g

*1 The bending radius of the protective cover (PVC, 25 mm) is 10 mm min.

Laser amplifier unit specifications

Item		Specifications	
Model		E3NC-LA0	E3NC-SA0
Connection method		Connector for sensor communication unit	
Power supply voltage		Supplied from the connector through the sensor communication unit	
Power consumption (at 24 VDC)[*1][*2]		Normal mode: 1560 mW max. (current consumption: 65 mA max.) Eco ON: 1320 mW max. (current consumption: 55 mA max.) Eco LO: 1440 mW max. (current consumption: 60 mA max.)	Normal mode: 1920 mW max. (current consumption: 80 mA max.) Eco ON: 1680 mW max. (current consumption: 70 mA max.) Eco LO: 1800 mW max. (current consumption: 75 mA max.)
Indicators		7-segment displays (sub digital display: green, main digital display: white) Display direction: Switchable between normal and reversed OUT indicator (orange), L/D indicator (orange), ST indicator (blue), DPC indicator (green), ZERO indicator (green) and OUT selection indicator (orange)	
Protection circuits		Power supply reverse polarity protection and output short-circuit protection	
Response time	Super-high speed mode (SHS)[*3]	Operate or reset: 80 μs	Operate or reset: 1.5 ms
	High-speed mode (HS)	Operate or reset: 250 μs	Operate or reset: 5 ms
	Standard mode (Stnd)	Operate or reset: 1 ms	Operate or reset: 10 ms
	Giga-power mode (GIGA)	Operate or reset: 16 ms	Operate or reset: 50 ms
Sensitivity adjustment		Smart tuning (2-point tuning, full auto tuning, position tuning, maximum sensitivity tuning, power tuning or percentage tuning (–99% to +99%) or manual adjustment.	Smart tuning (2-point tuning, full auto tuning,1-point tuning, tuning without workpiece, 2-point area tuning, 1-point area tuning or area tuning without workpiece) or manual adjustment.
Max. connectable units		30[*4]	
No. of unit for mutual interference prevention	Super-high speed mode (SHS)[*3]	0	0
	High-speed mode (HS)	2	2
	Standard mode (Stnd)	2	2
	Giga-power mode (GIGA)	4	2
Functions	Dynamic power control (DPC)	Provided	–
	Timer	Select from timer disabled, OFF-delay, ON-delay, one-shot or ON-delay + OFF-delay timer: 1 to 9,999 ms	
	Zero reset	Negative values can be displayed (threshold value is shifted)	
	Resetting settings[*5]	Select from initial reset (default settings) or user reset (saved settings)	
	Eco mode	Select from OFF (digital display lit), Eco ON (digital display no lit) or Eco LO (digital display dimmed)	
	Bank switching	Select from banks 1 to 4	
	Power tuning	Select from ON or OFF	–
	Output 1	Select from normal detection mode or area detection mode	Select from normal detection mode, area detection mode or hold mode
	Output 2	Select from normal detection mode, alarm output mode or error output mode	Select from normal detection mode or error output mode
	Keep function[*6]	–	Select from ON or OFF
	Background suppression[*7]	–	Select from ON or OFF
	Hysteresis width	Select from standard setting or user setting	
Ambient temperature range		Operating: 0 to 55ºC[*8], Storage: –30 to 70ºC (with no icing or condensation)	
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)	
Installation environment		Pollution degree 3 (as per IEC 60947-1)	
Insulation resistance		20 MΩ min. (at 500 VDC)	
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute	
Vibration resistance (destruction)		10 to 55 Hz with a 1.5 mm double amplitude for 2 hours each in X, Y and Z directions	
Shock resistance (destruction)		150 m/s^2 for 3 times each in X, Y and Z directions	
Weight (packed state/amplifier unit only)		Approx. 65 g / approx. 25 g	
Materials		Polycarbonate (PC)	
Accessories		Instruction manual	

[*1] **E3NC-LA0 amplifier:** At power supply voltage of 10 to 30 VDC: Normal mode: 1650 mW max. (current consumption: 55 mA max. at 30 VDC, 115 mA max. at 10 VDC). Eco ON mode: 1410 mW max. (current consumption: 47 mA max. at 30 VDC, 95 mA max. at 10 VDC). Eco LO mode: 1530 mW max. (current consumption: 51 mA max. at 30 VDC, 105 mA max. at 10 VDC).

[*2] **E3NC-SA0 amplifier:** At power supply voltage of 10 to 30 VDC: Normal mode: 2250 mW max. (current consumption: 75 mA max. at 30 VDC, 145 mA max. at 10 VDC). Eco ON mode: 2010 mW max. (current consumption: 67 mA max. at 30 VDC, 125 mA max. at 10 VDC). Eco LO mode: 2130 mW max. (current consumption: 71 mA max. at 30 VDC, 135 mA max. at 10 VDC).

[*3] The mutual interference prevention function is disabled if the detection mode is set to Super-high speed mode.

[*4] When the sensors are connected to the NJ-series machine controller.

[*5] The bank is not reset by the user reset function or saved by the user save function.

[*6] The output for a measurement error is set. ON: The value of the output from before the measurement error is retained. OFF: The output is turned OFF when a measurement error occurs.

[*7] Only the sensing object is detected when tuning.

[*8] When the number of connected unit is 11 or more, the ambient temperature is less than 50ºC.

Sensor head unit for E3NC-LA0 amplifier

Item		Specifications		
Model		E3NC-LH03	E3NC-LH02	E3NC-LH01
Light source (wavelength)*1		Visible semiconductor laser diode (660 nm), 1.35 mW (average output: 315 μW) (JIS class 1, IEC/EN class 1 and FDA class 1)		
Sensing distance*2	Giga-power mode (GIGA)	8 m	1200 mm	70±15 mm
	Standard mode (Stnd)	6 m	750 mm	
	High-speed mode (HS)	3.5 m	250 mm	
	Super-high speed mode (SHS)	2 m	200 mm	
Beam shape		Spot		
Beam size*3		Approx. 2 mm dia. at 1 mm	Approx. 0.8 mm dia. at 300 mm	Approx. 0.1 mm dia. at 70 mm
Differential distance*4		–	10% of sensing distance max.	
Indicators		OUT indicator (orange) and STABILITY indicator (green)		
Ambient illumination (receiver side)		Incandescence lamp: 10,000 lx max. Sunlight: 20,000 lx max.		
Ambient temperature range		Operating: –10 to 55ºC; Storage: –25 to 70ºC (with no icing or condensation)		
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)		
Insulation resistance		20 MΩ min. (at 500 VDC)		
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute		
Vibration resistance (destruction)		10 to 55 Hz with a 1.5 mm double amplitude or 100 m/s^2 for 2 hours each in X, Y and Z directions		
Shock resistance (destruction)		500 m/s^2 for 3 times each in X, Y and Z directions		
Degree of protection		IEC IP67	IEC IP65	
Connecting method		Pre-wired connector (standard cable length: 2 m)		
Weight (packed state/sensor head only)	Models with 2-m cable	Approx. 120 g / approx. 70 g	Approx. 115 g / approx. 65 g	
	Models with 5-m cable	Approx. 180 g / approx. 130 g	Approx. 175 g / approx. 125 g	
Materials		Case: Polybutylene terephthalate (PBT) / Lens: Methacrylic resin (PMMA) / Cable: Vinyl chloride (PVC)		
Accessories		Instruction manual		

*1 These sensors excluding the E3NC-LH03 model are classified as class 1 laser devices under IEC 60825-1 and the regulations of Laser Notice No. 50 for FDA certification. CDRH (Center for Devices and Radiological Health) registration has been completed (Accession Number: 1220690).

*2 The values were measured using the OMRON standard sensing object (white paper) for the E3NC-LH02 and E3NC-LH01 models. The values for the E3NC-LH03 model apply when an E39-R21, E39-R22, E39-RS10 or E39-RS11 reflector is used. Other reflectors are not recommended.

*3 Defined at the $1/e^2$ (13.5%) of the central intensity at the measurement distance. Measurement may be influenced if there is light leakage outside the defined region and the surroundings of the target object have a high reflectance in comparison to the target object.

*4 Measured at the rated sensing distance.

Sensor head unit for E3NC-SA0 amplifier

Item	Specifications		
Model	E3NC-SH250H	E3NC-SH250	E3NC-SH100
Light source (wavelength)*1	Visible semiconductor laser diode (660 nm), 1 mW (average output: 220 μW) (JIS class 2, IEC/EN class 2 and FDA class 2)	Visible semiconductor laser diode (660 nm), 0.5 mW (average output: 100 μW) (JIS class 1, IEC/EN class 1 and FDA class 1)	
Measurement range	35 to 250 mm (display value: 350 to 2,500)		35 to 100 mm (display value: 350 to 1,000)
Standard detected level difference*2	35 to 180 mm: 9 mm 180 to 250 mm: 25 mm		35 to 50 mm: 1.5 mm 50 to 100 mm: 3 mm
Beam size*3	Approx. 1 mm dia. at 250 mm		Approx. 0.5 mm dia. at 100 mm
Indicators	OUT indicator (orange), STABILITY indicator (green) and ST indicator (blue)		
Ambient illumination (receiver side)	Incandescent lamp: 4,000 lx max. Sunlight: 8,000 lx max.	Incandescent lamp: 2,000 lx max. Sunlight: 4,000 lx max.	Incandescent lamp: 4,000 lx max. Sunlight: 8,000 lx max.
Ambient temperature range	Operating: –10 to 55ºC; Storage: –25 to 70ºC (with no icing or condensation)		
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)		
Insulation resistance	20 MΩ min. (at 500 VDC)		
Dielectric strength	1,000 VAC at 50/60 Hz for 1 minute		
Vibration resistance (destruction)	10 to 55 Hz with a 1.5 mm double amplitude for 2 hours each in X, Y and Z directions		
Shock resistance (destruction)	500 m/s^2 for 3 times each in X, Y and Z directions		
Degree of protection	IEC IP67		
Connecting method	Pre-wired connector (standard cable length: 2 m)		
Weight (packed state/sensor head only)	Approx. 125 g / approx. 75 g		
Materials	Case: Polybutylene terephthalate (PBT) / Lens: Methacrylic resin (PMMA) / Cable: Vinyl chloride (PVC)		
Accessories	Instruction manual, laser warning label (E3NC-SH250H model only)		

*1 These sensors are classified as class 1 laser devices under IEC 60825-1 and the regulations of Laser Notice No. 50 for FDA certification. CDRH (Center for Devices and Radiological Health) registration has been completed (Accession Number: 1220691).

*2 The values were measured at the center of the sensing distance using OMRON's standard sensing object (white ceramic).

*3 Beam size: Defined at the $1/e^2$ (13.5%) of the central intensity at the measurement center distance. Measurement may be influenced if there is light leakage outside the defined region and the surroundings of the target object have a high reflectance in comparison to the target object. Also, when detecting a workpiece that is smaller than the beam size, a correct value may not be obtained.

Note: Incorrect detection may occur outside the measurement range if the object has a high reflection factor.

Contact amplifier unit specifications

Item		Specifications
Model		**E9NC-TA0**
Connection method		Connector for sensor communication unit
Power supply voltage		Supplied from the connector through the sensor communication unit
Display resolution		0.1 μm min.
Power consumption (at 24 VDC)[*1]		Normal mode: 2040 mW max. (current consumption: 85 mA max.) Eco ON: 1800 mW max. (current consumption: 75 mA max.) Eco LO: 1920 mW max. (current consumption: 80 mA max.)
Indicators		7-segment displays (white) GO indicator (orange), HIGH/LOW indicator (orange), NO/NC indicator (orange), PRST indicator (green) and ST indicator (blue)
Protection circuits		Power supply reverse polarity protection and output short-circuit protection
Response time	**Super-high speed mode (SHS)**	Operate or reset: 3 ms
	High-speed mode (HS)	Operate or reset: 10 ms
	Standard mode (Stnd)	Operate or reset: 100 ms
	Giga-power mode (GIGA)	Operate or reset: 1,000 ms
Threshold setting		Smart tuning (2-point area tuning, tolerance tuning, 2-point tuning, 1-point tuning) or manual adjustment
No. of banks		4
Max. connectable units		30[*2]
Functions	**Output mode selection**	Normal output, hybrid output (output is performed according to the combination of the two bits used to specify HIGH, GO, LOW and error)
	Preset	Negative values can be displayed
	Resetting settings[*3]	Select from initial reset (default settings) or user reset (saved settings)
	Eco mode[*4]	Select from OFF (digital display lit), Eco ON (digital display no lit) or Eco LO (digital display dimmed)
	Bank switching	Select from banks 1 to 4
	Origin point use setting	Select wether using the sensor head origin point or setting the point at power ON as origin
	Direction	Switchable
	Output	Select from normal sensing mode or area sensing mode
	Display digits	Settable in units ranging from 0.0001 mm to 1 mm
Ambient temperature range		Operating: 0 to 55ºC[*5], Storage: –30 to 70ºC (with no icing or condensation)
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute
Vibration resistance (destruction)		10 to 55 Hz with a 1.5 mm double amplitude for 2 hours each in X, Y and Z directions
Shock resistance (destruction)		150 m/s^2 for 3 times each in X, Y and Z directions
Weight (packed state/amplifier unit only)		Approx. 65 g / approx. 25 g
Materials		Polycarbonate (PC)
Accessories		Instruction manual

[*1] At power supply voltage of 10 to 30 VDC: Normal mode: 2250 mW max. (current consumption: 75 mA max. at 30 VDC, 155 mA max. at 10 VDC). Eco ON mode: 2010 mW max. (current consumption: 67 mA max. at 30 VDC, 135 mA max. at 10 VDC). Eco LO mode: 2130 mW max. (current consumption: 71 mA max. at 30 VDC, 145 mA max. at 10 VDC).

[*2] When the sensors are connected to the NJ-series machine controller.

[*3] The bank is not reset by the user reset function or saved by the user save function.

[*4] Eco LO is supported for amplifier units manufactured in August 2014 or later.

[*5] When the number of connected unit is 11 or more, the ambient temperature is less than 50ºC.

Sensor head unit for E9NC-TA0 amplifier

Item		Specifications	
Model		E9NC-TH5□	E9NC-TH12□
Measuring range (moving range)		5 mm	12 mm
Resolution		0.1 μm	
Precision*1		1 μm	
Measuring force*1	Upward	0.35±0.25 N	0.4±0.3 N
	Horizontal	0.4±0.25 N	0.5±0.3 N
	Downward	0.45±0.25 N	0.6±0.3 N
Indicator (preamplifier)		Operation indicator (blue/red)	
Ambient temperature range		Operating: –10 to 55ºC, Storage: –20 to 60ºC (with no icing or condensation)	
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)	
Maximum response speed		80 m/min	
Origin detection speed		80 m/min	
Origin position		1±0.5 mm from the spindle push-out position (the lowest point)	
Vibration resistance (destruction)		100 m/s^2 (20 to 2,000 Hz) 20 minutes each in X, Y and Z directions	
Shock resistance (destruction)		1,000 m/s^2 for 3 times each in X, Y and Z directions	
Degree of protection	Head	Right-angle air type: IEC IP67 (only when a hose elbow and air hose are connected) Straight type: -	
	Preamplifier	–	
Number of sliding operations		92 million times (based on OMRON's dedicated evaluation)	
Probe		Carbide with a round surface, screw thread size: M2.5	
Connecting method		Pre-wired connector (2 m from the sensor head to the preamplifier)	
Materials		Sensor head: Stainless steel (SUS303) / Rubber boot: Nitrile rubber (NBR) / Preamplifier: ABS / Probe contact point*2: Carbide / Cable: PVC / Hose elbow for air (right-angle air type only): Nickel-plated brass / Tightening nut (flanged type only): Stainless level (SUS410) / Wave dasher (flanged type only): SK5	
Weight (packed state/sensor head only)		Approx. 340 g / approx. 110 g	
Accessories		Common: Wrench, instruction manual Right-angle air type: Hose elbow Flanged type: Tightening nut, wave dasher, clamp wrench, pin	

*1 These values were measured at an ambient temperature of 20ºC.

*2 For the case of the provided E9NC-TB1 (3-dia. probe).

EtherCAT communication specifications

Item	Specifications
Communication protocol	Dedicated protocol for EtherCAT
Modulation	Base band method
Baud rate	100 Mbps
Physical layer	100BASE-TX (IEEE 802.3u)
Topology	Daisy chain
Communication media	STP category 5 or higher
Communication distance	Distance between nodes: 100 m max.
Noise immunity	Conforms to IEC 61000-4-4, 1 kV or higher
Node address setting method	Set with decimal rotary switch or software*1
Node address range	000 to 192*2

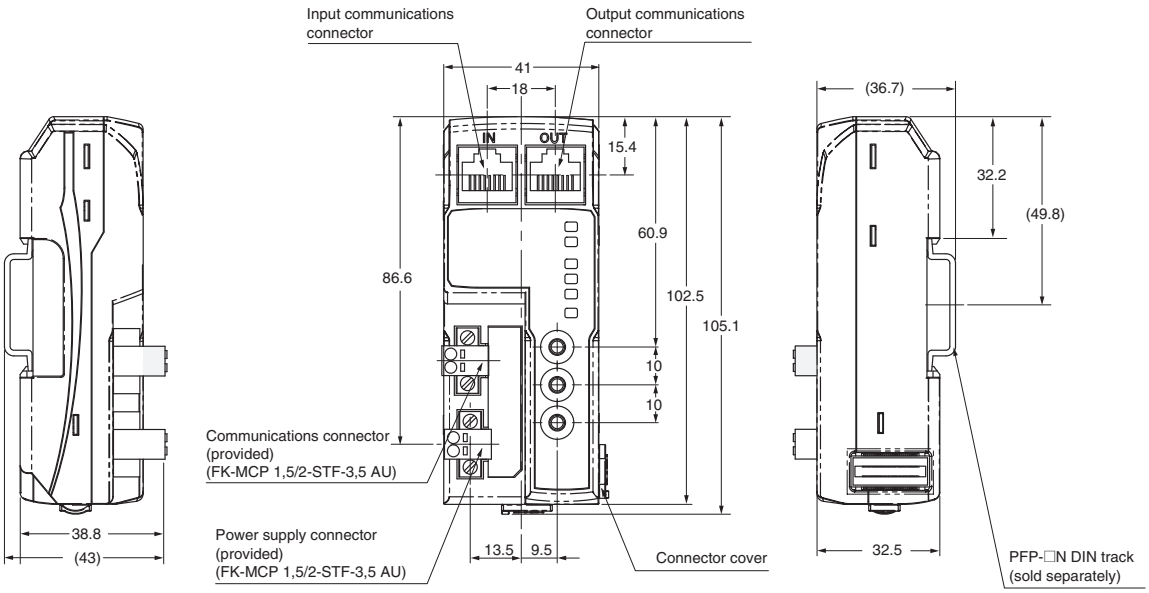
*1 The software setting is used when the node address setting switches are set to 0.

*2 The range depends on the EtherCAT master that is used. Refer to the "E3NW-ECT EtherCAT sensor communication unit operation manual (E429)" for details.

Dimensions

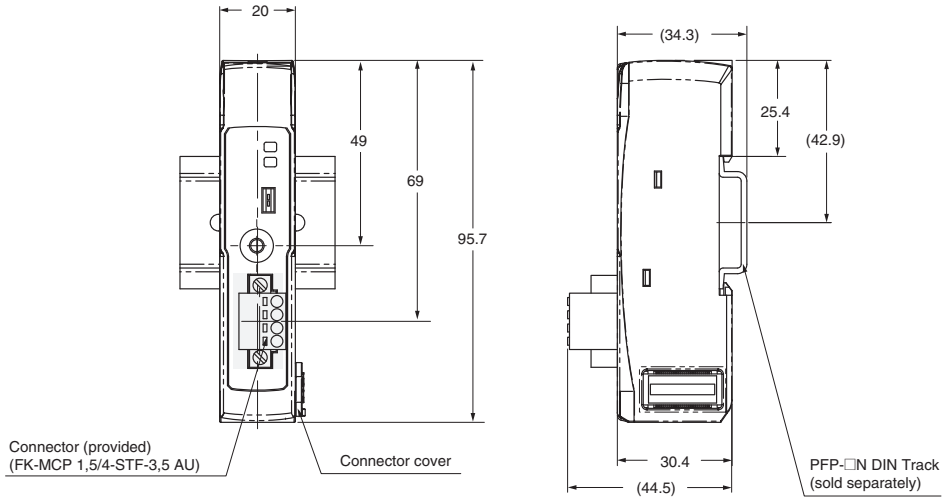
Sensor communication unit

E3NW-ECT



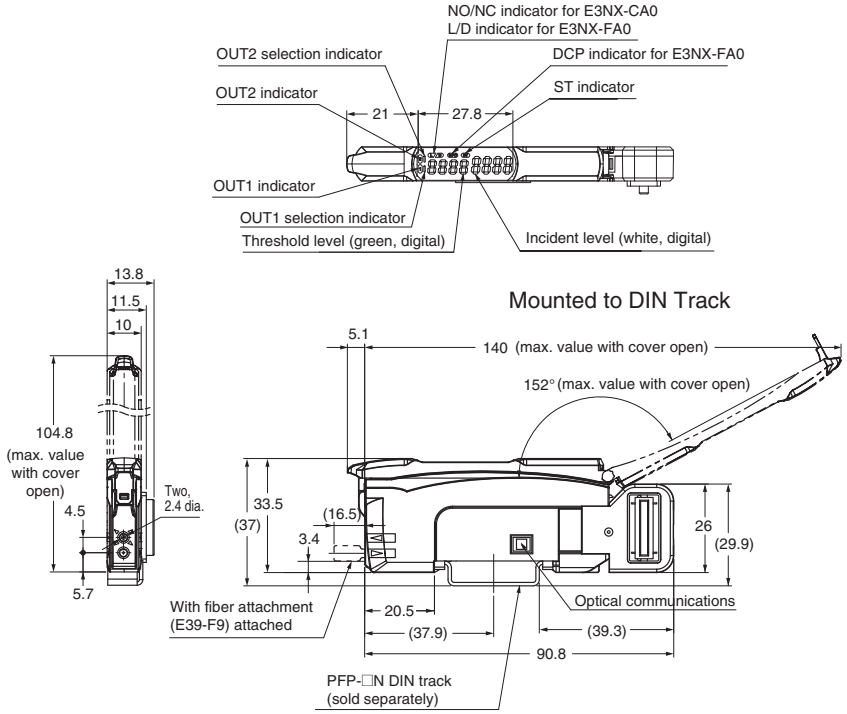
Distributed sensor unit

E3NW-DS



Fiber amplifier unit

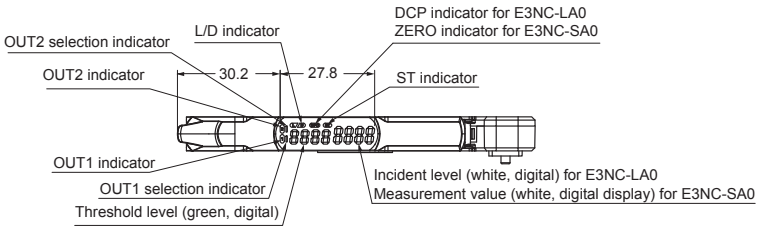
E3NX-FA0 / E3NX-CA0



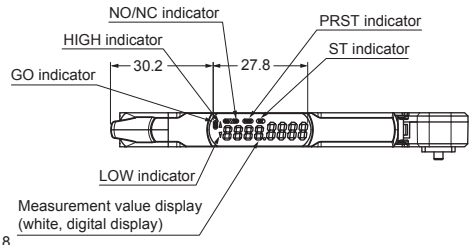
Laser / Contact amplifier unit

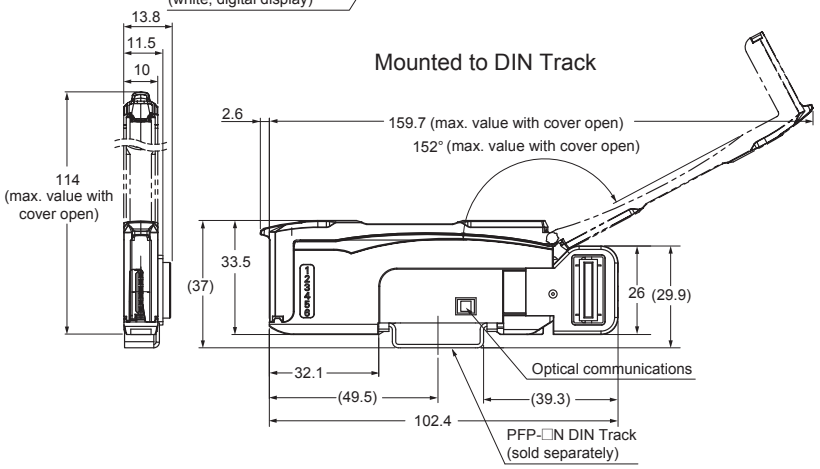
E3NC-LA0 / E3NC-SA0 / E9NC-TA0

E3NC-LA0/SA0



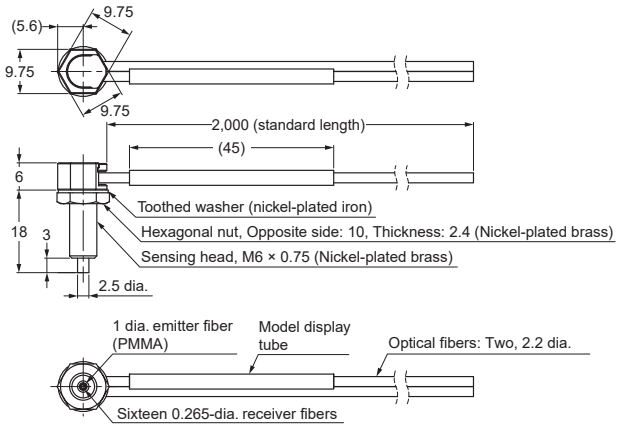
E9NC-TA0



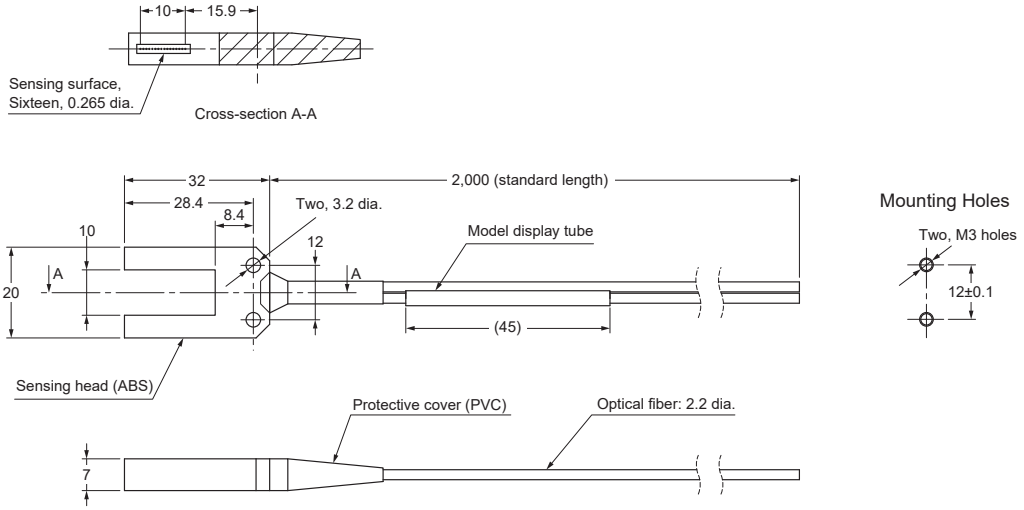


Fiber sensor head unit for E3NX-CA0 amplifier

E32-C91N

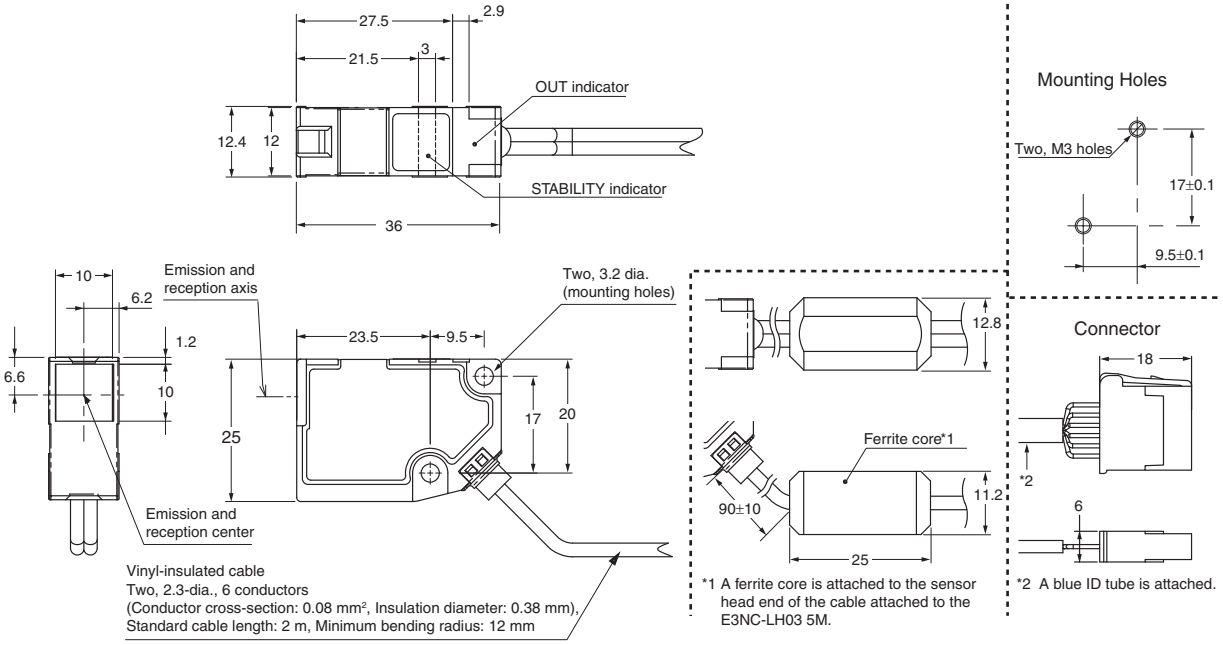


E32-G16

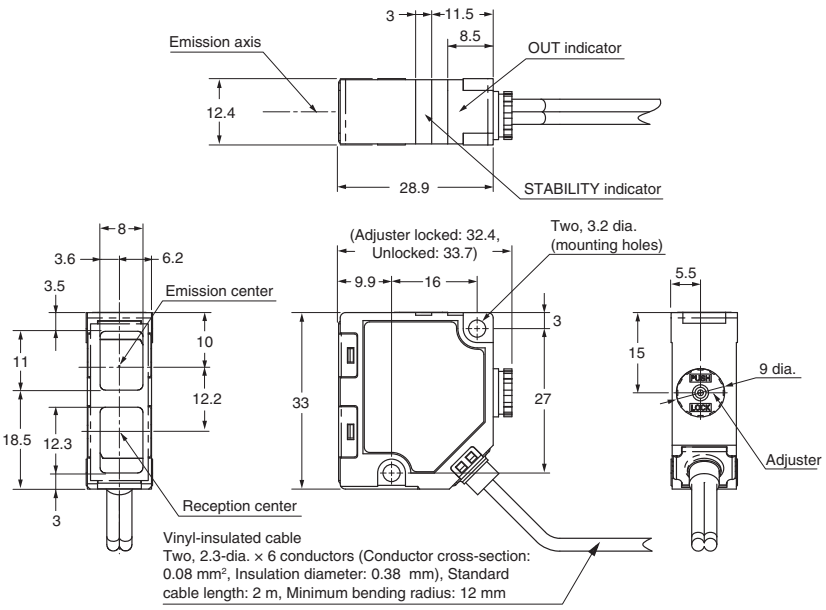


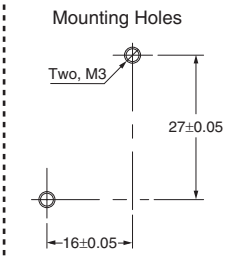
Sensor head unit for E3NC-LA0 amplifier

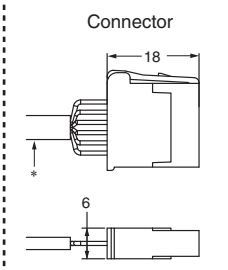
E3NC-LH03



E3NC-LH02

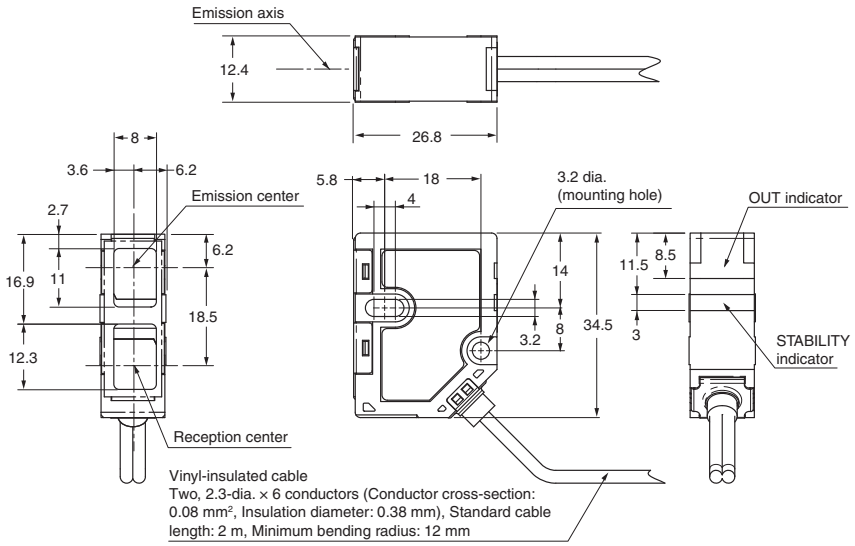


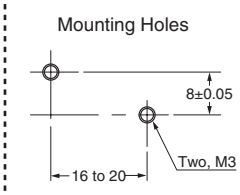


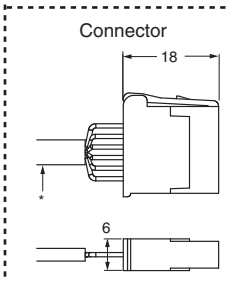


* A blue ID tube is attached.

E3NC-LH01



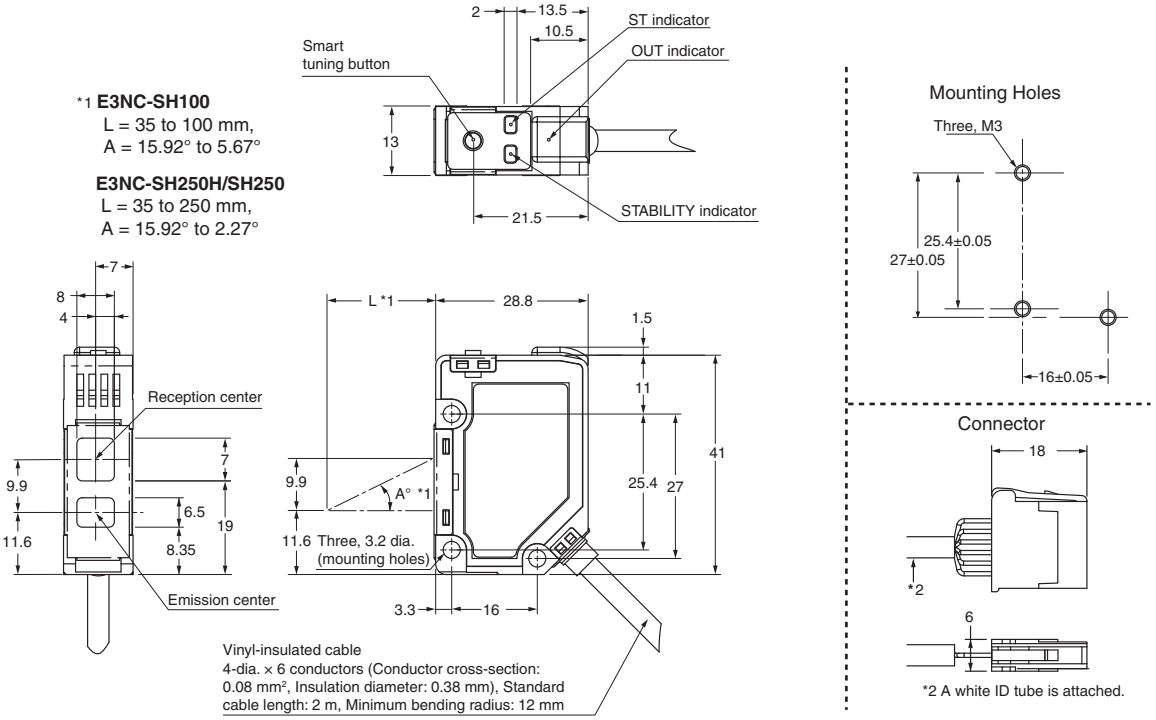




* A blue ID tube is attached.

Sensor head unit for E3NC-SA0 amplifier

E3NC-SH250H / E3NC-SH250 / E3NC-SH100



Sensor head unit for E9NC-TA0 amplifier

Figure 1: E9NC-TH□S

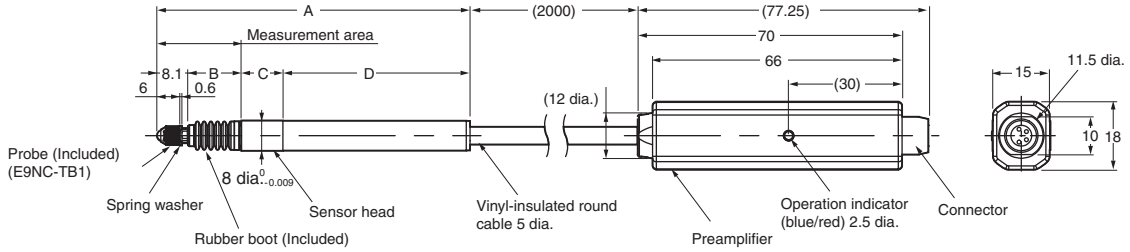


Figure 2: E9NC-TH□L

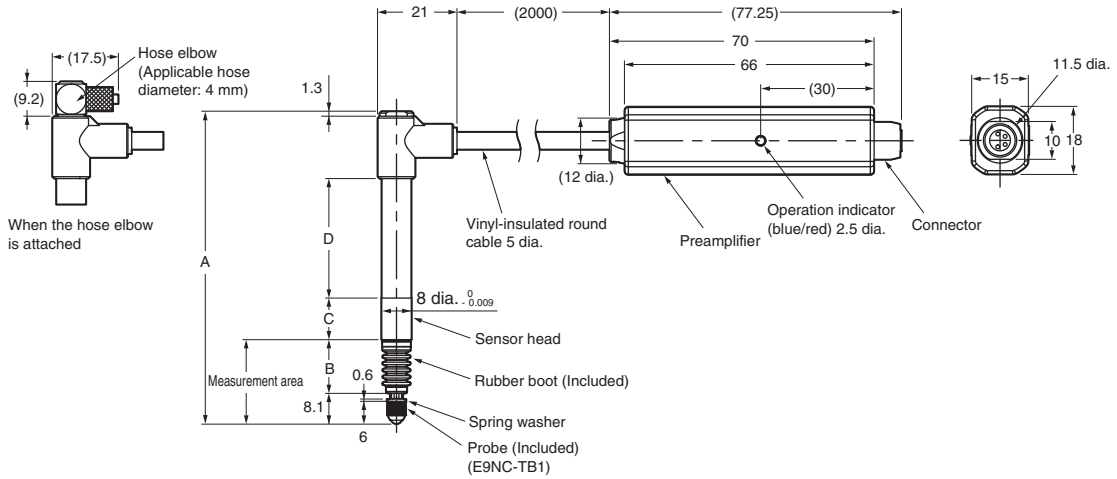


Figure 3: E9NC-TH□SF

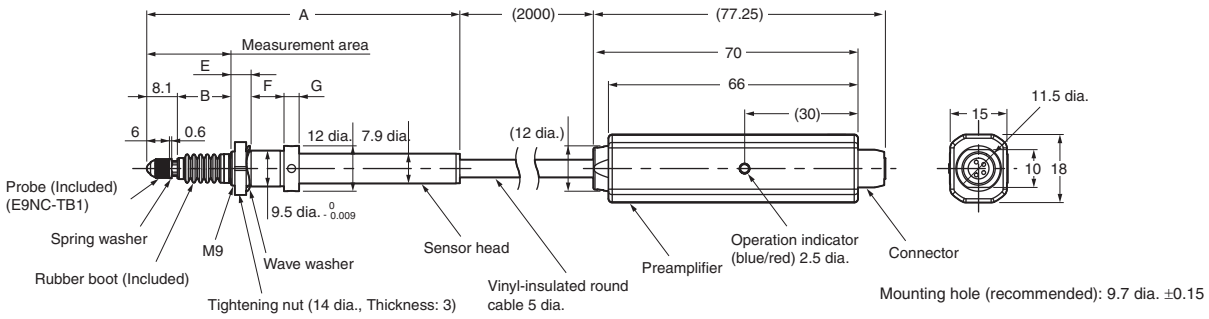
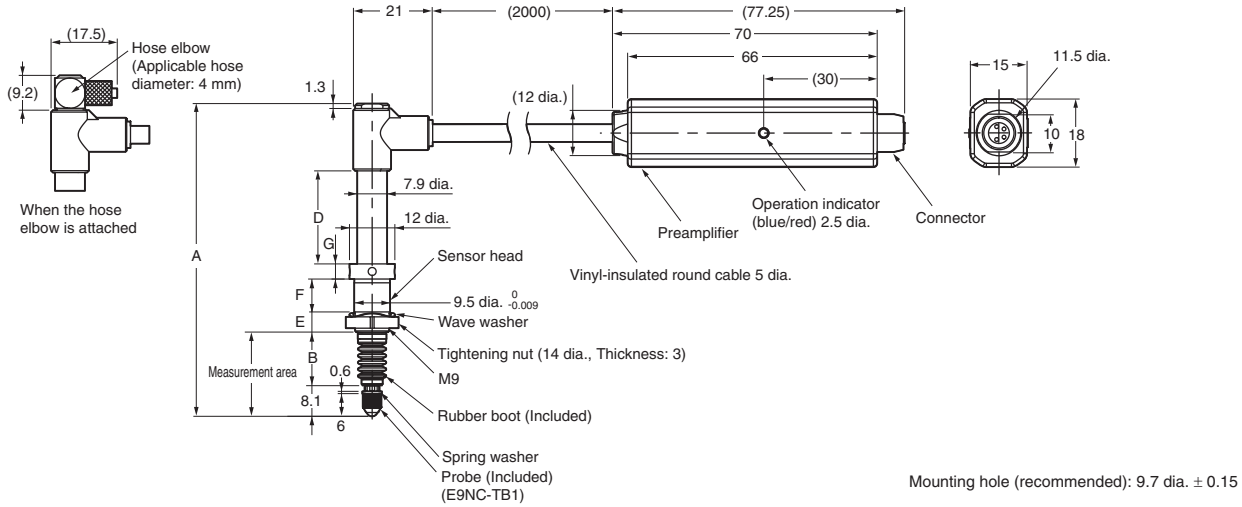


Figure 4: E9NC-TH□LF



Cable model	Figure	Dimensions (mm)								Rubber boot model (included)
		A	B	C	D	E	F	G	Measurement area	
E9NC-TH5S	1	82.8	14.2	11	49.5	–	–	–	17.3 to 22.3	E9NC-G5
E9NC-TH12S		109.7	24.9	19.5	57.2	–	–	–	21 to 33	E9NC-G12
E9NC-TH5L	2	82.7	14.2	11	31.6	–	–	–	17.3 to 22.3	E9NC-G5
E9NC-TH12L		109.6	24.9	19.5	39.3	–	–	–	21 to 33	E9NC-G12
E9NC-TH5SF	3	82.8	14.2	–	–	5.3	8.7	4	17.3 to 22.3	E9NC-G5
E9NC-TH12SF		109.7	24.9	–	–	8	5.8	5.7	21 to 33	E9NC-G12
E9NC-TH5LF	4	82.7	14.2	–	24.6	5.3	8.7	4	17.3 to 22.3	E9NC-G5
E9NC-TH12LF		109.6	24.9	–	39.3	8	5.8	5.7	21 to 33	E9NC-G12

Note: The minimum bending radius of the sensor head cable are 50 mm for repeated flexing and 20 mm for permanent bend.

Ordering information

Communication unit

Type	Power supply	Model	Appearance
Sensor communication unit for EtherCAT	24 VDC, supplied from terminal block connector	E3NW-ECT*1	
Distributed sensor unit	24 VDC, supplied from terminal block connector through the sensor communication unit	E3NW-DS	

*1 The E9NC-TA0 is supported for firmware version 1.03 or higher (sensor communication units manufactured in July 2014 or later).

Amplifier unit

Type	Power supply	Model	Appearance
Smart fiber amplifier unit	Supplied from the connector through the sensor communication unit and distributed unit	E3NX-FA0*1	
Smart color mark fiber amplifier unit		E3NX-CA0	
Smart laser amplifier unit		E3NC-LA0	
Smart laser amplifier unit (CMOS type)		E3NC-SA0	
Smart contact amplifier unit		E9NC-TA0	

*1 For details on the sensors that you can connect, refer to E32 fiber units information in the OMRON website.

Fiber sensor head unit for E3NX-CA0 amplifier

Type	Sensing direction	Size	Model	Appearance
Reflective	Right angle	M6	E32-C91N 2M	
Through-beam (grooved type)	Array	10 mm	E32-G16 2M	

Sensor head unit for E3NC-LA0 amplifier

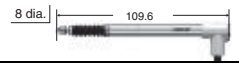
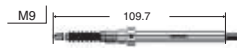
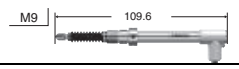
Type	Beam shape	Sensing distance	Laser class	Cable length	Model	Appearance
Coaxial retro-reflective with MSR function	Spot	8 m*1	Class 1	2 m	E3NC-LH03 2M	
				5 m	E3NC-LH03 5M	
Diffuse-reflective	Variable spot	1.2 m		2 m	E3NC-LH02 2M	
				5 m	E3NC-LH02 5M	
Limited-reflective	Spot	70±15 mm		2 m	E3NC-LH01 2M	
				5 m	E3NC-LH01 5M	

*1 This value apply when an E39-R21, E39-R22, E39-RS10 or E39-RS11 reflector is used. The reflector is not included. Purchase a reflector separately to match the intended use of the sensor.

Sensor head unit for E3NC-SA0 amplifier

Type	Beam shape	Measurement range	Laser class	Cable length	Model	Appearance
Distance-settable	Spot	35 to 250 mm	Class 2	2 m	E3NC-SH250H 2M	
			Class 1	2 m	E3NC-SH250 2M	
		35 to 100 mm		2 m	E3NC-SH100 2M	

Sensor head unit for E9NC-TA0 amplifier

Type	Measuring range (moving range)	Resolution	Precision	Model	Appearance (head size)
Straight type	5 mm	0.1 μm	1 μm	E9NC-TH5S 2M	
Right-angle air type				E9NC-TH5L 2M	
Flanged type/ straight type				E9NC-TH5SF 2M	
Flanged type/ right-angle air type				E9NC-TH5LF 2M	
Straight type	12 mm	0.1 μm	1 μm	E9NC-TH12S 2M	
Right-angle air type				E9NC-TH12L 2M	
Flanged type/ straight type				E9NC-TH12SF 2M	
Flanged type/ right-angle air type				E9NC-TH12LF 2M	

Note: Connection cable between preamplifier and amplifier unit is not provided with the sensor head. Be sure to have the connection cable ready when using the sensor.

Accessories

Type		Applicable sensor head	Model	Appearance
Mounting bracket	Mounting bracket: 1 Nut plate: 1 Philips screws (M3×18): 2	E3NC-LH03	E39-L190	
		E3NC-LH02	E39-L185	
		E3NC-LH01	E39-L186	
		E3NC-SH series	E39-L187	
			E39-L188	
		E32-C91N E32-G16 E9NC-TH series	E39-L143	
Probe	3-dia. probe	E9NC-TH series	E9NC-TB1*1	
	Nylon probe		E9NC-TB2	
	Probe for flat surfaces		E9NC-TB3	
DIN track	Length: 0.5 m, height: 7.3 mm		PFP-50N	
	Length: 1 m, height: 7.3 mm		PFP-100N	
	Length: 1 m, height: 16 mm		PFP-100N2	
End plate	End plate to secure the units on the DIN track		PFP-M (2 pcs)	

*1 The E9NC-TB1 is provided with the sensor head. Order replacements as required.

Cables

Type	Cable length	Model
Connection cable between preamplifier and E9NC-TA0 amplifier unit	0.5 m	E9NC-TXC05
	5 m	E9NC-TXC5
	10 m	E9NC-TXC10
	20 m	E9NC-TXC20

Computer software

Specifications	Model
Sysmac Studio version 1.05 or higher[*1]	SYSMAC-SE2□□□

[*1] For the E3NX-CA0 color fiber amplifier unit, Sysmac Studio version 1.16 or higher is needed.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_E97E-EN-03 In the interest of product improvement, specifications are subject to change without notice.

E3X-□, E3C-LDA0, E2C-EDA0

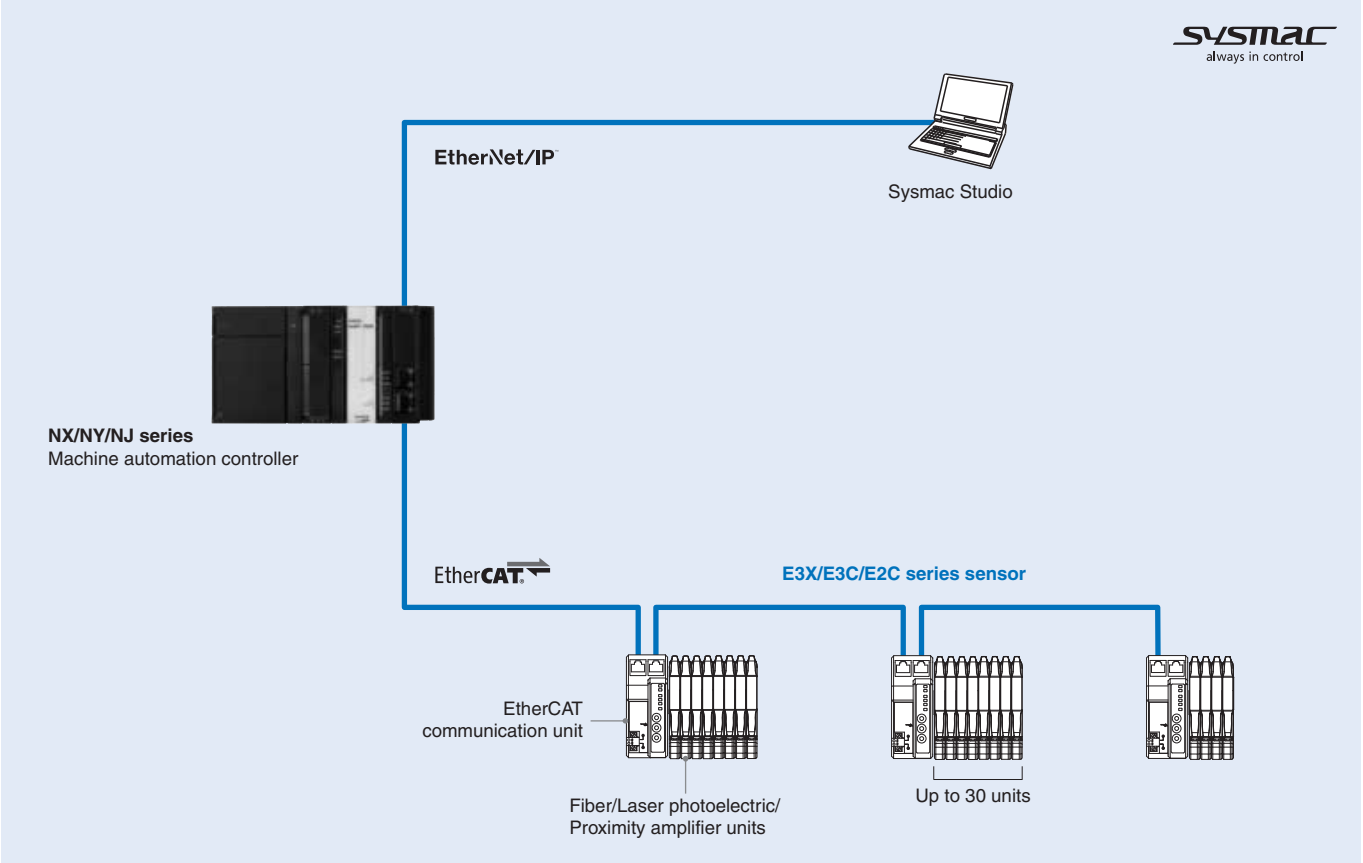
E3X/E3C/E2C series sensor



Easily connect fiber sensors, laser photoelectric sensors and proximity sensors to EtherCAT

- Most easy set up and operation by smart tuning and integration into Sysmac Studio
- Ultra high-speed communication of sensor output
- Sensor functions such as reading present values, changing settings and tuning are controlled by EtherCAT
- Up to 30 amplifiers can be connected

System configuration



Specifications

EtherCAT communication unit specifications

Item	Specifications
Model	**E3X-ECT**
Power supply voltage	20.4 to 26.4 VDC
Power consumption	2.4 W max. (not include sensors current) 100 mA max. at 24 VDC (not include sensors current)
Indicators	L/A IN (yellow), L/A OUT (yellow), PWR (green), RUN (green), ERROR (red), SS (sensor status) (green/red)
Vibration resistance	10 to 150 Hz with double-amplitude of 0.7 mm or 50 m/s^2 for 80 minutes each in X, Y and Z directions
Shock resistance	150 m/s^2, for 3 times each in 3 directions
Dielectric strength	500 VAC at 50/60 Hz for 1 minute
Insulation resistance	20 MΩ min.
Ambient operating temperature	0 to 55°C
Ambient operating humidity	25% to 85% (with no condensation)
Storage temperature	–30 to 70°C (with no icing or condensation)
Storage humidity	25% to 85% (with no condensation)
Installation	Mounted on 35 mm DIN track
Accessories	Power supply connector, connector cover, DIN track end plates and instruction manual
Weight (packed state)	Approx. 220 g

Fiber amplifier unit specifications

Item		Specifications	
Model		**E3X-HD0**	**E3X-MDA0**
Connection method		Connector for sensor communication unit	
Light source (wavelength)		Red, 4-element LED (625 nm)	Red LED (635 nm)
Power supply voltage		12 to 24 VDC, ±10%, ripple (P-P) 10% max	
Power consumption		Normal mode: 720 mW max. (30 mA max. at 24 VDC, 60 mA max. at 12 VDC) Power saving eco: 530 mW max. (22 mA max. at 24 VDC, 44 mA max. at 12 VDC)	1,080 mW max. (45 mA max. at power supply voltage of 24 VDC)
Protection circuits		Power supply reverse polarity protection and output short-circuit protection	Power supply reverse polarity protection and output short-circuit protection
Response time	**High-speed mode**	Operate or reset: 250 μs	Operate or reset: 450 μs
	Standard mode	Operate or reset: 1 ms	Operate or reset: 1 ms
	Giga-power mode	Operate or reset: 16 ms	Operate or reset: 4 ms
	High-resolution mode	–	–
	Tough mode	–	–
Mutual interference prevention		Possible for up to 10 units (optical communications sync)	Possible for up to 9 units (18 channels)
Auto power control (APC)		Always ON	
Other functions		Power tuning, differential detection, DPC, timer (OFF-delay, ON-delay or one-shot), zero reset, resetting settings and Eco mode	Power tuning, timer (OFF-delay, ON-delay or one-shot), zero reset, resetting settings, Eco mode and output setting
Ambient illumination (receiver side)		Incandescent lamp: 20,000 lux max., Sunlight: 30,000 lux max.	Incandescent lamp: 10,000 lux max., Sunlight: 20,000 lux max.
Connectable units		30 units max. (with E3X-ECT)	
Ambient temperature range		Operating: Groups of 1 to 2 amplifiers: 0 to 55 ºC Groups of 3 to 10 amplifiers: 0 to 50 ºC Groups of 11 to 16 amplifiers: 0 to 45 ºC Groups of 17 to 30 amplifiers: 0 to 40 ºC Storage: –30 to 70°C (with no icing condensation)	
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)	
Insulation resistance		20 MΩ min. (at 500 VDC)	
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute	
Vibration resistance		Destruction: 10 to 150 Hz with 0.7 mm double amplitude for 80 minutes each in X, Y and Z directions	
Shock resistance		Destruction: 150 m/s^2, for 3 times each in X, Y and Z directions	
Degree of protection		IEC 60529 IP50 (with protective cover attached)	
Weight (packed state)		Approx. 65 g	Approx. 55 g
Materials	**Case**	Heat-resistant ABS	Polybutylene terephthalate (PBT)
	Cover	Polycarbonate (PC)	
Accessories		Instruction manual	

Laser photoelectric amplifier unit specifications

Item		Specifications
Model		**E3C-LDA0**
Connection method		Connector for sensor communication unit
Power supply voltage		12 to 24 VDC, ±10%, ripple (P-P) 10% max
Power consumption		1,080 mW max. (45 mA max. at power supply voltage of 24 VDC)
Protection circuits		Power supply reverse polarity protection and output short-circuit protection
Response time	**High-speed mode**	Operate or reset: 250 μs
	Standard mode	Operate or reset: 1 ms
	High-resolution mode	Operate or reset: 4 ms
Mutual interference prevention		Possible for up to 10 units
Auto power control (APC)		Always ON
Other functions		Differential detection, timer (OFF-delay, ON-delay or one-shot), zero reset, resetting settings, counter and output setting
Connectable units		30 units max. (with E3X-ECT)
Ambient temperature range		Operating: Groups of 1 to 2 amplifiers: 0 to 55°C Groups of 3 to 10 amplifiers: 0 to 50°C Groups of 11 to 16 amplifiers: 0 to 45°C Groups of 17 to 30 amplifiers: 0 to 40°C Storage: –30 to 70°C (with no icing condensation)
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute
Vibration resistance		Destruction: 10 to 150 Hz with 0.7 mm double amplitude for 80 minutes each in X, Y and Z directions
Shock resistance		Destruction: 150 m/s^2, for 3 times each in X, Y and Z directions
Degree of protection		IEC 60529 IP50 (with protective cover attached)
Weight (packed state)		Approx. 55 g
Materials	**Case**	Polybutylene terephthalate (PBT)
	Cover	Polycarbonate (PC)
Accessories		Instruction manual

Proximity amplifier unit specifications

Item		Specifications
Model		**E2C-EDA0**
Connection method		Connector for sensor communication unit
Power supply voltage		12 to 24 VDC, ±10%, ripple (P-P) 10% max
Power consumption		1,080 mW max. (45 mA max. at power supply voltage of 24 VDC)
Protection circuits		Power supply reverse polarity protection and output short-circuit protection
Response time	**High-speed mode**	Operate or reset: 300 μs
	Standard mode	Operate or reset: 1 ms
	High-resolution mode	Operate or reset: 4 ms
Mutual interference prevention		Possible for up to 5 units
Other functions		Differential detection, timer (OFF-delay, ON-delay or one-shot), zero reset, resetting settings, hysteresis settings and output setting
Connectable units		30 units max. (with E3X-ECT)
Ambient temperature range		Operating: Groups of 1 to 2 amplifiers: 0 to 55°C Groups of 3 to 5 amplifiers: 0 to 50°C Groups of 6 to 16 amplifiers: 0 to 45°C Groups of 17 to 30 amplifiers: 0 to 40°C When used in combination with an E2C-EDR6-F: Groups of 3 to 4 amplifiers: 0 to 50°C Groups of 5 to 8 amplifiers: 0 to 45°C Groups of 9 to 16 amplifiers: 0 to 40°C Groups of 17 to 30 amplifiers: 0 to 35°C Storage: –30 to 70°C (with no icing condensation)
Ambient humidity range		Operating and storage: 35% to 85% (with no condensation)
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		1,000 VAC at 50/60 Hz for 1 minute
Vibration resistance		Destruction: 10 to 150 Hz with 0.7 mm double amplitude for 80 minutes each in X, Y and Z directions
Shock resistance		Destruction: 150 m/s^2, for 3 times each in X, Y and Z directions
Degree of protection		IEC 60529 IP50 (with protective cover attached)
Weight (packed state)		Approx. 55 g
Materials	**Case**	Polybutylene terephthalate (PBT)
	Cover	Polycarbonate (PC)
Accessories		Instruction manual

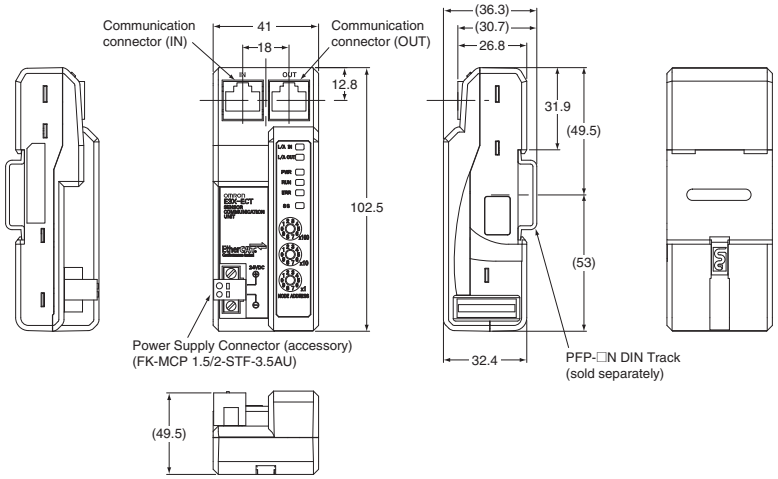
EtherCAT communication specifications

Item	Specifications
Communication protocol	Dedicated protocol for EtherCAT
Modulation	Base band
Baud rate	100 Mbps
Physical layer	100BASE-TX (IEEE802.3)
Connectors	RJ45 shielded connector × 2/CN IN: EtherCAT input/CN OUT: EtherCAT output
Topology	Daisy chain
Communication media	Category 5 or higher (cable with double, aluminium tape and braided shielding is recommended)
Communication distance	Distance between nodes (slaves): 100 m max.
Noise resistance	Conforms to IEC 61000-4-4, 1 kV or higher
Node address setting method	Set with decimal rotary switch or Sysmac Studio
Node address range	1 to 999: set with rotary switch/1 to 65,535: set with Sysmac Studio
LED display	PWR × 1/L/A IN (Link/Activity IN) × 1/L/A OUT (Link/Activity OUT) × 1/RUN × 1/ERR × 1
Process data	Variable PDO mapping
PDO size/node	36 byte max.
Mailbox	Emergency messages, SDO requests, SDO responses and SDO information
Synchronization mode	Free run mode or DC mode 1

Dimensions

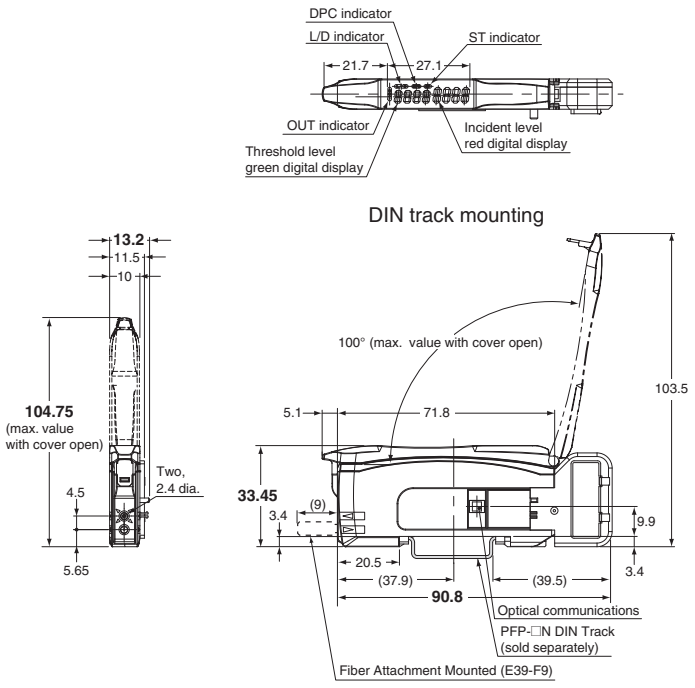
EtherCAT communication unit

E3X-ECT

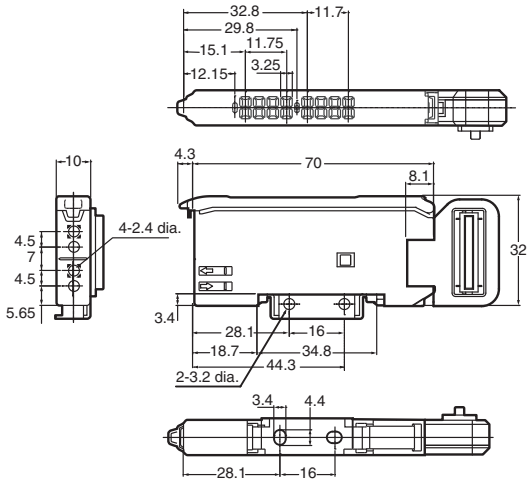


Fiber amplifier unit

E3X-HD0

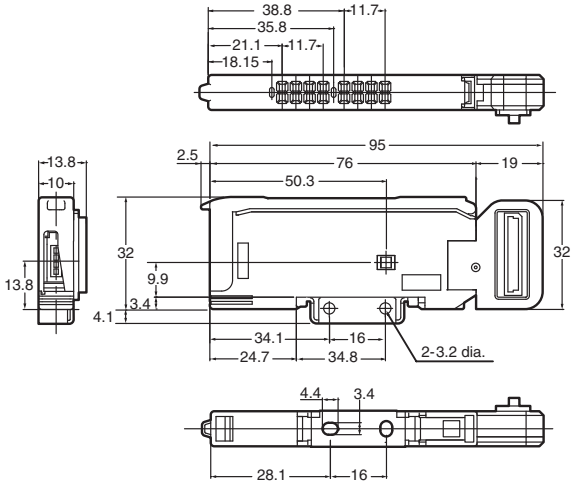


E3X-MDA0



Laser photoelectric/Proximity amplifier unit

E3C-LDA0 / E2C-EDA0



Ordering information

EtherCAT communication unit

Type	Power supply voltage	Power supply	Model
EtherCAT communication unit	24 VDC	Supplied from the connector	E3X-ECT

Note: Please read and understand the important precautions and reminders described on the manuals (E413) of E3X-ECT, before attempting to start operation.

Connectable amplifiers

Type	Connection method	Power supply	Model
Standard fiber amplifier unit	Connect to a communication unit and amplifier units by connectors	Supplied from the connector through the communication unit	E3X-HD0*1
Two-channel fiber amplifier unit			E3X-MDA0*1
Laser photoelectric amplifier unit			E3C-LDA0*2
Proximity amplifier unit			E2C-EDA0*3

*1. These fiber amplifier units should be connected to a fiber unit (E32 series). For details on the sensors that you can connect, refer to product information on your OMRON website.

*2. This laser photoelectric amplifier unit should be connected to a laser photoelectric sensor head unit (E3C-LD series). For details on the sensors that you can connect, refer to product information on your OMRON website.

*3. This proximity amplifier unit should be connected to a proximity sensor head unit (E2C-ED series). For details on the sensors that you can connect, refer to product information on your OMRON website.

Note: Please read and understand the important precautions and reminders described on the instruction sheet bundled to the product, before attempting to start operation.

EtherCAT communication cables

Refer to “Recommended EtherCAT and EtherNet/IP communication cables” in the NJ-Series controller section for the recommended cables.

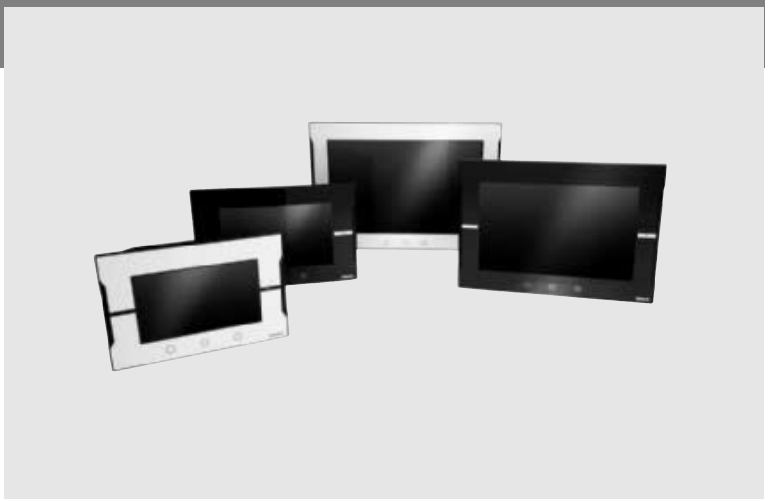
Computer software

Specifications	Model
Sysmac Studio version 1.02 or higher	SYSMAC-SE2□□□

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_E417-E2-02A In the interest of product improvement, specifications are subject to change without notice.

NA series

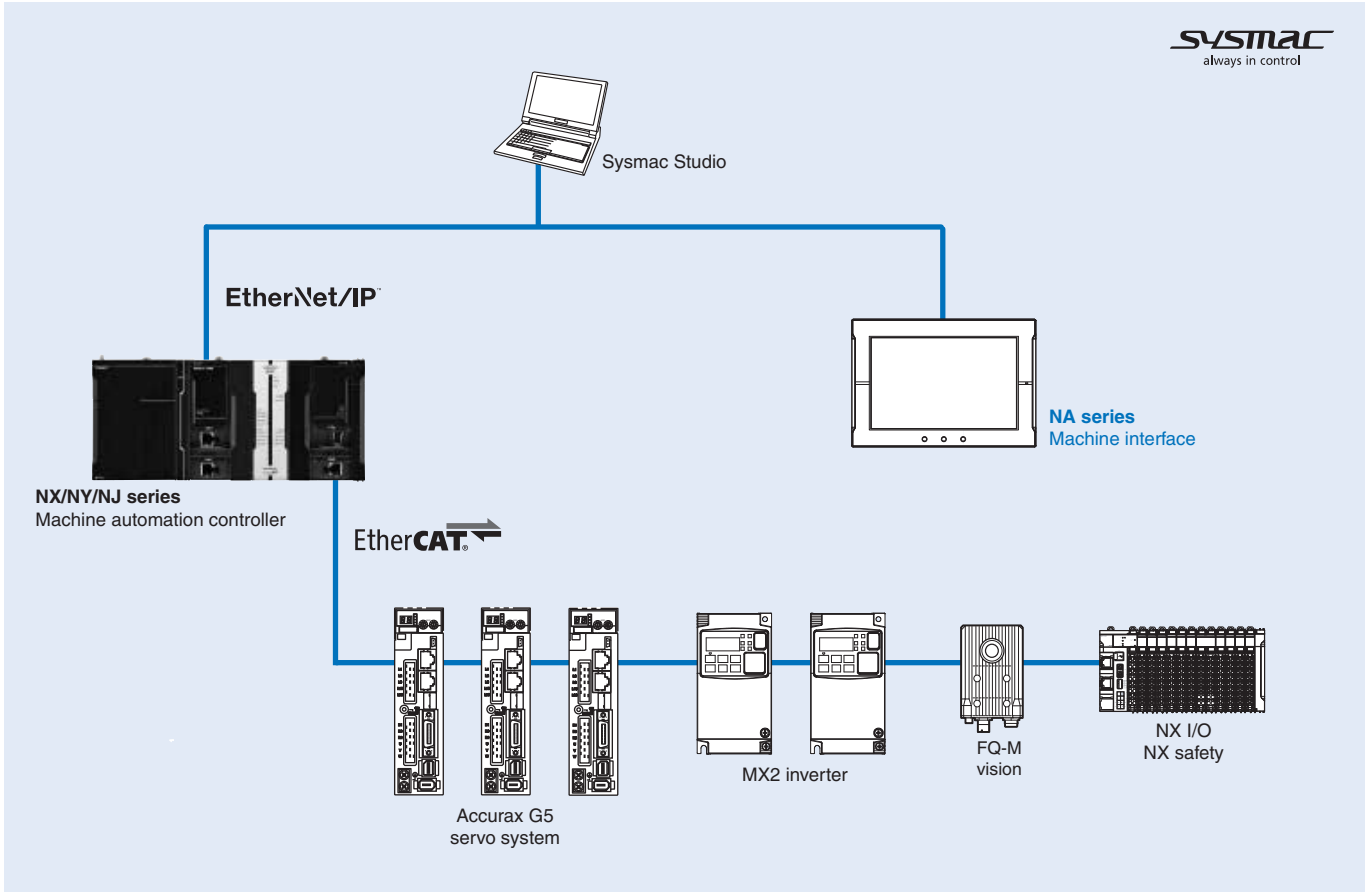


The next generation of machine interface

An HMI that is dynamic, intuitive and predictive makes industrial machines more attractive and competitive. Our Sysmac HMI enables faster, more efficient control and monitoring - and a more natural, proactive relationship between operator and machine.

- Widescreen in all models: 7, 9, 12 and 15 inches
- Up to 1,280 x 800 high resolution display
- Multimedia including video and PDF
- NX/NY/NJ controller variables (tags) in the NA project
- Multiple-access level security with password protection
- Visual Basic programming with VB.net

System configuration

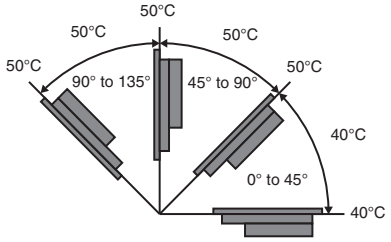


Specifications

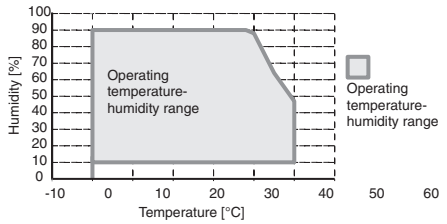
General specifications

Item	Specifications			
	NA5-15W_	NA5-12W_	NA5-9W_	NA5-7W_
Rated power supply	24 VDC			
Allowable power supply voltage range	19.2 to 28.8 VDC (24 VDC ±20%)			
Power consumption	47 W max.	45 W max.	40 W max.	35 W max.
Ambient operating temperature	0 to 50ºC*1*2			
Ambient storage temperature	-20 to 60ºC*3			
Ambient operating humidity	10 to 90%*2 (without condensation)			
Atmosphere	Must be free from corrosive gases			
Pollution degree	2 or less: JIS B 3502, IEC 61131-2			
Noise immunity	2 kV on power supply line (conforms to IEC 61000-4-4)			
Vibration resistance (during operation)	Conforms to IEC 60068-2-6 5 to 8.4 Hz with 3.5 mm half amplitude and 8.4 to 150 Hz with 9.8 m/s^2 for 100 minutes each in X, Y and Z directions (time coefficient of 10 minutes x coefficient factor of 10 = total time of 100 min)			
Shock resistance (during operation)	Conforms to IEC 60028-2-27 147 m/s^2 3 times each in X, Y and Z directions			
Dimensions (W x H x D)	420 x 291 x 69 mm	340 x 244 x 69 mm	290 x 190 x 69 mm	236 x 165 x 69 mm
Panel cutout dimensions	392 x 268 mm (horizontal x vertical) Panel thickness: 1.6 to 6.0 mm*4	310 x 221 mm (horizontal x vertical) Panel thickness: 1.6 to 6.0 mm*4	261 x 166 mm (horizontal x vertical) Panel thickness: 1.6 to 6.0 mm*4	197 x 141 mm (horizontal x vertical) Panel thickness: 1.6 to 6.0 mm*4
Weight	3.2 kg max.	2.3 kg max.	1.7 kg max.	1.3 kg max.
Degree of protection	Front-panel controls: IP65 oil-proof type, UL type 4X To reinstall the NA unit in a panel, contact your OMRON representative for replacement of the rubber packing.			
Battery life	5 years at 25ºC The RTC will be backed up for 5 days after the battery runs low. The RTC will be backed up by a super capacitor for 5 minutes after removing the old battery. (This assumes that the power is first turned ON for at least 5 minutes and then turned OFF.)			
International standards	UL 508/CSA standard C22.2 No. 142*5 EMC Directive (2004/108/EC) EN 61131-2:2007 Shipbuilding standards LR, DNV and NK IP65 oil-proof, UL type 4X*6 (front panel only) ANSI 12.12.01 Class 1 Division 2/CSA standard C22.2 No. 213-M1987 (R2013) RoHS Directive (2002/95/EC) KC standards KN 61000-6-2:2012-06 for EMS and KN 61000-6-4:2012-06 for EMI RCM			

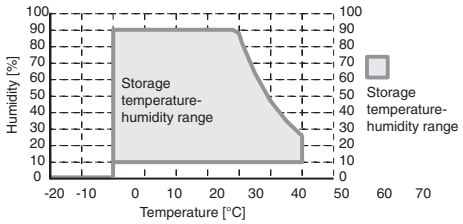
*1 The ambient operating temperature is subject to the following restrictions, depending on the mounting angle:
- The ambient operating temperature is 0 to 40ºC when the mounting angle is 0º or more and less than 45º to the horizontal.
- The ambient operating temperature is 0 to 50ºC when the mounting angle is 45º or more and 90º or less to the horizontal.
- The ambient operating temperature is 0 to 50ºC when the mounting angle is 90º or more and 135º or less to the horizontal.



*2 Use the programmable terminal within the following temperature and humidity ranges:



*3 Store the programmable terminal within the following temperature and humidity ranges:



*4 When the NA-_WATW01 high-pressure waterproof attachment is used, the panel thickness is between 1.6 to 4.5 mm.

*5 Use power supply Class 2 to conform to UL standard.

*6 Use the NA-_WATW01 high-pressure waterproof attachment (sold separately) to conform to UL type 4X.

Performance specifications

Item			Specifications			
			NA5-15W_	NA5-12W_	NA5-9W_	NA5-7W_
Display	Display panel[*1]	Display device	TFT LCD			
		Screen size	15.4 inches	12.1 inches	9.0 inches	7.0 inches
		Resolution	1,280 x 800 pixels (horizontal x vertical)		800 x 480 pixels (horizontal x vertical)	
		Colors	16,770,000 colors (24-bit full color)			
		Effective display area	331 x 207 mm (horizontal x vertical)	261 x 163 mm (horizontal x vertical)	197 x 118 mm (horizontal x vertical)	152 x 91 mm (horizontal x vertical)
		View angles	Left: 60º, Right: 60º, Top: 60º, Bottom: 60º			
	Backlight[*2]	Life	50,000 hours min.[*3]			
		Brightness adjustment	200 levels			
	Front panel indicators[*4]	RUN	Lit green: Normal operation Lit red: Error			
Operation	Touch panel	Method	Analog resistance membrane (pressure sensitive)			
		Resolution	16,384 x 16,384			
		Life	1,000,000 operations			
	Function keys[*5]		3 inputs (capacitance inputs)			
Data capacity	User data capacity		256 MB			
External interfaces	Ethernet ports	Applications	Port 1: Connecting to factory network. NX/NY/NJ machine controller and VNC clients Port 2: Sysmac Studio connection for programming			
		Number of ports	2 ports			
		Compliant standards	IEEE 802.3i (10BASE-T), IEEE 802.3u (100BASE-TX), and IEEE 802.3ab (1000Base-T)			
		Transmission media	Shielded twisted-pair (STP) cable: Category 5, 5e or higher			
		Transmission distance	100 m			
		Connector	RJ45 8P8C modular connector			
	USB host ports	Applications	USB memory device, keyboard or mouse			
		Number of ports	2 ports			
		Compliant standards	USB 2.0			
		Transmission distance	5 m max.			
		Connector	Type-A connector			
	USB slave port	Applications	Sysmac Studio connection for programming			
		Number of ports	1 port			
		Compliant standards	USB 2.0			
		Transmission distance	5 m max.			
		Connector	Type-B connector			
	Serial port[*6]	Applications	Device connection			
		Number of ports	1 port			
		Compliant standards	RS-232C			
		Transmission distance	15 m max.			
		Connector	D-SUB 9-pin female connector			
	SD memory card slot	Applications	To transfer or store the project or to store log data			
		Number of slots	1 slot			
		Compliant standards	SD/SDHC			
	Expansion unit connector[*6]	Applications	Expansion unit			
		Quantity	1			

[*1] There may be some defective pixels in the display. This is not a fault as long as the numbers of defective light and dark pixels fall within the following standard ranges:

Model	Standard range
NA5-15W_ NA5-12W_ NA5-9W_ NA5-7W_	Number of light and dark pixels: 10 or less. (There must not be 3 consecutive light/dark pixels)

[*2] The backlight can be replaced at an OMRON maintenance base.

[*3] This is the estimated time before brightness is reduced by half at room temperature and humidity. The life expectancy is drastically shortened if programmable terminal is used at high temperatures.

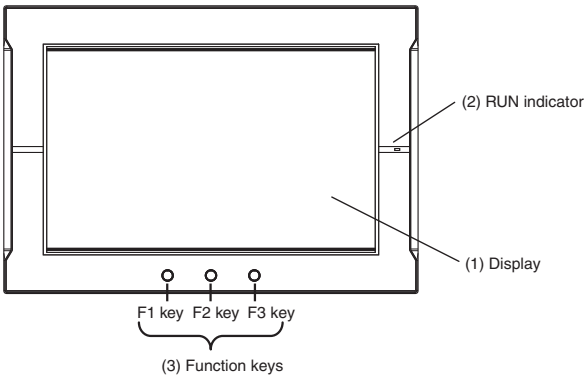
[*4] The brightness of the front panel indicators is also adjustable when you adjust the brightness of the backlight.

[*5] Each function key has blue indicator. The brightness of the function key indicators is also adjustable when you adjust the brightness of the backlight.

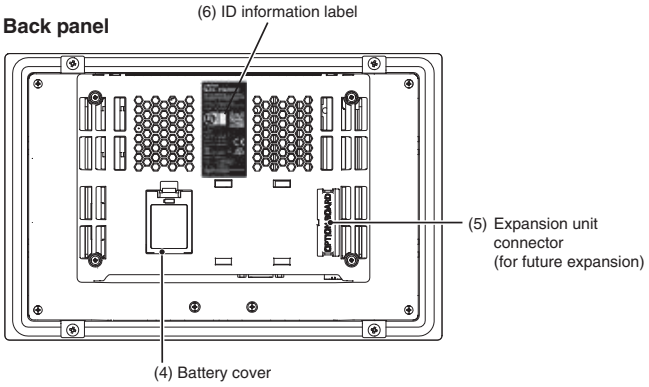
[*6] The serial port and expansion unit connector are for future expansion.

Nomenclature

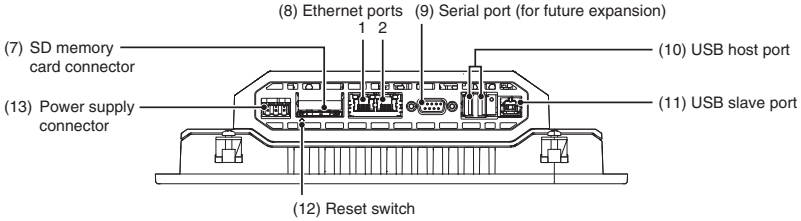
Front panel

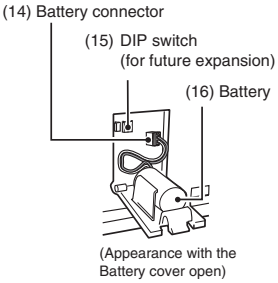


Back panel



Bottom panel



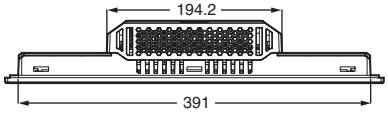


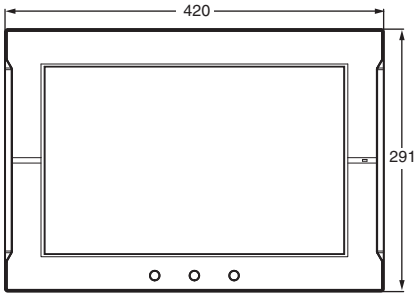
No.	Name	Description
1	Display	The entire display is a touch panel that also functions as an input device.
2	RUN indicator	The status of the indicator changes according to the status of the NA HMI.
3	Function keys	There are three function keys: F1, F2 and F3. You can use the function keys as execution conditions for the actions for global or page events. You can also use the function keys for interlocks.
4	Battery cover	Open this cover to replace the battery.
5	Expansion unit connector*1	For future expansion.
6	ID information label	You can check the ID information of the NA HMI.
7	SD memory card connector	Insert an SD memory card here.
8	Ethernet port 1	Connect a device other than the Sysmac Studio.
	Ethernet port 2	Connect mainly the Sysmac Studio.
9	Serial port	For use with VB.NET.
10	USB host port	Connect this port to a USB memory device, mouse, etc...
11	USB slave port	Connect the Sysmac Studio or other devices.
12	Reset switch	Use this switch to reset the NA HMI.
13	Power supply connector	Connect the accessory power supply connector and supply power.
14	Battery connector	Connect the connector on the backup battery here.
15	DIP switch*1	For future expansion. (The DIP switch is on a PCB that is accessed by opening the battery cover) Do not change any of the factory settings of the pins on the DIP switch. (Default setting: OFF)
16	Battery	This is the battery to backup the clock information in the NA HMI.

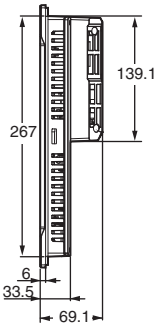
*1 The expansion unit connector and DIP switch are for future expansion.

Dimensions

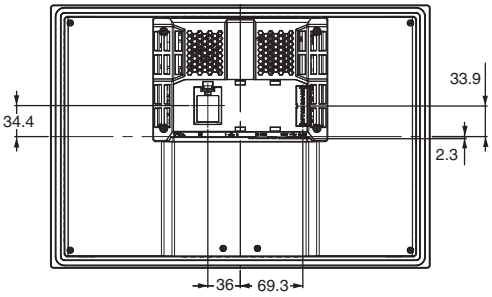
NA5-15W_

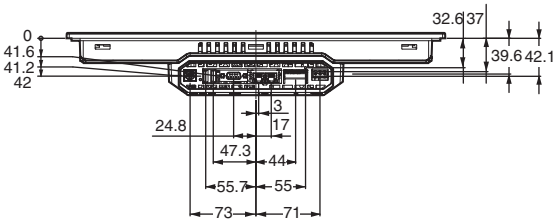




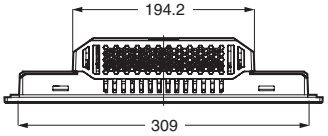


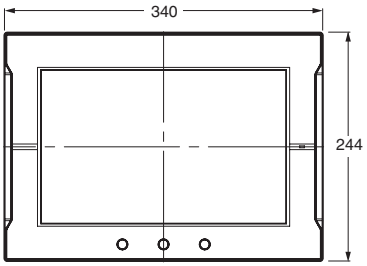
Cable connection dimensions

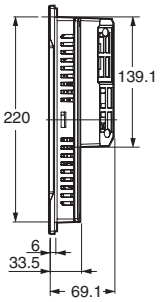




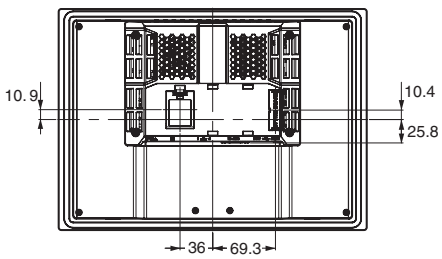
NA5-12W_

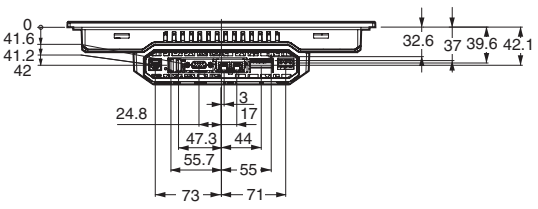




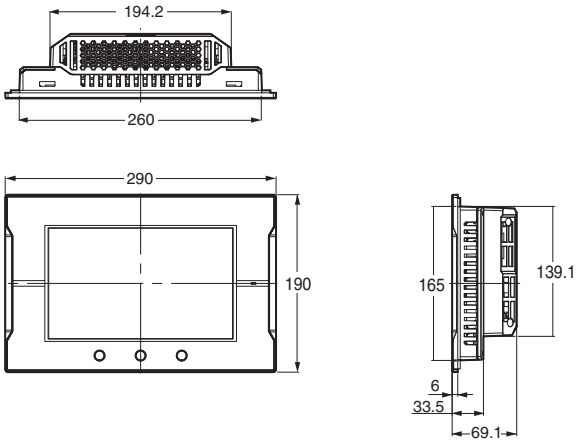


Cable connection dimensions

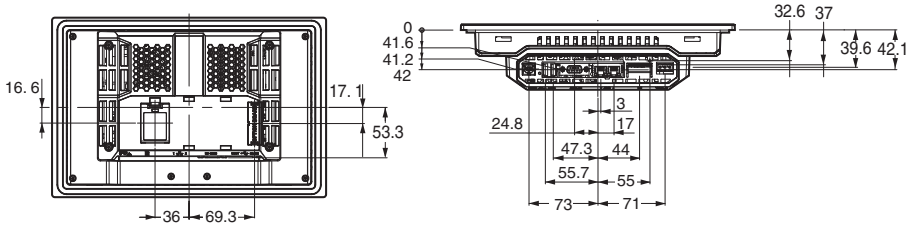




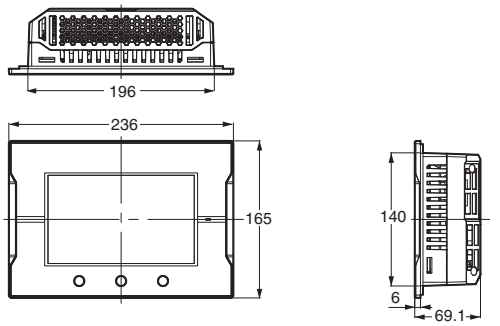
NA5-9W_



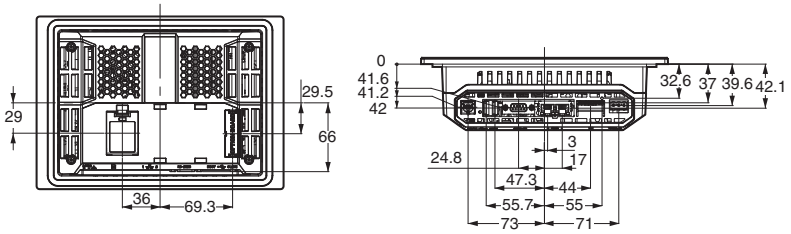
Cable connection dimensions



NA5-7W_



Cable connection dimensions



Ordering information

Machine interface

Display	Colors	Resolution	Frame color	Model
15.4-inch widescreen TFT LCD	24-bit full color	1,280 x 800 pixels	Silver	NA5-15W101S
			Black	NA5-15W101B
12.1-inch widescreen TFT LCD			Silver	NA5-12W101S
			Black	NA5-12W101B
9-inch widescreen TFT LCD		800 x 480 pixels	Silver	NA5-9W001S
			Black	NA5-9W001B
7-inch widescreen TFT LCD			Silver	NA5-7W001S
			Black	NA5-7W001B

Accessories

Type	Specifications		Model
SD memory card	2 GB		HMC-SD291
	4 GB		HMC-SD491
USB memory	2 GB		FZ-MEM2G
	8 GB		FZ-MEM8G
Replacement battery	Battery life: 5 years (at 25ºC). This battery is provided as an accessory.		CJ1W-BAT01
Anti-reflection sheets	Attach a sheet to the screen to protect against diffused reflections and dirt. The entire sheet is colorless and transparent. Five sheets are provided in one set.	For NA5-15W model	NA-15WKBA04
		For NA5-12W model	NA-12WKBA04
		For NA5-9W model	NA-9WKBA04
		For NA5-7W model	NA-7WKBA04
High-pressure waterproof attachment (UL Type 4X)	This metal frame is for high-pressure waterproofing. Install it to conform to UL Type 4X standards. UL Type 4X is the rating for high-pressure washdown applications with a flow rate of 246 liter/min.	For NA5-15W model	NA-15WATW01
		For NA5-12W model	NA-12WATW01
		For NA5-9W model	NA-9WATW01
		For NA5-7W model	NA-7WATW01

Computer software

Specifications	Model
Sysmac Studio version 1.10 or higher	SYSMAC-SE2□□□
Sysmac Studio HMI Edition version 1.10 or higher	SYSMAC-HE001L

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_V413-EN-02 In the interest of product improvement, specifications are subject to change without notice.

SYSMAC-SE2□

Sysmac Studio



Sysmac Studio for machine creators

The Sysmac Studio provides one design and operation environment for configuration, programming, simulation and monitoring.

- One software for motion, logic sequencing, safety, drives, vision and HMI
- Fully compliant with open standard IEC 61131-3
- Supports Ladder, Structured Text and Function Block programming with a rich instruction set
- CAM editor for easy programming of complex motion profiles
- One simulation tool for sequence and motion in a 3D environment
- Advanced security function with 32 digit security password

System requirements

Item	Requirement
Operating system (OS)[*1][*2][*3]	Windows 7 (32-bit/64 bit version) / Windows 8 (32-bit/64-bit version) / Windows 8.1 (32-bit/64-bit version)[*4] / Windows 10 (32-bit/64-bit version)
CPU[*3]	Windows computers with Intel® Celeron™ processor 540 (1.8 GHz) or faster CPU Intel® Core™ i5 M520 processor (2.4 GHz) or equivalent or faster recommended
Main memory[*3][*5]	2 GB min. (4 GB min. recommended)
Recommended video memory / video card for using 3D motion trace	Video memory: 512 MB min. Video card: Either of the following video cards: • NVIDIA® GeForce® 200 series or higher • ATI RadeonHD5000 series or higher
Hard disk	Minimum 4.6 GB of Hard disk space is required to install
Display	XGA 1024 x 768, 16 million colors WXGA 1280 x 800 min. recommended
Disk drive	DVD-ROM drive
Communication ports	USB port corresponded to USB 2.0 or Ethernet port[*6]
Supported languages[*7]	Japanese, English, German, French, Italian, Spanish, simplified Chinese, traditional Chinese, Korean

*1 Sysmac Studio operating system precaution: System requirements and hard disk space may vary with the system environment.

*2 The following restrictions apply to some application operations when Sysmac Studio is used with Microsoft Windows 7, Windows 8/Windows 8.1 or Windows 10:

Application	Restriction
CX-Designer	If a new Windows 7, Windows 8/Windows 8.1 or Windows 10 font (e.g., Meiryo) is used in a project, the font size on labels may be bigger and protrude from the components if the project is transferred from CX-Designer running on a Windows XP or earlier OS to the NS/NSJ.
CX-Integrator/Network Configurator	Although you can install CPS files, EDS files, Expansion Modules and Interface Modules, the virtual store function of Windows 7, Windows 8/Windows 8.1 or Windows 10 imposes the following restrictions on the use of the software after installation: • If another user logs in, the applications data will need to be installed again. • The CPS files will not be automatically updated. These restrictions will not exist if application data is installed using Run as Administrator.
CX-ConfiguratorFDT	.NET Framework 3.5.1 is required to install when CX-ConfiguratorFDT is used with Windows 8/Windows 8.1 or Windows 10.

*3 If you create a user program with a memory size that exceeds 20 MB, use the 64-bit edition of the operating system and 8 GB or more of RAM. If the user program size is large, we recommend that you use the 64-bit edition of the operating system, an Intel® CoreTM i7 processor or the equivalent, and 8 GB or more of RAM. If you use Vision & Robot integrated simulation with Robot Additional Option, use the 64-bit edition of the operating system, an Intel® CoreTM i5 processor or the equivalent, and 8 GB or more of RAM.

*4 Windows 8.1 update (KB2919355) must be applied.

*5 The amount of memory required varies with the Support Software used in Sysmac Studio for the following Support Software. Refer to user documentation for individual Support Software for details. CX-Designer, CX-Protocol and Network Configurator.

*6 Refer to the hardware manual for your CPU unit for hardware connection methods and cables to connect the computer and CPU unit.

*7 Supported only by the Sysmac Studio version 1.01 or higher about German, French, Italian and Spanish. Supported only by the Sysmac Studio version 1.02 or higher about simplified Chinese, traditional Chinese and Korean.

Function specifications

Common specifications

Item			Function	Sysmac Studio
Setting parameters	EtherCAT configuration and setup	–	You can create a configuration in the Sysmac Studio of the EtherCAT slaves connected to the built-in EtherCAT port of the NX/NJ-series CPU unit or NY-series Industrial PC and set the parameters for the EtherCAT masters and slaves.	All versions
		Registering slaves	You can set up devices by dragging slaves from the device list displayed in the Toolbox pane to the locations where you want to connect them.	
		Changing the coupler model	You change the model number or unit version of a coupler unit. Use this function to change the model number and version of the coupler unit registered in the project to the new model number and version when replacing a coupler unit.	Ver. 1.09 or higher
		Setting master parameters	You set the common parameters of the EtherCAT network (e.g., the fail-soft operation and wait time for slave startup settings.)	All versions
		Setting slave parameters	You set the standard slave parameters and assign PDOs (process data objects).	
		Comparing and merging network configuration information	The EtherCAT network configuration information in the NX/NJ-series CPU unit or NY-series Industrial PC and in the Sysmac Studio are compared and the differences are displayed.	
		Transferring the network configuration information	The EtherCAT network configuration information is transferred to the NX/NJ-series CPU unit or NY-series Industrial PC. Or, the EtherCAT network configuration information in the CPU unit or PC is transferred to the Sysmac Studio and displayed in the EtherCAT editor.	
		Installing ESI files	ESI (EtherCAT slave information) files are installed.	
	EtherCAT slave terminal configuration and setup	–	The configuration of any slave terminal that is connected to an EtherCAT network is created on the Sysmac Studio. The NX units that compose the slave terminal are set in the configuration.	Ver. 1.06 or higher
		Registering NX units	A slave terminal is built by dragging NX units from the device list displayed in the Toolbox to the locations where you want to mount them.	
		Setting NX units	The I/O allocations, mounting settings and unit operation settings of the NX units are edited.	
		Displaying the width of a slave terminal configuration	The width and power consumption of a slave terminal are displayed based on the unit configuration information.	
		Comparing and merging the slave terminal configuration information	When online, you can compare the configuration information in the project with the physical configuration. You can also select the missing units and add them to the project.	
		Transferring the slave terminal configuration information	The unit configuration information is transferred to the CPU unit or NY-series Industrial PC using the synchronize function.	
	CPU/Expansion rack configuration and setup	–	You create the configuration in the Sysmac Studio of the Units mounted in the CPU rack and Expansion racks of NJ-series and NX1 CPU units and set the special units.	All versions
		Registering units	A rack is built by dragging units from the device list displayed in the Toolbox Pane to the locations where you want to mount them.	
		Creating racks	An Expansion rack (power supply unit, I/O interface unit and end cover) is added.	
		Switching unit displays	For NJ-series CPU units, model numbers, unit numbers and slot numbers are displayed. For NX1 CPU units, model numbers and unit numbers are displayed.*1	
		Setting special units	The input time constants are set for input units and parameters are set for special units.	
		Displaying rack widths, current consumption and power consumption	For NJ-series CPU units, rack width, current consumption and power consumption are displayed based on the unit configuration information. For NX1 CPU units, rack width is displayed based on the unit configuration information.*1	
		Comparing the CPU/Expansion rack configuration information with the physical configuration	When online, you can compare the configuration information in the project with the physical configuration. You can also select the missing units and add them.	
		Transferring the CPU/Expansion rack configuration information	The unit configuration information is transferred using the synchronization function.	
		Printing the unit configuration information	The unit configuration information is printed.	
	Controller setup	–	The controller setup is used to change settings related to the operation of the controller. The controller setup contains PLC function module operation settings and built-in EtherNet/IP function module port settings.	
		Operation settings	The startup mode, SD memory card diagnosis at startup, write protection at startup, controller error level changes*2 and other settings are made.	
		Transferring operation settings	The synchronization function is used to transfer the operation settings to the NX/NJ-series CPU unit or NY-series Industrial PC.	
		Built-in EtherNet/IP port settings	These settings are made to perform communications using the built-in EtherNet/IP port of the NX/NJ-series CPU unit or NY-series Industrial PC.	
		Transferring built-in EtherNet/IP port settings	The synchronization function is used to transfer the built-in EtherNet/IP port settings to the NX/NJ-series CPU unit or NY-series Industrial PC.	
		Built-in I/O settings	You make the settings related to built-in I/O of the NX1 CPU unit.	Ver. 1.17 or higher
		Transferring built-in I/O settings	The synchronization function is used to transfer the built-in I/O settings to the NX1 CPU unit.	
		Option board settings	You make the settings related to the option boards mounted on the NX1 CPU unit.	
		Transferring option board settings	The synchronization function is used to transfer the option board settings to the NX1 CPU unit.	
		Memory settings	You make the settings related to the memory area for CJ-series units in the NX1 CPU unit.	
		Transferring memory settings	The synchronization function is used to transfer the memory settings to the NX1 CPU unit.	
	Motion control setup	–	The motion control setup is used to create the axes to use in motion control instructions, assign those axes to servo drives and encoders and set axis parameters.	All versions
		Axis settings	Axes are added to the project.	
		Axis setting table	The axis setting table is a table of all registered axis parameters. You can edit any axis parameters here just as you can on the axis settings tab page.	
	Axes group settings	–	You can setup axes to perform interpolated motions as an axes group.	
		Axes group basic settings	Set the axes group number, wether to use the axes group, the composition and the composition axes.	
		Operation settings	Set the interpolated velocity, the maximum interpolated acceleration and deceleration, and the interpolated operation settings.	

Item			Function	Sysmac Studio
Setting parameters	Cam data settings	–	The cam data settings are used to create electronic cam data. When you build the project for the controller, a cam table is created according to the cam data settings.	All versions
		Registering cam data settings	Cam data settings are added to the project.	
		Editing cam data settings	You can set properties and node points for cam data settings.	
		Transferring cam data settings	You can select to transfer all or part of the cam data.	
		Importing cam data settings	You can import cam data settings from a CSV file.	
		Exporting cam data settings	You can export cam data to a CSV file.	
		Registering cam definitions	You add new cam definitions to change a cam table in the program.	Ver 1.09 or higher
		Editing cam definitions	You set cam definitions.	
		Transferring cam definitions	You transfer cam definitions to the controller.	
		Exporting cam tables	You can export a cam table to a CSV file.	All versions
		Transferring cam tables from the controller to files	You can save a cam table in the NX/NJ-series CPU unit or NY-series Industrial PC to a CSV file.	
		Transferring cam tables from files to the controller	You can transfer a cam table that is saved in a CSV file to update the contents of a cam table that is already in the NX/NJ-series CPU unit or NY-series Industrial PC.	
		Superimposing cam table	You can superimpose the cam table from a CSV file on the cam profile curve position graph that is currently displayed.	
	Task settings	–	Programs are executed in tasks in an NX/NJ-series CPU unit or NY-series Industrial PC. The task settings define the execution period, the execution timing, the programs executed by the task, the I/O refreshing performed by the task and which variables to share between tasks.	
		Registering tasks	The tasks, which are used to execute programs, are registered.	
		Setting task I/O	The task I/O settings define what units the task should perform I/O refreshing for.	
		Assigning programs	Program assignments define what programs a task will execute.	
		Setting exclusive control of variables in tasks	You can specify if a task can write to its own values (known as a refreshing task) or if it can only access them (an accessing task) for global variables. This ensures concurrency for global variable values from all tasks that reference them.	
	I/O map settings	–	The I/O ports that correspond to the registered EtherCAT slaves and to the registered units on the CPU rack and Expansion racks are displayed. The I/O map is edited to assign variables to I/O ports. The variables are used in the user program.	
		Displaying I/O ports	I/O ports are displayed based on the configuration information of the devices (slaves and units).	
		Assigning variables	Variables are assigned to I/O ports.	
		Creating device variables	Device variables are created in the I/O map. You can either automatically create a device variable or manually enter the device variable to create.	
		Checking I/O assignments	The assignments of external I/O devices and variables are checked.	
	Vision sensor settings		You can set and calibrate vision sensors. Refer to "**Vision sensor functions**" section for more details.	Ver. 1.01 or higher
	Displacement sensor settings		You can set and calibrate displacement sensors. Refer to "**Displacement sensor functions**" section for more details.	Ver. 1.05 or higher
	DB connection function settings		You can set and transfer the DB connection function settings. Refer to "**DB connection functions**" section for more details.	Ver 1.06 or higher with NJ501-□□20 or Ver 1.14 or higher with NJ101-□□20
	EtherNet/IP connection settings		You can make settings related to tag data links (connections) in an EtherNet/IP network. Refer to "**EtherNet/IP connection functions**" section for more details.	Ver. 1.10 or higher
	EtherNet/IP slave terminal settings		You can make and transfer settings for EtherNet/IP slave terminals. Refer to "**EtherNet/IP slave terminal functions**" section for more details.	Ver. 1.11 or higher
	NA-series programmable terminal (PT) settings		You can make settings and transfer projects for NA-series programmable terminals. Refer to "**HMI functions**" section for more details.	Ver. 1.11 or higher
Programming	**Instruction list (Toolbox)**		A hierarchy of the instructions that you can use is displayed in the Toolbox. You can drag the required instruction to a program in the Ladder Editor or ST Editor to insert the instruction.	All versions
	Programming ladder diagrams	–	Ladder diagram programming involves connecting rung components with connecting lines to build algorithms. Rung components and connecting lines are entered in the Ladder Editor.	
		Starting the ladder editor	The Ladder Editor for the program is started.	
		Adding and deleting sections	You can divide your ladder diagrams into smaller units for easier management. These units of division are called sections.	
		Inserting rung components	You insert rung components in the Ladder Editor to create an algorithm.	
		Inserting and deleting function blocks	You can insert a function block instruction or user-defined function block into the Ladder Editor.	
		Inserting and deleting functions	You can insert a function instruction or user-defined function into the Ladder Editor.	
		Inserting and deleting inline ST	You can insert a rung component in a ladder diagram to enable programming in ST. This allows you to include ST in a ladder diagram.	
		Editing rung components	You can copy and paste rung components.	
		Inserting and deleting jump labels and jumps	You can insert a jump label in the rung to jump and then specify that jump label when you insert a jump.	
		Inserting and deleting bookmarks	You can add bookmarks to the beginning of rungs and move between them.	
		Rung comments	You can add comments to rungs.	
		Displaying rung errors	When you enter a rung component, the format is always checked and any mistakes are displayed as errors. If there are any errors, a red line is displayed between the rung number and the left bus bar.	
		Entry assistance	When you enter instructions or parameters, each character that you enter from the keyboard narrows the list of candidates that is displayed for selection.	
		Displaying variable comments[*3]	A specified variable comment can be displayed with each variable of rung components on the ladder diagrams. You can change the length of the displayed variable comments to make them easier to read.[*4]	Ver. 1.01 or higher

Item			Function	Sysmac Studio
Programming	Programming structured text	–	You combine different ST statements to build algorithms.	All versions
		Starting the ST Editor	The ST Editor for programs or for functions/function blocks is started.	
		Editing ST	You combine different ST statements to build algorithms.	
		Entering calls to functions and function blocks	You can enter the first character of the instance name of the function or the function block in the ST Editor to call and enter a function or function block.	
		Entering constants	You can enter constants in the ST Editor.	
		Entering comments	Enter "(*" at the beginning and "*)" at the end of any text to be treated as a comment in the ST Editor. If you only want to comment out a single line, enter a double forward slash (//) at the beginning of the line.	
		Copying, pasting and deleting ST elements	You can copy, paste and delete text strings.	
		Indenting	You can indent nested statements to make them easier to read.	
		Moving to a specified line	You can specify a line number to jump directly to that line.	
		Bookmarks	You can add bookmarks to any lines and move between them.	
		Entry assistance	When you enter instructions of parameters, each character that you enter from the keyboard narrows the list of candidates that is displayed for selection.	
	Namespaces		Namespaces allow you to group and nest the names of functions, function block definitions and data types so that you can manage them. This reduces the chance of duplicated names and makes the entities easier to access.	Ver. 1.02 or higher
	Variable manager		A list of the variables in the global and local variable tables is displayed in a separate window. You can display variable usage, sort and filter the variables, edit and delete variables, or more variables while displaying another editing view.	Ver. 1.04 or higher
	Changing variable comments and data type comments		You can globally change variable comments and data type comments to other comments. You can change the comments to different language for users in a different country.	
	Sorting and filtering variables		You can sort and filter the variables in each variable table.	Ver 1.08 or higher
	Searching and replacing		You can search for and replace strings in the data of a project.	All versions
	Retrace searching		You can search for the program inputs and the input parameters to functions or function blocks that use the selected variable if the selected variable is used as a program output or as the output parameter of a function or function block. Also, you can search for the program outputs and the output parameters to functions or function blocks that use the selected variable if the selected variable is used as a program input or as the input parameter of a function or function block.	Ver. 1.01 or higher
	Jumping		You can jump to the specified rung number or line number in the program.	All versions
	Building	–	The programs in the project are converted into a format that is executable in the NX/NJ-series CPU unit or NY-series Industrial PC.	
		Rebuilding	A rebuild is used to build project programs that have already been built.	
		Aborting a build operation	You can abort a build operation.	
	Creating applications for NA-series PT		You can create and transfer pages and subroutines for NA-series programmable terminals. Refer to "**HMI functions**" section for more details.	Ver. 1.11 or higher
Reuse functions	Library	–	You can create functions, function block definitions, programs[*5] and data types in a library file to use them as objects in other projects.	Ver. 1.02 or higher
		Creating libraries	You can create library files to enable using functions, function block definitions and data types in other projects.	
		Using libraries	You can access and reuse objects from library files that were created in other projects.	
File operations	File operations	Creating, opening, saving or rename a project file	You can create, open, save or save under a different name a project file.	All versions
		Project update history management	You can assign numbers to projects to manage the project history.	Ver. 1.03 or higher
		Exporting a project file	You can export a project to an .smc2 or .csm2 project file[*6]. You can also export a project to a previous project file format, i.e., .smc or .csm[*7].	All versions
		Importing a project file	You can import a project from an .smc2[*6], .csm2[*6], .smc or .csm[*7] project file.	
		Importing a ST project file	Import of ST program files created by the Simulink® PLC Coder™ (version R2013a or higher) from MathWorks® Inc.	Ver. 1.04 or higher
		Offline comparison	Compares the data for an open project with the data for a project file and displays the results. You can also compare the open project with an exported .smc2[*6] or .smc project file. Or, you can merge detailed comparison results[*8].	Ver. 1.02 or higher
		Importing motor sizing tool results	You can import the EtherCAT configuration and motion control settings created by the motor sizing tool.	Ver. 1.16 or higher
	Cutting, copying and pasting		You can cut, copy or paste items that are selected in the Multiview Explorer or any of the editors.	All versions
	Synchronize		The project file in the computer is compared with the data in the online NX/NJ-series CPU unit or NY-series Industrial PC and any differences are displayed. You can specify the transfer direction for any type of data and transfer all of the data.	
	Batch transfer		You transfer data between the computer and NX/NJ-series CPU unit or NY-series Industrial PC that are connected online. You can select the same data to transfer as in the synchronization operation. Unlike the synchronization, the data is transferred in the specified direction without displaying the comparison results.	Ver 1.09 or higher
	Printing		You can print various data. You can select the items to print.	All versions
	Clear all memory		The clear all memory menu command is used to initialize the user program, controller configurations and setup, and variables in the CPU unit to the defaults from the Sysmac Studio.	
	SD memory cards	–	The following procedures are used to execute file operations for the SD memory card mounted in the NX/NJ-series CPU unit or the virtual SD memory card of the NY-series Industrial PC (hereinafter called SD memory card) and to copy files between the SD memory card and computer.	
		Formatting the SD memory card	The SD memory card is formatted.	
		Displaying properties	The properties of the selected file or folder in the SD memory card are displayed.	
		Copying files and folders in the SD memory card	The selected file or folder in the SD memory card is copied to the SD memory card.	
		Copying files and folders between the SD memory card and the PC	The selected file or folder in the SD memory card is copied to the computer. Or, the selected file or folder in the computer is copied to the SD memory card.	

Item			Function	Sysmac Studio
Debugging	**Monitoring**		Variables are monitored during ladder program execution. You can monitor the TRUE/FALSE status of inputs and outputs and the present values of variables in the NX/NJ-series CPU unit or NY-series Industrial PC. You can monitor operation on the Ladder Editor, ST Editor, Watch Tab Page or I/O Map.	All versions
	Differential monitoring		You can detect the number of times the specified BOOL variable or BOOL member changes to TRUE or FALSE and display the count in the differential monitor window. You can check if bits turn ON and OFF and the number of times that they turn ON and OFF.	Ver. 1.04 or higher
	Changing present values and TRUE/FALSE		You can change the values of variables that are used in the user program and settings to any desired value and you can change program inputs and outputs to TRUE or FALSE. This allows you to check the operation of the user program and settings.	All versions
	Changing the present values of variables [*9]		You can change the present values of user-defined variables, system-defined variables and device variables as required. You can do this in the Ladder Editor, ST Editor, Watch Tab Page or I/O Map.	
	Forced refreshing		Forced refreshing allows the user to refresh external inputs and outputs with user-specified values from the Sysmac Studio. The specified value is retained even if the value of the variable is overwritten from the user program. You can use forced refreshing to force BOOL variables to TRUE or FALSE in the Ladder Editor, Watch Tab Page or I/O Map.	
	Online editing		Online editing allows you to edit programs on systems that are currently in operation. Online editing can be used to edit only POUs and global variables. User-defined data types cannot be edited with online editing.	
	Cross reference tab page		Cross references allow you to see the programs and locations where program elements (variables, data types, I/O ports, functions or function blocks) are used. You can view all locations where an element is used from this list.	
	Data tracing	–	Data tracing allows you to sample the specified variables and store the values of the variables in trace memory without any programming. You can choose between two continuous trace methods: a triggered trace, where you set a trigger condition and data is saved before and after that condition is meet, or a continuous trace, in which continuous sampling is performed without any trigger and the results are stored in a file on your computer. However, you can still display data retrieved on the Sysmac Studio and save those results to a file even if you use a triggered trace. These same functions can be used with the simulator as well.	
		Setting sampling intervals	The interval to perform sampling on the target data is set. Sampling is performed for the specified task period, at the specified time, or when a trace sampling instruction is executed.	
		Setting triggers	To perform a triggered trace, you set a condition to trigger sampling. A suitable trigger condition is set to record data before and after an event.	
		Setting a continuous trace	The method to save the data traced during a continuous trace is set.	
		Setting variables to sample	The variables to store in trace memory are registered. The sampling intervals can also be set.	
		Starting and stopping tracing	The data trace settings are transferred to the NX/NJ-series CPU unit or NY-series Industrial PC and the tracing starts. If you selected *Trigger (Single)* as the trace type, tracing waits for the trigger to begin sampling. If you selected Continuous, sampling begins immediately and all traced data is transferred to the computer as it is gathered and saved to a file.	
		Displaying trace results	You view the results of the traced data in either a chart or the 3D Motion Monitor. After sampling begins, sample data is immediately transferred and drawn on the graph. The trace target variable table shows the maximum, minimum and average values for each variable. You can change the line colors on the graph.[*10] You can consecutively read and display continuous trace results from more than one file.[*11]	
		Exporting/importing trace results	Trace results are saved within your project automatically when you save the project on the Sysmac Studio. If you want to save this data as a separate file, you can export the data to a CSV file. You can import trace results that you have exported.	
		Printing trace results	You can print out data trace settings along with digital and analog charts.	
	Debugging vision sensors		You can debug the vision sensor offline. Refer to "**Vision sensor functions**" section for more details.	Ver. 1.01 or higher
	Debugging displacement sensors		You can debug displacement sensors offline. Refer to "**Displacement sensor functions**" section for more details.	Ver. 1.05 or higher
Simulation	**Programs for debugging**		You can create programs for debugging that are used only to execute simulations and specify virtual inputs for simulation.	All versions
	Executing a simulation	**Selecting what to a simulate**	You can select the programs to simulate from all of the programs in the Sysmac Studio. Programs can be dragged to select them.	
		Setting breakpoints	You can set breakpoints to stop the simulation in the Program Editor.	
		Executing and stopping simulations	You can control simulation execution to monitor the user program or to check operation through data tracing. Step execution and pausing are also possible.	
			You can perform a linked simulation between sequence control and continuous control (operations controlled by Simulink) to debug the sequence control program and continuous control program[*12].	Ver 1.09 or higher
		Changing the simulation speed	You can change the execution speed.	All versions
		Task period simulation	You can display the task periods.	
		Batch transfer of the present values of variables	You can save the values of variables at specific times during simulations in a file, or you can write the values of variables that were saved in a file back to the simulator. This allows you to write the initial values of variables, e.g., for test applications, before you start a simulation.	Ver. 1.02 or higher
		Integrated NS-series PT simulation [*13]	You can simulate the linked operation of a sequence program and an NS-series programmable terminal to debug the sequence program and screen data offline.	
		Simultaneous simulation of controller and NA-series PT	You can simultaneously simulate sequence control and NA-series PT operation, including displaying pages and subroutines created with Visual Basic and debugging the sequence programming.	Ver. 1.11 or higher
	Setting the virtual equipment	**Creating 3D equipment models**	You can create a 3D equipment model at the control target to monitor with the 3D motion monitor function.	All versions
		3D motion monitor display mode	You set the axis variables for each element of the 3D equipment model, and then set the 3D equipment into motion according to those axis motions.	
		Displaying 2D paths	You can display the 2D paths of the markers for the projections in the 3D display.	
Monitoring information	**Displaying unit production information**		You can display the production information of the NX/NJ-series CPU unit or NY-series Industrial PC, and special units, including the models of the units and unit versions.	
	Monitoring task execution times		You can monitor the execution time of each task when the user program is executed on an NX/NJ-series CPU unit, NY-series Industrial PC or in the simulator. When you are connected to the simulator, you can also monitor the real processing time of tasks. This allows you to perform a controller performance test.	

Item			Function	Sysmac Studio
Monitoring information	Troubleshooting	–	You can use troubleshooting to check the errors that occurred in the controller, display corrections for the errors and clear the errors.	All versions
		Controller errors	Any current controller errors are displayed. (Observations and information are not displayed.)	
		User-defined errors	Information is displayed on current errors.	
		Controller event log	You can display a log of controller events (including controller errors and controller information). (You cannot display logs from EtherCAT slaves.)	
		User-defined event log	The log of user-defined events that were stored for the create user-defined error (SetAlarm) instruction and the create user-defined Information (SetInfo) instruction is displayed.	
		Event settings table	The event setting table is used to register the contents displayed on the Sysmac Studio on HMIs for user-defined events that occur for execution of the create user-defined error (SetAlarm) instruction and the create user-defined information (SetInfo) instruction.	
	User memory usage monitor		The space that is used by the user program that you are editing in the Sysmac Studio is displayed in relation to the size of memory for the NX/NJ-series CPU unit or NY-series Industrial PC.	
	Setting clock information		You can read and set the clock of NX/NJ-series CPU unit or NY-series Industrial PC. The computer's clock information is also displayed.	
	DB connection function		You can monitor information for the DB connection. Refer to "**DB connection functions**" section for more details.	Ver 1.06 or higher with NJ501-□□20 or Ver 1.14 or higher with NJ101-□□20
Communications	Going online with a controller		An online connection is established with the controller. You also can transfer a project from the connected controller to the computer with a simple operation without creating a new project or opening an existing project.*6	All versions
	Checking for forced refreshing		When you go offline, any forced refreshing is cleared.	
Maintenance	Changing the operating mode of the controller		There are two operating modes for NX/NJ-series CPU unit or NY-series Industrial PC, depending on if control programs are executed or not. These are RUN mode and PROGRAM mode.	
	Resetting the controller		The operations and status when the power supply to the controller is cycled are emulated. This can be performed only in PROGRAM mode. You cannot reset the controller in RUN mode.	
	Backup functions	–	You can back up, restore and compare the user program and other data of the NX/NJ-series CPU unit or NY-series Industrial PC to replace hardware, such as the CPU unit, or to restore device data.	
		Variables and memory backup	You can back up the contents of retained memory to a file and restore the contents of the backup file. You can individually select the retained variables to restore.*14	
		Controller backup	You can backup data (user program and settings, variable values, memory values, unit settings and slave settings) from a controller to a file and restore the backed up data from the file to the controller.	Ver. 1.04 or higher
		SD memory card backup	You can backup the controller data to an SD memory card mounted in the NX/NJ-series CPU unit or to the virtual SD memory card of the NY-series Industrial PC, or compare the controller data to the data in these memory cards.	
		Importing/exporting to/from backup files	You can import the data in a backup file created for a controller backup or SD memory card backup to a project. Also, you can export project data to a backup file.	
Security measures	Prevention of incorrect connections	Confirming CPU unit names and serial IDs	If the name or the serial ID is different between the project and the CPU unit when an online connection is established, a confirmation dialog box is displayed.	All versions
	Prevention of incorrect operation	Operation authority verification	You can set any of five levels of operation authority (administrator, designer, maintainer, operator and observer) for a Sysmac Studio project file or NX/NJ-series CPU unit or NY-series Industrial PC to restrict the operations that can be performed according to the operation authority of the user.	
		Write protection of the CPU unit	You can prevent rewriting of data in the CPU unit from the Sysmac Studio.	
	Prevention of the theft of assets	Authentication of user program execution IDs	You can ensure that a user program cannot be operated on another CPU unit even if copied.	
		User program transfer with no restoration information	The program source code is not transferred. If this option is selected, programs are not displayed even if uploaded from another computer. However, variables and settings are transferred even if this option is selected.	
		Password protection for project files	You can place a password on the file to protect your assets.	
		Data protection	You can set passwords for individual POUs (programs, functions and function block definitions) to prohibit displaying, changing and copying them.	Ver. 1.02 or higher
Window operation	Docking		You can dock and undock configuration tab pages, program editors, Watch Tab Pages, Cross Reference Tab Page and other window parts to/from the main Sysmac Studio window.	Ver 1.09 or higher
Online help	Sysmac Studio help system		You can access Sysmac Studio operating procedures.	All versions
	Instructions reference		Information is provided on how to use the instructions that are supported by the NX/NJ-series CPU unit or NY-series Industrial PC.	
	System-defined variable reference		You can display a list of descriptions of the system-defined variables that you can use on the Sysmac Studio.	
	Keyboard mapping reference		You can display a list of convenient shortcut keys that you can use on the Sysmac Studio.	

*1 Supported only by Sysmac Studio version 1.17 or higher.
*2 Changing event levels for controller errors is supported by version 1.04 or higher.
*3 Displaying comments for members of arrays, structures and unions and displaying long comments for variables (up to five lines) are supported by version 1.04 or higher.
*4 Changing the length of the displayed variable comments is supported by version 1.05 or higher.
*5 Creating programs in a library file is supported by version 1.06 or higher.
*6 Supported only by the Sysmac Studio version 1.08 or higher.
*7 The .csm format is supported by version 1.04 or higher. The size of a csm file is smaller than the size of the smc file.
*8 Merging detailed comparison results is supported by version 1.03 or higher.
*9 Changing present values in the Ladder Editor or ST Editor is supported by version 1.03 or higher.

*10 Changing the colors of graph lines is supported by version 1.01 or higher.
*11 Consecutively reading and displaying continuous trace results from more than one file is supported by version 1.05 or higher.
*12 MATLAB®/Simulink R2013a or higher is required.
*13 CX-Designer version 3.41 or higher is required.
*14 Individual selection of the retained variables to restore is supported by version 1.05 or higher.

DB connection functions

Item			Description
Setting parameters	DBMS settings		The database to connect is selected.
	Run mode setting of the DB connection service		The operation mode is selected to send SQL statements when DB connection instructions are executed or test mode is selected to not send SQL statements when DB connection instructions are executed.
	Spooling settings		You can set the service so that SQL statements are spooled when problems occur and resent when operation is restored.
	Operation log settings		Settings are made for the execution log for execution of the DB connection service, the debug log for execution of SQL statements for the DB connection service and the SQL execution failure log for SQL execution failures.
	Database connection service shutdown settings		Settings are made to control operation in order to end the DB connection service after automatically storing the operation log files on an SD memory card.
Programming	DB connection instructions		You can use the following DB connection instructions to write the user program for controlling the data in the database: DB_Insert (insert DB record), DB_Select (retrieve DB record), DB_Update (update DB record) and DB_Delete (delete DB record)
Monitoring information	Monitoring the DB connection service		The status of the DB connection service is monitored.
	Monitoring the DB connections		The status of each DB connection is monitored.
	Displaying the operation logs		The contents of the execution log, debug log and SQL execution failure log are displayed.

Note: The DB connection service can be used if the NJ501-□□20 is selected with Sysmac Studio version 1.06 or higher or the NJ101-□□20 is selected with Sysmac Studio version 1.14 or higher.

EtherNet/IP connection functions

Item			Description
EtherNet/IP connection settings	Connection settings		Functions related to tag data link (connection) settings in the EtherNet/IP network are provided.
	Setting connections	Editing tag sets	You create tags and tag sets using network variables.
		Editing target devices	You add target devices to connect to.
		Editing connections	You select tag sets from a list and create connections.
		Adding EDS files	You can add the types of EtherNet/IP devices that can be set as targets.
	Transferring connections	Synchronized transfer and batch transfer	All the connection settings in the controller or the project are transferred at the same time.
		Individual transfer and comparison	You can transfer or compare the connection settings of each EtherNet/IP device individually.
	Monitoring connections	Status monitor	The operating status of one or more connections is displayed. You can start or stop all the connections at the same time.
		Tag/tag set monitor	The detailed operation information of tags and tag sets, such as the presence or absence of tags and connection times of tag sets, is displayed.
		Ethernet information monitor	The detailed operation information of EtherNet/IP devices, such as bandwidth usage (pps), is displayed.

Note: Supported only by the Sysmac Studio version 1.10 or higher.

EtherNet/IP slave terminal functions

Item		Description
EtherNet/IP slave terminal configuration and setup	Configuration and setup	You create the configuration of slave terminal to be connected to the EtherNet/IP network on the Sysmac Studio and set the NX units that compose the slave terminal.
	Registering the NX units	You configure the slave terminal by dragging the NX units from the device list displayed in the toolbox to the positions where to mount the units.
	Setting the NX units	You edit the I/O allocation settings, mounting settings and unit operation settings of the NX units.
	Displaying the width of slave terminal configuration	The width and power consumption of the slave terminal configuration are displayed based on the unit configuration information.
	Comparing and merging the slave terminal configuration information	You can compare the configuration information on the project with actual configuration online, select the units with different information to correct and merge the information.
	Transferring the slave terminal configuration information	You transfer the unit configuration information to the slave terminal.

Note: Supported only by the Sysmac Studio version 1.11 or higher.

Safety control unit functions

Item			Description
Setting parameters	Safety I/O settings	Safety I/O settings	You make a setting for safety process data communications and connection with safety I/O devices.
		Safety process data communications settings	You select safety I/O units to perform safety process data communications (FSoE communications) and make necessary settings.
		Safety device allocation settings	You set the connection between safety I/O units and safety devices.
	Standard I/O settings	Exposed variable settings	You set wether to expose global variables of the safety CPU unit. The values of exposed variables can be referenced from NX/NJ-series CPU units or NY-series Industrial PC.
		Standard process data communications[*1]	You set the devices and ports of the standard I/O units for the exposed variables of the safety CPU unit.
	Safety task	Settings	You define the execution cycle and timing of the safety task and programs to be executed in the task.
		Assigning programs	You assign safety programs to execute the task.
	I/O map settings		The ports of safety I/O units used in safety process data communications are displayed. You assign device variables used in safety programs to the I/O ports.
Creating safety programs	Instruction list (Toolbox)		A hierarchy of the functions and function blocks that you can use is displayed in the toolbox. You can drag the required functions and function blocks onto the FBD editor to insert it to a safety program.
	FBD programming	FBD programming	You connect variables, functions and function blocks with connecting lines to build networks. The FBD editor is used to enter them.
		Adding FBD networks	You create FBD networks on the FBD editor to create algorithms.
		Inserting/Deleting functions/function blocks	You insert and delete functions and function blocks on the FBD editor.
		Entry assistance	When you enter functions, function blocks or parameters, each character that you enter from the keyboard narrows the list of candidates that is displayed for selection.
		Commenting out FBD networks	You can comment out each FBD network. When a network is commented out, it is no longer executed.
	Creating variables		You create variables used in safety programs in the global or local variable table,
	User-defined Function Blocks	Function Blocks	You create user-defined function blocks.
		Help reference[*2]	You can display the user-defined function block help with the popup menu or shortcut key.
	Export/import	Programs[*3]	You can export/import POUs.
		User-defined Function Blocks[*2]	You can export/import user-defined function blocks.
	Searching and replacing		You can search for and replace strings in the variable tables, programs and function blocks of a safety CPU unit.
Debugging	Monitoring		Variables are monitored during safety program execution. You can monitor the present values of device variables assigned to safety I/O units and user-defined variables. The values can be monitored on the FBD editor or Watch Tab Page.
	Changing the present values of variables		You can change the present values of user-defined variables and device variables as required. You can do this on the FBD editor or Watch Tab Page.
	Forced refreshing		The inputs from external devices and outputs to external devices are refreshed with a specified value on the Sysmac Studio. The specified value is retained even if the value of the variable is overwritten from the user program. You can use forced refreshing on the FBD editor or Watch Tab Page.
	Offline debugging[*4]	Offline debugging	You can check if the control program logic works as designed in advance using a special debugging function for the Simulator without connecting online with the safety CPU unit.
		Initial value settings[*5]	You can set the initial values of variables when you start execution of simulation.
		Feedback settings[*5]	You can set input status that is linked to changes in output status when simulator is running.
		Simple automatic test[*6]	You can check that expected values of the outputs to the inputs of the program are designed as intended using the Simulator functions of the safety CPU unit.
	User memory usage monitor[*5]		The memory usage of the safety control system and usage of safety network such as I/O data size are displayed.
Safety	Safety validation		You append the “safety-validated” information to a safety program when you can ensure safety of the program after you complete debugging.
	Changing operation mode		There are four operating modes: PROGRAM mode, DEBUG mode (STOPPED), DEBUG mode (RUN) and RUN mode. The RUN mode can be selected only for the validated safety programs.
Security measures	Setting the node name		You set a unique name for each safety CPU unit to confirm that you operate the correct safety CPU unit.
	Safety password		You can prevent unauthorized access to safety functions of safety CPU units by setting a safety password for online operations that affect the safety functions.
	Data protection	Programs[*3]	You can set passwords for individual programs to prohibit displaying or changing them.
		User-defined Function Blocks[*4]	You can set passwords for individual user-defined function blocks to prohibit displaying or changing them.

[*1] Supported if the EtherNet/IP coupler is selected with Sysmac Studio version 1.11 or higher.
[*2] Supported only by the Sysmac Studio version 1.12 or higher.
[*3] Supported only by the Sysmac Studio version 1.17 or higher.
[*4] Supported only by the Sysmac Studio version 1.08 or higher.
[*5] Supported only by the Sysmac Studio version 1.10 or higher.
[*6] Supported only by the Sysmac Studio version 1.15 or higher.

Note: Supported only by Sysmac Studio version 1.07 or higher.

HMI functions

NA-series programmable terminals

Item			Description
Parameter settings	Device	References	Devices, such as controllers, through which the NA-series PT can read and write information with communications are created on the Sysmac Studio and settings are made for them.
		Displaying internal devices	Controllers that were created in the project are displayed.
		Registering external devices	Devices, such as controllers, that were not created in the project are registered. The communications settings of the devices to communicate with the NA-series PT and information, such as variables and addresses within the devices that the NA-series PT will read and write, are also registered.
	Mapping variables		The information on the devices registered in the device references, such as variables and addresses, are mapped to the global variables of the NA-series PT.
	HMI settings	HMI	Settings for NA-series PT operation are made.
		Device	Settings, such as the startup page, default language, layout of the USB keyboard, automatic logout, screen saver, screen brightness and method to change to the system menu are made.
		TCP/IP	Settings for the Ethernet port, that is built-in to the NA-series PT, are made.
		FTP	Settings to communicate with FTP clients using the Ethernet port are made.
		NTP	Settings to communicate with an NTP server using the Ethernet port are made.
		FINS	Settings to communicate with devices that support FINS are made.
		VNC	Settings to communicate with VNC clients using the Ethernet port are made.
		Print*1	Print settings are made.
	Security settings	Security	Settings, such as user registration and permissions to restrict NA-series PT operation and displays, are made.
		User account	The user names, login passwords and permissions for each user to operate the NA-series PT are set.
		Permission and access level	The range of information that can be accessed for different permissions are set.
	Troubleshooter*2		Troubleshooter settings are made.
	Language settings		Language settings to perform multi-language displays on the NA-series PT are made.
Creating data and programming	Pages	Editing pages	The pages to display on the NA-series PT are edited.
		Adding and deleting pages	Pages are added, deleted or copied with the Multiview Explorer. Pages can also be copied to other projects.
		Adding and deleting page groups	Groups to organize and manage pages on the Multiview Explorer are added and deleted. Pages can be added to or moved to the groups.
		Page properties settings	The page type, overlapping, background color, etc., are set in the Properties Window.
		Changing the display language	If using multiple languages is set in the language settings, the resources displayed on the Page Editor are displayed in the language set for each resource.
		Changing the display status of each object*1	You can check display status changes for lamp and other objects on the Page Editor.
		Displaying object configuration	The objects and groups that were added to each page can be confirmed in a tree structure using the Page Explorer.
		Adding objects	Objects, such as buttons or graphics, to display on a page are added by dragging them from the Toolbox to the Page Editor.
		Grouping objects	Settings to operate multiple objects together as a group are made.
		Aligning objects	Multiple objects are aligned.
		Editing objects	Objects and groups can be copied within a page or to another page. Objects can also be deleted and locations, sizes, rotations and position relationships with other objects can be set. Also, labels can be edited*1.
		Setting object entry order*1	Entry order of Data Edit objects can be set.
		Object property settings	Properties, such as the colors and shapes of objects and the mapped variables, can be changed. Properties are displayed and changed in the Properties Window.
		Duplicating objects*3	You can duplicate a specified number of objects. Offsets are set to the element numbers of the array set for the object.
		Animation settings	Animation to modify dynamically the appearance of objects are set. Animation is displayed and changed in the Animation Window.
		Event and action settings	The events that can be set for objects and the actions that can be executed when an event occurs are set.
	Programming with Visual Basic	Visual Basic	Subroutines are created with Visual Basic.
		Language specifications	Visual Basic 2008 and .NET Compact Framework 3.5 are supported.*4
		Adding subroutine groups	Groups to organize and manage global subroutines on the Multiview Explorer are added or deleted. Subroutines can be added or moved to the groups.
		Editing subroutines	Subroutines are created using the Code Editor, which is optimized for Visual Basic.
		Bookmarks	Bookmark can be added to any code line and you can move between the bookmarks.
		Data entry assistance	The characters that are entered from the keyboard are used to display candidates when entering the source code.
	User alarms	User alarms	Settings for detection conditions and displaying messages for user alarms are made.
		Adding and deleting user alarm groups	Groups to organize and manage user alarms on the Multiview Explorer are added or deleted. User alarms can be created in the groups.
		Registering and deleting user alarm	Setting for detection conditions for user alarms and displaying messages or popup pages are made for user alarm groups.
		Copying user alarms	User alarms can be copied within a group or to another group.
		Event and action settings	Events and the actions that are executed when the events occur are set for the user alarms. Displaying and changing the settings for events and actions is performed in the Events and Actions Window.
	Controller events*1	User-defined event settings	Settings for pages that can be changed from user-defined events display in Troubleshooter.
	Data logging	Data logging	Data logging is set to log specified data in the NA-series PT at the specified times.
		Adding and deleting data sets	Data sets are added to perform data logging.
		Log condition setting	Conditions to perform data logging and target global variables are set for the data sets.
	Broken-line graph*1	Settings	Settings for the data that is displayed in a broken-line graph.
		Adding and deleting data groups	Data groups for which a broken-line graph is drawn are added and deleted.
		Log condition setting	Conditions to display a broken-line graph and target global variables are set for data groups.
	Recipes	Recipes	Data groups that are retained in the NA-series PT and can be switched for user requests are set.
		Adding and deleting templates	Data storage locations, value ranges and data names are added or deleted.
		Recipe data settings	The actual data is set for each recipe.
	Keypad customization*1		Keypads can be customized.

Item			Description
Creating data and programming	Global events		The events that are detected on any page and the actions that are executed when the events occur are set.
	Resource management	Management	All of the character strings and graphics that are displayed on pages are managed. Also, registered resources can be indirectly accessed.
		Registering and deleting general character strings	The character strings that are displayed on pages are registered and deleted, except for character strings used for user alarms.
		Registering and deleting character strings for user alarms	The character strings used for user alarms are added or deleted.
		Registering and deleting document files	Document files that are displayed with the Document Viewer are set or deleted.
		Registering and deleting image files	Image files that are displayed for objects are set or deleted.
		Registering and deleting movies	Movie files that are displayed for Media Player objects are set or deleted.
		Importing and exporting	The general character strings and alarm character strings can be imported and exported using Excel files.
	Scaling[*1]		Values of variables and objects are converted by a specified a scaling factor set for them.
	Searching and replacing		You can search all strings in a project to find and replace a specified string.
	Cross reference[*1]		Where a specified program element (variable, data type, page or resource) is used in a project can be checked with a list. You can access the use locations of the element from the list.
	Building		The project is converted into a format that can be executed in the NA-series PT.
Reusability	IAGs	Intelligent application gadgets	Multiple objects and subroutines are combined to create a reusable object.
		Creating IAGs	An IAG that consists of multiple objects and subroutines is created as a functional unit in an IAG project.
		Creating IAG collection files	A created IAG is built and saved as a module that can be distributed and reused.
		Creating user-defined events[*1]	You can create user-defined events that can be used in an IAG.
		Using IAGs	IAG collection files are imported using the IAG Collection Manager. The imported IAGs are displayed in the Toolbox and can be used in the same way as other objects.
	Custom objects	Custom objects	The selected objects are registered in a reusable format in the Toolbox.
		Registering custom objects	Objects or grouped objects are dragged to the Toolbox to register them.
		Using custom objects	Custom objects are displayed on a page by dragging them from the Toolbox to the Page Editor.
File operations	Synchronization		The data in the NA-series PT that is online is compared with the data in the Sysmac Studio. You can check the differences and then transfer the data after specifying the transfer direction.
	Transferring files via storage media		The data in a storage media in the computer is compared with the data in the Sysmac Studio. You can check the differences and then transfer the data to the storage media. You can use the System Menu to transfer a saved project file to the NA-series PT.
	Clearing all memory		All of the data except for the clock information is deleted from the NA-series PT.
Simulation	Executing simulations		A project file on the computer is virtually executed to debug it.
	Setting and clearing breakpoints		Breakpoints can be set at the specified positions in a subroutine.
	Synchronized simulation with Controller Simulator		Sequence control and NA-series PT operation, such as displaying pages and subroutine operation, is simulated together to debug the application in the NA-series PT.
Setting clock information			The clock information in the NA-series PT can be checked and set.
Communications	Going online with NA-series PT		The computer can be placed online with the NA-series PT. However, information in the NA-series PT, such as the values of variables, cannot be read.
	Upgrading system program		When the Sysmac Studio is online with the NA-series PT, the system program in the NA-series PT can be upgraded as required.
Printing[*1]			Settings of each project can be printed out.
Security	Preventing malfunctions		If the name or serial ID of the project and the NA-series PT are different when the Sysmac Studio goes online, a confirmation dialog box is displayed.
	Preventing incorrect operations		You can prevent data in the NA-series PT from being overwritten from the Sysmac Studio.

[*1] Supported only by the Sysmac Studio version 1.14 or higher.
[*2] Supported only by the Sysmac Studio version 1.13 or higher.
[*3] Supported only by the Sysmac Studio version 1.16 or higher.
[*4] There are restrictions on the functions that can be used.

Note: Supported only by Sysmac Studio version 1.11 or higher.

Vision sensor functions

FQ-M vision sensor

Item			Description
Setting parameters	Main edit	General settings	Displays and sets basic information of the sensor.
		Sensor connection	Changes the connection status of the sensor, and sets the conditions for communications with the sensor.
		Sensor control in online	Performs various controls for the sensor mode change, data transfer/save and monitoring.
		Sensor error history	Displays and clears the error history of an online sensor.
		Tool	Restarts and initializes the sensor, updates the firmware of the sensor, reads sensor data from a file, saves a sensor data to a file, prints the sensor parameters and displays help.
	Scene data edit	Image condition settings	Adjusts the image condition.
		Specifies the calibration pattern	Sets a registered calibration pattern.
		Registers inspection item	Registers the inspection item to use in the measurement. You can select from the following inspection items: edge position, search, labeling, shape search.
		Calculation settings	Makes a setting for basic arithmetic operations and function operations using inspection item judgment results and measurement data.
		Logging settings	Makes a setting for logging measurement results of inspection items and calculation results.
		Output settings	Makes a setting for data to output to external devices.
		Run settings	Switch sensor modes or monitors measurement results.
	Sensor system data edit settings	Trigger condition	Sets the trigger type and image timing.
		I/O	Sets the conditions of output signals. You can check the status of I/O signal while online.
		Encoder	Make settings for the encoder such as common encoder settings, ring counter settings and encoder trigger settings.
		Ethernet communication	Makes Ethernet communication settings. You can select data communication from no-protocol data, PLC link data and programmable no-protocol data.
		EtherCAT communication	Makes the EtherCAT communication settings according to the communication settings of the EtherCAT master.
		Logging condition	Sets the conditions to log to the internal memory of sensor.
		Sensor	Makes the settings for startup scene control function, password setting function and adjustment judgment function.
	Calibration scene data settings		Calculates, views and edits the calibration parameters. The vision sensor supports general-purpose calibration and calibration for conveyor tracking.
Debugging	Offline debugging of sensor operation		Simulates measurements offline without connecting to the vision sensor. You can use external image files and perform measurements under the conditions set in the offline settings, then display the results of those measurements.
	Offline debugging of the sensor control program and sensor operation		Performs a linked simulation between the sequence control of an NX/NJ-series CPU unit or NY-series Industrial PC and the operation of an FQ-M sensor in EtherCAT configuration systems. This allows you to debug operation offline from when measurements and other processing are performed for control signals such as measurement triggers through the output of processing results.

Note: Supported only by the Sysmac Studio version 1.01 or higher.

FH vision sensor

Item			Description
Setting parameters	Main edit	Sensor information	Displays and sets basic information of the sensor.
		Online	Changes the connection status of the sensor and performs various controls such as sensor restart and initialization.
	Line edit	Operation view	Monitors the measurement images of the sensor and detailed results of each process unit.
		Scene maintenance view	Edits, manages and saves the scene groups and scenes.
	Scene data edit	Flow edit	Creates the process flow in combination of user-specified units.
		Process unit edit	Edits each process unit.
	Sensor system data edit settings	Camera	Checks the camera connection status and sets the camera's imaging timing and communications speed.
		Controller	Makes the system environment settings for the sensor.
		Parallel I/O	Sets the conditions of output signals.
		RS-232C/422	Makes the RS-232C/422 communications settings.
		Ethernet communication	Makes the Ethernet communication settings.
		EtherNet/IP communication	Makes the EtherNet/IP communication settings.
		EtherCAT communication	Makes the EtherCAT communication settings.
		Encoder	Makes the encoder settings.
	Tools	Communication command customization tool	Makes the settings for customized communication commands.
		File saving tool	Copies and transfers the files in the sensor memory.
		Calibration support tool	Checks the calibration information.
		User data tool	Edits the data (user data) that can be shared and used in sensors.
		Security setting tool*1	Edits the security settings of the sensor.
		Scene group save destination setting tool*1	Sets the destination to save the scene group data.
		Image file save tool*1	Saves the logging images and image files stored in the sensor memory.
		Registered image management tool*1	Saves the images used for model registration and reference registration as registered images.
		Reference position update tool*1	Edits all reference positions of more than one processing unit.
		Scene group data conversion tool*1	Creates the scene group data with more than 128 scenes.
		Scene control macro tool*1	Makes a setting for complementing and expanding the measurement flow and scene control.
		Conveyor calibration wizard tool*2	Calibrate cameras, conveyors and robots in a conveyor tracking application.
		Calibration plate print tool*2	Prints out calibration patterns that are used in the conveyor calibration wizard.
		Conveyor panorama display tool*2	Displays a panoramic image in a conveyor tracking application.

Item		Description
Debugging	Offline debugging of sensor operation	Simulates measurements offline without connecting the sensor. You can use external image files and perform measurements under the conditions set in the offline settings, then display the results of those measurements.
	Offline debugging of sensor control program and sensor operation *3	Simulates the linked operation of the sequence controls in the NX/NJ-series CPU unit or NY-series Industrial PC and FH-series sensor operation for an EtherCAT system. You can debug a series of operations offline to perform the measurement and other processing and output the results when a control signal such as measurement trigger is input to the sensor.
Security	Prevention of incorrect operation *4	Prevents unauthorized access by setting an account password for online operations.

*1 Supported only by the Sysmac Studio version 1.10 or higher.
*2 Supported only by the Sysmac Studio version 1.14 or higher.
*3 Supported only by the Sysmac Studio version 1.08 or higher.
*4 Supported only by the Sysmac Studio version 1.09 or higher.

Note: Supported only by the Sysmac Studio version 1.07 or higher.

Displacement sensor functions

Item			Description
Setting parameters	Main editing	General settings	Displays and sets basic information on the sensor.
		Sensor connection	Changes the connection status of the sensor, and sets the conditions for communications with the sensor.
		Online sensor control	Performs various controls for the sensor (e.g., changing the mode, controlling internal logging and monitoring).
		Tools	Restarts and initializes the sensor, updates the firmware in the sensor, recovers ROM data, prints the sensor parameters and displays help.
	Editing bank data	Setting sensing conditions	Adjusts the light reception conditions for each measurement region.
		Setting task conditions	Used to select the measurement items to use in measurements. You can select from the height, thickness or calculations. The following are set for the measurement items: scaling, filters, holding, zero-resetting and judgement conditions.
		Setting I/O conditions	Sets parameters for outputting judgements and analog values to external devices.
		Sensor settings	Sets the following: ZW sensor controller's key lock, number of displayed digits below the decimal point, the bank mode, the analog output mode and timing/reset key inputs.
		Ethernet communication settings	Sets up Ethernet communications and fieldbus parameters.
		RS-232C communication settings	Sets up RS-232C communications.
		Data output settings	Sets serial output parameters for holding values.
Monitoring		Sensor monitoring	Monitors the light-detection status and the measurement results of the sensor.
		Trend monitoring	Logs and monitors the measurement results that meet the specific conditions of the sensor.
Debugging		Offline debugging of sensor control programs and sensor operation	Performs a linked simulation between the sequence control of an NX/NJ-series CPU unit or NY-series Industrial PC and the operation of a ZW sensor in EtherCAT configuration systems. This allows you to simulate the operation of signals when timing signals and other control signals are input to the sensor to debug the control logic offline.

Note: The ZW-7000-series is supported only by the Sysmac Studio version 1.15 or higher.
Note: The ZW-series is supported only by the Sysmac Studio version 1.05 or higher.

Robot additional option functions

Item		Description
3D machine models	Conveyor for picking	This conveyor is for picking workpieces in a Pick&Place 3D equipment model that uses a Vision sensor and Delta robots. A workpiece is displayed at the specified coordinates in the field of vision of the Vision sensor and the workpiece is moved on a conveyor at the set speed.
Pick&Place 3D equipment model creation wizard	Setup with a wizard	You can easily build a Pick&Place 3D equipment model that uses a Vision sensor and Delta robots. You can select from configuration elements (such as one conveyor for picking, one conveyor for placing and two robots) and enter the required parameters in a wizard to complete the 3D equipment model.
Calibration parameter output	Text output	The calibration parameters required in programming to operate a Pick&Place 3D equipment model are output in ST program format.

Note: This option can be used by applying the Robot Additional Option to Sysmac Studio version 1.14 or higher.

Web support services

Category	Function
Online user registration	You can register online as a user of Sysmac Studio.
Automatic update	With the automatic update function of Sysmac Studio, the latest update information for your computer environment can be searched for and applied using the Internet. Your Sysmac Studio can be constantly updated to the latest state.

Ordering information

Automation software

Please purchase a DVD and licenses the first time you purchase the Sysmac Studio. DVD's and licenses are available individually.
The license does not include the DVD.

Product	Specifications			Model
	Description	Number of licenses	Media	
Sysmac Studio Standard Edition Ver. 1.□□	The Sysmac Studio is the software that provides an integrated environment for setting, programming, debugging and maintenance of machine automation controllers including the NX/NJ-series CPU units, NY-series Industrial PC, EtherCAT slave and the HMI. Sysmac Studio runs on the following OS: Windows 7 (32-bit/64-bit version) Windows 8/Windows 8.1 (32-bit/64-bit version) Windows 10 (32-bit/64-bit version)	– (Media only)	DVD	SYSMAC-SE200D
		1 license	–	SYSMAC-SE201L
		3 licenses	–	SYSMAC-SE203L
		10 licenses	–	SYSMAC-SE210L
		30 licenses	–	SYSMAC-SE230L
		50 licenses	–	SYSMAC-SE250L
Sysmac Studio Lite Edition Ver. 1.□□	Same functionality and supported devices than Sysmac Studio Standard Edition except for controller. The Lite Edition only supports the NJ1 and NX1 machine controllers.	1 license	–	SYSMAC-LE201L
		3 licenses	–	SYSMAC-LE203L
		10 licenses	–	SYSMAC-LE210L
Sysmac Studio Upgrade	Software upgrade from Sysmac Studio Lite Edition to Sysmac Studio Standard Edition.	1 license	–	SYSMAC-LU501L
		3 licenses	–	SYSMAC-LU503L
		10 licenses	–	SYSMAC-LU510L
Sysmac Studio Vision Edition Ver. 1.□□ *1 *2	Sysmac Studio Vision Edition is a limited license that provides selected functions required for FQ-M series and FH-series vision sensor settings.	1 license	–	SYSMAC-VE001L
Sysmac Studio Measurement Sensor Edition Ver. 1.□□ *1 *3	Sysmac Studio Measurement Sensor Edition is a limited license that provides selected functions required for ZW-series displacement sensor settings.	1 license	–	SYSMAC-ME001L
		3 licenses	–	SYSMAC-ME003L
Sysmac Studio NX-I/O Edition Ver. 1.□□ *1 *4	Sysmac Studio NX-I/O Edition is a limited license that provides selected functions required for EtherNet/IP coupler settings.	1 license	–	SYSMAC-NE001L
Sysmac Studio HMI Edition *1 *5	Sysmac Studio HMI Edition is a limited license that provides selected functions required for NA-series PTs settings.	1 license	–	SYSMAC-HE001L
Sysmac Studio Drive Edition *1 *6	Sysmac Studio Drive Edition is a limited license that provides selected functions required for drive settings.	1 license	–	SYSMAC-DE001L
Sysmac Studio Robot Additional Option *1	Sysmac Studio Robot Additional Option is a limited license to enable the Vision & Robot integrated simulation.	1 license	–	SYSMAC-RA401L

*1 This product is a license only. You need the Sysmac Studio Standard Edition DVD media to install it.
*2 With the Vision Edition, you can use only the setup functions for FQ-M series and FH-series vision sensors.
*3 With the Measurement Sensor Edition, you can use only the setup functions for ZW-7000-series and ZW-series displacement sensors.
*4 With the NX-I/O Edition, you can use only the setup functions for EtherNet/IP coupler.
*5 With the HMI Edition, you can use only the setup functions for NA-series PTs.
*6 With the Drive Edition, you can use only the setup functions for 1S and Accurax G5 servo systems.

Note: Site licenses are available for users who will run Sysmac Studio on multiple computers. Ask your OMRON sales representative for details.

Components

DVD (SYSMAC-SE200D)

Components	Details
Introduction	An introduction about components, installation/uninstallation, user registration and auto update of the Sysmac Studio is provided.
Setup disk (DVD-ROM)	1

License (SYSMAC-SE2□□L/VE0□□L/ME0□□L/NE0□□L/HE0□□L/DE0□□L/RA4□□L)

Components	Details
License agreement	The license agreement gives the usage conditions and warranty for the Sysmac Studio.
License card	A model number, version, license number and number of licenses are described.
User registration card	Two cards are contained. One is for users in Japan and the other is for users in other countries.

Included support software

DVD media of Sysmac Studio includes the following support software:

Included support software		Outline
CX-Designer	**Ver. 3.□□**	The CX-Designer is used to create screens for NS-series PTs[*1]
CX-Integrator	**Ver. 2.□□**	The CX-Integrator is used to set up FA networks.
CX-Protocol	**Ver. 1.□□**	The CX-Protocol is used for protocol macros for serial communications units.
Network Configurator	**Ver. 3.□□**	The Network Configurator is used for tag data links on the built-in EtherNet/IP port.
SECS/GEM Configurator[*2]	**Ver. 1.□□**	The SECS/GEM Configurator is used for SECS/GEM settings.
Adept Robot IP Address Setting Tool	**Ver. 1.□□**	The Adept Robot IP Address Setting Tool is used for setting IP address of Adept Robot.
CX-ConfiguratorFDT	**Ver. 2.□□**	The software that sets the IO-Link devices.
IODD DTM Configurator	**Ver. 3.□□**	The software that adds and deletes IODD files for the IO-Link devices.

[*1] Please, use the Sysmac Studio to create the project of the NA-series PTs.
[*2] Please, purchase the required number of SECS/GEM Configurator licenses.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I181E-EN-08 In the interest of product improvement, specifications are subject to change without notice.

CX-Compolet/SYSMAC Gateway

High performance and full connectivity

CX-Compolet includes software components that can make it easy to create programs for communications between a computer and Omron controllers. This package includes .NET control objects and ActiveX control objects that can be used with Visual Basic and C# programming languages. Apart of the standard communications functionality, it supports the communication using EtherNet/IP Tag names with NX/NY/NJ machine controller families. Data types like structures and arrays are also supported.

SYSMAC Gateway is a communications middleware for personal computers running Windows. Support CIP communications and tag data links (EtherNet/IP) in addition to FinsGateway functions. It's available as a standalone package to act just as communications middleware and it's also included in the CX-Compolet package.



Specifications

System requirements (CX-Compolet/SYSMAC Gateway)

Item	Requirements	
Operating system (OS) Japanese or English system	Microsoft Windows Vista (32-bit) Microsoft Windows XP SP3 (32-bit) Microsoft Windows Server 2003 (32-bit)	Microsoft Windows 8.1[*1] (32-bit/64-bit[*2]) Microsoft Windows 8 (32-bit/64-bit[*2]) Microsoft Windows 7 (32-bit/64-bit[*2]) Microsoft Windows Server 2012 (64-bit[*2]) Microsoft Windows Server 2012 R2 (64-bit[*2]) Microsoft Windows Server 2008 (32-bit/64-bit[*2]) Microsoft Windows Server 2008 R2 (64-bit[*2])
Personal computer	Windows computers with Intel (x86 processor)	Windows computers with Intel 32-bit (x86 processor) or 64-bit (x64 based processor)
CPU	Processor recommended by Microsoft (1 GHz or faster recommended)	Processor recommended by Microsoft (2 GHz or faster recommended)
Memory	512 MB min. (1 GB min. recommended)	1 GB min. (2 GB min. recommended)
Hard disk	At least 400 MB of available space	

[*1] The CX-Compolet version 1.4 or higher is required for Microsoft Windows 8.1.

[*2] This software runs on WOW64 (Windows-On-Windows 64). Customer application must be run as 32-bit process.

Note: **1.** USB port on the PC can not be shared between SYSMAC Gateway and CX-One in Windows Vista or higher.
2. System requirements for Windows computers are the same as those recommended by Microsoft.

Comparison between SYSMAC Gateway and CX-Compolet

Communications method	Protocols	Specifying memory areas	SYSMAC Gateway	CX-Compolet + SYSMAC Gateway
Message communications	FINS	Physical address	Yes	Yes
	CIP	Physical address	Yes[*1]	Yes
		Tag names	No	Yes
Tag Data Links (EtherNet/IP)	CIP	Physical address	Yes[*2]	Yes
		Tag names	No	Yes
Development languages			C, C++	Visual Basic, C#

[*1] Please, use after understanding the CIP communications specifications.

[*2] Data is transferred through the event memory.

Correspondence between machine controller models and connected networks

Machine controller model	Personal computer side							
	RS-232C				USB	Ethernet (LAN)		Controller Link
	SYSWAY (Host Link C mode)	SYSWAY-CV (Host Link FINS)	CompoWay/F (master at PC)	Peripheral USB	FINS	Ethernet (FINS)	EtherNet/IP	FINS
NX7 CPU (unit version 1.10 or higher)*1	No	No	No	No	No	No	Yes*2	No
NJ5 CPU (unit version 1.03 or higher)*3	No	No	No	No	No	No	Yes*2	No
NJ3 CPU (unit version 1.03 or higher)*3	No	No	No	No	No	No	Yes*2	No
NJ1 CPU (unit version 1.10 or higher)*1	No	No	No	No	No	No	Yes*2	No

*1. To connect NX7/NJ1 machine controller, CX-Compolet/SYSMAC Gateway version 1.70 or higher is required.

*2. Tag data links between SYSMAC Gateway and the machine controller CPU unit can be created within the CJ-series specifications for variable with basic data type, array variable and structure variable. SYSMAC Gateway memory allocation of structure variable is the same as the CJ-series.

*3. To connect NJ5/NJ3 machine controller, CX-Compolet/SYSMAC Gateway version 1.31 or higher is required.

Ordering information

CX-Compolet

Product	Specifications		Model
CX-Compolet*1	Software components that can make it easy to create programs for communications between a computer and controllers. This packaged product bundles CX-Compolet and SYSMAC Gateway with 1 license each. Supported execution environment: .NET Framework (2.0, 3.0, 3.5, 4.0 or 4.5.1)*2 Development environment: Visual Studio 2005/2008/2010/2012/2013 Development languages: Visual Basic, C# Supported communications: Equal to SYSMAC Gateway	1 user license	CX-COMPOLET-EV1-01L
		5 user license	CX-COMPOLET-EV1-05L
		10 user license	CX-COMPOLET-EV1-10L
		Site user license	CX-COMPOLET-EV1-XXL

*1. One license is required per computer.

*2. When .NET Framework version 1.1 (Visual Studio 2003) is used for development, only the specifications of CX-Compolet version 1.5 are available.

Note: Supported only by the machine controller CPU units version 1.03 or higher and the CX-Compolet version 1.31 or higher.

SYSMAC Gateway (communications middleware)

Product	Specifications	Model
SYSMAC Gateway*1	Communications middleware for personal computers running Windows. Supports CIP communications and tag data links (EtherNet/IP) in addition to FinsGateway functions. This package includes SYSMAC Gateway with 1 license. (FinsGateway is also included.) Supported communications: RS-232C, USB, Controller Link, SYSMAC Link, Ethernet, EtherNet/IP	SYSMAC-GATEWAY-RUN-V1

*1. One license is required per computer.

Note: Supported only by the machine controller CPU units version 1.03 or higher and the CX-Compolet version 1.31 or higher.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. SysCat_I184E-EN-02 In the interest of product improvement, specifications are subject to change without notice.

Selection table – Ethernet and EtherCAT media

	Ethernet and EtherCAT cables				
					
Model	**EtherCAT cable**		**Ethernet/EtherCAT patch cable**		
Type	Cable with standard connectors on both ends (M12 Straight/M12 Straight)	Cable with rugged connectors on both ends (M12 Straight/RJ45)	Cable with standard connectors on both ends (RJ45/RJ45)	Cable with standard connectors on both ends (RJ45/RJ45)	Cable with rugged connectors on both ends (RJ45/RJ45)
Specifications	• Cat 5e • Quad-core • Double shield SF/UTP • Improved shield for EtherCAT communications	• Cat 5e • Quad-core • Double shield SF/UTP • Improved shield for EtherCAT communications	• Cat 6a • 4 pair • Double shield S/FTP	• Cat 5e • 4 pair • Double shield SF/UTP	• Cat 5e • Quad-core • Double shield SF/UTP
Cable sheath material	Polyvinylchloride (PVC)	Polyvinylchloride (PVC)	Low Smoke Zero Halogen (LSZH)	Polyurethane (PUR)	Polyvinylchloride (PVC)
Cable colour	Black	Black	Yellow, blue and green	Green	Grey
Length	0.5, 1.0, 2.0, 3.0, 5.0, 10 m	0.5, 1.0, 2.0, 3.0, 5.0, 10 m	0.2, 0.3, 0.5, 1.0, 1.5, 2.0, 3.0, 5.0, 7.5, 10, 15, 20 m	0.5, 1.0, 1.5, 2.0, 3.0, 5.0, 7.5, 10, 15, 20 m	0.3, 0.5, 1.0, 2.0, 3.0, 5.0, 10, 15 m
Page	45, 63	45, 63	45, 63	45, 63	45, 63

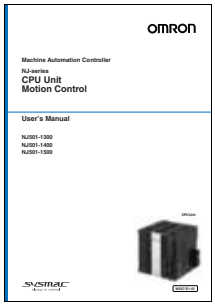
	Ethernet and EtherCAT connectors		
			
Model	**Ethernet field-mount plugs**		**Ethernet socket**
Type	Industrial RJ45 connector	Rugged RJ45 connector	Socket to terminate installation cable in the cabinet
Specifications	• Metal RJ45 • For AWG22 to AWG26	• Plastic RJ45 • For AWG22 to AWG24	• RJ45 socket • DIN-rail mount
Cable colour	Chrome	Black	Grey
Dimensions	52 mm	52 mm	60 × 17.5 × 67 mm
Page	46, 64	46, 64	46, 64

	Industrial Switching Hub		
			
Model	**Ethernet switch**		
Number of ports	5	5	3
Functions	• QoS for EtherNet/IP • Auto MDI/MDIX • Failure detection: Broadcast storm and LSI error detection 10/100BASE-TX, Auto-Negotiation	• QoS for EtherNet/IP • Auto MDI/MDIX	• QoS for EtherNet/IP • Auto MDI/MDIX
Power requirements	24 VDC (±5%)	24 VDC (±5%)	24 VDC (±5%)
Dimensions	48 × 78 × 90 mm	48 × 78 × 90 mm	25 × 78 × 90 mm
Mounting	DIN rail	DIN rail	DIN rail
Page	45, 63	45, 63	45, 63

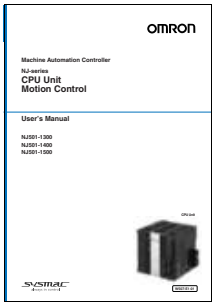
	Ethernet and EtherCAT cables			
				
Model	**Ethernet/EtherCAT patch cable**		**Ethernet installation cable**	
Type	Cable with rugged connectors on both ends (M12 Straight/RJ45)	Cable with rugged connectors on both ends (M12 Right angle/RJ45)	Cable without connectors	Cable without connectors
Specifications	• Cat 5e • Quad-core • Double shield SF/UTP	• Cat 5e • Quad-core • Double shield SF/UTP	• Cat 5 • 4×2×AWG24/1 (Solid core) • Double shield SF/UTP	• Cat 5 • 4×2×AWG26/7 (Stranded core) • Double shield SF/UTP
Cable sheath material	Polyvinylchloride (PVC)	Polyvinylchloride (PVC)	Polyurethane (PUR)	Polyurethane (PUR)
Cable colour	Grey	Grey	Green	Green
Length	0.3, 0.5, 1.0, 2.0, 3.0, 5.0, 10, 15 m	0.3, 0.5, 1.0, 2.0, 3.0, 5.0, 10, 15 m	100 m	100 m
Page	45, 63	45, 63	45, 63	45, 63

	EtherCAT branching unit	
		
Model	**EtherCAT junction slave**	
Number of ports	6	3
Functions	• Power, Link/Act indicators • Auto MDI/MDIX • Reference clock	• Power, Link/Act indicators • Auto MDI/MDIX • Reference clock
Power requirements	24 VDC (–15% to +20%)	24 VDC (–15% to +20%)
Dimensions	48 × 78 × 90 mm	25 × 78 × 90 mm
Mounting	DIN rail	DIN rail
Page	44, 63	44, 63

Technical documentation



	Product	Title	Cat. No.
Machine controller	IPC machine controller (Industrial box PC type) hardware	User Manual	W556-E2
	IPC machine controller (Industrial panel PC type) hardware	User Manual	W557-E2
	IPC machine controller software	User Manual	W558-E1
	IPC machine controller setup	User Manual	W568-E1
	Industrial monitor	User Manual	W554-E2
	Industrial PC platform	Troubleshooting Manual	W564-E1
	NX7-series CPU units hardware	User Manual	W535-E1
	NJ-series CPU units hardware	User Manual	W500-E1
	NX1-series CPU units hardware	User Manual	W578-E1
	NX1-series built-in I/O and option board	User Manual	W579-E1
	NX/NJ-series CPU units software	User Manual	W501-E1
	NX/NJ-series CPU units motion control	User Manual	W507-E1
	NX/NJ-series CPU units built-in EtherCAT port	User Manual	W505-E1
	NX/NJ-series CPU units built-in EtherNet/IP port	User Manual	W506-E1
	NJ-series database connection CPU units	User Manual	W527-E1
	NJ-series SECS/GEM CPU units	User Manual	W528-E1
	NJ-series robotics CPU units	User Manual	W539-E1
	NJ-series CPU units	Startup Guide	W513-E1
	NJ-series CPU units motion control	Startup Guide	W514-E1
	NX/NJ-series instructions	Reference Manual	W502-E1
	NX/NJ-series motion control instructions	Reference Manual	W508-E1
	NX/NJ-series troubleshooting	Troubleshooting Manual	W503-E1
	CJ-series analog I/O units for NJ-series CPU unit	Operation Manual	W490-E1
		Operation Manual	W498-E1
	CJ-series temperature control units for NJ-series CPU unit	Operation Manual	W491-E1
	CJ-series ID sensor units for NJ-series CPU unit	Operation Manual	Z317-E1
	CJ-series high-speed counter units for NJ-series CPU unit	Operation Manual	W492-E1
	CJ-series serial communications units for NJ-series CPU unit	Operation Manual	W494-E1
	CJ-series EtherNet/IP units for NJ-series CPU unit	Operation Manual	W495-E1
	CJ-series DeviceNet units for NJ-series CPU unit	Operation Manual	W497-E1
	CJ-series CompoNet master units for NJ-series CPU unit	Operation Manual	W493-E1
	CJ-series EtherCAT slave units for NJ-series CPU Unit	Operation Manual	W542-E1
Software	Sysmac Studio	Operation Manual	W504-E1
Remote I/O	NX-series EtherCAT coupler unit	User Manual	W519-E1
	NX-series EtherNet/IP coupler unit	User Manual	W536-E1
	NX-series IO-Link master unit	User Manual	W567-E1
	NX-series digital I/O units	User Manual	W521-E1
	NX-series analog I/O units	User Manual	W522-E1
	NX-series temperature input/heater burnout detection units	User Manual	W566-E1
	NX-series load cell input unit	User Manual	W565-E1
	NX-series position interface units	User Manual	W524-E1
	NX-series communication interface units	User Manual	W540-E1
	NX-series system units	User Manual	W523-E1
	NX-series	Data Reference Manual	W525-E1
	GX-series	User Manual	W488-E1
Safety	NX-series safety control units	User Manual	Z930-E1
		Reference Manual	Z931-E1
Servo system	1S servo system	User Manual	I586-E1
	Accurax G5 EtherCAT rotary servo system	User Manual	I576-E1
	Accurax G5 EtherCAT linear servo system	User Manual	I577-E1
	Integrated servo motor	User Manual	I103E-EN
Frequency inverter	MX2 inverter	User Manual	I570-E2
		Quick Start Guide	I129E-EN
	RX inverter	User Manual	I560-E2
		Quick Start Guide	I130E-EN
	MX2/RX EtherCAT communication unit	User Manual	I574-E1
Vision	FH series vision system	User Manual	Z365-E1
		Hardware Manual	Z366-E1
	FH series vision system processing item function	Reference Manual	Z341-E1
	FH series vision system communication settings	User Manual	Z342-E1
	FH series vision system for Sysmac Studio	Operation Manual	Z343-E1
	FH series vision system macro customize functions	Programming Manual	Z367-E1
	FQ-M series specialized vision sensor for positioning	User Manual	Z314-E1



	Product	Title	Cat. No.
Sensing	ZW-7000 displacement sensor	User Manual	Z362-E1
	ZW-7000 displacement sensor for communications settings	User Manual	Z363-E1
	N-Smart EtherCAT sensor communication unit	User Manual	E429-E1
Human machine interface	NA-series programmable terminals	Hardware Manual	V117-E1
		Software Manual	V118-E1
		Device Connection Manual	V119-E1
		Quick Start Guide	V120-E1

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