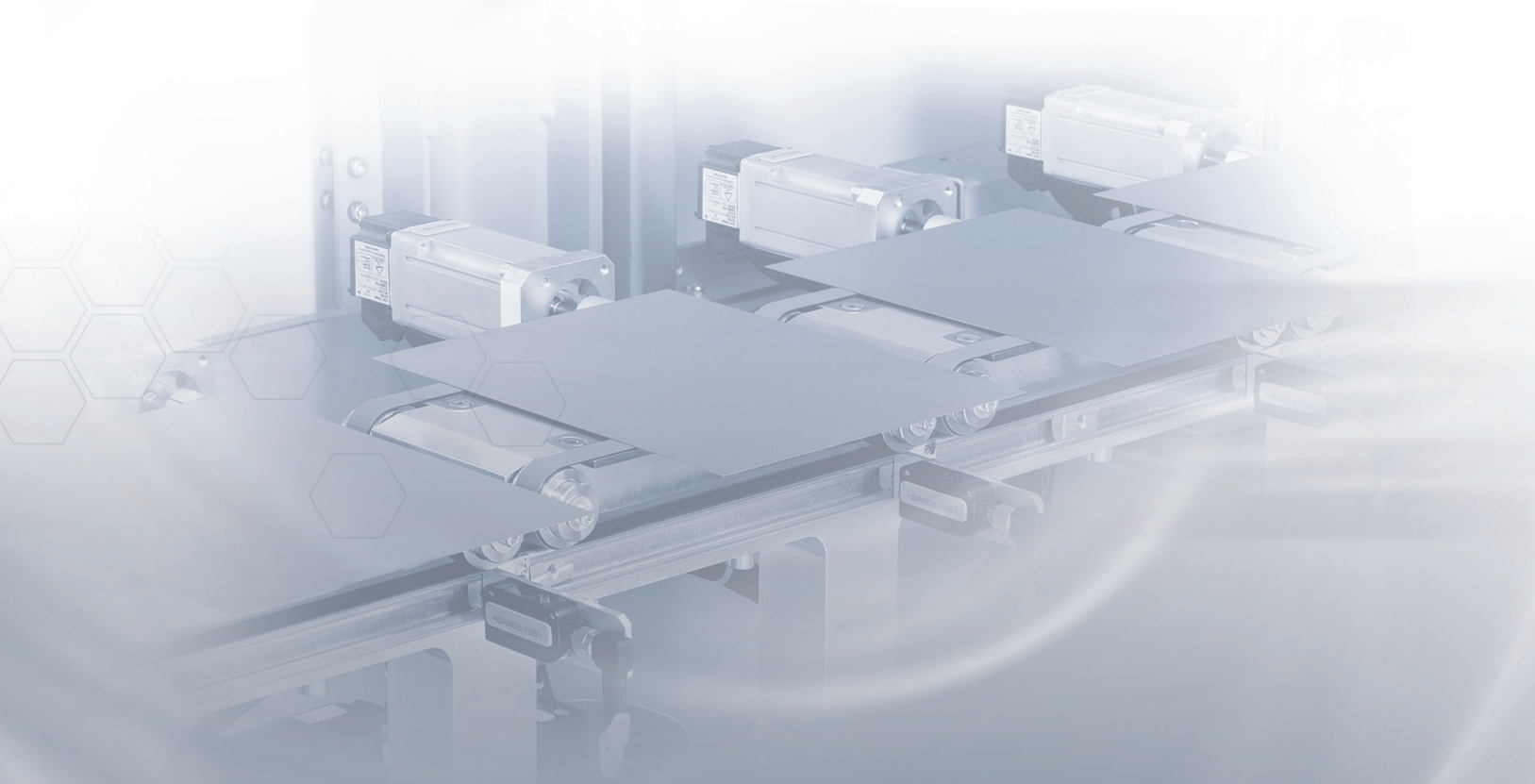
OMRON

Sysmac Catalogue 2011

One Machine Control

sysmac
always in control






Sysmac Catalogue

This document is a selection and design guide helping you to create fast, flexible and reliable machines. Sysmac Automation Platform provides an integrated solution consisting of the best in class machine controller working seamlessly with the best in class field devices across the fastest machine network in the market - EtherCAT. Sysmac Automation Platform is programmed, configured and simulated by one software - Sysmac Studio, and accessed through one connection, Ethernet/IP.

CONTENT

One Machine Control

Motion, Logic and Vision in one

Complete machine control through one connection and one software is how we define the new Sysmac machine control. Our new machine automation controller - the NJ - integrates motion, sequencing and network, a new software - Sysmac Studio - that includes configuration, programming, simulation and monitoring plus a fast machine network -EtherCAT - to control motion, vision, sensors and actuators. Sysmac is a powerful and robust ONE automation platform.

One machine controller: NJ-Series

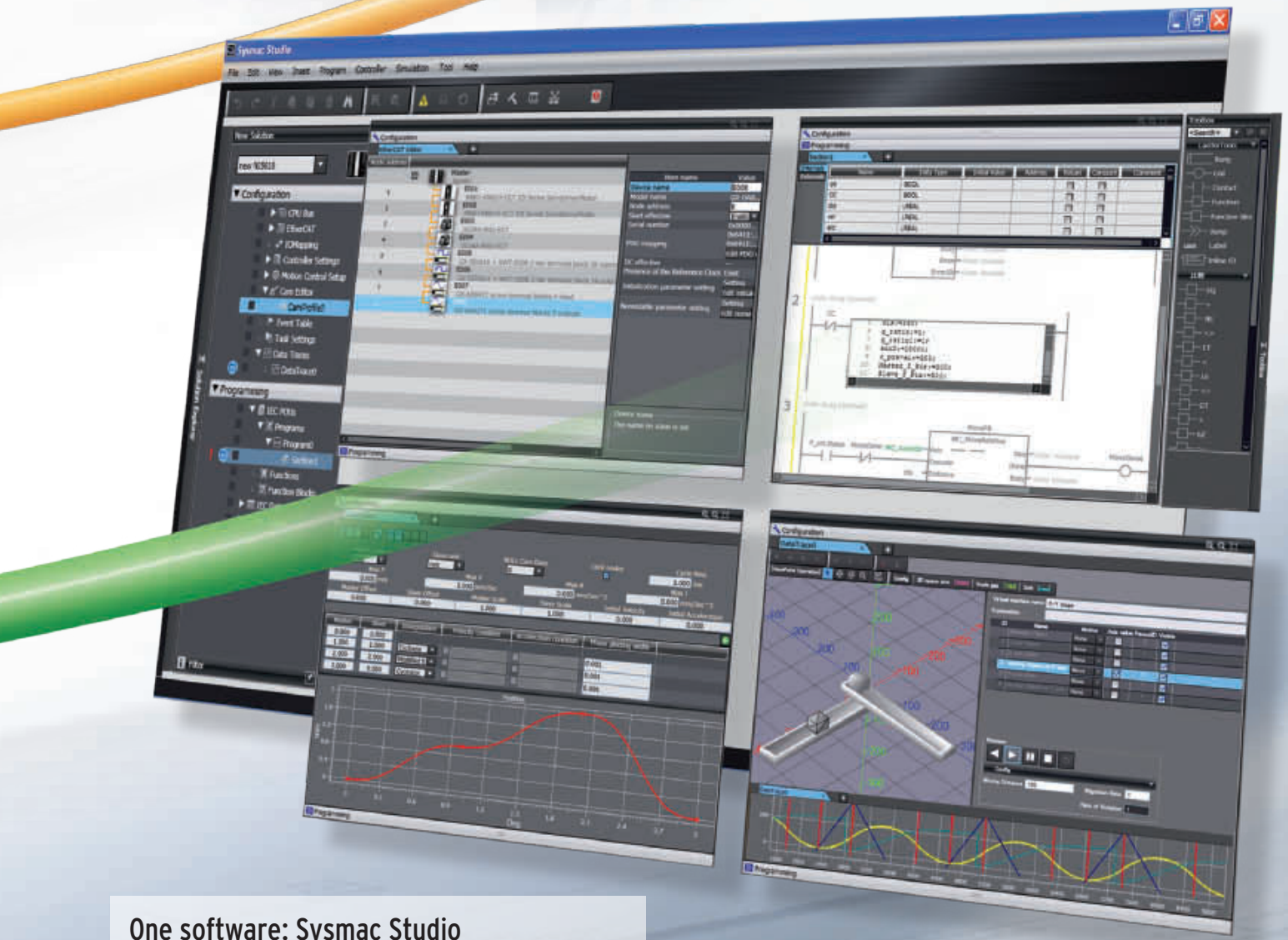
For complete control and management of your machine. Logic and advanced motion control in one

One connection: EtherNet/IP

For local or remote access to the complete machine

One machine network: EtherCAT

For real time control of servo drive, inverter, vision system and I/O



One software: Sysmac Studio

For configuration, programming, simulation and monitoring

One connection
One machine network

One connection via the NJ-Series controller allows seamless control and communication with both the machine and the factory. The new NJ-Series controllers join the world standard factory automation network, EtherNet/IP, with the best Ethernet-based machine control network, EtherCAT.

NJ-Series motion features

- Up to 64 axis control
- Complies with PLCopen Function Blocks for Motion Control
- Linear, circular and spiral (helical) interpolation
- Master slave functions: registration control, flying shear, etc.
- E-cam with on the fly change

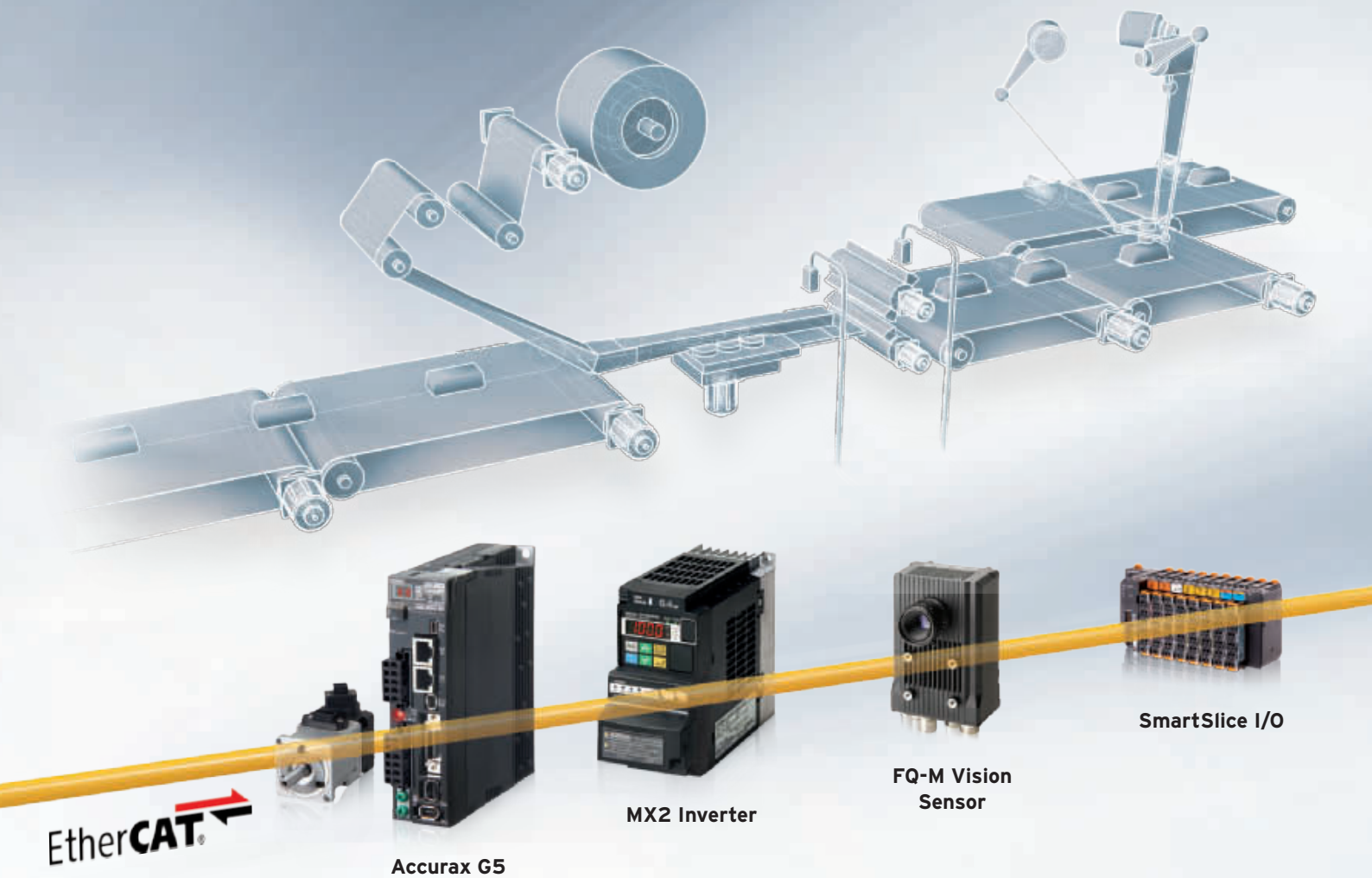
NJ-Series system features

- Fast PLC tasks in 500 µs
- Programming and data types fully compliant with IEC 61131-3
- Multi-tasking program
- EtherCAT, EtherNet/IP embedded
- SD card slot and USB port built-in
- Works with most CJ-PLC modules
- 10 years maintenance free

EtherNet/IP: the ONE factory automation network

- Peer-to-Peer controller communication
- Interface with NS HMI series or SCADA software
- Interface to Sysmac Studio

IMAGE



EtherCAT: the ONE machine network

- Up to 192 slaves
- Fastest machine network on the market
- Noise immunity to stringent Omron standards
- Embedded in Omron servo drive, inverter, vision sensor and I/O
- Uses standard STP Ethernet cable with RJ45 connectors

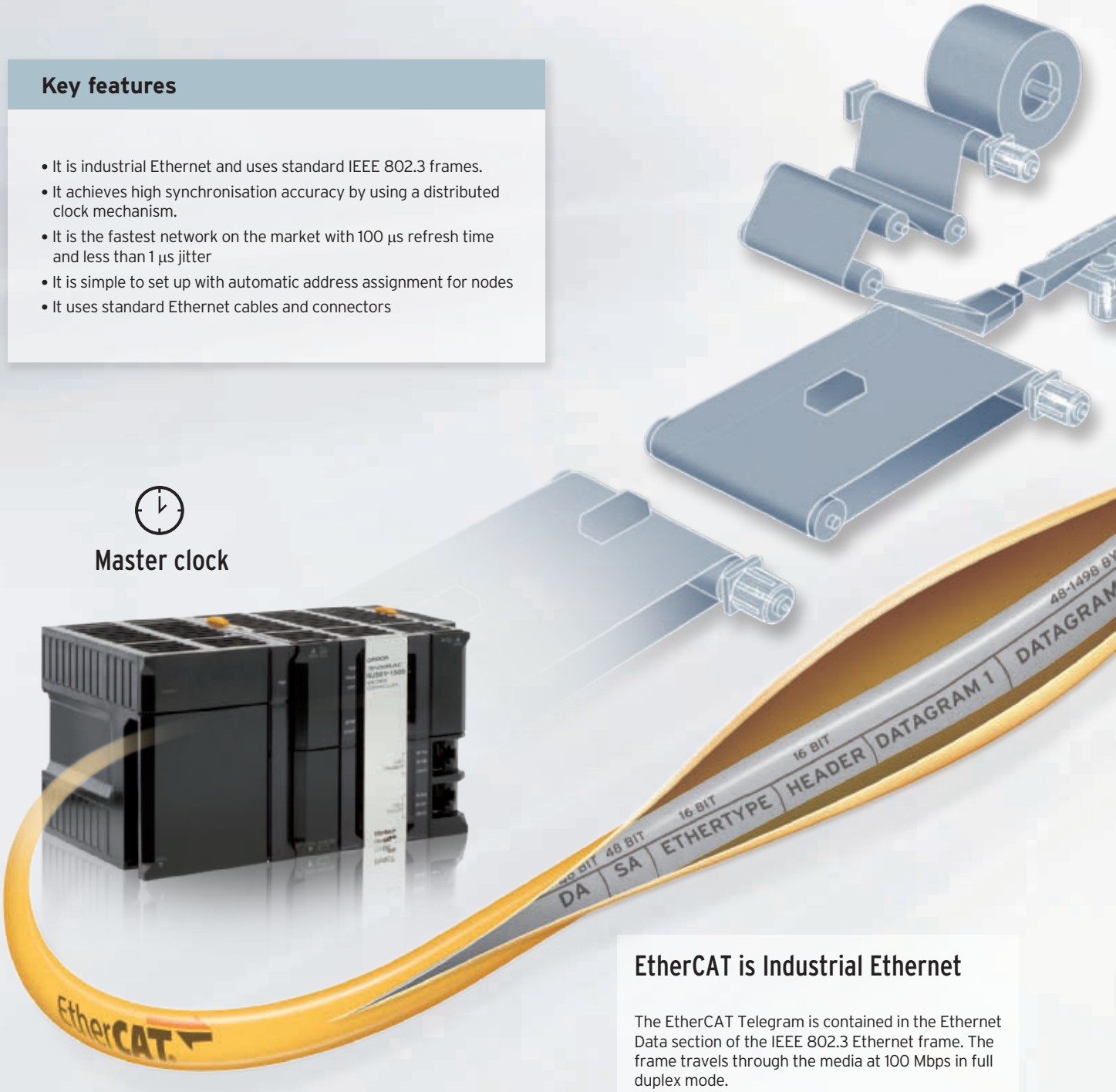
One connection

EtherCAT the optimal machine network

EtherCAT is the fastest emerging network for machine automation. It is Omron's de-facto machine network for our wide range of field and motion devices. It is Ethernet based, fast, accurate and highly efficient in terms of data transmission. All our EtherCAT devices have been designed and tested to meet Omron's stringent requirements on noise immunity.

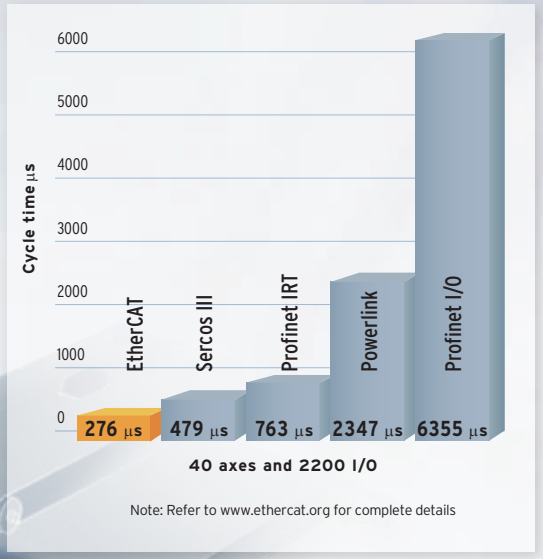
Key features

- It is industrial Ethernet and uses standard IEEE 802.3 frames.
- It achieves high synchronisation accuracy by using a distributed clock mechanism.
- It is the fastest network on the market with 100 μs refresh time and less than 1 μs jitter
- It is simple to set up with automatic address assignment for nodes
- It uses standard Ethernet cables and connectors



EtherCAT is Industrial Ethernet

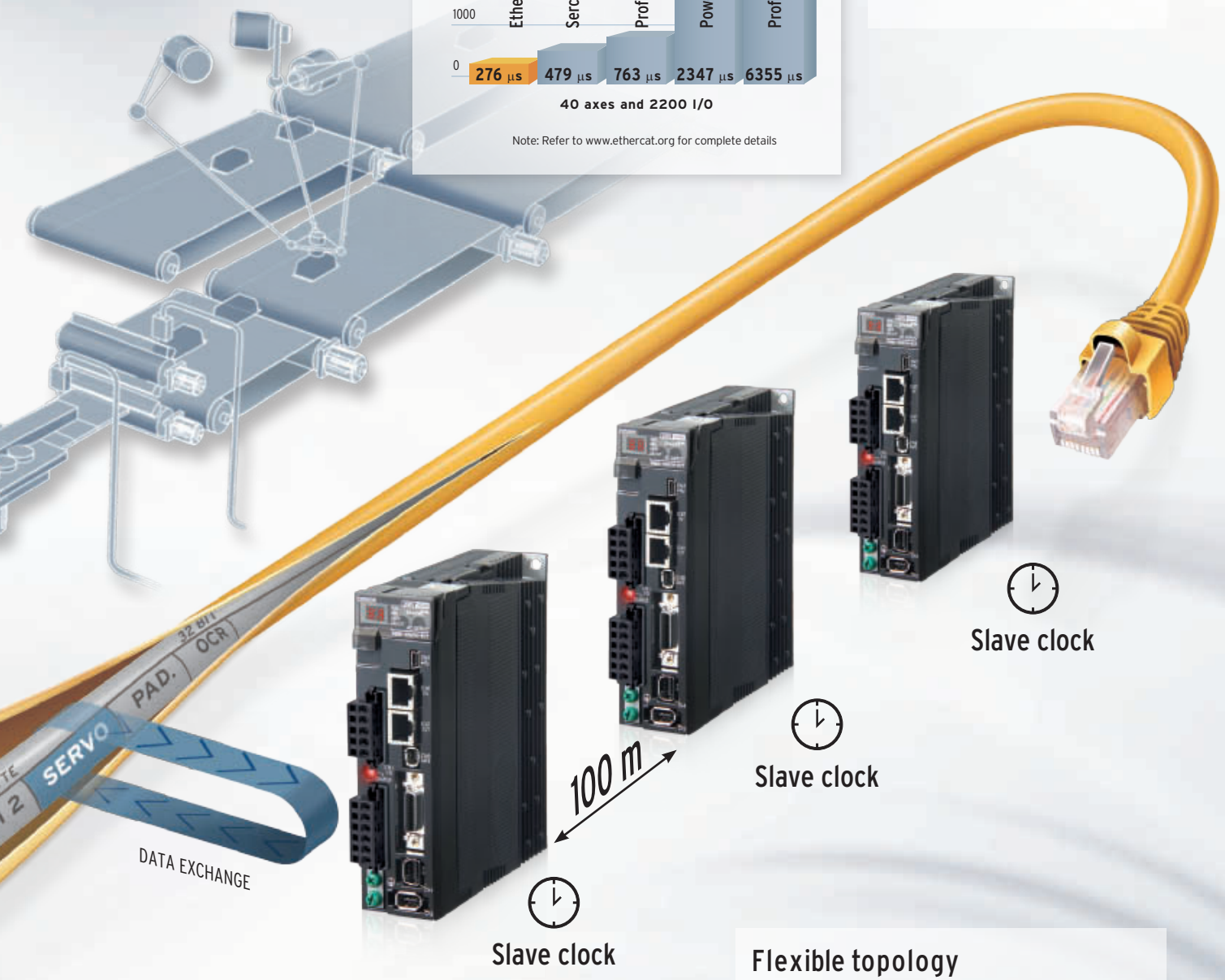
The EtherCAT Telegram is contained in the Ethernet Data section of the IEEE 802.3 Ethernet frame. The frame travels through the media at 100 Mbps in full duplex mode.



Note: Refer to www.ethercat.org for complete details

Simple cabling: 100Base-TX

EtherCAT uses standard 100BASE-TX Ethernet communication very efficiently, over standard shielded Ethernet cables and connectors. No need for network switches.



Flexible topology

With two EtherCAT ports on all devices, no additional switches are required to create a linear network. EtherCAT junctions can be used to build tree and star topologies, which can reduce the amount of cabling.

"On-the-fly" data exchange

The slave devices extract and/or insert data on the fly. This method assures the highest possible throughput.

Distributed clocks

The EtherCAT node slave measures the time difference between incoming and returning frame - timestamp-. With these timestamps the master can determine the propagation delay offset to the individual slave accurately. This mechanism ensures accurate synchronisation between devices with less than 1 µs jitter.

One software

Sysmac Studio for machine creators

Turning machine programmers into machine creators is the driving vision behind Sysmac Studio. Cutting programming, debugging and set-up time while maximising the functionality and performance of your machine is our ultimate goal. For this Sysmac Studio aims to offer ONE software for the complete machine. A software tool that only needs to be learned once, programmed, tested and tuned as one and secured as a whole.

Learn it ONCE

- One software for motion, drives and vision
- Fully compliant with open standard IEC 61131-3
- One design and operation environment for configuration, programming and monitoring

Develop it FAST

- Supports Ladder, Structured Text and Function Block programming with a rich instruction set
- CAM editor for easy programming of complex motion profiles
- Intuitive editor with auto-complete assistance for Ladder and Structured Text programming

Test it in ONE

- One simulation tool for sequence and motion in a 3D environment
- Complete or partial program can be simulated and debugged
- Data logging* and trending for tuning and debugging

Secure it ALL

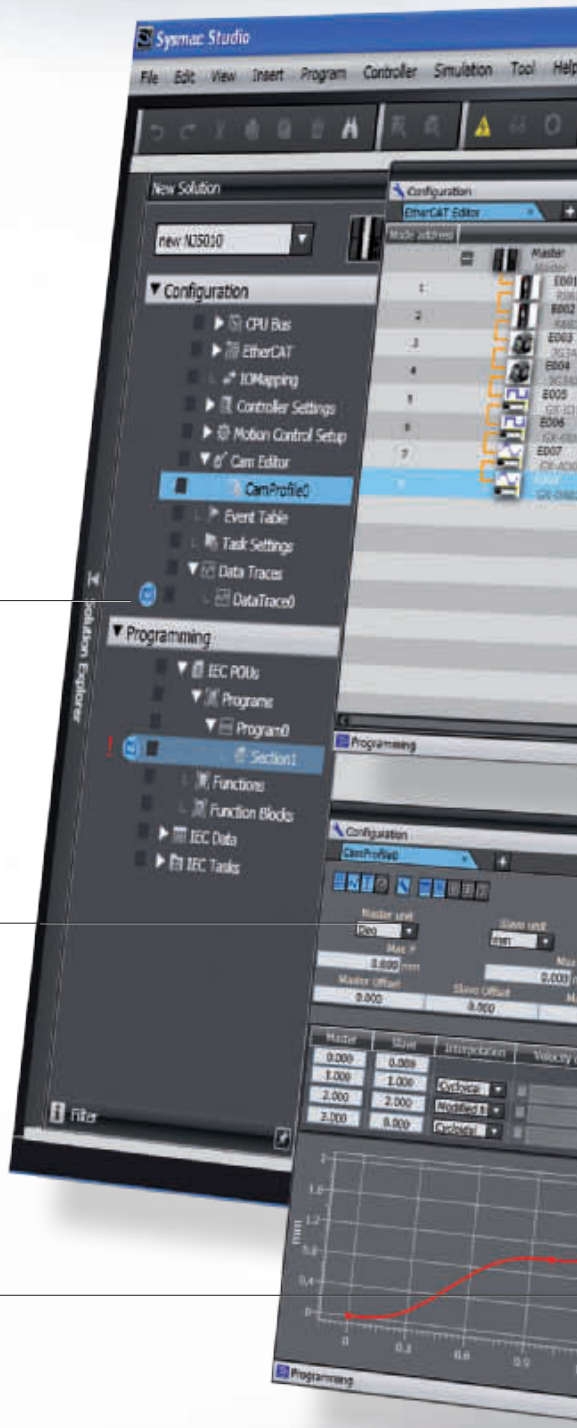
- Advanced security function with 32 digit security password.
- Complete project or single Function Block* can be protected
- Machine cloning prevention

* Available in Sysmac Studio above v1.0

One software

Sysmac Studio to develop machines

Created to give you complete control over your automation system, Sysmac Studio integrates configuration, programming and monitoring. Graphics-oriented configuration allows quick set-up of the controller, field devices and networks while machine and motion programming based on IEC standard and PLCopen Function Blocks for Motion Control cuts programming time. Smart Editor with On-line debugging helps quick and error free programming. Advanced simulation of sequence and motion control, data logging and data trace reduce machine tuning and set-up.



Design and operability

Unified design environment is provided for programming, configuration and monitoring. It also offers intuitive navigation between control modes.

Motion control

The graphical CAM editor allows quick implementation of complex motion profiles. CAM tables can be modified on the fly. A PLCopen Function Blocks for the Motion Control library are available to implement general purpose motion control.

Simulation

Motion trajectories in 3D can be pre-tested with advanced simulation of sequence and motion control. Simulation of single Function Blocks, POU's (Program Organisation Unit) or the entire program can be performed. In addition all standard features such as Break & Step are available.

Data logging* and tracing

Easy system tuning thanks to integrated and synchronised data tracing of motion commands, position and speed feedback and I/O status and values.

Configuration

Simple drag and drop configuration for controller, network, servo-axis and other field devices.

Programming

Multi-tasking and fully compliant with IEC61131-3 standard. The program editor includes smart support functions such as syntax error check and clear colour segregation of variables and symbols. ST instructions can be directly written in Ladder programs thanks to in-line ST function.

* Available in Sysmac Studio above v1.0

NJ-Series Machine Automation Controller

Complete and robust machine automation

The NJ-Series Machine Automation Controller is at the heart of the new Sysmac platform. One integrated machine controller that offers speed, flexibility and scalability of software centric architecture without compromising on the traditional reliability and robustness that you have come to expect from Omron PLCs. The NJ-Series is designed to meet extreme machine control requirements in terms of motion control speed and accuracy, communication, security and robust system. You just create…

Hardware design

- Architecture Based on new Intel CPU 1.6GHz
- The most compact controller in its class
- Built-in USB port and SD card slot
- Fan-less cooling

Motion control

- Up to 64 axis control
- Single axis moves and axes interpolation
- 32 axes/ 1 ms cycle time
- Electronic cams and gearboxes

System robustness

- One event log for controller, field devices and networks
- Standard PLC system check: Watch-Dog Timer, memory check, network topology check, etc.

NJ-Series controller features

- Fast PLC tasks in 500 μs
- Motion controller supporting up to 64 servo axes
- EtherNet/IP and EtherCAT ports embedded
- Up to 192 EtherCAT Slaves (64 axes)
- Standard IEC 61131-3 programming
- Certified PLCopen Function Blocks for Motion Control
- Linear and circular interpolation
- Linear and infinite axes management
- Electronic Gear and CAM synchronisation
- Global standards CE, cULus, NK, LR

Machine control

- Seamless integration of Logic and Motion
- Synchronous control of all machine network devices
- Works with most CJ PLC series modules

Standard Factory network

- Programming
- Other Machine controllers
- HMI / SCADA
- IT systems

EtherNet/IP

Standard Machine network

- Servos
- Inverters
- Vision systems
- Distributed I/O

EtherCAT

Standard programming

- Fully conforms IEC 61131-3 standards
- PLCopen Function Blocks for Motion Control

PLCopen motion control

Accurax G5 Servo system
At the heart of every great machine

Great machines are born from a perfect match between control and mechanics. G5 gives you that extra edge to build more accurate, faster, smaller and safer machines.

EtherCAT

EtherCAT connectivity

- Compliant with CoE -CiA402 Drive profile-
- Cyclic Synchronous Position, Velocity and Torque modes
- Embedded Gear Ratio, Homing and Profile Position mode
- Distributed clock to ensure high precision synchronisation

Accurax G5 servo system features

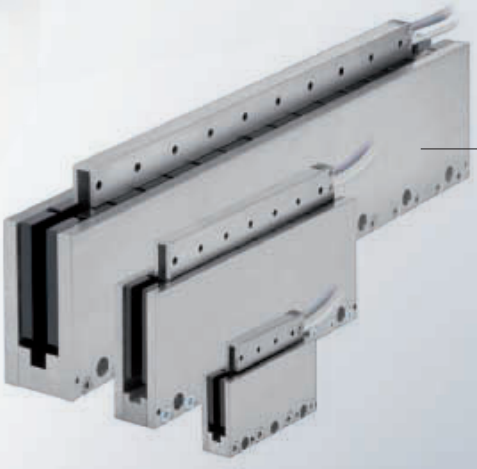
- Compact size servo drives with EtherCAT connectivity built-in
- High-response frequency of 2 kHz
- Load vibration suppression
- Embedded Safety conforming ISO13849-1 Performance Level d
- Advanced tuning algorithms (Anti-vibration function, torque feedforward, disturbance observer)
- Wide range of linear and rotary servo motors

Safety conformance

- PL-d according ISO13849-1
- STO: IEC61800-5-2
- SIL2 according to EN61508

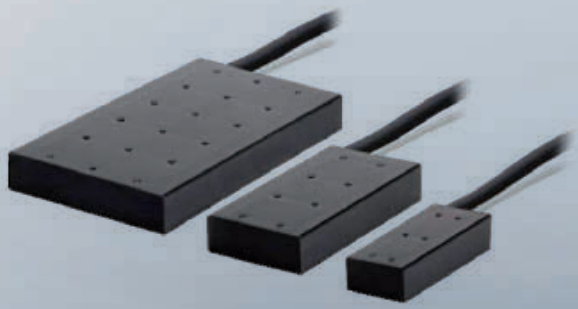
Improved rotary motors

- Low cogging torque servo motors
- High accuracy provided by 20 bit encoder
- IP67 for all motors and connectors
- Large range of motors from 0.16 Nm up to 96 Nm nominal torque (224 Nm peak)



Ironless linear motors

- Compact, efficient design
- Excellent force-to-weight ratio
- No latching force



Iron-core linear motors

- Compact, flat design
- Optimum ratio between force and volume
- Weight-optimized magnetic track

MX2 Inverter

Born to drive machines

Thanks to its advanced design and algorithms, the MX2 provides smooth control down to zero speed, plus precise operation for cyclic operations and torque control capability in open loop. The MX2 is fully integrated within the Omron Sysmac automation platform.

Torque control in open loop

- Ideal for low to medium torque applications
- Can replace a flux vector inverter or servo drive in suitable systems

EtherCAT®

EtherCAT connectivity

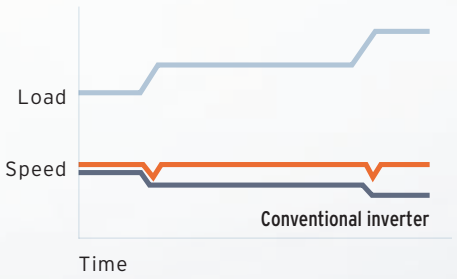
- Compliant with CoE -CiA402 Drive profile-
- Velocity mode

MX2 features

- Torque control in open loop, ideal for low to medium torque applications.
- 200% starting torque near stand-still operation (0.5Hz)
- Double rating VT 120%/1 min and CT 150%/1 min

Quick response to load fluctuation

- MX2 provides accurate speed control with less than 2% error at 1 Hz
- Stable control without decreasing machine speed improves quality and productivity

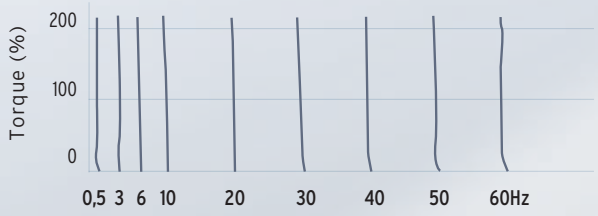


200% starting torque

- Near stand-still operation (0.5Hz)
- Smooth control of high inertia loads
- Control of fast cyclic loads

Frequency response vs Torque

(Example with 7.5kW 4-pole motor)



FQ-M Vision Sensor

Designed for object tracking

The new FQ-M series* is a vision sensor designed specifically for pick and place applications. It comes with EtherCAT embedded and can be configured and monitored from Sysmac Studio software. The FQ-M series is compact, fast and includes an incremental encoder input for easy tracking and calibration.

EtherCAT

Connectivity

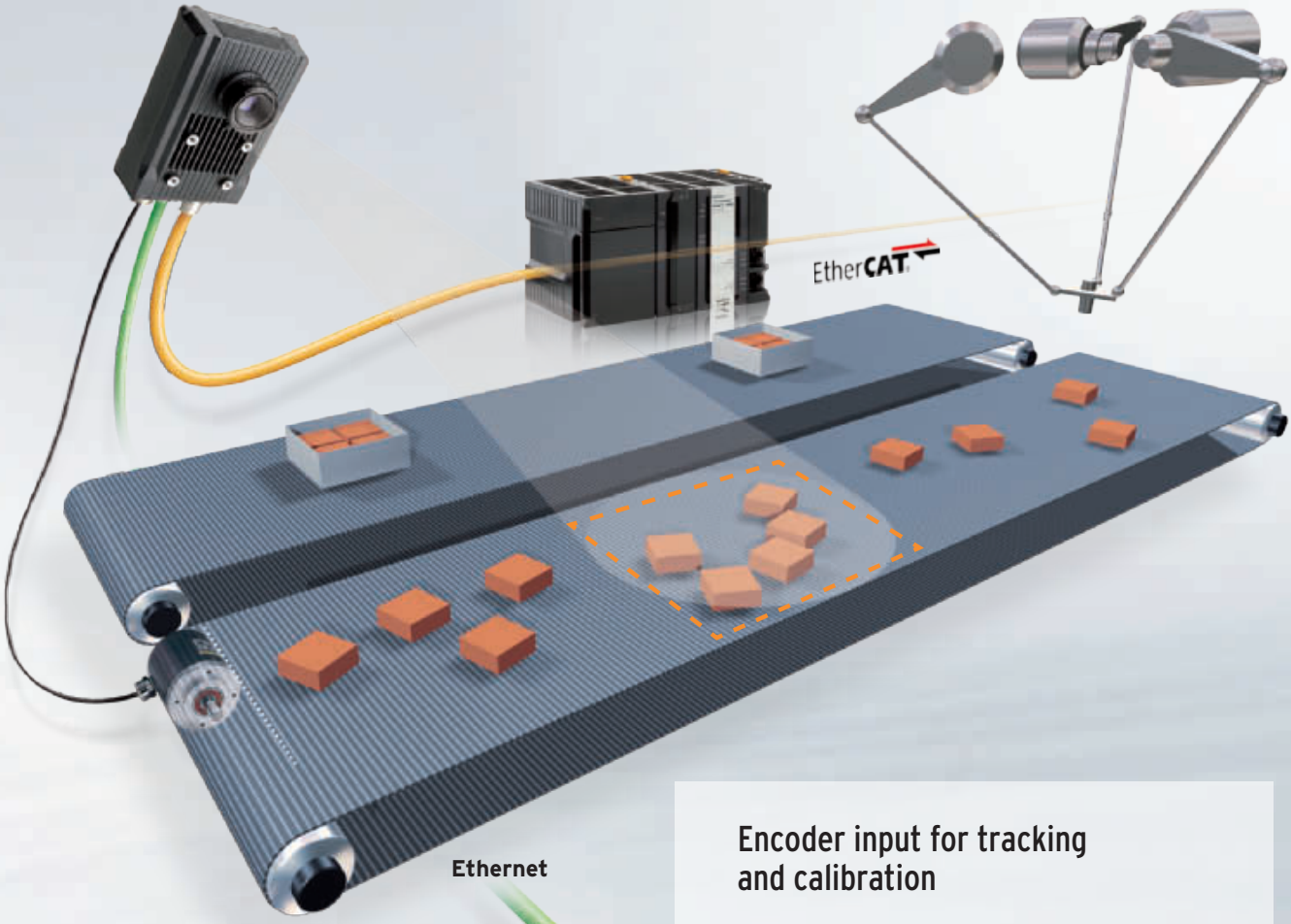
- EtherCAT port for object tracking
- Ethernet port for advanced configuration and monitoring
- Encoder input for accurate "on the fly tracking" and easy calibration
- Automatic strobe timing control

Detection

- Up to 5000 pieces per minute with 360 degree rotation
- Stable and robust detection under changeable environmental conditions

FQ-M features

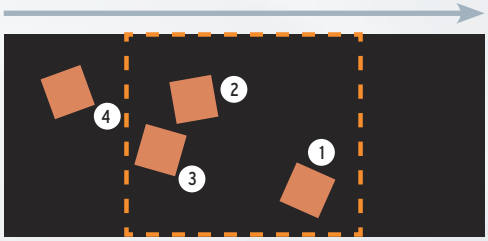
- Made specifically for tracking applications
- Designed to work within Sysmac integrated automation with embedded EtherCAT and integrated software tool
- Smart camera with EtherCAT: camera, image processing and connectivity in one
- Vision sensor with encoder input for tracking function
- Calibration function of the complete system
- Can inspect a wide range of objects
- Sysmac Studio software for vision system operation and setting



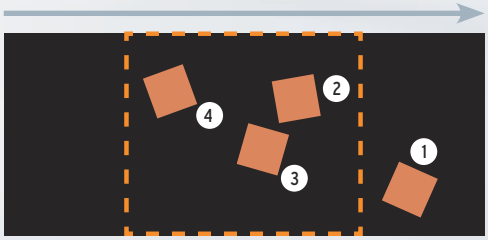
Encoder input for tracking and calibration

» The assisted calibration procedure simplifies the overall system set-up.

» Objects that overlap within more than one field of view are segregated and its data is ignored.



First shot: The position and orientation data of pieces 1, 2 and 3 are sent to the controller.



Next shot: Only the position and orientation data of piece 4 are sent to the controller.

Design

- Camera and image processing in one
- Standard C-mount lenses; choose the field of view and focus distance you need
- Variety of industrial connector types (angled, straight) for correct mounting

Software tool

- Fully integrated within the Sysmac Studio software tool
- Intuitive and icon driven set-up and configuration
- Trending and logging function

* Available as of autumn 2011

Service and Support

PRESENCE

OMRON technical offices across the World

Tsunagi laboratory | Automation Competence Centre | Technical office | Premium partner

COMPETENCE

OMRON

Design

Our wide network of machine automation specialists will help you to select the right automation architecture and products to meet your requirements. Our flat structure based on expert-to-expert contact ensures that you will have ONE accountable and responsible expert to deal with on your complete project.

Proof of concept

As your project matures make use of our Automation centers to test and catch-up with technology trends in motion, robotics, networking, safety, quality control etc. Make use of our Tsunagi (connectivity) laboratory to interface, test and validate your complete system with our new machine network (EtherCAT) and factory network (EtherNet/IP).

We will assign a dedicated application engineer to assist with initial programming and proof testing of the critical aspects of your automation system. Our application engineers have in-depth expertise in and knowledge of networks, PLCs, motion, safety and HMIs when applied to machine automation.

CONFIDENCE

ASSURANCE

Development

During your prototyping phase you will need flexibility in technical support, product supply and exchange. We will assign an inside sales contact to help you source the correct products fast during your prototyping phase.

Commissioning

With our world-wide network for service and support the export of your product is made simple, we will support you on-site with your customer, anywhere in the world. We can arrange a liaison sales engineer to facilitate training, spare parts supply or even machine commissioning. All this in a localised language with localised documentation – giving you complete peace of mind.

Serial production

As your production increases we will engage in supplying you within 24hrs and repairing within 3 days. All our products are global products meeting global standards - CE, cULus, NK, LR -

Main content

Sysmac Automation Platform

Selection table

	Controller
	
	NJ-Series
	Complete and robust machine automation
Task	Multi-tasking program
Programming	Ladder, Structured Text and Function Block (standard IEC 61131-3)
Built-in port	EtherNet/IP and EtherCAT
Axes control method	EtherCAT
Number of axes	16, 32, 64
Applicable Servo Drive	Accurax G5-Series
Application	Registration linear, circular and spiral (helical) interpolation. Electronic cams and gearboxes
Servo control mode	Position, velocity and torque
I/O units	Compatible with most of the CJ PLC modules
Page	27

	Servo drives	
		
	Accurax G5 rotary drive	Accurax G5 linear drive
	EtherCAT network and safety built-in	EtherCAT network and safety built-in
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 motor	Accurax G5 linear motor
Position, speed and torque control	EtherCAT	EtherCAT
Safety approvals	ISO13849-1:2008 (PL d), EN 954-1:1996 (Cat-3)	ISO13849-1:2008 (PL d), EN 954-1:1996 (Cat-3)
Full closed loop	Built-in	N/A
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	Rotary servo motors			
				
	Accurax G5 rotary motor			
Rated speed	3,000 rpm	2,000 rpm	1,500 rpm	1,000 rpm
Maximum speed	4,500 to 6,000 rpm	3,000 rpm	2,000 to 3,000 rpm	2,000 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
Sizes	50 W to 5 kW	400 W to 5 kW	7,5 kW to 15 kW	900 W to 6 kW
Applicable servo drive	Accurax G5 servo drive	Accurax G5 servo drive	Accurax G5 servo drive	Accurax G5 servo drive
Encoder resolution	20-bit incremental/ 17-bit absolute	20-bit incremental/ 17-bit absolute	17-bit absolute	20-bit incremental/ 17-bit absolute
IP rating	IP67	IP67	IP67	IP67
Page	69			

	Accurax linear motors		
			
	Accurax linear motors		**Accurax linear motor axis**
Type	Iron-core linear motors	Ironless linear motors	Linear motor axis
Continuous force range	48 N to 760 N	26.5 N to 348 N	48 N to 760 N
Peak force range	105 N to 2000 N	100 N to 2100 N	105 N to 2000 N
Maximum speed	1 to 10 m/s	1.2 to 16 m/s	5 m/s
Magnetic attraction force	300 N to 4440 N	Zero	300 N to 4440 N
Applicable servo drive	Accurax G5 linear drive	Accurax G5 linear drive	Accurax G5 linear drive
Page	87		103

	Frequency inverter
	
	MX2
	Born to drives machines
400 V three-phase	0.4 kW to 15 kW
200 V three-phase	0.1 kW to 15 kW
200 V single-phase	0.1 kW to 2.2 kW
Application	Harmonized motor and machine control
Control method	Open loop speed and torque control for vector and speed for V/F control
Torque features	200% at 0.5 Hz
Connectivity	EtherCAT option board
Logic Programming	Standard Firmware
Customisation options	IP54 enclosure
Page	117

	Remote I/O	
		
	SmartSlice I/O	**GX-Series I/O**
	Plug-and-Play I/O	High-speed remote I/O terminals
Network specification	EtherCAT	EtherCAT
Number of units	64 I/O units per station	1 expansion digital unit per slave
I/O types	Digital and analog I/O units, relay outputs and configurable temperature inputs	Digital and analog I/O units, encoder input unit and digital I/O expansion units
I/O Connection technology	Push-in screwless clamp	M3 screw terminals (1- or 3- wire DI)
Features	Automatic I/O assignment, easy configuration backup, host-swap with auto-restore and optional address setting.	Easy set-up, digital I/O terminals with high-speed input functionality, digital input filters prevent malfunction and removable I/O terminals for easy maintenance.
Mounting	DIN rail mounting	DIN rail mounting
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NJ-Series

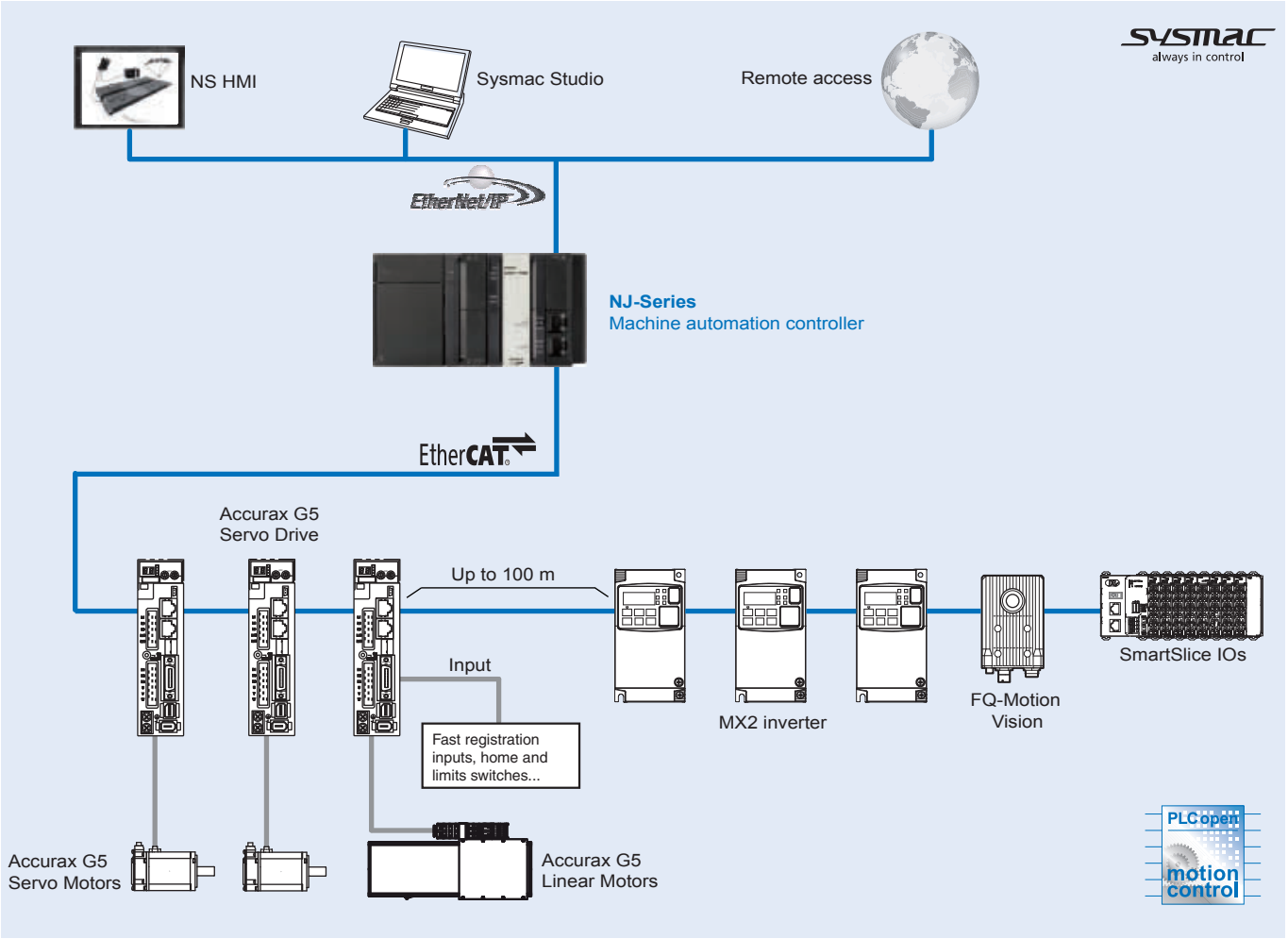
Machine Automation Controller

Complete and robust machine automation

The NJ-Series is designed to meet extreme machine control requeriments in terms of motion control speed and accuracy, communication, security and robustness.

- Up to 64 axes motion control.
- EtherCAT and EtherNet/IP ports embedded.
- Architecture Based on new Intel CPU 1.6 GHz.
- Standard IEC 61131-3 programming.
- Certified PLCopen Function Blocks for Motion Control.
- Linear, circular and spiral (helical) interpolation.
- Global standards CE, cULus, NK, LR.

System configuration



Specifications

General specifications

Item		NJ501-1300 / NJ501-1400 / NJ501-1500
Enclosure		Mounted in a panel
Grounding		Less than 100 Ω
CPU Unit Dimensions (H x D x W)		90 mm x 90 mm x 90 mm
Weight		550 g (icluding 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 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 IEC60068-2-6 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 IEC60068-2-27 147 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 and EC Directives.

Performance Specifications

Item			NJ501-1300	NJ501-1400	NJ501-1500
Programming	Program capacity		20 MB (execution objects and variable tables (including variables))		
	Memory capacity for variables	Variables with Retain attribute (Does not include Holding, DM and EM Area memory for CJ-Series Units.)	2 MB		
		Variables without Retain attribute (Does not include CIO and Work Area memory for CJ-Series Units.)	4 MB		
	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 x 25 banks (E0_00000 to E18_32767)		
Unit configuration	Maximum number of connectable Units		Maximum per CPU Rack or Expansion Rack: 10 Units Entire Controller: 40 Units		
	Number of Expansion Racks		3 max.		
	I/O Capacity		2,560 points max. plus EtherCAT slave I/O capacity		
Motion control	Controllable Servo Drives		Servo Drives with CoE-compatible EtherCAT communications.		
	Recommended Servo Drives		Version 2.1 or higher of OMRON G5-Series Servo Drives with built-in EtherCAT Communications		
	Control method		Control commands using EtherCAT communications		
	Control modes		Position, Velocity and Torque control (csp, csv and cst)		
	Number of controlled axes	Maximum number of axes	16 axes	32 axes	64 axes
		Linear interpolation control	4 axes max. per axes group		
		Circular interpolation control	2 axes per axes group		
	Number of axes groups		32 axes groups max.		
	Electronic gear ratio		Command pulses per motor rotation divided by work travel distance per motor rotation		
	Positions that can be managed		Command positions and actual positions		
	Position command values		Negative, positive or 0 long real data (LREAL) (command units*1) *1. Positions can be set within a 40-bit signed integer range when converted to pulses		
	Velocity command values		Negative, positive or 0 long real data (LREAL) (command units/s)		
	Acceleration/Deceleration command values		Positive or 0 long real data (LREAL) (command units/s^2)		
	Jerk command values		Positive or 0 long real data (LREAL) (command units/s^2)		
	Override factors		0.00% or 0.01% to 500.00%		
	Axis type		Servo axes, virtual servo axes, encoder axes and virtual encoder axes		
	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				NJ501-1300	NJ501-1400	NJ501-1500
Communications	Built-in EtherNet/IP port	Communications protocol		TCP/IP, UDP/IP and BOOTP client		
		Supported services		Sysmac Studio connection, tag data link, CIP message communications, socket service, FTP server, automatic clock adjustment (NTP client), SNMP agent, DNS client		
		Physical layer		10Base-T or 100Base-TX		
		Media access method		CSMA/CD		
		Modulation		Baseband		
		Topology		Star		
		Baud rate		100 Mbps (100Base-TX)		
		Transmission media		Shielded, twisted-pair cable (STP): Category 5, 5e or higher		
		Transmission distance		100 m max. (distance between EtherNet switch and node)		
		Number of cascade connections		There are no restrictions if an EtherNet switch is used		
		CIP service: Tag data links (cyclic communications)	Number of connections	32		
			Packet Interval	10 to 10,000 ms in 1.0-ms increments. Can be set for each connection. (Data will be refreshed at the set interval, regardless of the number of nodes.)		
			Permissible communications band	1,000 pps *1 including heartbeat		
			Number of tag sets	32		
			Tag types	Network variables (CIO, Work, Holding, DM and EM Areas.)		
			Number of tags	8 (Seven tags if Controller status is included in the tag set.)		
			Maximum link data size per node	19,200 bytes (total size for all tags.)		
			Maximum data size per connection	600 bytes (Note: Data concurrency is maintained within each connection.)		
			Number of registrable tag sets	32 (1 connection = 1 tag set)		
			Maximum tag set size	600 bytes (Two bytes are used if Controller status is included in the tag set.)		
			Changing tag data link parameters	Supported.*2 (When controller is in RUN mode)		
			Multi-cast packet filter*3	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.		
			CIP routing	Supported. Units through which CIP routing is supported: CS1W-EIP21, CJ1W-EIP21, CJ2H-CPU□□-EIP and CJ2M-CPU3□		
	Built-in EtherCAT port	Communications standard		IEC 61158, Type 12		
		EtherCAT master specifications		Class B (Feature Pack Motion Control compliant)		
		Communications protocol		Special protocol for EtherCAT		
		Supported services		CoE (PDO communications and SDO communications)		
		Synchronized communications		DC (distributed clock)		
		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.		
		Maximum number of slaves		192		
		Maximum process data size		Inputs: 5,736 bytes Outputs: 5,736 bytes However, the maximum number of process data frames is 4.		
		Maximum process data size per slave		Inputs: 1,434 bytes Outputs: 1,434 bytes		
		Communications period		500, 1000, 2000 or 4000 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. Means packets per second, i.e., the number of communications packets that can be sent or received in one second.

*2. However, if port parameters are changed, the relevant EtherNet/IP port is restarted. Communications for the nodes that were communicating with that port will time out, and then they will be automatically restored.

*3. 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				NJ501
Tasks	Function			I/O refresh and the user program can be executed in 2 type of tasks: • Primary periodic task: This task has the highest priority. It is always executed in the specified period. There is only one primary periodic task. • Periodic tasks: Periodic tasks are executed during the unusued time between executions of the primary periodic task. There can be three periodic tasks.
	Setup	System service times		The execution interval and the percentatge of the total user program execution time are set for the system services (processes that are executed by the CPU Unit separate from task execution).
		I/O refresh settings		CJ-Series Units: I/O refreshing is set as required for each Unit in the primary periodic task or a periodic task. EtherCAT Slaves: Axes assigned to Servo Drives and encoder input slaves: Assigned to the primary periodic task. Other Slaves: Assigned as required to the primary periodic task or a periodic task.
	Monitoring	Task execution times		The average, maximum, and minimum execution times are displayed for each task.
Programming	POUs (program organization units)	Programs		POUs that are assigned to tasks.*1
		Function blocks		POUs that are used to create objects with specific conditions.*1 *2
		Functions		POUs that are used to create an object that determine unique outputs for the inputs, such as for data processing.*1 *2
	Programming languages	Types		Ladder diagrams (see note) and structured text (ST). **Note:** Inline ST is supported. (Inline ST is ST that is written as an element in a ladder diagram.)
	Variables	Type of variables	User-defined variables	Variables that are defined by the user.
			Semi-user-defined variables	Variables for which only some of the attributes can be changed.
			System-defined variables	Variables that are defined by the system. None of the attributes of these variables can be changed.
		External access of variables		Network variables (This is set as an attribute of the variable.)
		Initial values	Variables without Retain attribute	Initial values are set when the user program is transferred.
			Variables with Retain attribute	Wether to set initial values can be selected when the user program is transferred.
	Array attribute	Array variables	Function	An array groups data with the same attributes so that it can be handled as a single unit of data. Number of dimensions: 3 max. Maximum number of elements: 65,535 Maximum size: No restrictions. (They are capacity restrictions to the total data size of variables.)
			Array specifications for FB instances	Supported. (Execution of multiple instances is possible with one instance by using a variable to indirectly specify an array element number. However, the arrays must be one-dimensional.)
			Protective functions	During programming and program execution, exceeding the number of elements that was defined for the array is detected.
	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.)
		Structures	Function	A derivative data type that groups together data with different variable types. Number of members: 2,048 max. Nesting levels: 8 max. Number of registered structures: No restrictions. Maximum size: No restrictions.
			Member data types	Basic data types, structures, enumerations, unions or array variables.
		Unions	Function	A derivative data type that enables access to the same data with different data types. Number of members: 4 max.
			Member data types	BOOL, BYTE, WORD, DWORD or LWORD.
		Enumerations	Function	A derivative data type that uses text strings called enumerators to express variable values.
		Data type attributes	Array specifications	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. You can specify arrays for both basic data types and derivative data types.
			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. You can specify a range for any integer basic data type.
		Program checks		Programming is checked offline with the Sysmac Studio and when instructions are executed.
Motion control functions *3	Single axes	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 position 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.
		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.

Item				NJ501
Motion control functions *3	Single axes	Single-axis synchronized control	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 sunc 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.
			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.
			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).
			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.
	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.
		Auxiliary functions for multi-axes coordinated control	Resetting axes group errors	Axes groups 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.
	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-voltage memory in the CPU unit.
		Parameters	Writing MC settings	Some of the axis parameters or axes group parameters are overwritten temporarily.
	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 Mode		You can set the Stop Mode to determine when the immediate stop input signal or limit input signal is valid.
		Re-execution of motion control functions		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				NJ501
Motion control functions *3	**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 each axis.
			Velocity, acceleration rate, deceleration rate, torque, interpolation velocity, interpolation acceleration rate, and interpolation deceleration rate	You can set warning values for each axis and each axes group.
		Absolute encoder support		You can use an OMRON G5-Series Servomotor with an Absolute Encoder to eliminate the need to perform homing at startup.
	External interface signals			The following Servo Drive input signals are used. Home signal, home proximity signal, positive limit signal, negative limit signal, immediate stop signal and interrupt input signal.
Unit (I/O) management	**CJ-Series Units**	**I/O allocations**		Use one of the following procedures: • Creating the Unit configuration offline with Sysmac Studio. • Creating the Unit configuration online by reading the actual Unit configuration with the Sysmac Studio.
		Basic I/O Units	**Chattering and noise counter-measures**	Input response times are set.
			Load short-circuit protection and I/O disconnection detection	Alarm information for Basic I/O Units is read.
		Special Units	**Restarting**	Units can be restarted from instructions, system-defined variables, and the Sysmac Studio.
			Special Unit Setup	Special Units can be set up with Unit settings from the Sysmac Studio or by setting device variables.
	EtherCAT slaves	**Basic I/O**	**Chattering and noise counter-measures**	Input response times are set.
		Special I/O	**Restarting**	Restarting is possible from the Sysmac Studio.
Communica-tions	**EtherNet/IP port**	**CIP communi-cations 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.
			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 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	**Process data communications**		Control information is exchanged in cyclic communications between the EtherCAT master and slaves.
		SDO communications		Control information is exchanged in noncyclic event communications between the EtherCAT master and slaves. The following application protocol is supported. CoE (CANopen over EtherCAT).
		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). To implement the distributed clock, propagation delay compensation, drift compensation, and offset compensation are performed.
	Communications instructions			The following instructions are supported: CIP communications instructions, SDO message instructions, no-protocol communications instructions, and protocol macro instructions.
Operation management	**RUN output contacts**			The NJ-P□3001 Power Supply Unit turns ON in RUN mode.
System management functions	**Log management**	**Event logs**		The following events are recorded. • Events for the operation of the NJ-Series system itself. • Communications events. • Security events. • Events for the operation of user-designed device applications.
Debugging	**Online editing**			Programs, function blocks, functions and global variables can be changed online, individual POUs can be changed by more than worker working across a network.
	Forced refreshing			The user can force specific variables to TRUE or FALSE. Device variables for CJ-Series Units and variables with AT specifications: 64 variables max. Device variables for EtherCAT slaves: 64 variables max. **Note:** Forced refreshing values are overwritten by program execution. Refreshing of external outputs uses the forced refreshing values, not the program values.

Item				NJ501
Debugging	Motion Control Test Mode			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.
	Data tracking	Data tracking		The specified variables are sampled and stored in trace memory when the specified conditions are met. No programming is required. Maximum number of records: 10,000 records. Maximum number of sampled variables: 192 variables
		Timing of sampling		Sampling is performed for the specified task period, at the specified time, or when a sampling instruction is executed.
		Starting tracing		When specified from the Sysmac Studio or automatically at startup.
		Triggered traces	Triggered traces	Trigger conditions are set to record data before and after and 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 percentatge of sampling before and after the trigger condition is met. (Example: 20%/80%).
		Continuous tracing		Data tracing is executed continuously and the trace data is collected by the Sysmac Studio.
	Simulation			The operation of the CPU Unit is emulated in the Sysmac Studio. The following can be emulated: user program execution (including partial emulation), debugging (including step execution and breakpoints), monitoring, tracing, estimating execution times and Servo Drives signals. (Emulation is possible on the Simulator that is included with the Sysmac Studio integrated software package.)
Maintenance	Connection to HMIs	Connected port		Built-in EtherNet/IP port.
	Sysmac Studio connection	Connected port		Peripheral USB port or built-in EtherNet/IP port.
		Remote programming and monitoring		Connection is possible through the peripheral USB port to other nodes that are connected to the built-in EtherNet/IP port.
	ID information	Production information		Individual identifiers, lot numbers and other information is accessed from the Sysmac Studio.
Reliability functions	Self-diagnosis	Controller errors		• Major faults: Internal bus check errors, main memory check errors, etc. • Partial faults: Motion control period exceeded, slave initialization error, etc. • Minor faults: Battery-backed-up memory check errors, clock oscillation stopped, etc.
		User-defined errors		User-defined errors are registered in advance and then generated by executing an instruction. Error registration, error resetting, error information registration.
		User-defined error messages		User-defined error messages can be specified in up to nine languages, including Japanese and English.
	Power supply management	Allowable power supply interruption time		AC power supply: 30 to 45 ms. DC power supply: 22 to 25 ms.
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	Protection for online operations from the Sysmac Studio	User program transfers with no restoration information. Prevents reading data in the CPU Unit from the Sysmac Studio.
				CPU Unit write-protection. Prevents writing data to the CPU Unit from the Sysmac Studio.
			Protection for offline operations from the Sysmac Studio	Protection of all project files. Prohibits opening or copying project files on the Sysmac Studio without a password.
		Verification of operation authority		Online operations are restricted by operation rights to prevent damage to equipment or injuries that may be caused by operating mistakes.
		Hardware identification (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 Functions	Storage type			SD Memory Card (2GB max.)
	Application	SD Memory Card operation instructions		You can access SD Memory Cards from instructions in the user program.
		FTP server		You can use FTP commands from an FTP client on an intranet to read and write large files in the SD Memory Card through EtherNet/IP.
		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.

*1. There are no restrictions to the number of definitions. (There are capacity restrictions.)

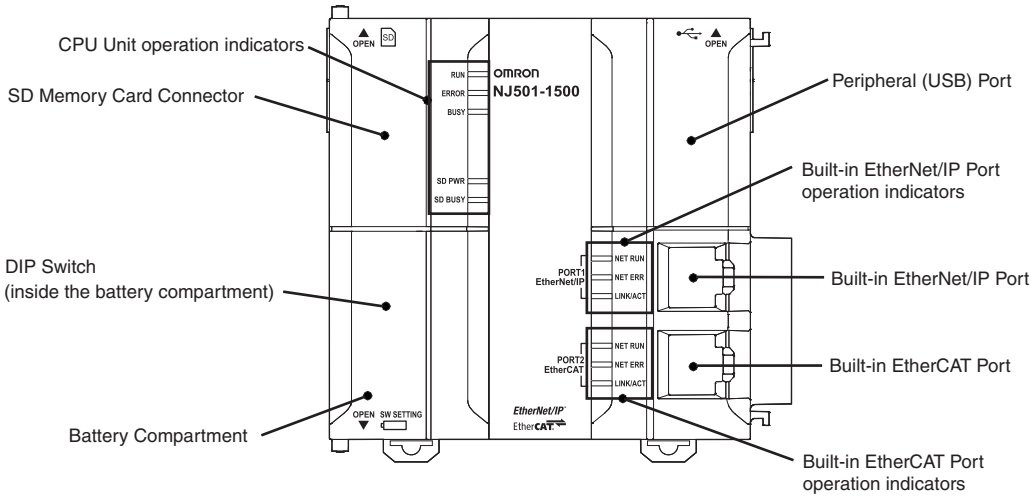
*2. Programming languages: Ladder diagrams and structured text (ST).

*3. When connected to an OMRON G5-Series Servo Drive with built-in EtherCAT communications.

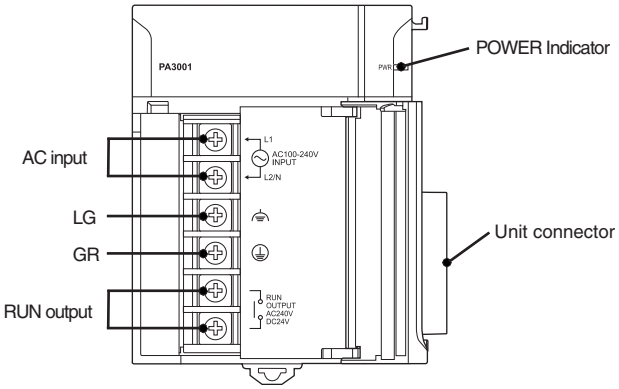
Note: You can use FINS message communications with NJ-Series Controllers. However, not all memory areas in the NJ-Series CPU Unit can be accessed.

Nomenclature

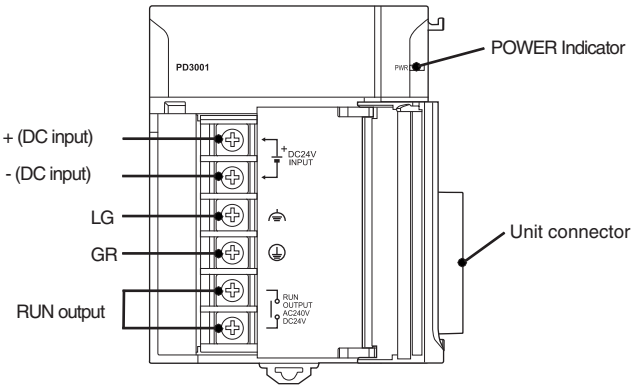
NJ501 CPU Unit (NJ501-□□□□)



100-240 VAC Power Supply Unit (NJ-PA3001)

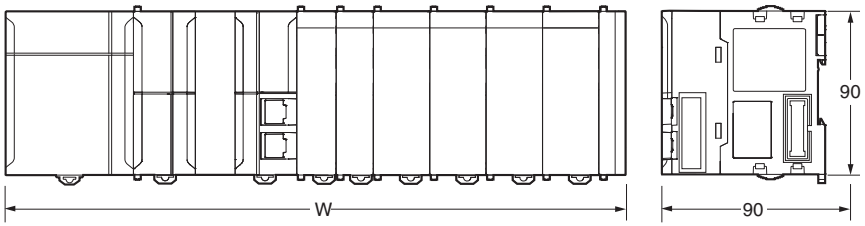


24 VDC Power Supply Unit (NJ-PD3001)



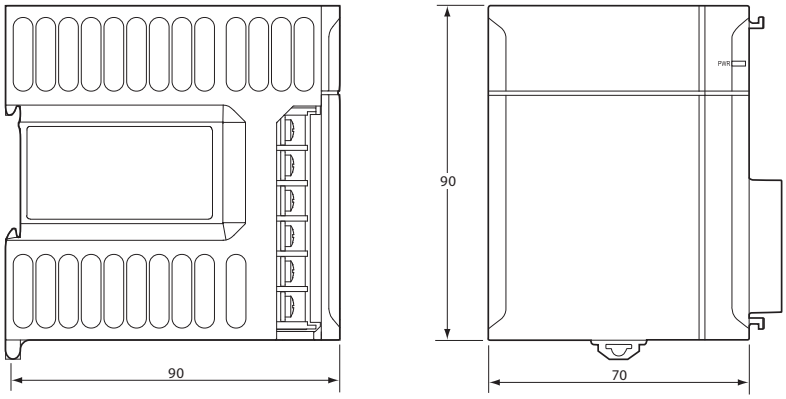
Dimensions

NJ-Series system (NJ-P□3001 + NJ501- □□□□ + One I/O Unit + CJ1W-TER01)

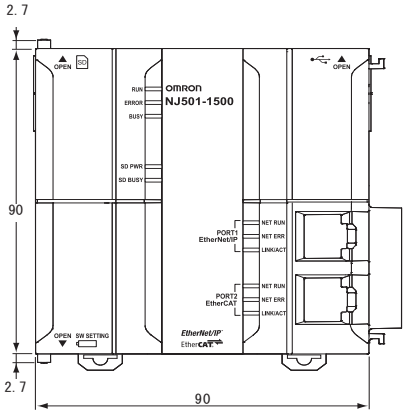


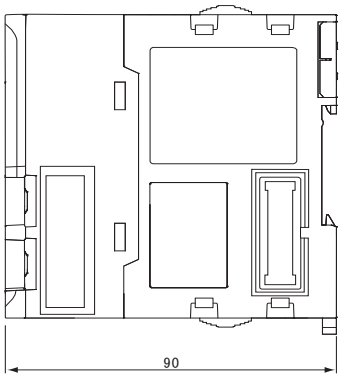
No. of Units mounted with 31-mm width	Rack width (mm)
	With NJ501-1500
1	205.7
2	236.7
3	267.7
4	298.7
5	329.7
6	360.7
7	391.7
8	422.7
9	453.7
10	484.7

Power Supply Unit (NJ-PA3001/NJ-PD3001)

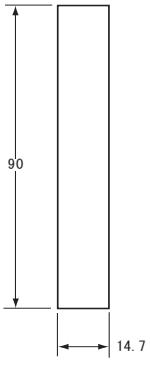


NJ501 CPU Unit (NJ501- □□□□)



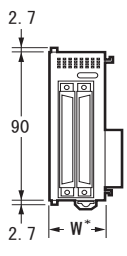


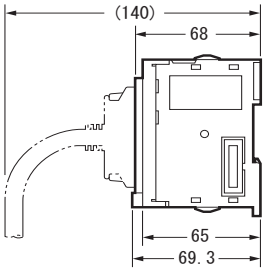
End Cover (CJ1W-TER01)



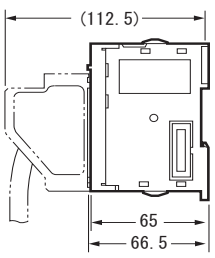
CJ Units

I/O connector

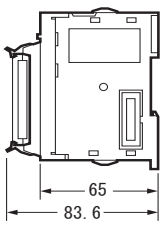




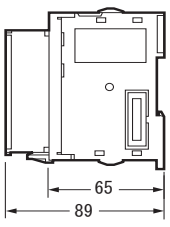
Fujitsu connector



MIL connector

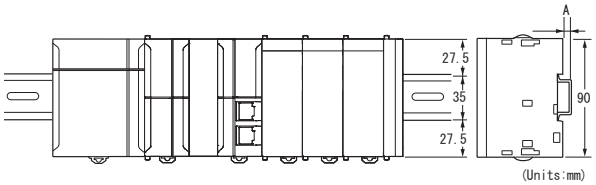


M3 screw and screwless type connector

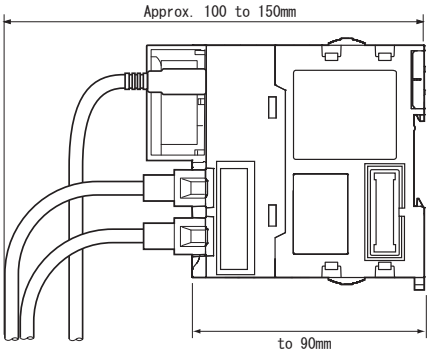


* Refer to the CJ Unit tables in the Ordering information section for the specific unit width.

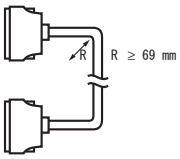
Mounting Dimensions



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 requeriments for each Rack.

Condition 1: Current Requeriments
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 Requeriments
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.

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.

Power Supply Units	Max. current supplied			(C) Max. total power supplied
	(A) 5-VDC CPU Racks*	(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

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) x 5 V + (2) x 24 V ≤ (C) value

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.

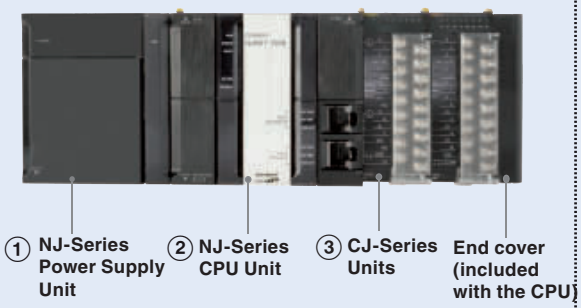
Unit type	Model	Quantity	Voltage group	
			5 V	24 V
CPU Unit	NJ501-1500	1	1.90 A	-
I/O Control Unit	CJ1W-IC101	1	0.02 A	-
Basic I/O Units (Input Units)	CJ1W-ID211	2	0.08 A	-
	CJ1W-ID231	2	0.09 A	-
Basic I/O Units (Output Units)	CJ1W-OC201	2	0.09 A	0.048 A
Special I/O Unit	CJ1W-DA041	1	0.12 A	-
CPU Bus Unit	CJ1W-SCU22	1	0.28 A	-
Current consumption	Total		1.9 A + 0.02 A + 0.08 A x 2 + 0.09 A x 2 + 0.09 A x 2 + 0.12 A + 0.28	0.048 A x 2
	Result		2.84 A (≤ 6.0 A)	0.096 A (≤ 1.0 A)
Power consumption	Total		2.84 A x 5 V = 14.2 W	0.096 A x 24 V = 2.3 W
	Result		14.2 W + 2.3 W = 16.5 W (≤ 30 W)	

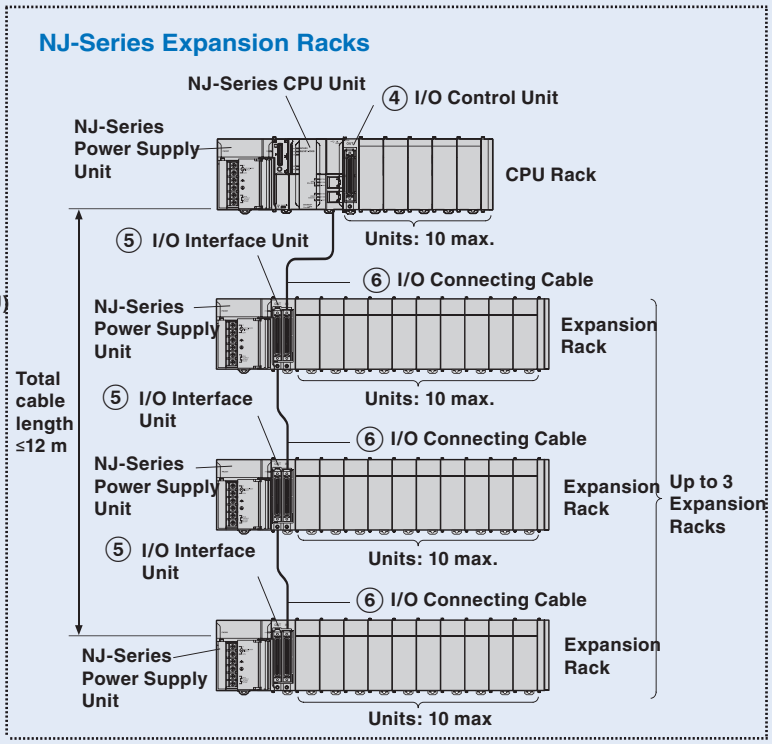
Note: 1. For details on Unit current consumption, refer to Ordering Information.

2. CPU Rack and Expansion Rack current consumption and width can be displayed in the Sysmac Studio software by selecting ***CPU/Expansion Racks*** from the ***Configurations and Setup*** in the Multiview Explorer.

Ordering information

NJ-Series system





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-Series	6.0 A	1.0 A	30 W	Supported	NJ-PA3001
	24 VDC Power Supply Unit for NJ-Series					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	Name	Number of axes	Program capacity	Variables capacity	I/O capacity	No. of units	Current consumption		Model
							5 VDC	24 VDC	
②	NJ501 CPU Unit (end cover unit CJ1W-TER01 is included)	16	20 MB	2 MB: Retained 4 MB: Not retained	2,560 points	CPU Rack: 10 units max. Expansion Rack: 40 units max. (Up to 3 expansion racks)	1.90 A	-	NJ501-1300
		32							NJ501-1400
		64							NJ501-1500

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

Symbol	Points	Type	Rated voltage	Rated current	Width	Remarks	Current consumption (A)		Connection type	Model
							5 VDC	24 VDC		
③	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	DC Output (sink)	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	0.3 A	20 mm	Short-circuit protection	0.15	-	MIL	CJ1W-OD232
	64		24 VDC	0.3 A	31 mm	-	0.17	-	MIL	CJ1W-OD262
	16 + 16	DC In + Out (source)	24 VDC	0.5 A	31 mm	-	0.13	-	MIL	CJ1W-MD232
	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
	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*	Conversion time	Width	Remarks	Current consumption (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: 1/12000 T/C: 0.1°C RTD: 0.1°C	V: 0.3% I: 0.3% T/C: 0.3% RTD: 0.3%	250 ms/4point	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)

Symbol	Points	Type	Ranges	Resolution	Accuracy*	Conversion time	Width	Remarks	Current consumption (A)		Connection type	Model
									5 V	24 V		
③	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, potenciometer	1/256000	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 1,300ºC) 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 650ºC) Pt1000 (-200 to 650ºC)	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
	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

* Accuracy for Voltage and Current Inputs/Outputs as percentatge of full scale and typical value at 25°C ambient temperature (Consult the operation manual for details)
Accuracy for Temperature Inputs/Outputs as percentatge 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 x 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 x RS-232C	High-speed	CompoWay/F, Host link, NT link, Modbus, User-defined	31 mm	0.28	-	9 pin D-Sub	CJ1W-SCU22
		2 x RS-422A/RS-485			31 mm	0.28	-	9 pin D-Sub	CJ1W-SCU32
		1 x RS-232C + 1 x RS-422/RS-485			31 mm	0.28	-	9 pin D-Sub	CJ1W-SCU42
	DeviceNet	1 x CAN	-	DeviceNet	31 mm	0.29	-	5-p detachable	CJ1W-DRM21
	PROFIBUS-DP	1 x RS-485 (Master)	-	DP, DPV1	31 mm	0.40	-	9 pin D-Sub	CJ1W-PRM21
		1 x RS-485 (Slave)	-	DP	31 mm	0.40	-		CJ1W-PRT21
	PROFINET-IO	1 x 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

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

Recommended EtherCAT and EtherNet/IP Communications Cables

Item			Recommended manufacturer	Cable length (m)	Model
For EtherCAT	Wire Gauge and Number of Pairs: AWG22, 2-pair Cable	Cable with Connectors on Both Ends (RJ45/RJ45) 	OMRON	0.3	XS5W-T421-AMD-K
				0.5	XS5W-T421-BMD-K
				1	XS5W-T421-CMD-K
		Cable with Connectors on Both Ends (M12/RJ45) 	OMRON	2	XS5W-T421-DMC-K
				5	XS5W-T421-GMC-K
				10	XS5W-T421-JMC-K
For EtherCAT and EtherNet/IP		RJ45 Assembly Connector 	OMRON		XS6G-T421-1
		RJ45 plug-in connector (tool-less). Recommended industrial Ethernet connector (suitable up to AWG22) 	Weidmüller		IEPSRJ45FHBK

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.

EtherCAT Junction Slave

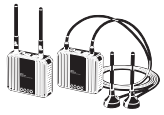
Name	No. of ports	Power supply voltage	Current consumption (A)	Dimensions (W x D x H)	Weight	Model	Appearance
EtherCAT junction slave	3	20.4 to 28.8 VDC (24 VDC -15 to +20%)	0.08	25 mm x 78 mmx 90 mm	165 g	GX-JC03	
	6		0.17	48 mm x 78 mmx 90 mm	220 g	GX-JC06	

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

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

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	
	USA	Access Point (Master)	WE70-AP-US	
		Client (Slave)	WE70-CL-US	
	China	Access Point (Master)	WE70-AP-CN	
		Client (Slave)	WE70-CL-CN	

Accessories

Name	Type	Model
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

NS HMI Series

Type		Case color	Model
TFT, 15", 1024 x 768 pixels	EtherNet	Black	NS15-TX01B-V2
		Silver	NS15-TX01S-V2
TFT, 12", 800 x 600 pixels		Black	NS12-TS01B-V2
		Ivory	NS12-TS01-V2
TFT, 10", 640 x 480 pixels		Black	NS10-TV01B-V2
		Ivory	NS10-TV01-V2
TFT, 8.4", 640 x 480 pixels		Black	NS8-TV01B-V2
		Ivory	NS8-TV01-V2
TFT, 5.7", 320 x 240 pixels		Black	NS5-TQ11B-V2
		Ivory	NS5-TQ11-V2
TFT, 5.7", 320 x 240 pixels		Black	NS5-SQ11B-V2
		Ivory	NS5-SQ11-V2
STN, Monochrome 5.7", 320 x 240 pixels		Black	NS5-MQ11B-V2
		Ivory	NS5-MQ11-V2

Note: To connect the NJ-Series Controller, NS System version 8.5 or higher is required. CX-Designer version 3.3 or higher is also required.

Accessories

Name	Specifications		Model
Cable	Serial programming cable		XW2Z-S002
	USB programming cable		CP1W-CN221
Video Input Unit	Inputs: 4 channels Signal type: NTSC/PAL		NS-CA001
	Input channels: 2 video channels and 1 RGB channel * Signal type: NTSC/PAL		NS-CA002
Cable to connect NS-CA00_ to Video console unit	Cable length: 2 m		F150-VKP (2 m)
	Cable length: 5 m		F150-VKP (5 m)
Sheet/Cover	Anti-reflection Sheets (5 surface sheets)	NS15	NS15-KBA04
		NS12/10	NS12-KBA04
		NS8	NS7-KBA04
		NS5	NT30-KBA04
	Protective Covers (5 pack) (anti-reflection coating)	NS12/10	NS12-KBA05
		NS8	NS7-KBA05
		NS5	NT31C-KBA05
	Protective Covers (1 cover included) (Transparent)	NS15	NS15-KBA05N
	Protective Covers (5 covers included) (Transparent)	NS12/10	NS12-KBA05N
		NS8	NS7-KBA05N
		NS5	NT31C-KBA05N
	Chemical-resistant cover (1 cover)	NS5	NT30-KBA01
Attachment Adapter	NT625C/631/631C-Series to NS12/10-Series		NS12-ATT01
	NT625C/631/631C-Series to NS12/10-Series (Black)		NS12-ATT01B
	NT610C-Series to NS12/10-Series		NS12-ATT02
	NT620S/620C/600S-Series to NS8-Series		NS8-ATT01
	NT600M/600G/610G/612G-Series to NS8-Series		NS8-ATT02
Memory Card	128 MB		HMC-EF183
	256 MB		HMC-EF283
	512 MB		HMC-EF583
Memory Card Adapter for PC	-		HMC-AP001
Replacement Battery	Battery life: 5 years (at 25°C)		CJ1W-BAT01

* One screen cannot display two videos inputs simultaneously.

Options and accessories

Specifications		Model	Appearance
SD Memory Card, 2 GB		HMC-SD291	
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)	
Battery for NJ-Series 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	

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

In the interest of product improvement, specifications are subject to change without notice.

R88D-KN□□□-ECT

Accurax G5 rotary drive

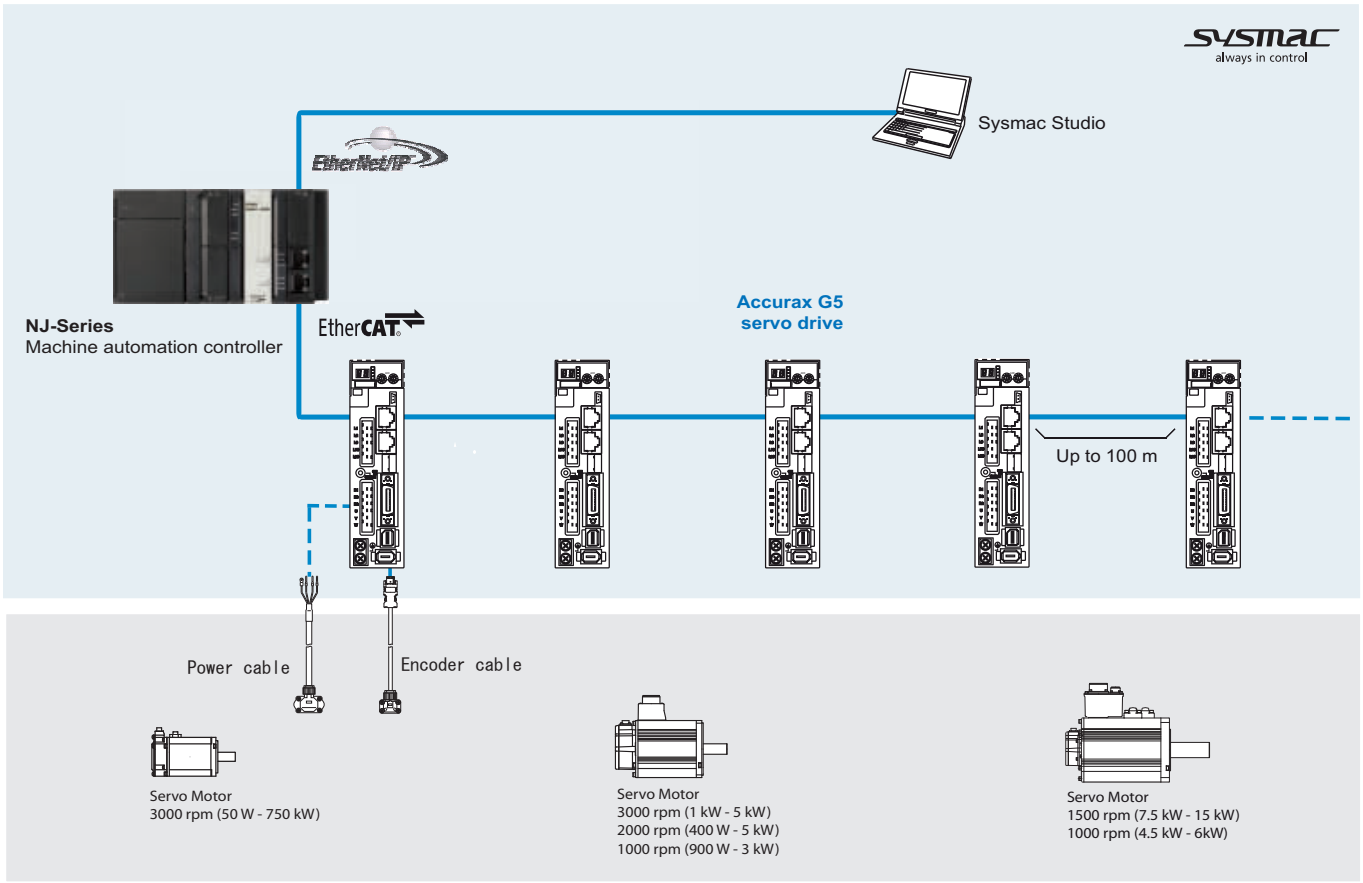
Accurate motion control in a compact size servo drive family. EtherCAT and safety built-in.

- 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

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
			23.9 Nm	5000 W	R88M-K5K020(F/C)-□	R88D-KN50F-ECT
7.5 kW - 15 kW		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

Type designation

Servo drive

R88D-KN01H-ECT

- Accurax G5 Series servo drive
- Drive Type
  N: Network type
- 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
	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					
	Conditions: Usage/storage humidity			90% RH or less (non-condensing)					
	Conditions: Altitude			1000m or less above sea level					
	Conditions: Vibration/shock resistance		(max.)	5.88 m/s^2 10-60 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

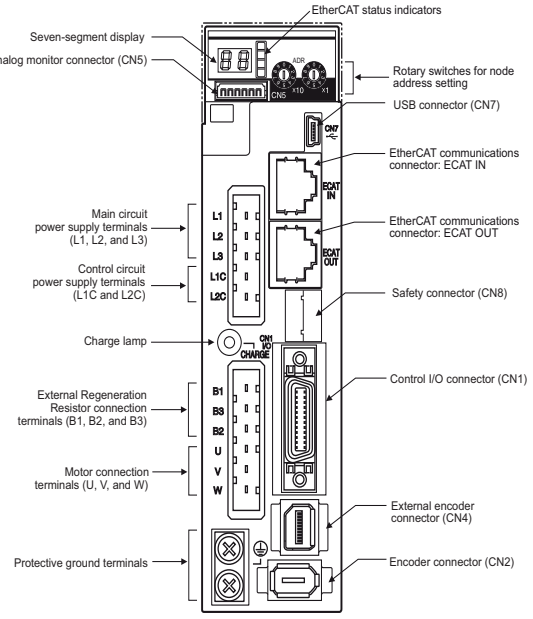
Servo drive type			R88D-KN	06F-ECT	10F-ECT	15F-ECT	20F-ECT	30F-ECT	50F-ECT	75F-ECT	150F-ECT
Applicable servo motor			R88M-K□	40020(F/C)-□	75030(F/C)-□	1K030(F/C)-□	2K030(F/C)-□	3K030(F/C)-□	4K030(F/C)-□	6K010C-□	11K015C-□
				60020(F/C)-□	1K020(F/C)-□	1K530(F/C)-□	2K020(F/C)-□	3K020(F/C)-□	5K030(F/C)-□	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% (50/60Hz)							
	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							
	Conditions: Usage/storage humidity			90% RH or less (non-condensing)							
	Conditions: Altitude			1000 m or less above sea level							
	Conditions: Vibration/shock resistance			5.88 m/s^2 10-60 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).
	*1 Drive Profile		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 x 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 x servo drive error output 2 x 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 x 2 ECAT IN: EtherCAT input x 1 ECAT OUT: EtherCAT output x 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 x 1 ERR x 1 L/A IN (Link/Activity IN) x 1 L/A OUT (Link/activity OUT) x 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 x digit 7-segment LED display shows the drive status, alarm codes, parameters...
		Switches	2 x 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 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 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 12V-24V (±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 5.2V +/-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). Perfoms 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	-	

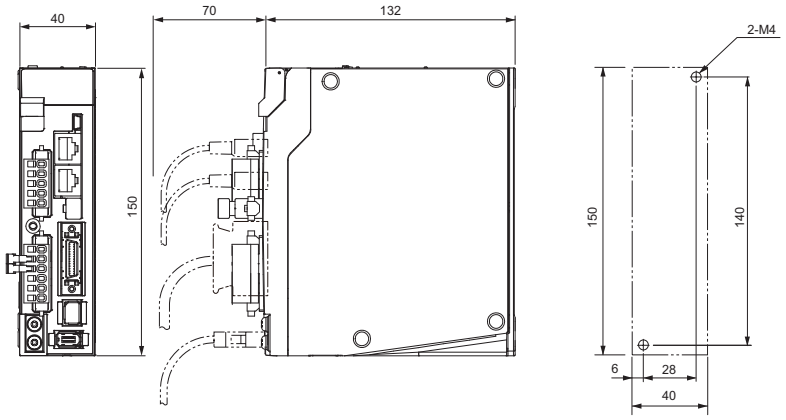
Safety connector (CN8)

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.

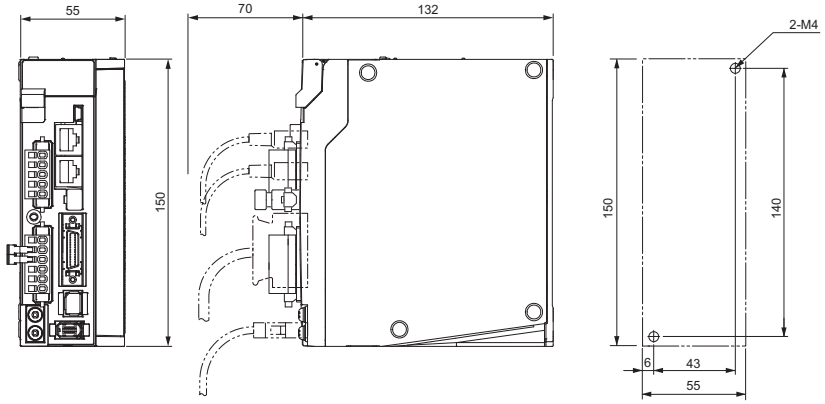
Dimensions

Servo drives

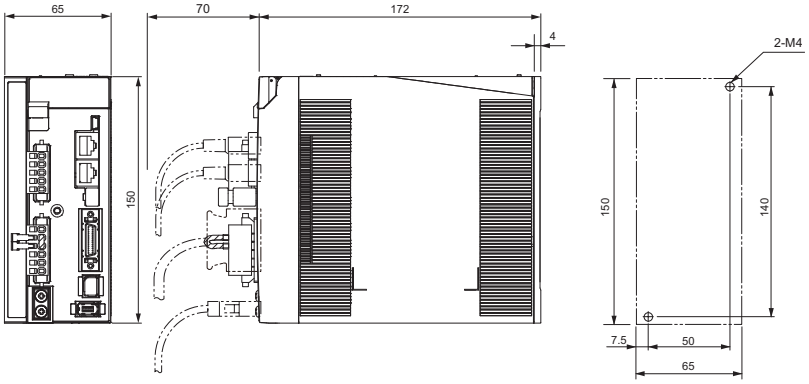
R88D-KN01H/02H-ECT (230 V, 100 - 200W)



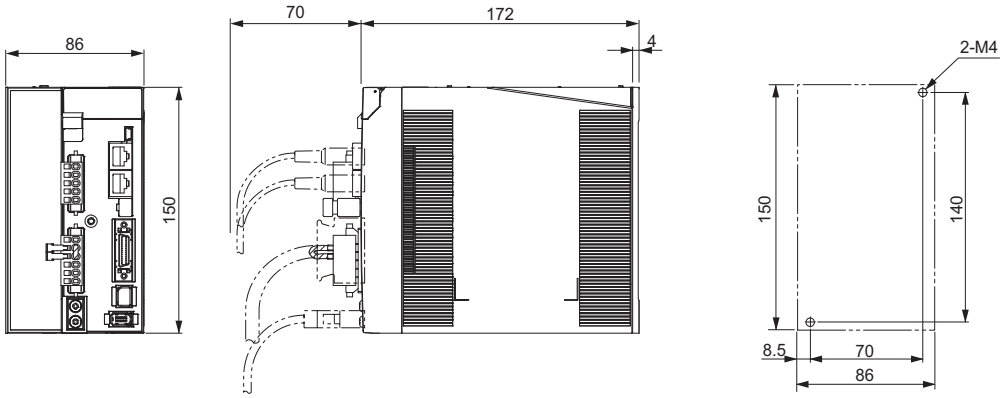
R88D-KN04H-ECT (230 V, 400 W)



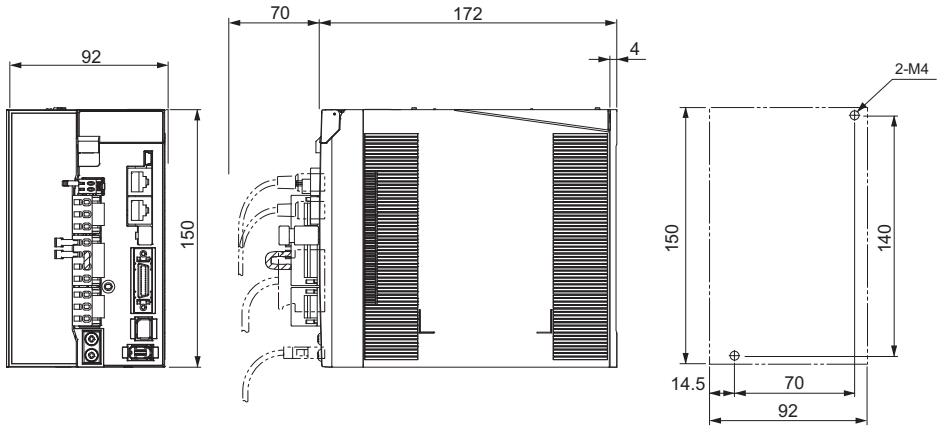
R88D-KN08H-ECT (230 V, 750 W)



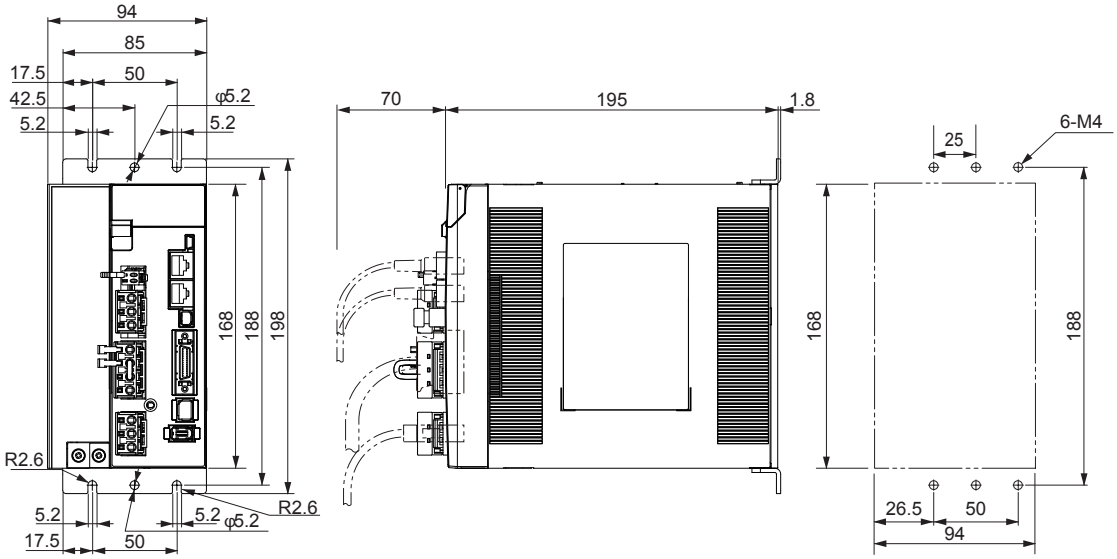
R88D-KN10H/15H-ECT (230 V, 1 - 1.5 kW)



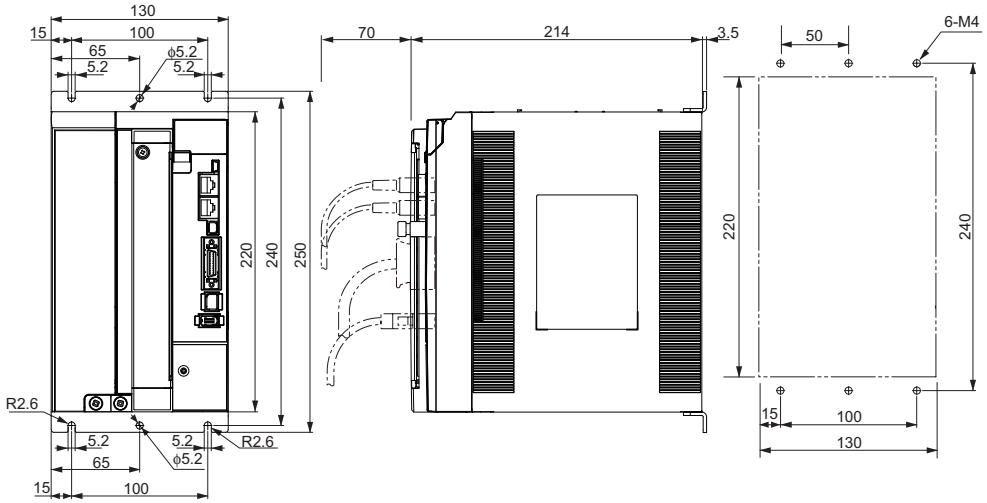
R88D-KN06F/10F/15F-ECT (400 V, 600 W - 1.5 kW)



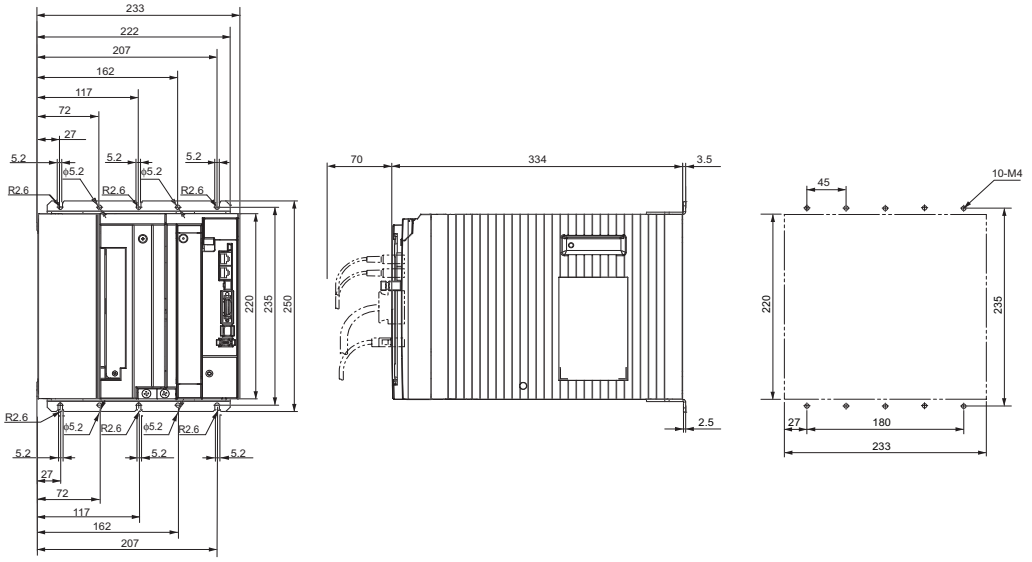
R88D-KN20F-ECT (400 V, 2 kW)



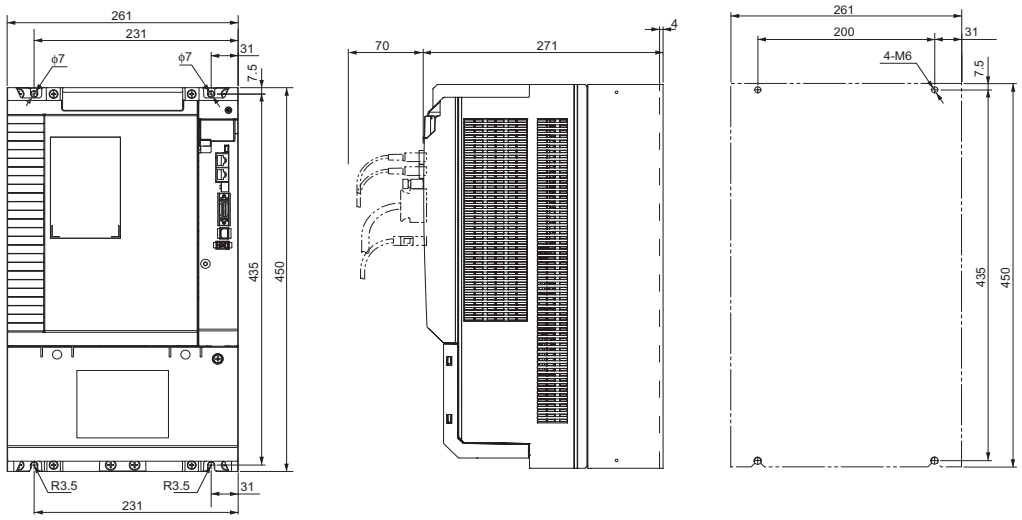
R88D-KN30F/50F-ECT (400 V, 3 - 5 kW)



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

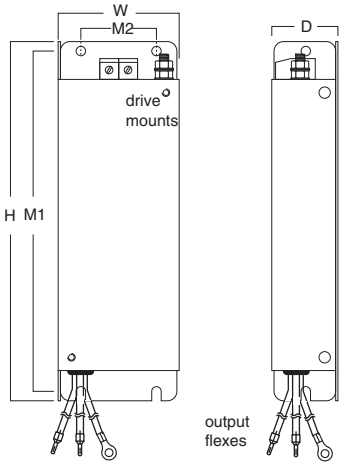


R88D-KN150F-ECT (400 V, 15 kW)



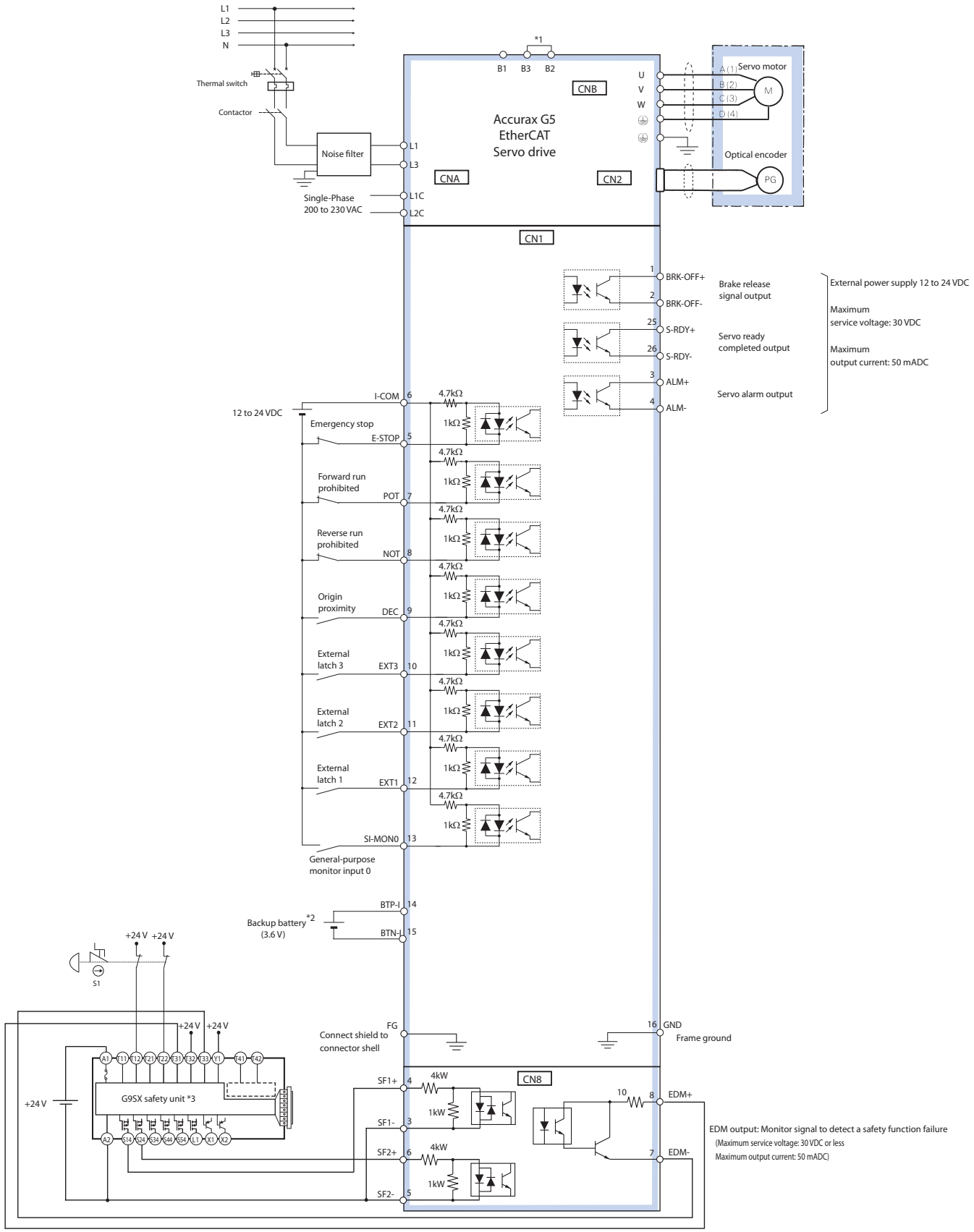
Filters

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	190	86	40	180	60
R88A-FIK306-RE	245	94	40	235	60
R88A-FIK312-RE	290	130	45	280	100



Installation

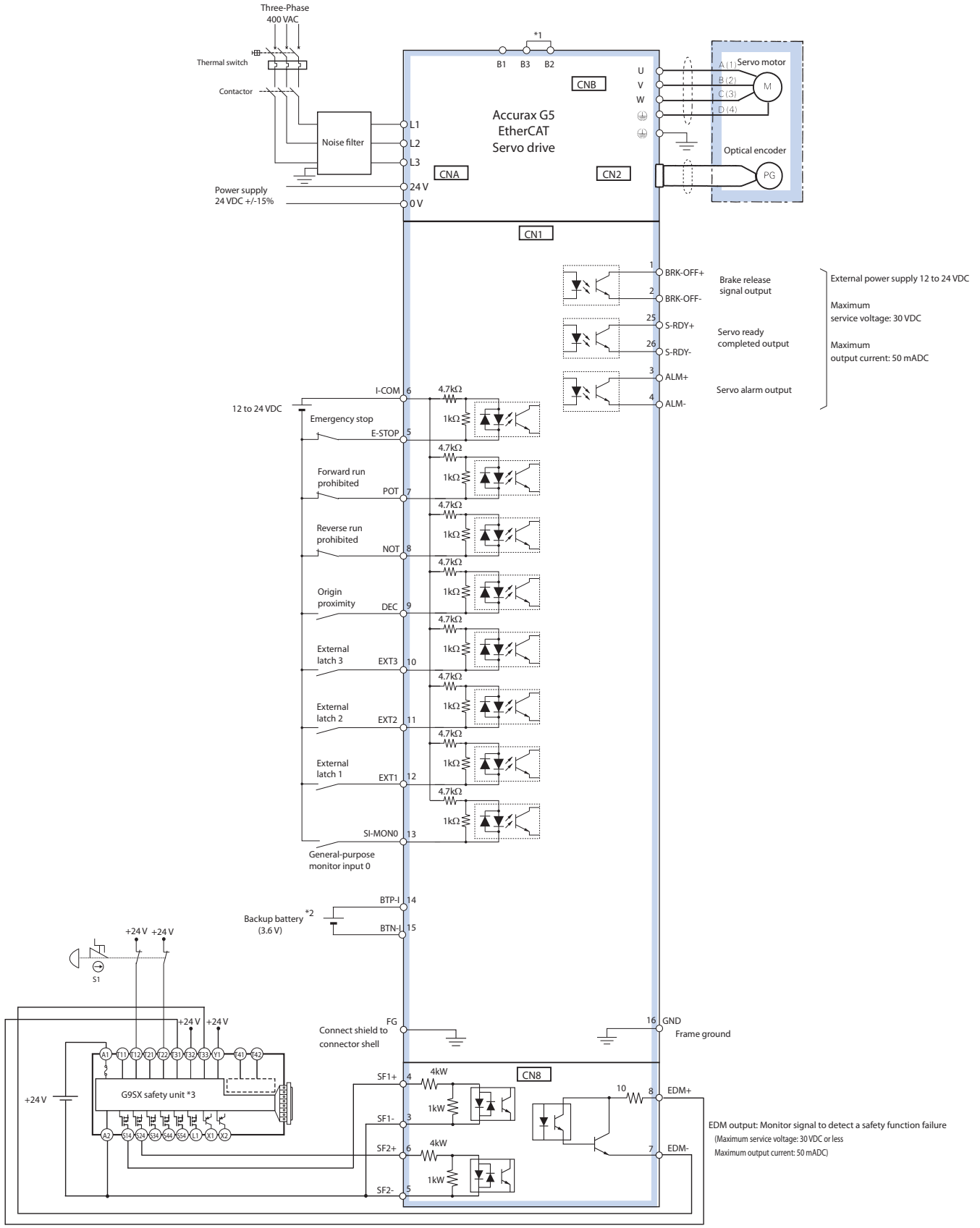
Single-phase, 230 VAC



*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 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

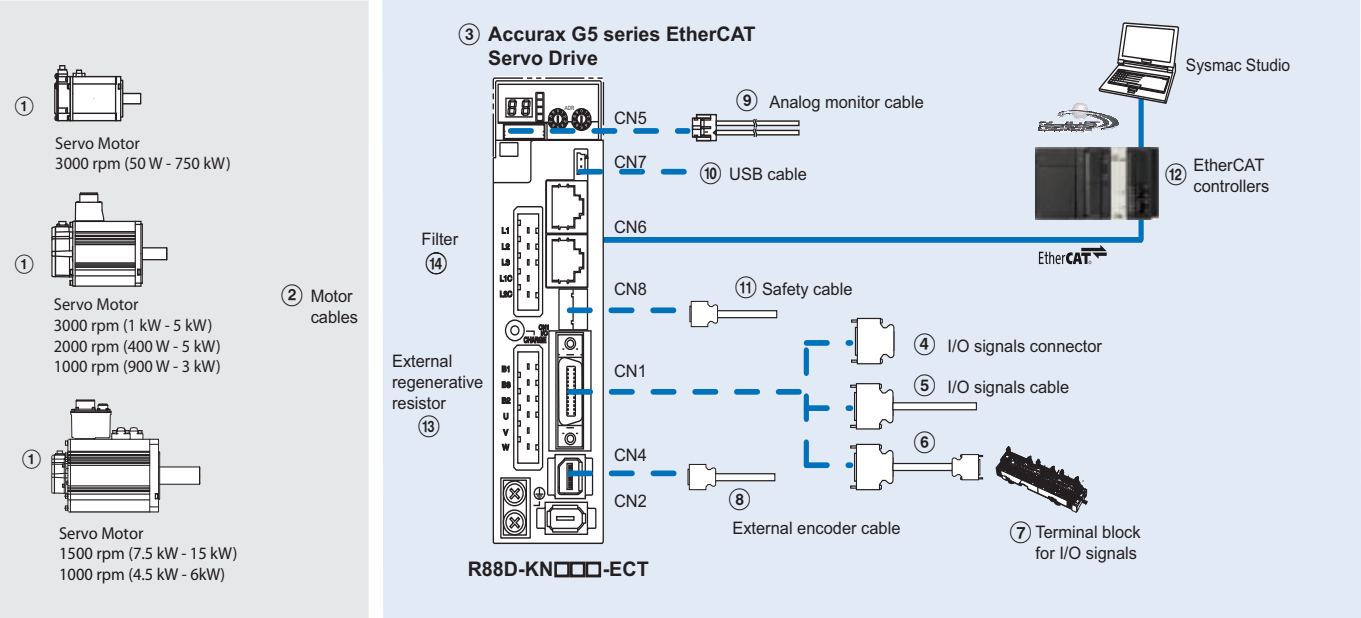


*1 For servo drives from 600 W to 5 kW, B2 and B3 are short-circuited. If the internal regenerative resistor is insufficient, remove the wire between B2 and B3 and connect an external regenerative resistor between B1 and B2.
*2 For use only with an absolute encoder. If a backup battery is connected to 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 model	① Compatible G5 series rotary servo motors
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)-□
		400 W	R88D-KN04H-ECT	R88M-K40030(H/T)-□
		750 W	R88D-KN08H-ECT	R88M-K75030(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)-□
		1.5 kW	R88D-KN15F-ECT	R88M-K1K030(F/C)-□
				R88M-K1K530(F/C)-□
				R88M-K1K520(F/C)-□
				R88M-K90010(F/C)-□
		2.0 kW	R88D-KN20F-ECT	R88M-K2K030(F/C)-□
				R88M-K2K020(F/C)-□
		3.0 kW	R88D-KN30F-ECT	R88M-K3K030(F/C)-□
				R88M-K3K020(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-K5K020(F/C)-□
				R88M-K4K510C-□
				R88M-K3K010(F/C)-□
		7.5 kW	R88D-KN75F-ECT	R88M-K6K010C-□
				R88M-K7K515C-□
		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	1m	R88A-CPKB001S-E
			2m	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	5m	R88A-CRKM005SR-E
		10m	R88A-CRKM010SR-E
		20m	R88A-CRKM020SR-E

Analog monitor (CN5)

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

USB personal computer cable (CN7)

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

Cable for safety (CN8)

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

EtherCAT controllers

Symbol	Name		Model
⑫	NJ Series	CPU Units	NJ501-1300 (16 axes)
			NJ501-1400 (32 axes)
			NJ501-1500 (64 axes)
		Power Supply Units	NJ-PA3001 (220 VAC)
			NJ-PD3001 (24 VDC)

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	Rated current	Leakage current	Rated voltage
⑭	R88D-KN01H-ECT, R88D-KN02H-ECT	R88A-FIK102-RE	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	-	-	
	R88D-KN150F-ECT	R88A-FIK350-RE	-	-	

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□□□

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.

In the interest of product improvement, specifications are subject to change without notice.

R88D-KN□□□-ECT-L

Accurax G5 linear drive

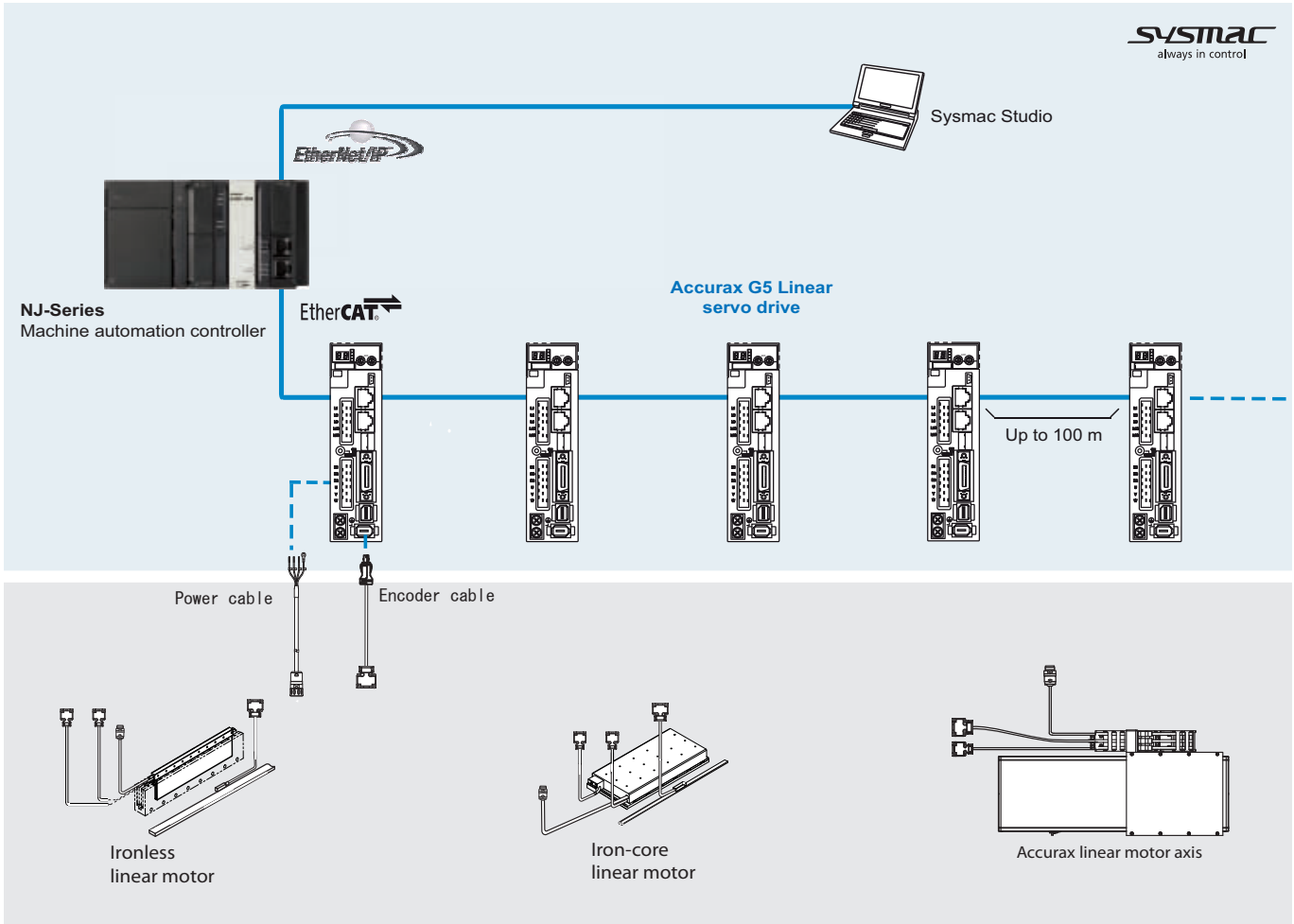
Accurate motion control in a compact size servo drive family. EtherCAT and safety built-in.

- 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 motor - 26.5 to 348 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  230V / 400V	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  200V	26.5N	100 N	Coil without connectors	R88L-EC-GW-0303-ANPS	R88D-KN02H-ECT-L	-
	53 N	200 N		R88L-EC-GW-0306-ANPS	R88D-KN08H-ECT-L	-
	80 N	300 N		R88L-EC-GW-0309-ANPS	R88D-KN10H-ECT-L	-
	58 N	240 N		R88L-EC-GW-0503-ANPS	R88D-KN02H-ECT-L	-
	117 N	480 N		R88L-EC-GW-0506-ANPS	R88D-KN04H-ECT-L	-
	175 N	720 N		R88L-EC-GW-0509-ANPS	R88D-KN08H-ECT-L	-
	117 N	700 N		R88L-EC-GW-0703-ANPS	R88D-KN04H-ECT-L	-
	232 N	1400 N		R88L-EC-GW-0706-ANPS	R88D-KN08H-ECT-L	-
	348 N	2100 N		R88L-EC-GW-0709-ANPS	R88D-KN10H-ECT-L	-
	26.5N	100 N	Coil with connectors	R88L-EC-GW-0303-APLS	R88D-KN02H-ECT-L	-
	53 N	200 N		R88L-EC-GW-0306-APLS	R88D-KN08H-ECT-L	-
	80 N	300 N		R88L-EC-GW-0309-APLS	R88D-KN10H-ECT-L	-
	58 N	240 N		R88L-EC-GW-0503-APLS	R88D-KN02H-ECT-L	-
	117 N	480 N		R88L-EC-GW-0506-APLS	R88D-KN04H-ECT-L	-
	175 N	720 N		R88L-EC-GW-0509-APLS	R88D-KN08H-ECT-L	-
	117 N	700 N		R88L-EC-GW-0703-APLS	R88D-KN04H-ECT-L	-
	232 N	1400 N		R88L-EC-GW-0706-APLS	R88D-KN08H-ECT-L	-
	348 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-KN10F-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
	50F	5.0 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-0703		GW-0509		GW-0709		-	
			-		-		GW-0706		-		-	
Basic specifications	Power	W	200		400		750		1000		1500	
	PWM frequency	KHz	6	12	6	12	6	12	6	12	6	12
	Continuous output current	Arms	-	1.63	2.6	1.5	4	2.4	5.6	4.1	9.5	5.7
	Max. output current	Arms	-	4.89	7.8	4.5	12	7.2	16.8	12.3	28.5	17
	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									
	Conditions: Usage/storage humidity		90% RH or less (non-condensing)									
	Conditions: Altitude		1000m or less above sea level									
	Conditions: Vibration/shock resistance	(max.)	5.88 m/s^2 10-60 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			

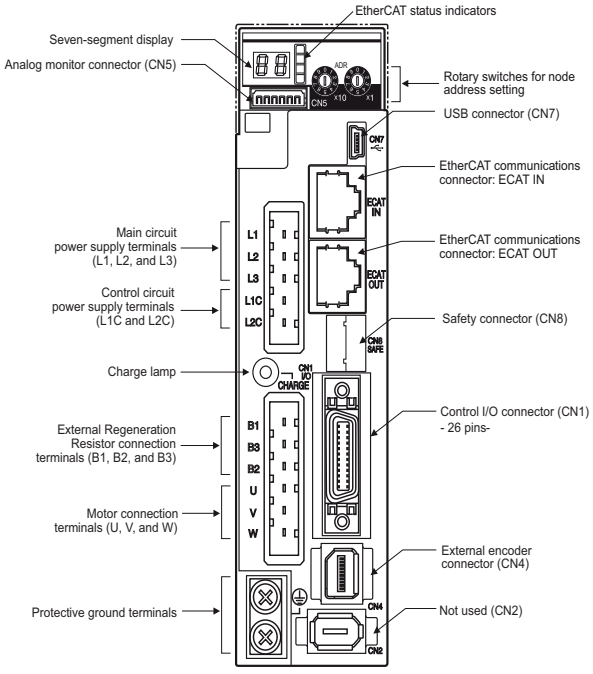
Three-phase, 400 V

Servo drive type		R88D-KN	06F-ECT-L		10F-ECT-L		15F-ECT-L		20F-ECT-L		30F-ECT-L		50F-ECT-L	
Applicable linear servo motor		R88L-EC-	FW-0303		FW-0303		FW-0606		FW-0609		FW-0612		FW-1115	
			-		FW-0306		-		-		FW-1112		-	
Basic specifications	Power	kW	0.6		1		1.5		2		3		5	
	PWM frequency	KHz	6	12	6	12	6	12	6	12	6	12	6	12
	Continuous output current	Arms	1.5	1.5	2.8	1.5	4.7	2.8	5.9	4.7	9.2	5.9	13	9.2
	Max. output current	Arms	4.5	4.5	8.4	4.5	14.1	8.4	17.7	14.1	27.6	17.7	39	27.6
	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											
	Conditions: Usage/storage humidity		90% RH or less (non-condensing)											
	Conditions: Altitude		1000 m or less above sea level											
	Conditions: Vibration/shock resistance		5.88 m/s^2 10-60 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 x 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 x servo drive error output 2 x multi-function outputs by parameters setting (servo ready, bracke 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 x 2 ECAT IN: EtherCAT input x 1 ECAT OUT: EtherCAT output x 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 x 1 ERR x 1 L/A IN (Link/Activity IN) x 1 L/A OUT (Link/activity OUT) x 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: ±10V DC)
	Panel operator	Display functions	2 x digit 7-segment LED display shows the drive status, alarm codes, parameters...
		Switches	2 x 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 750W: no internal resistor is connected. Leave B2 and B3 open. Connect an external regenerative resistor between B1 and B2. Servo drives from 750W 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 12V-24V (±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 5.2V +/-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). Perfoms 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/(500mm/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	-	

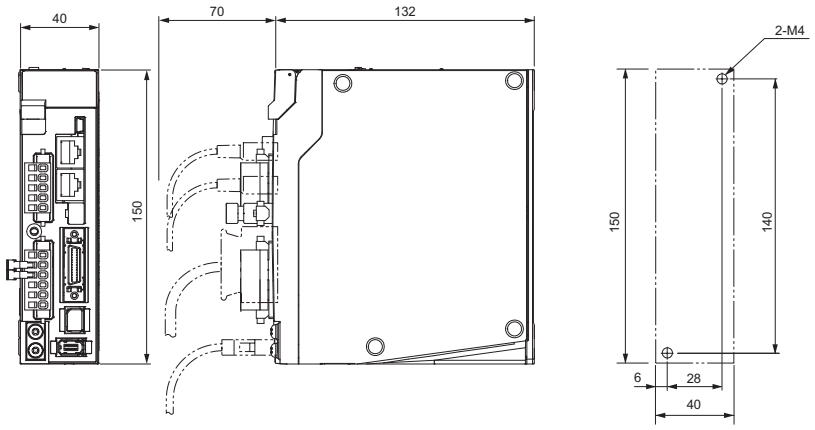
Safety connector (CN8)

Pin No.	Signal name	Function
1	-	Not used. Do not connect.
2	-	
3	SF1-	Safety input 1 & 2. This input turns OFF the power trransistor 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.

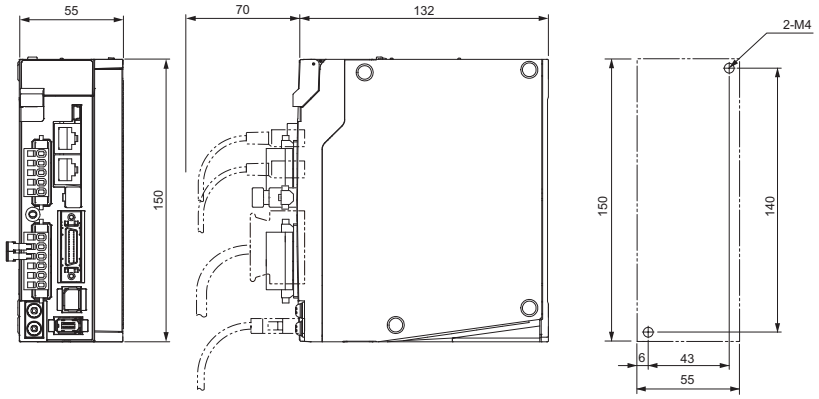
Dimensions

Servo drives

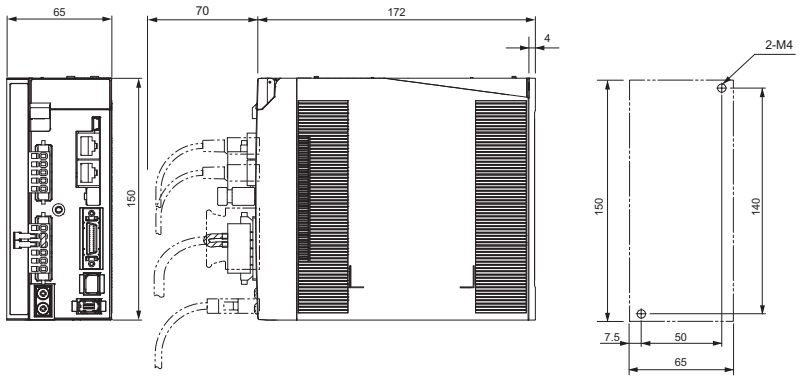
R88D-KN02H-ECT-L (230 V, 200 W)



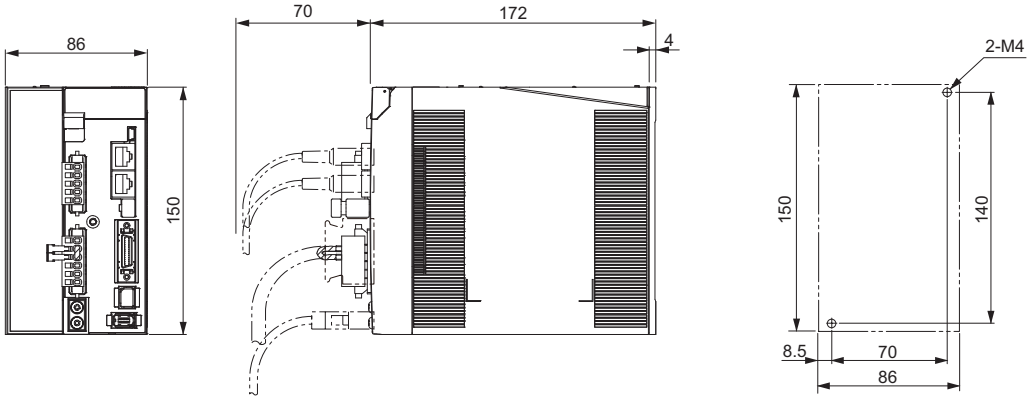
R88D-KN04H-ECT-L (230 V, 400 W)



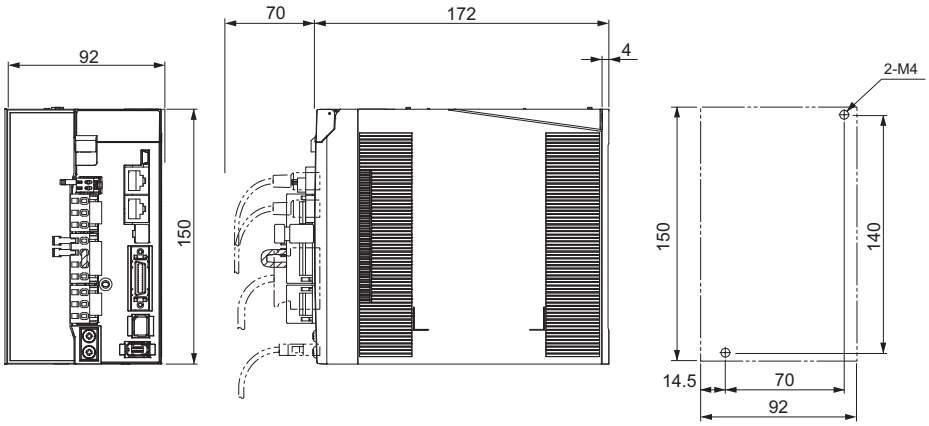
R88D-KN08H-ECT-L (230 V, 800 W)



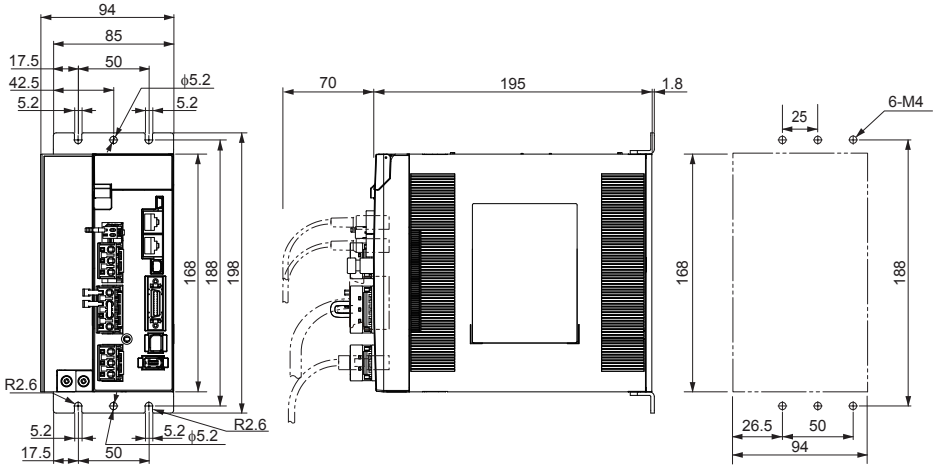
R88D-KN10H/15H-ECT-L (230 V, 1 - 1.5 kW)



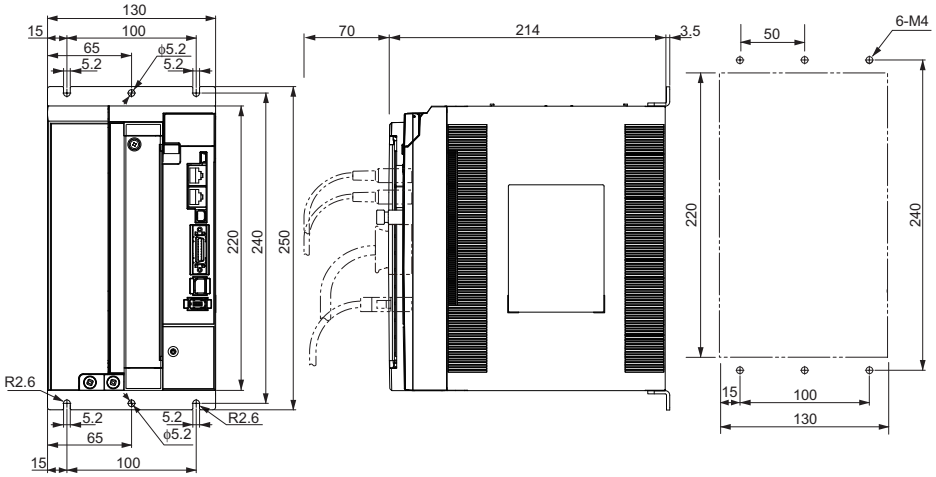
R88D-KN06F/10F/15F-ECT-L (400 V, 600 W - 1.5 kW)



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

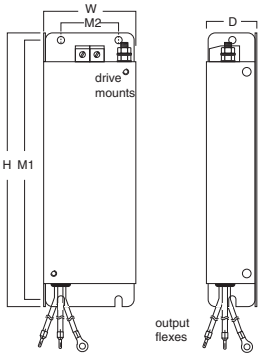


R88D-KN30F/50F-ECT-L (400 V, 3 - 5 kW)



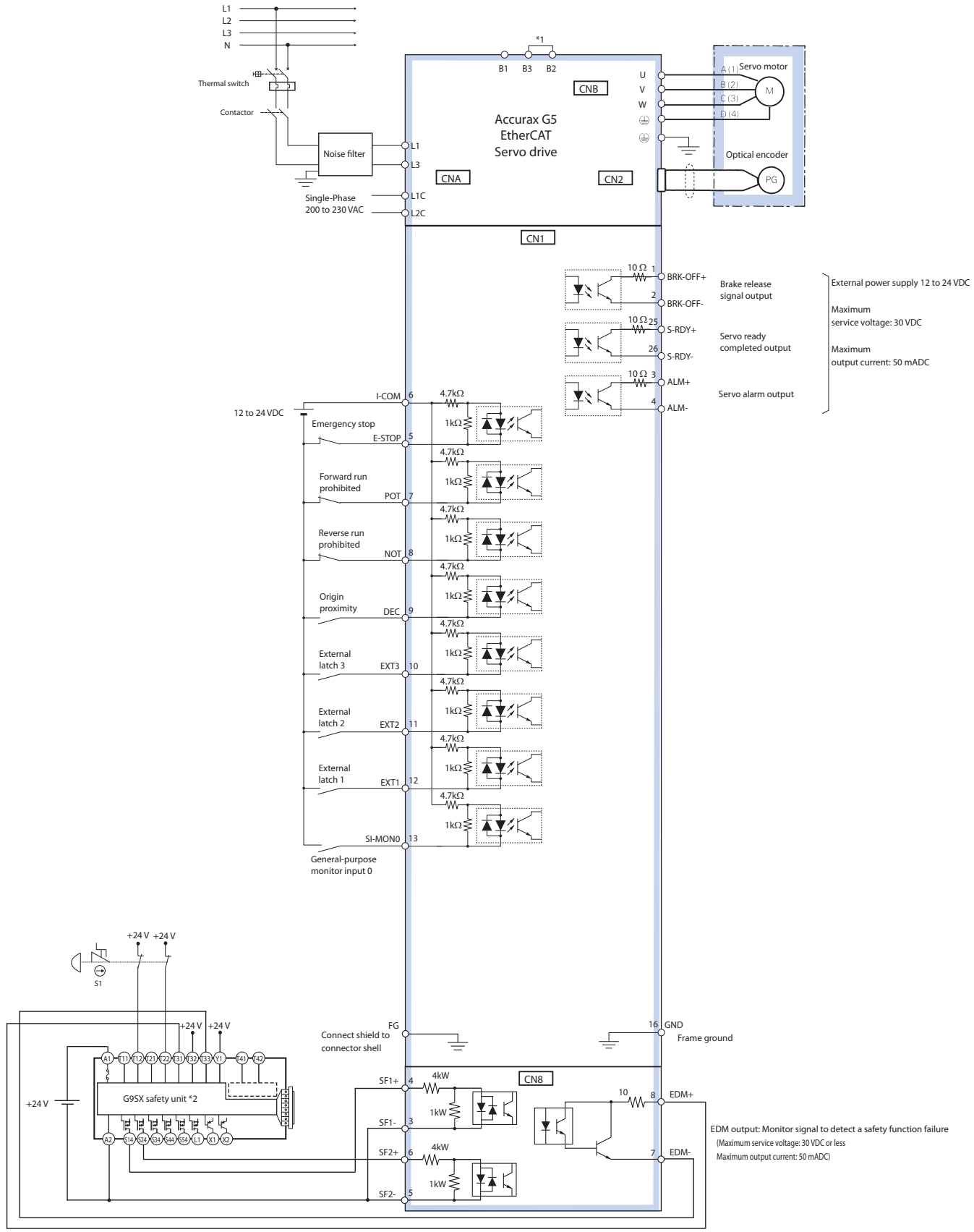
Filters

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	190	86	40	180	60
R88A-FIK306-RE	245	94	40	235	60
R88A-FIK312-RE	290	130	45	280	100



Installation

Single-phase, 230 VAC

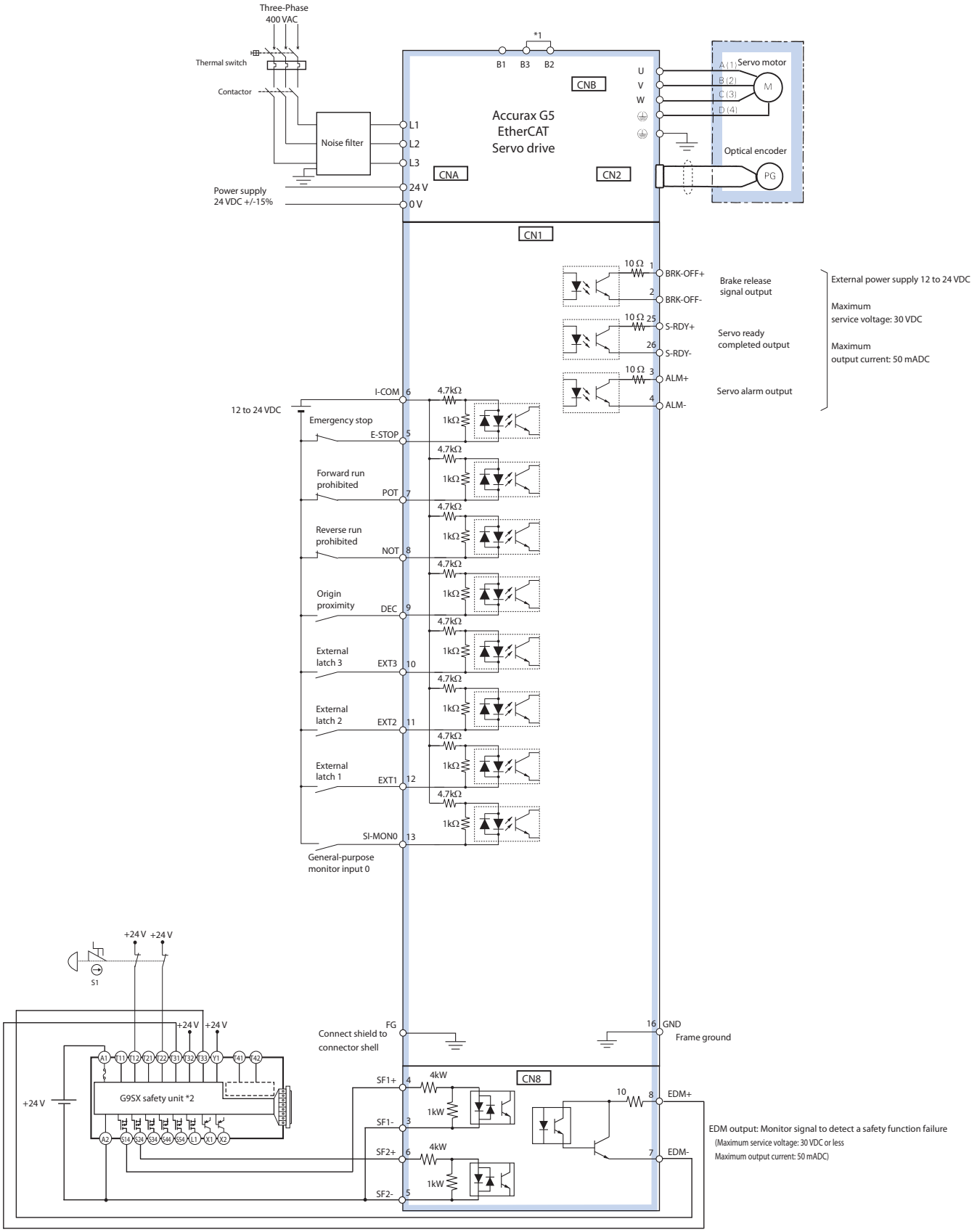


*1 For servo drives from 750 W, B2 and B3 are short-circuited. If the internal regenerative resistor is insufficient, remove the wire between B2 and B3 and connect an external regenerative resistor between B1 and B2.

*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



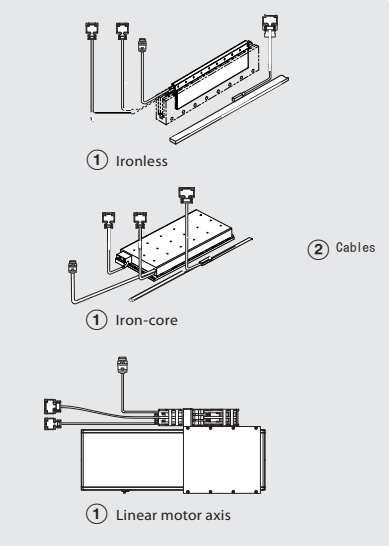
*1 Normally B2 and B3 are short-circuited. If the internal regenerative resistor is insufficient, remove the wire between B2 and B3 and connect an external regenerative resistor between B1 and B2.

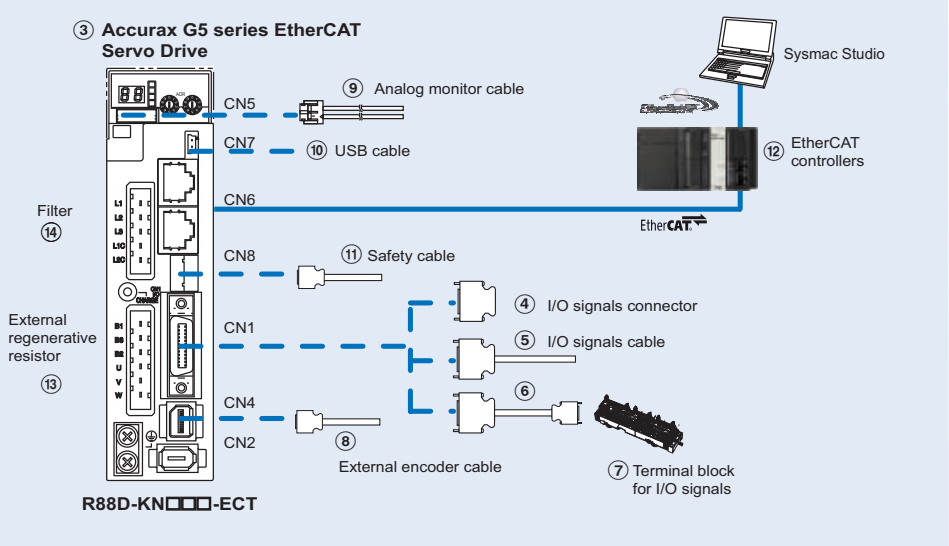
*2 Wiring diagram example using the G9SX safety unit. If a safety unit is not used, keep the factory safety bypass connector installed in the CN8.

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 model	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-□	-	-
		R88D-KN10F-ECT-L	R88L-EC-FW-0306-□	-	R88L-EA-AF-0303-□
					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	1m	R88A-CPKB001S-E
			2m	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	5m	R88A-CRKM005SR-E
		10m	R88A-CRKM010SR-E
		20m	R88A-CRKM020SR-E

Analog monitor (CN5)

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

USB personal computer cable (CN7)

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

Cable for safety (CN8)

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

EtherCAT controllers

Symbol	Name		Model
⑫	NJ Series	CPU Units	NJ501-1300 (16 axes)
			NJ501-1400 (32 axes)
			NJ501-1500 (64 axes)
		Power Supply Units	NJ-PA3001 (220 VAC)
			NJ-PD3001 (24 VDC)

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	Rated current	Leakage current	Rated voltage
⑭	R88D-KN02H-ECT-L	R88A-FIK102-RE	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, R88D-KN50F-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□□□

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.

In the interest of product improvement, specifications are subject to change without notice.

R88M-K□

Accurax G5 rotary motors

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

- 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

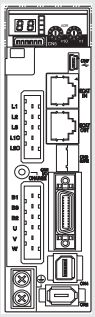
Ratings

- 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)

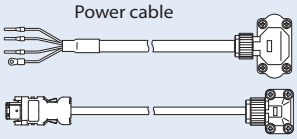
Servo drive options



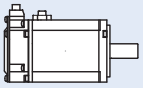
Accurax G5 sevo drives
EtherCAT models

SYSMAC always in control

Power cable



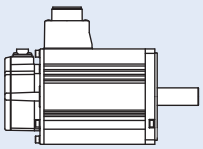
Encoder cable



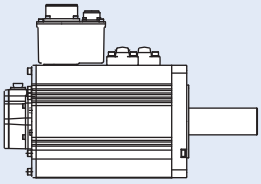
Servo motor
3000 rpm (50 W-750 W)

Power cable

Encoder cable



Servo motor
3000 rpm (1 kW-5 kW)
2000 rpm (400 W-5 kW)
1000 rpm (900 W-3 kW)



Servo motor
1500 rpm (7.5 kW-15 kW)
1000 rpm (4.5 kW-6 kW)

Servo motor / servo drive combination

Accurax G5 rotary servo motor						Model
	Voltage	Speed	Rated torque	Capacity	Model	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
	230 V	2000 min^{-1}	4.77 Nm	1000 W	R88M-K1K020(H/T)-□	R88D-KN10H-ECT
 7.5 KW - 15 kW			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

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

Servo motor

R88M-K05030H-BOS2

Accurax G5 Series Servomotor

Capacity

050	50 W
100	100 W
200	200 W
400	400 W
600	600 W
750	750 W
900	900 W
1K0	1 kW
1K5	1.5 kW
2K0	2 kW
3K0	3 kW
4K0	4 kW
4K5	**4.5 kW**
5K0	5 kW
6K0	6 kW
7K5	7.5 kW
11K0	11 kW
15K0	15 kW

Rated Speed (r/min)

10	1000
15	1500
20	2000
30	3000

Voltage and encoder specifications
H: 230 V and 20-bit incremental encoder
T: 230 V and 17-bit absolute encoder
F: 400 V and 20-bit incremental encoder
C: 400 V and 17-bit absolute encoder

Brake specifications

Blank	No brake
B	Brake

Oil seal specifications

Blank	No oil seal
O	Oil seal

Shaft end specifications

Blank	Straigth shaft, no key
S2	Straigth, key, tapped (standard)

Servo motor specifications

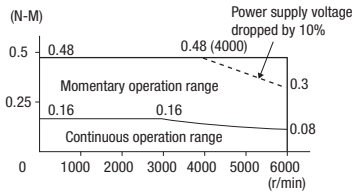
Servo motors 3000 r/min, 230 V

Ratings and specifications

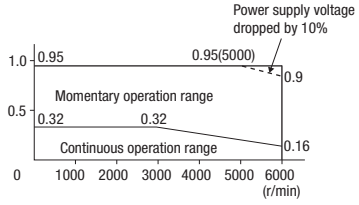
Voltage		230 V						
Servo motor model R88M-K□	**20-bit incremental encoder**	**05030H-□**	**10030H-□**	**20030H-□**	**40030H-□**	**75030H-□**	**1K030H-□**	**1K530H-□**
	17-bit absolute encoder	**05030T-□**	**10030T-□**	**20030T-□**	**40030T-□**	**75030T-□**	**1K030T-□**	**1K530T-□**
Rated output	W	50	100	200	400	750	1000	1500
Rated torque	N·m	0.16	0.32	0.64	1.3	2.4	3.18	4.77
Instantaneous peak torque	N·m	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)	$kg·m^2x10^{-4}$ (without brake)	0.025	0.051	0.14	0.26	0.87	2.03	2.84
	$kg·m^2x10^{-4}$ (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				20	15	
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	24VDC ±10%						
	Holding brake moment of inertia J	$kg·m^2x10^{-4}$	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						

Torque-speed characteristics

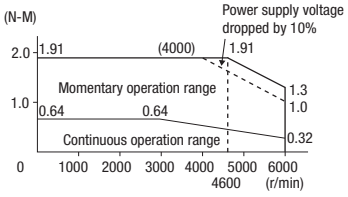
R88M-K05030H/T (50 W)



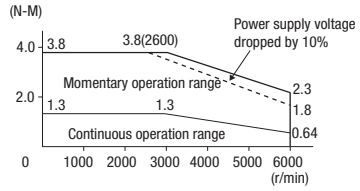
R88M-K10030H/T (100 W)



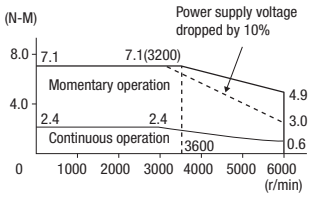
R88M-K20030H/T (200 W)



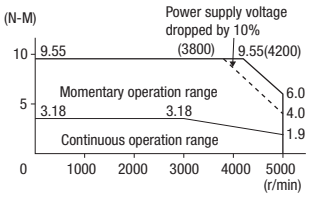
R88M-K40030H/T (400 W)



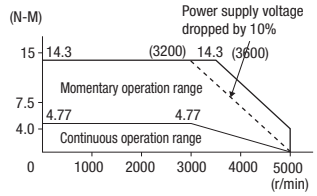
R88M-K75030H/T (750 W)



R88M-K1K030H/T (1 kW)



R88M-K1K530H/T (1.5 kW)



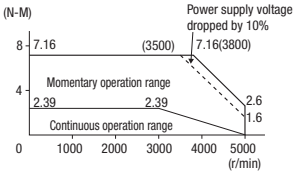
Servo motors 3000 r/min, 400 V

Ratings and specifications

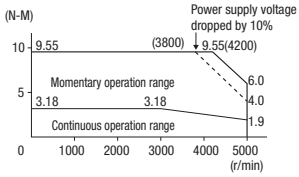
Voltage			400 V						
Servo motor model R88M-K□		20-bit incremental encoder	75030F-□	1K030F-□	1K530F-□	2K030F-□	3K030F-□	4K030F-□	5K030F-□
		17-bit absolute encoder	75030C-□	1K030C-□	1K530C-□	2K030C-□	3K030C-□	4K030C-□	5K030C-□
Rated output		W	750	1000	1500	2000	3000	4000	5000
Rated torque		N·m	2.39	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)		$kg·m^2x10^{-4}$ (without brake)	1.61	2.03	2.84	3.68	6.5	12.9	17.4
		$kg·m^2x10^{-4}$ (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	15					
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		24VDC±10%						
	Holding brake moment of inertia J	$kg·m^2x10^{-4}$	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						

Torque-speed characteristics

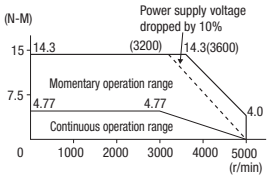
R88M-K75030F/C (750 W)



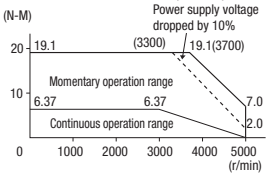
R88M-K1K030F/C (1 kW)



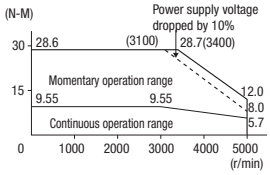
R88M-K1K530F/C (1.5 kW)



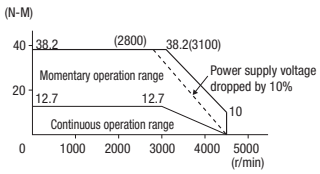
R88M-K2K030F/C (2 kW)



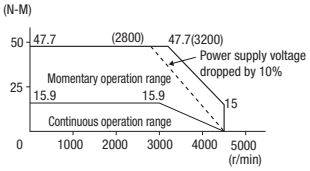
R88M-K3K030F/C (3 kW)



R88M-K4K030F/C (4 kW)



R88M-K5K030F/C (5 kW)



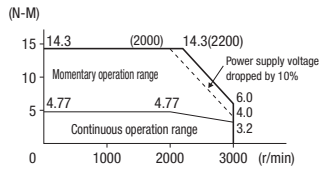
Servo motors 2000 r/min, 230V/ 400 V

Ratings and specifications

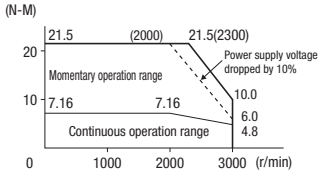
Voltage		230 V		400 V							
Servo motor model R88M-K□	**20-bit incremental encoder**	**1K020H-□**	**1K520H-□**	**40020F-□**	**60020F-□**	**1K020F-□**	**1K520F-□**	**2K020F-□**	**3K020F-□**	**4K020F-□**	**5K020F-□**
	17-bit absolute encoder	**1K020T-□**	**1K520T-□**	**40020C-□**	**60020C-□**	**1K020C-□**	**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)	$kg·m^2x10^{-4}$ (without brake)	4.60	6.70	1.61	2.03	4.60	6.70	8.72	12.9	37.6	48
	$kg·m^2x10^{-4}$ (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									
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	24VDC ±10%									
	Holding brake moment inertia (J)	$kg·m^2x10^{-4}$	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	TypeF									
	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									

Torque-speed characteristics

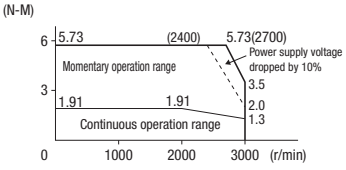
R88M-K1K020H/T (230V, 1 kW)



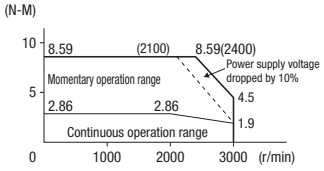
R88M-K1K520H/T (230V, 1.5 kW)



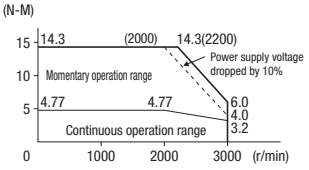
R88M-K40020F/C (400V, 400 W)



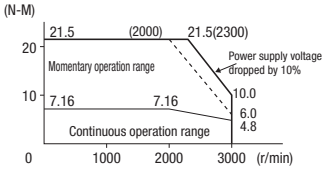
R88M-K60020F/C (400V, 600 W)



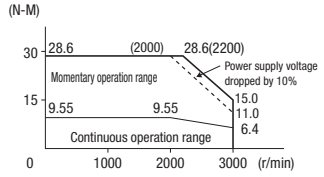
R88M-K1K020F/C (400V, 1 kW)



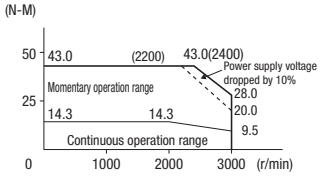
R88M-K1K520F/C (400V, 1.5 kW)



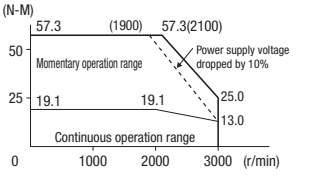
R88M-K2K020F/C (400V, 2 kW)



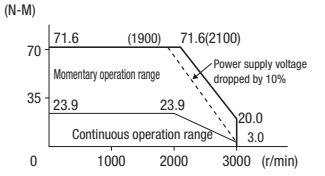
R88M-K3K020F/C (400V, 3 kW)



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



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



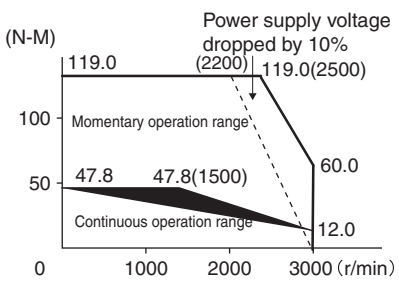
Servo motors 1500 r/min, 400 V

Ratings and specifications

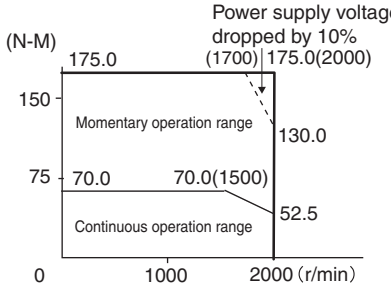
Applied voltage		400 V		
Servo motor model R88M-K□	**17-bit absolute encoder**	**7K515C-□**	**11K015C-□**	**15K015C-□**
Rated output	W	7500	11000	15000
Rated torque	N·m	47.8	70.0	95.5
Instantaneous peak torque	N·m	119.0	175.0	224.0
Rated current	A (rms)	22.0	27.1	33.1
Instantaneous max. current	A (rms)	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)	$kg·m^2x10^{-4}$ (without brake)	101	212	302
	$kg·m^2x10^{-4}$ (with brake)	107	220	311
Allowable load moment of inertia (JL)	Multiple of (JM)	10		
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%		
Brake specifications: Holding brake moment of inertia J	$kg·m^2x10^{-4}$	4.7	7.1	
Brake specifications: Power consumption (at 20°C)	W	34	26	
Brake specifications: Current consumption (at 20°C)	A	1.4±10%	1.08±10%	
Brake specifications: Static friction torque	N.m (minimum)	58.8	100	
Brake specifications: Rise time for holding torque	ms (max.)	150	300	
Brake specifications: Release time	ms (max)	50	140	
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		

Torque-speed characteristics

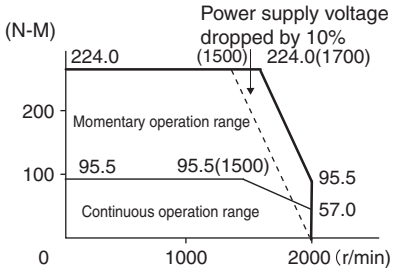
R88M-K7K515C (7.5 kW)



R88M-K11K015C (11 kW)



R88M-K15K015C (15 kW)



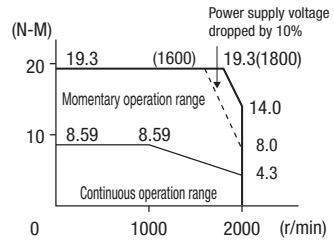
Servo motors 1000 r/min, 230V/ 400 V

Ratings and specifications

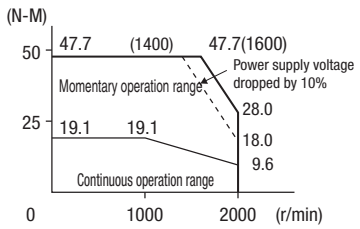
Applied voltage			230 V		400 V			
Servo motor model R88M-K□		**20-bit incremental encoder**	**90010H-□**	**90010F-□**	**2K010F-□**	**3K010F-□**		
		17-bit absolute encoder	**90010T-□**	**90010C-□**	**2K010C-□**	**3K010C-□**	**4K510C-□**	**6K010C-□**
Rated output		W	900	900	2000	3000	4500	6000
Rated torque		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)		$kg·m^2x10^{-4}$ (without brake)	6.70		30.3	48.4	79.1	101
		$kg·m^2x10^{-4}$ (with brake)	7.99		31.4	49.2	84.4	107
Allowable load moment of inertia (JL)		Multiple of (JM)	10					
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%					
	Holding brake moment of inertia J	$kg·m^2x10^{-4}$	1.35		4.7			
	Power consumption (at 20°C)	W	19		31	34		
	Current consumption (at 20°C)	A	0.79±10%		1.3±10%	1.4±10%		
	Static friction torque	N.m (minimum)	13.7		24.5	58.8		
	Rise time for holding torque	ms (max.)	100		80	150		
	Release time	ms (max)	50		25	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% 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					

Torque-speed characteristics

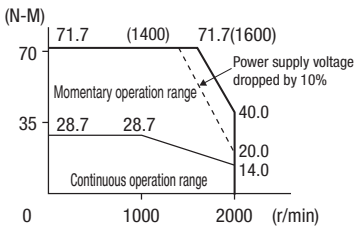
R88M-K90010H/T/F/C



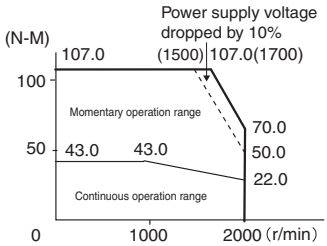
R88M-K2K010F/C



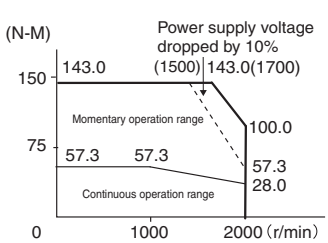
R88M-K3K010F/C



R88M-K4K510C



R88M-K6K010C

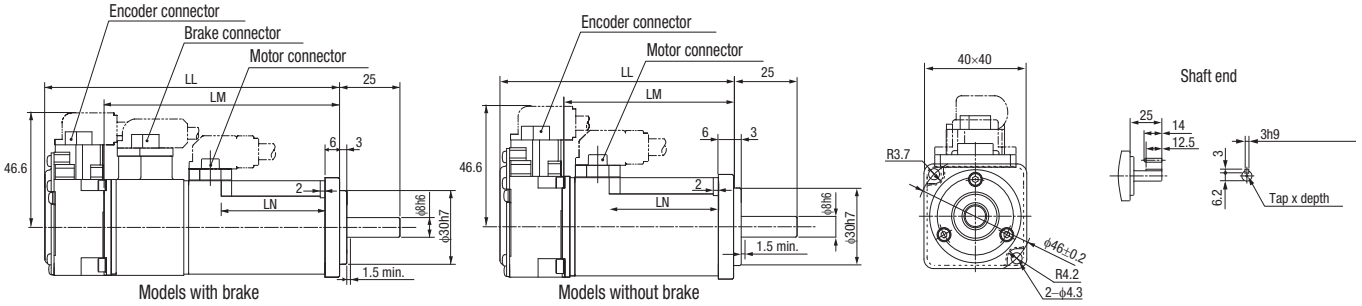


Dimensions

Servomotors

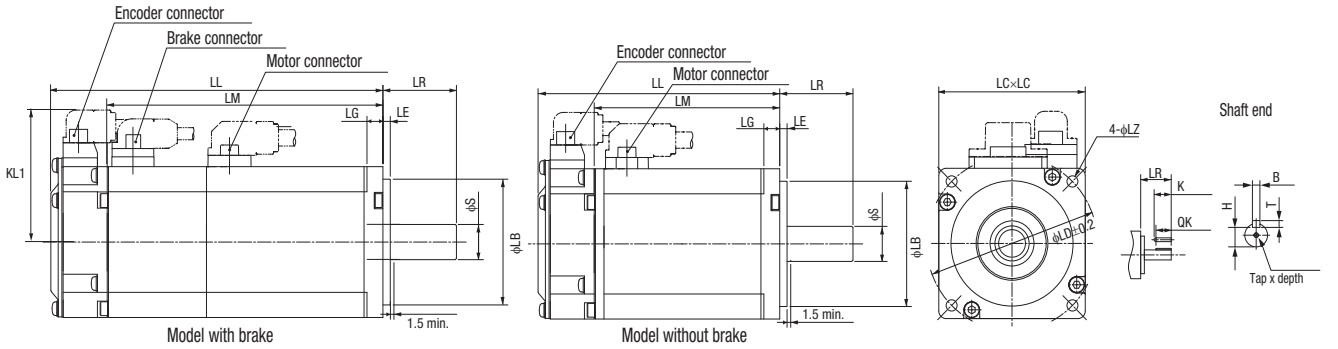
Type 3000 r/min motors (230 V, 50 - 100 W)

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 x 6L	0.32	0.53
R88M-K10030(H/T)-□S2	92	68	122	98	43		0.47	0.68



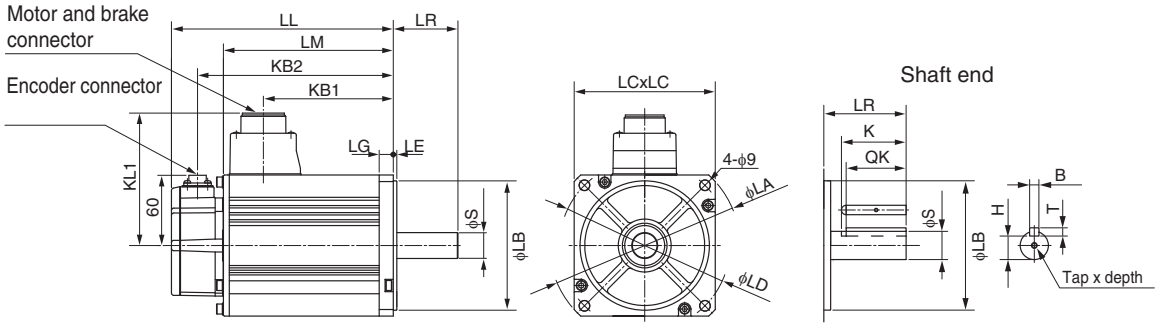
Type 3000 r/min motors (230 V, 200 - 750 W)

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	M4x8L	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	M5x10L	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



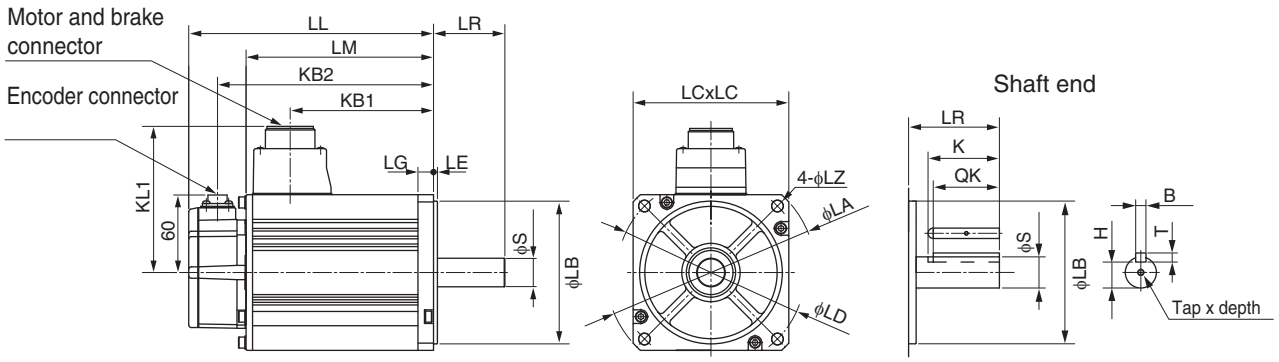
Type 3000 r/min motors (230 V, 1 - 1.5 kW/ 400V, 750 W - 5 kW)

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 x 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}	M5x 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}	M8x 20L	55	51	20			11	12.6
	5K030(F/C)-□S2	243	199	162	221		268	224	162	246																14	16



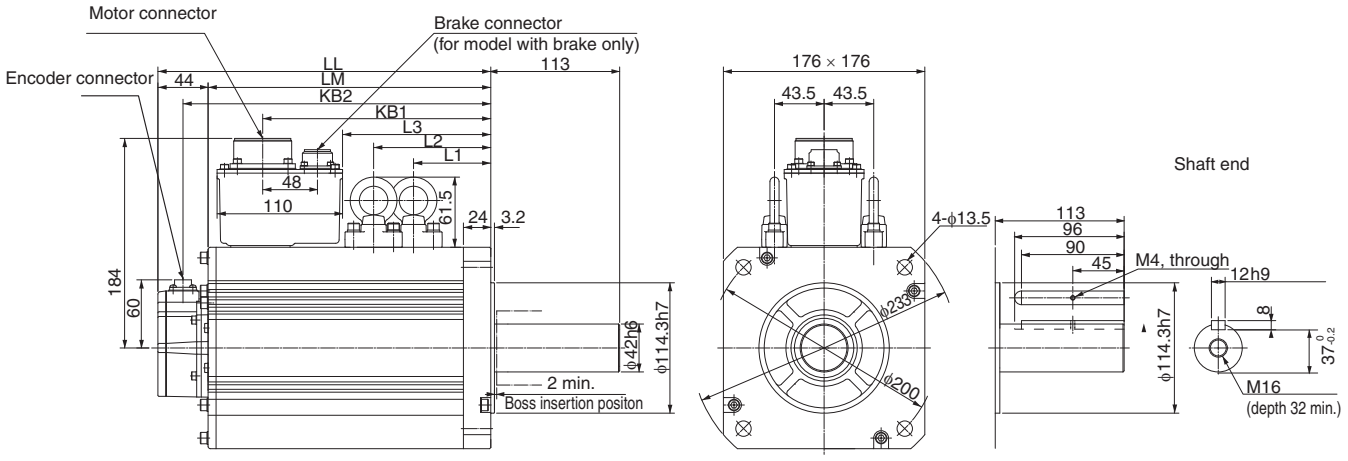
Type 2000 r/min motors (230 V, 1 - 1.5 kW / 400 V, 400W - 5 kW)

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 x 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}	M5x 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}	M8x 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}	M12x 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



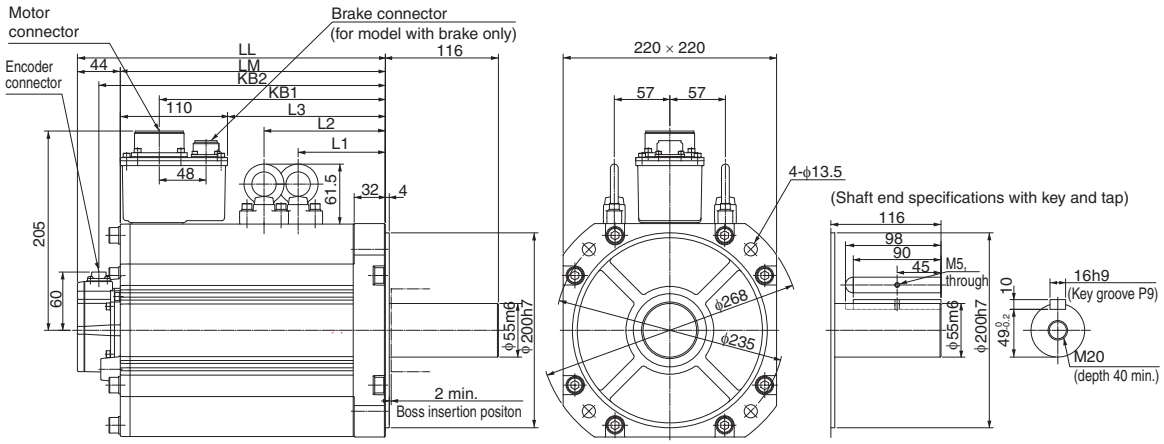
Type 1500 r/min motors (400 V, 7.5kW)

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



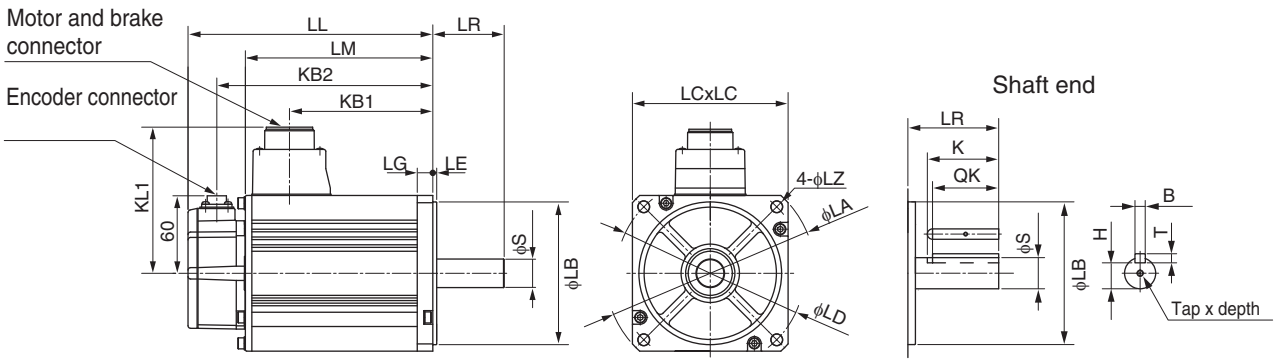
Type 1500 r/min motors (400 V, 11 - 15 kW)

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



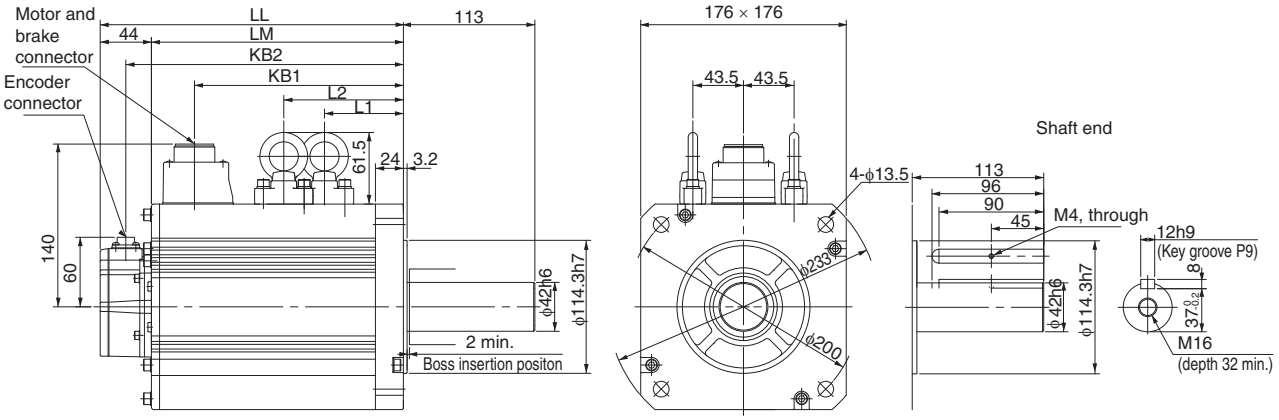
Type 1000 r/min motors (230 V, 900W / 400 V, 900W - 3 kW)

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 x 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}	M5x12L	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}	M12x 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



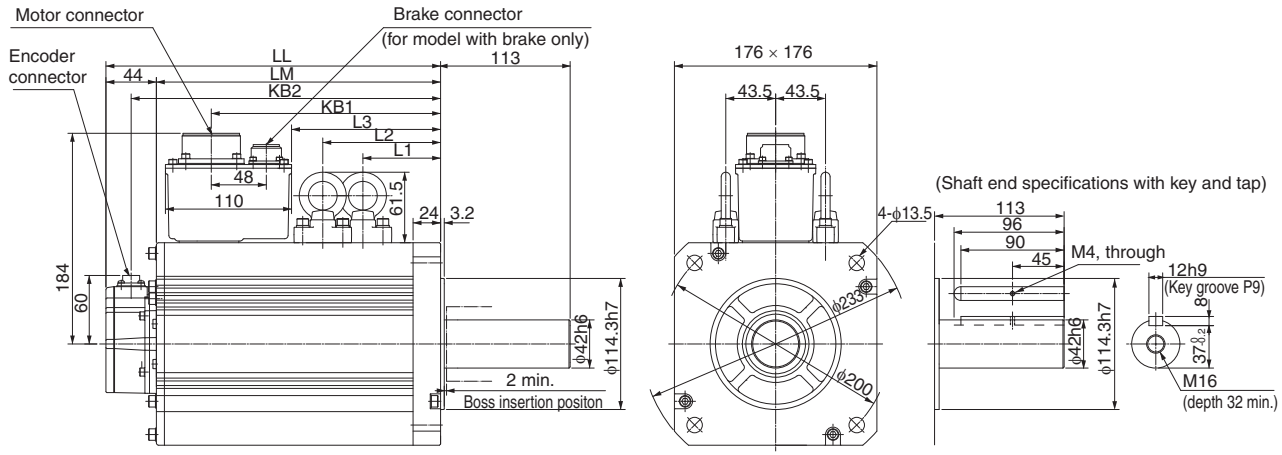
Type 1000 r/min motors (400 V, 4.5 kW)

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	Whithout brake	With brake
400	4K510C-□S2	266	222	185	244	98	98	291	247	185	269	98	133	29.4	33.3

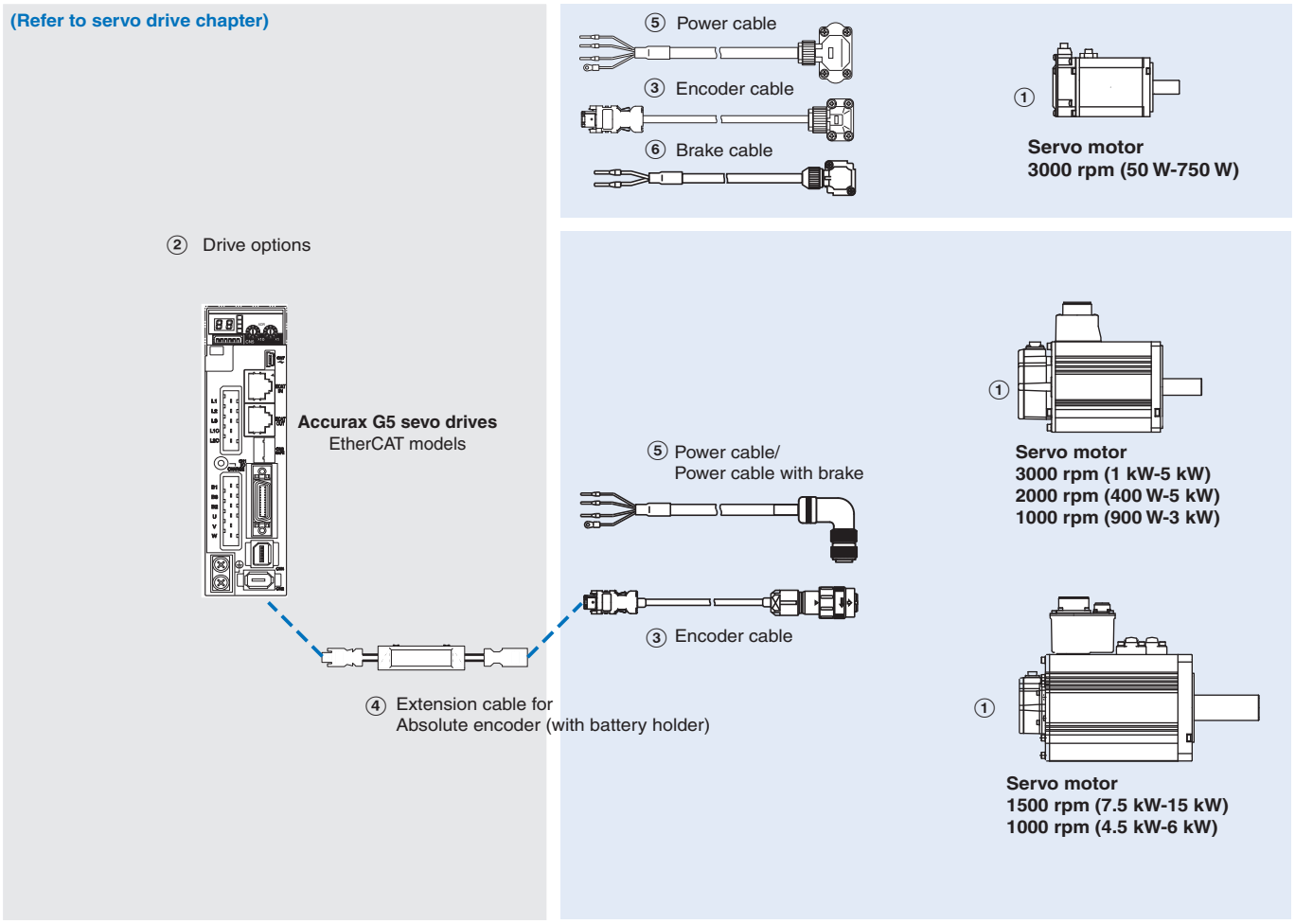


Type 1000 r/min motors (400 V, 6 kW)

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	Whithout 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



Ordering information



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

Servo motor

① Select motor from R88M-K family 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.

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

Symbol	Specifications					Servo motor model	Compatible servo drives ②
	Voltage	Encoder and design		Rated torque	Capacity		G5 EtherCAT
①  230V (50 - 750 W)  230V (1 kW - 1.5 kW) 400V (750 W - 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 - 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 - 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 - 6000 W)

Symbol	Specifications					Servo motor model	Compatible servo drives ②
	Voltage	Encoder and design		Rated torque	Capacity		G5 EtherCAT
①  900 W - 3 kW  4.5 kW - 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-S2	R88D-KN30F-ECT
				28.7 Nm	3000 W	R88M-K3K010C-S2	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

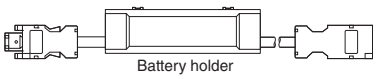
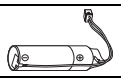
Encoder cables

for absolute and incremental encoders

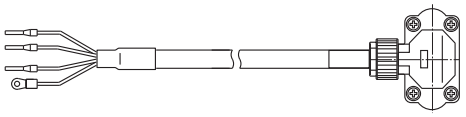
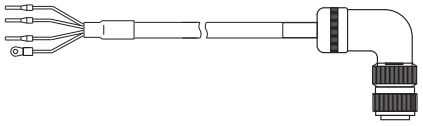
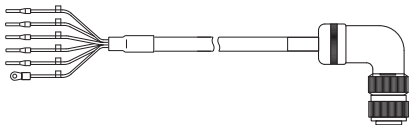
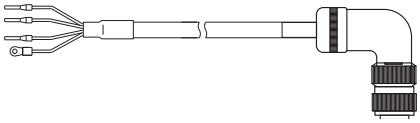
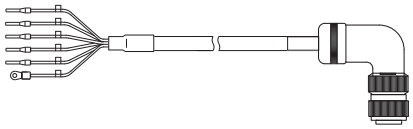
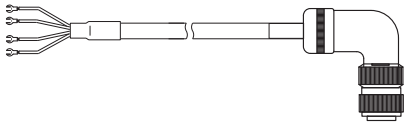
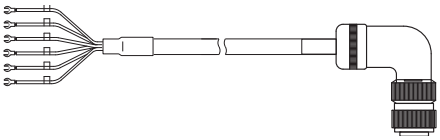
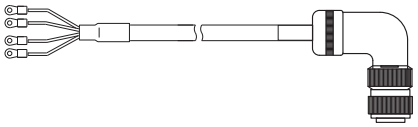
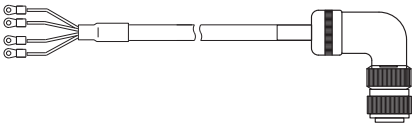
Symbol	Specifications		Model	Appearance
③	Encoder cable for servomotors R88M-K(050/100/200/400/750)30(H/T)□	1.5 m	R88A-CRKA001-5CR-E	
		3 m	R88A-CRKA003CR-E	
		5 m	R88A-CRKA005CR-E	
		10 m	R88A-CRKA010CR-E	
		15 m	R88A-CRKA015CR-E	
		20 m	R88A-CRKA020CR-E	
	Encoder cable for servomotors R88M-K(1K0/1K5)30(H/T)□ 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□	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.

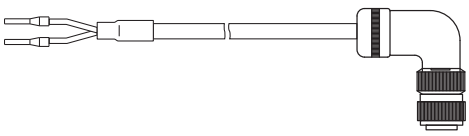
Absolute encoder battery cable (encoder extension cable only)

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 3.6V	-	R88A-BAT01G	

Power cables

Symbol	Specifications			Model	Appearance
⑤	For 200 V servomotors R88M-K(050/100/200/400/750)30(H/T)□ **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-K(1K0/1K5)30(H/T)□ R88M-K(1K0/1K5)20(H/T)□ R88M-K90010(H/T)□	without brake □-S2	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 □-BS2	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	
	For 400 V servomotors R88M-K(750/1K0/1K5/2K)30(F/C)□ R88M-K(400/600/1K0/1K5/2K0)20(F/C)□ R88M-K90010(F/C)□	without brake □-S2	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 □-BS2	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)□ R88M-K(3K0/4K0/5K0)20(F/C)□ R88M-K(2K0/3K0)10(F/C)□ R88M-K4K510C□	without brake □-S2	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 □-BS2	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□ R88M-K7K515C□ **Note:** for servomotors with brake R88M-K(6K010/7K515)C-BS2 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 **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 50-750 W servo motors and 400 V 6-15 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	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-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-□	R88A-CNK04R
Connectors for making power cables	Motor side	R88M-K(050/100/200/400/750)30(H/T)□	R88A-CNK11A
	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	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	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	MS3108E22-22S
	Motor side	R88M-K6K010C-□ R88M-K(7K5/11K0/15K0)15C-□	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	MS3108E14S-2S

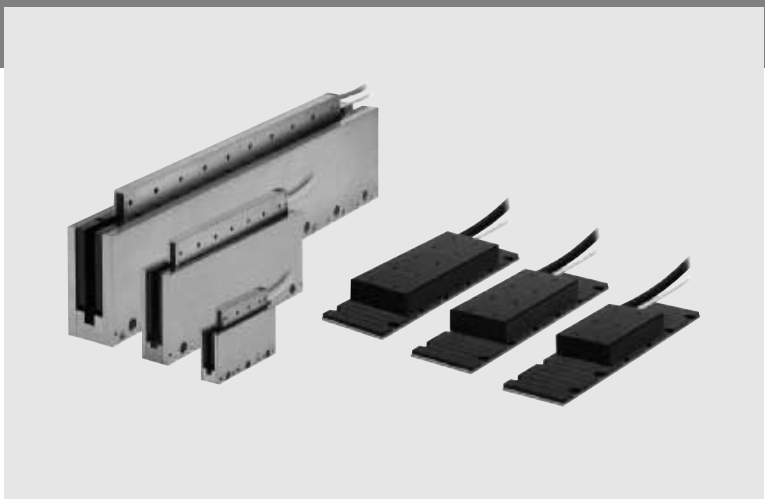
Note: 1. All cables listed are flexible and shielded (except the R88A-CAKA□□□-BR-E which is only a flexible cable).
2. All connectors and cables listed have IP67 class (except R88A-CNW01R connector and R88A-CRGD0R3C cable).

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

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

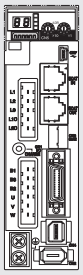
Ratings

- Iron-core motors - 48 to 760 N (2000 N peak force)
- Ironless motor - 26.5 to 348 N (2100 N peak force)

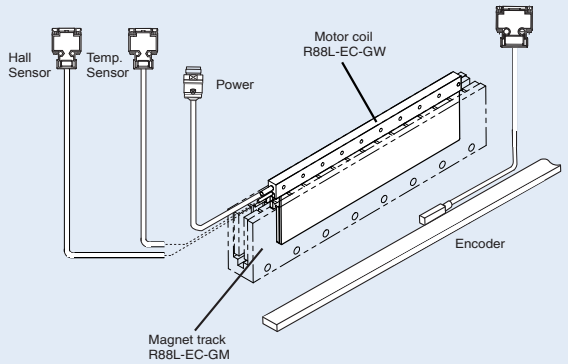
System configuration

(Refer to servo drive chapter)

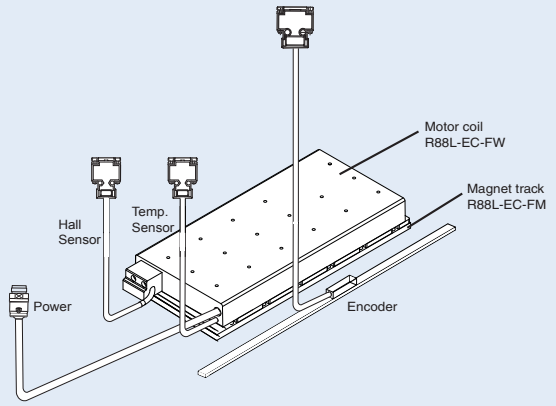
SYSMAC always in control



Accurax G5 servo drive
EtherCAT models



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  230V / 400V	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  230V	26.5N	100 N	Coil without connectors	R88L-EC-GW-0303-ANPS	R88D-KN02H-ECT-L	-
	53 N	200 N		R88L-EC-GW-0306-ANPS	R88D-KN08H-ECT-L	-
	80 N	300 N		R88L-EC-GW-0309-ANPS	R88D-KN10H-ECT-L	-
	58 N	240 N		R88L-EC-GW-0503-ANPS	R88D-KN02H-ECT-L	-
	117 N	480 N		R88L-EC-GW-0506-ANPS	R88D-KN04H-ECT-L	-
	175 N	720 N		R88L-EC-GW-0509-ANPS	R88D-KN08H-ECT-L	-
	117 N	700 N		R88L-EC-GW-0703-ANPS	R88D-KN04H-ECT-L	-
	232 N	1400 N		R88L-EC-GW-0706-ANPS	R88D-KN08H-ECT-L	-
	348 N	2100 N		R88L-EC-GW-0709-ANPS	R88D-KN10H-ECT-L	-
	26.5N	100 N	Coil with connectors	R88L-EC-GW-0303-APLS	R88D-KN02H-ECT-L	-
	53 N	200 N		R88L-EC-GW-0306-APLS	R88D-KN08H-ECTL	-
	80 N	300 N		R88L-EC-GW-0309-APLS	R88D-KN10H-ECT-L	-
	58 N	240 N		R88L-EC-GW-0503-APLS	R88D-KN02H-ECT-L	-
	117 N	480 N		R88L-EC-GW-0506-APLS	R88D-KN04H-ECT-L	-
	175 N	720 N		R88L-EC-GW-0509-APLS	R88D-KN08H-ECT-L	-
	117 N	700 N		R88L-EC-GW-0703-APLS	R88D-KN04H-ECT-L	-
	232 N	1400 N		R88L-EC-GW-0706-APLS	R88D-KN08H-ECT-L	-
	348 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	30mm active magnet width
05	50mm active magnet width
06	60mm active magnet width
07	70mm active magnet width
11	110mm 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	30mm active magnet width
05	50mm active magnet width
06	60mm active magnet width
07	70mm active magnet width
11	110mm 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	
Code	Specifications
03	30mm active magnet width
05	50mm active magnet width
07	70mm 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 (100V)	**m/s**	2,5		2			1	
Maximum speed (200V)	**m/s**	5		4			2	
Maximum speed (400V)	**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	**VDC/m/s**	32		38			76	
Motor constant	N /√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 disipation (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 x w x h)	**mm**	238 x 220 x10		250 x 287 x 12			371 x 330 x14	
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						
Di-electric strength		2750V for 1sec						
Max. allowable coil temperature		130ºC						
Ambient humidity		20 bis to 80% (non-condensing)						
Max. allowable magnet temperature		70ºC						

[*1] Coil temperature rising by 6K/s.

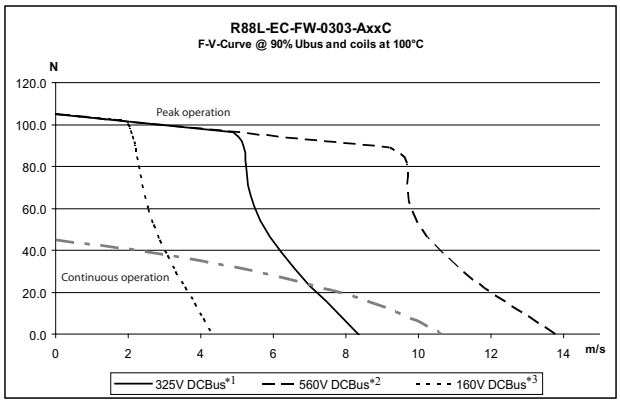
[*2] Values at 100ºC coil temperature and magnets at 25ºC. Coil unit must be attached to the given cooling plate sizes in the table and an airstream of 2.5 m/s (25ºC) has to be applied.

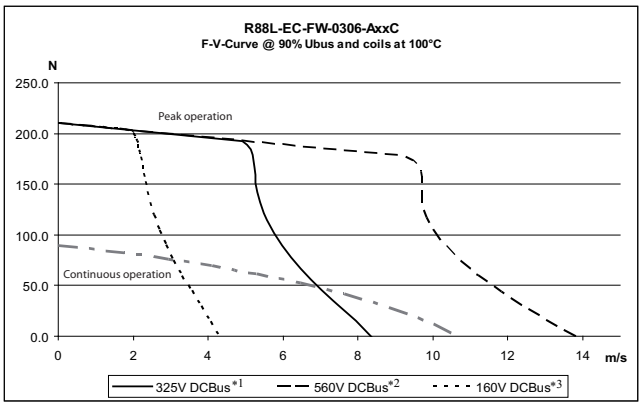
[*3] Weight without connector and cable.

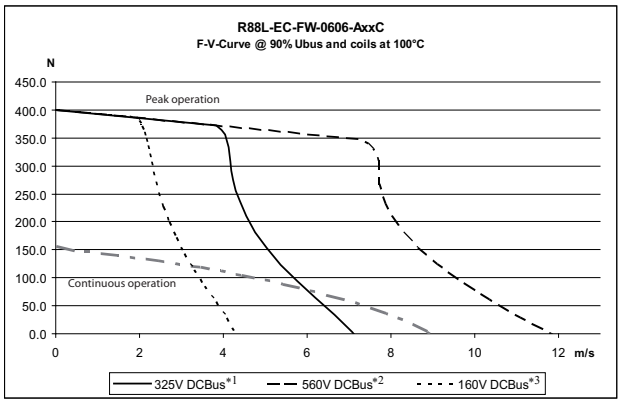
[*4] I^2t has to be set properly for high current applications.

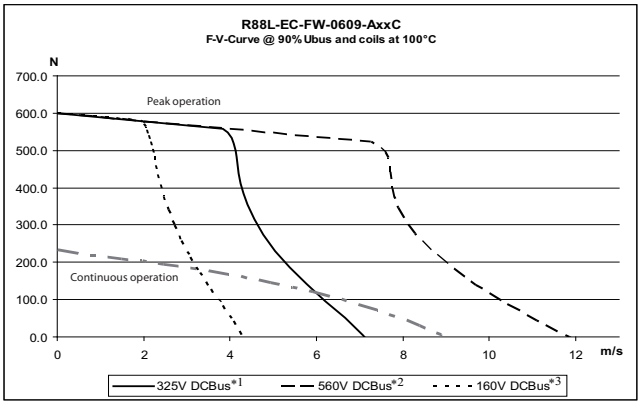
All other values at 25ºC (+/-10%).

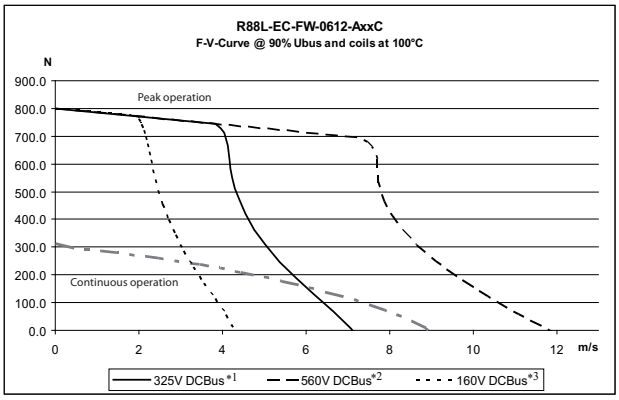
Force-speed characteristics

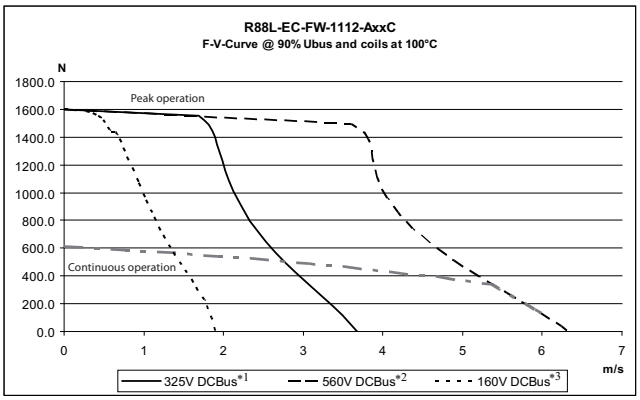


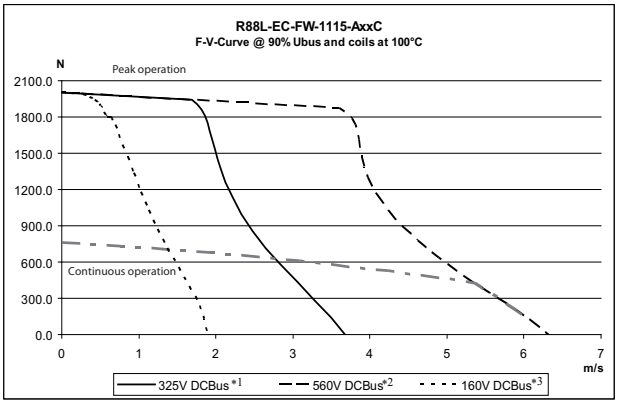












*1 The DCBus voltage corresponds to an AC voltage input (V_{ACIN}) of 235V or more.

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

*3 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 (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	7.1	10.6	5.6	11.3	16.9
Continuous force*2	N	26.5	53	80	58	117	175	117	232	348
Continuous current*2	Arms	1.33	2.66	4	0.87	1.76	2.6	0.94	1.87	2.81
Motor force constant	N / A_{rms}	19.9			68			124		
BEMF	VDC/m/s	16			55.5			101		
Motor constant	$N / \sqrt{W}$	4.9	6.93	8.43	9.85	13.96	17.03	17.97	25.44	31.14
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 disipation (all coils)	W	47	95	142	67	134	200	82	165	247
Thermal resistance	K/W	2.1	1.06	0.71	1.7	0.85	0.65	1.56	1.04	0.52
Thermal time constant	s	36			72			96		
Magnetic attraction force	N	0								
Magnet pole pitch	mm	30			42			57		
Weight coil unit*3	Kg	0.084	0.138	0.198	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								
Di-electric strength		2250V for 1 sec								
Max. allowable coil temperature		110ºC								
Ambient humidity		20-80% non-condensing								
Max. allowable magnet temperature		70ºC								

*1 Coil temperature rising 03-series by 40K/s, 05-series by 20K/s and 07-series by 20K/s.

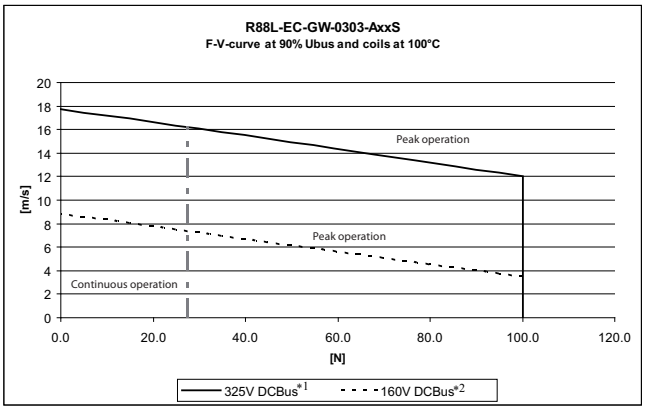
*2 Values at 110ºC coil temperature and magnets at 25ºC.

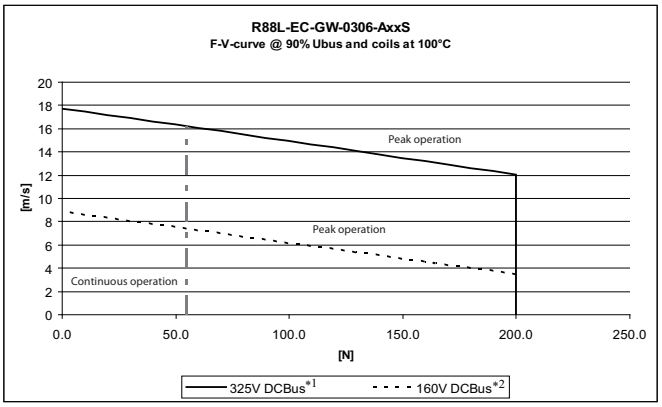
*3 Weight without connector and cable.

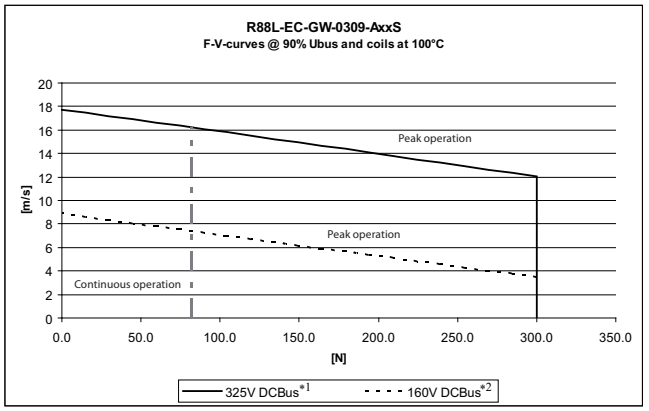
*4 I^2t has to be set properly for high current overload applications.

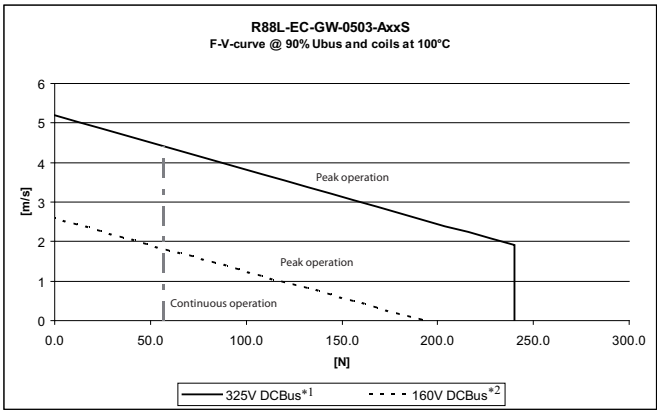
All other values at 25ºC (+/-10%).

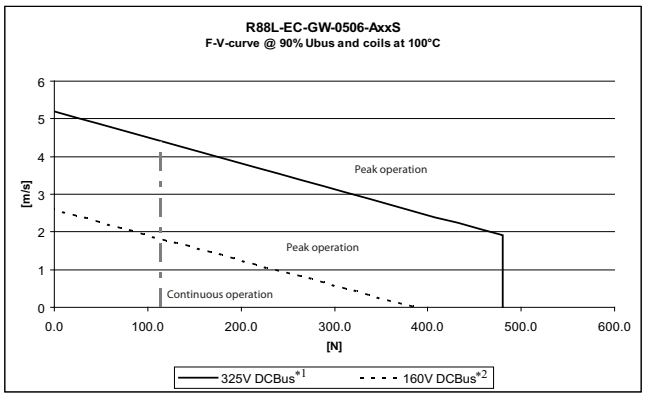
Force-speed characteristics

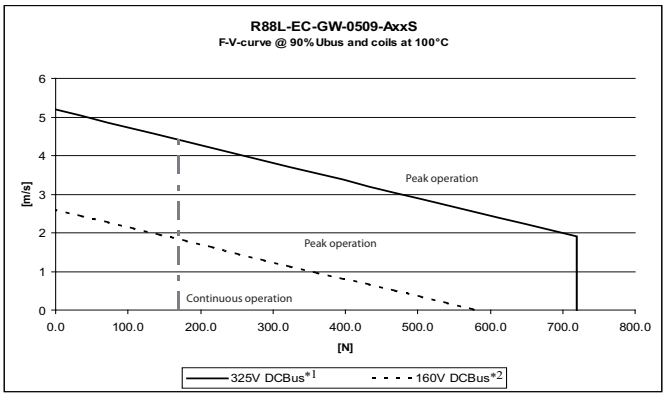


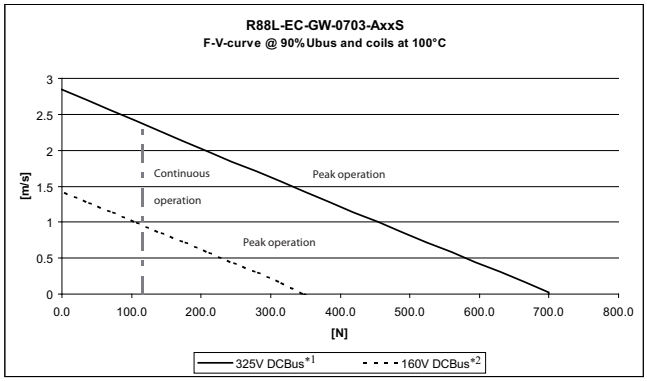


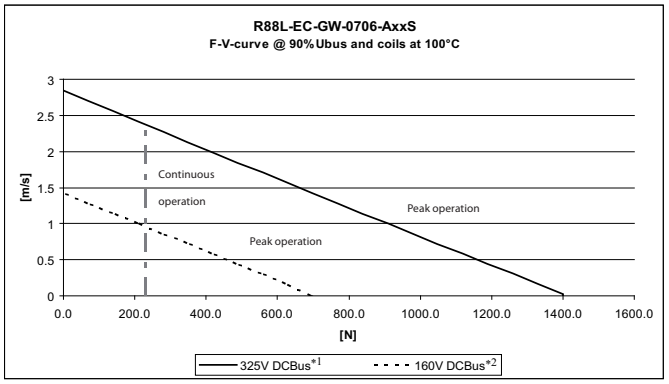


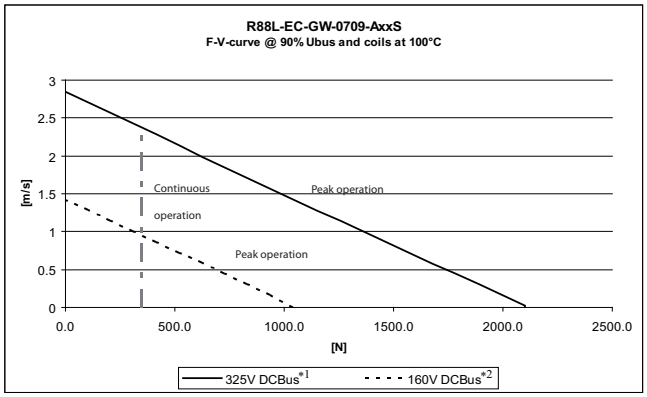












*1 The DCBus voltage corresponds to an AC voltage input (V_{ACIN}) of 235V or more.

*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:

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

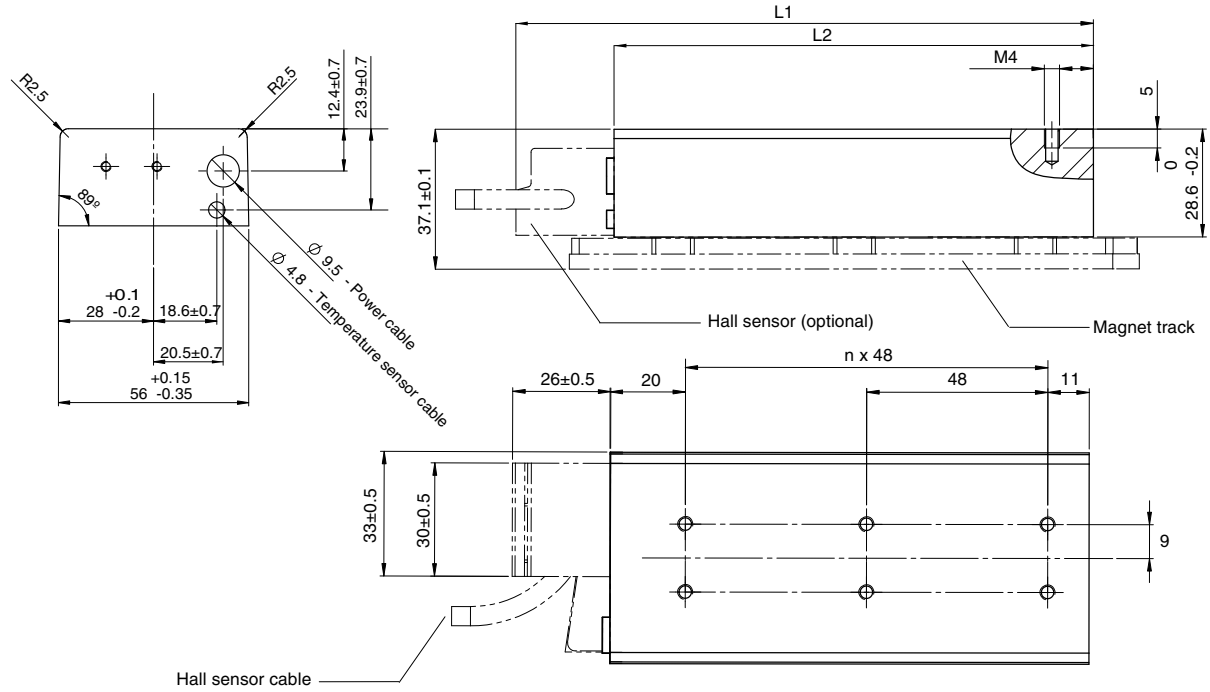
Dimensions

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)



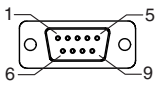
Units: mm

Wiring specifications for motor with connectors

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

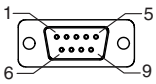
Power connector		
Pin No.	Wire	Function
1	Black-1	Phase U
2	Black-2	Phase V
3	Green/Yellow	Ground
4	Black-3	Phase W
5	Not used	-
6	Not used	-

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	-

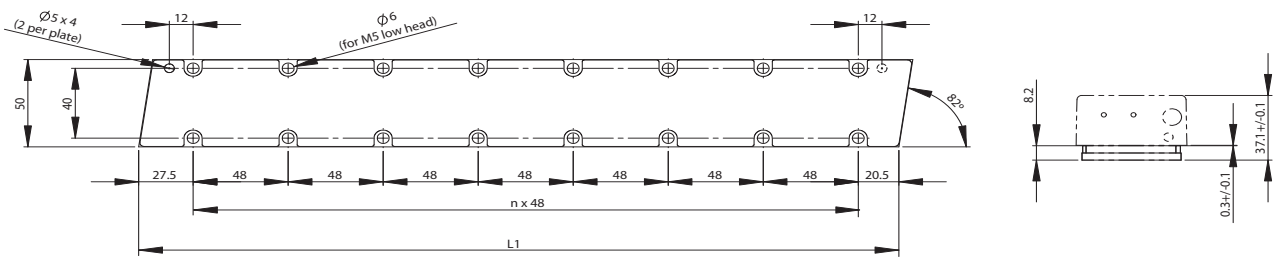


Cable length 500±30
D-Sub 9-pin (FEMALE)

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	

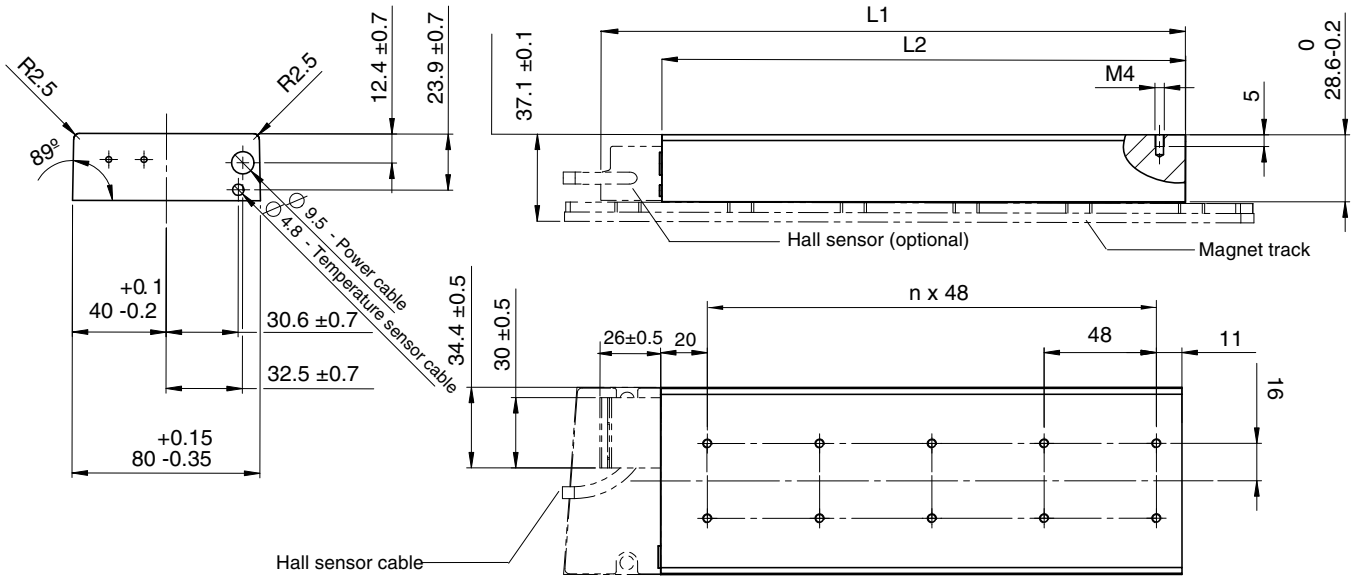


Iron-core R88L-EC-FW-06□

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)



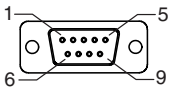
Units: mm

Wiring specifications for motor with connectors

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

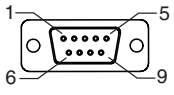
Power connector		
Pin No.	Wire	Function
1	Black-1	Phase U
2	Black-2	Phase V
3	Green/Yellow	Ground
4	Black-3	Phase W
5	Not used	-
6	Not used	-

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	-

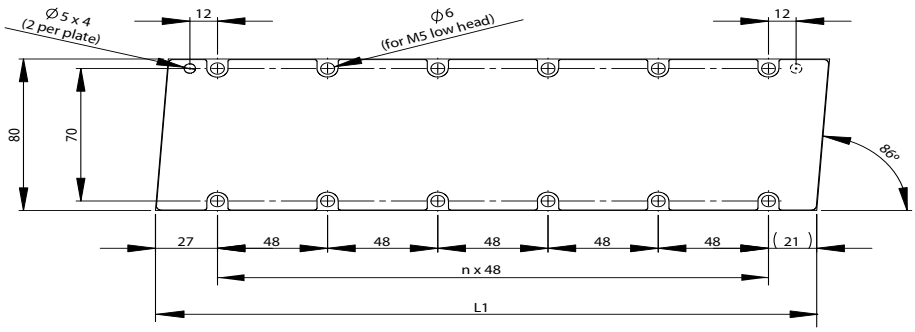


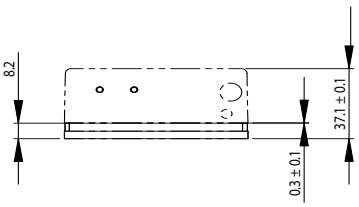
Cable length 500±30
Connector optional
D-Sub 9-pin (FEMALE)

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-06192-A	192	3	3.8
R88L-EC-FM-06288-A	288	5	



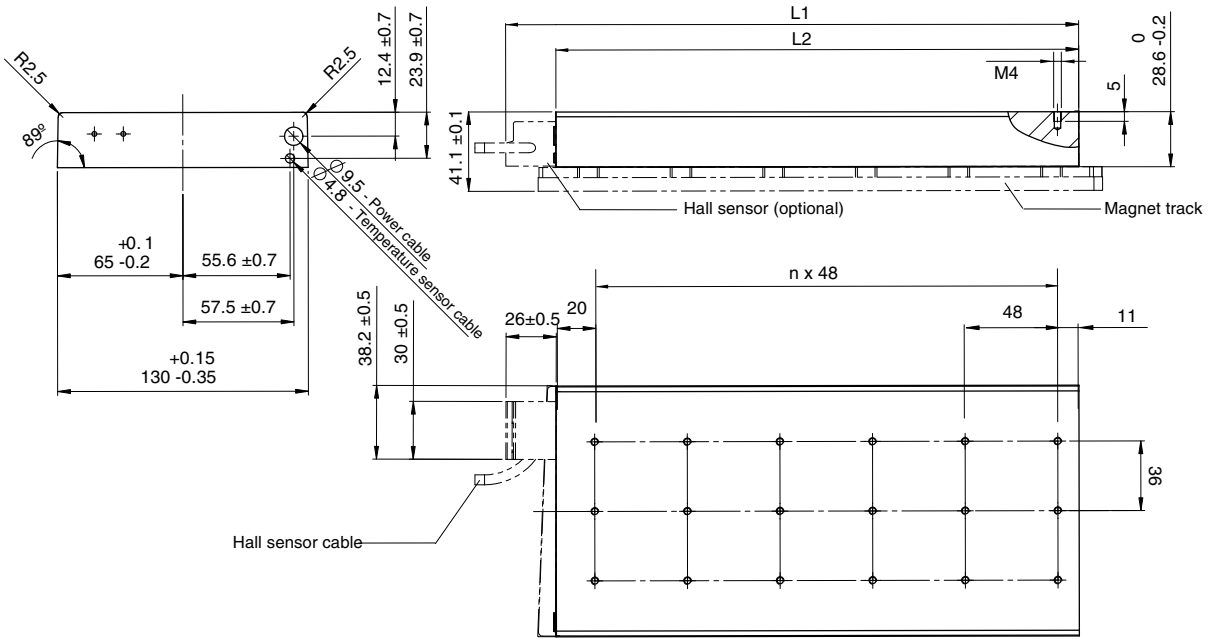


Iron-core R88L-EC-FW-11□

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)



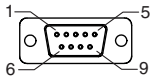
Units: mm

Wiring specifications for motor with connectors

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

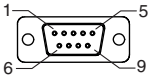
Power connector		
Pin No.	Wire	Function
1	Black-1	Phase U
2	Black-2	Phase V
3	Green/Yellow	Ground
4	Black-3	Phase W
5	Not used	-
6	Not used	-

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	-

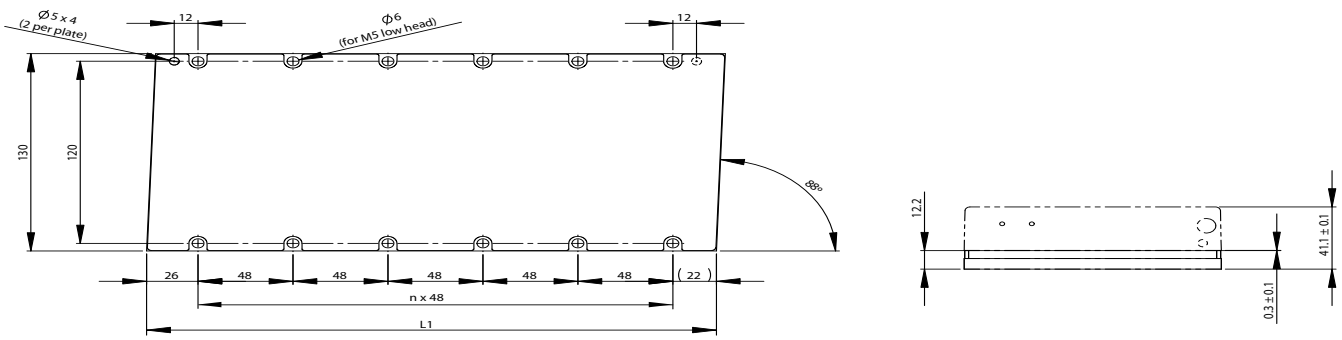


Cable length 500±30
D-Sub 9-pin (FEMALE)

Hall sensor connector (optional)		
Pin No.	Wire	Function
1	Brown	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

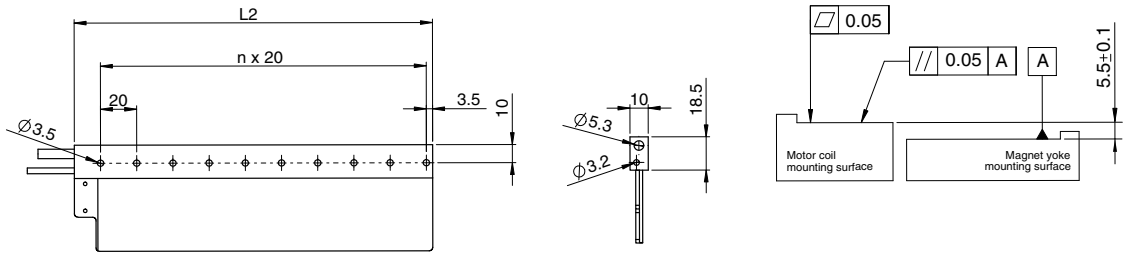
Model	L1 (mm)	n	Approx. weight (Kg/m)
R88L-EC-FM-11192-A	192	3	10.5
R88L-EC-FM-11288-A	288	5	



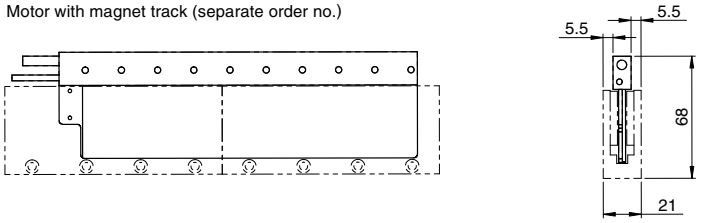
Ironless R88L-EC-GW-03□

Motor coil

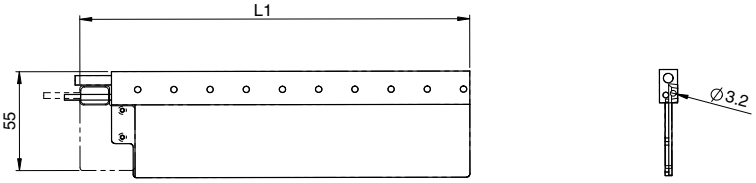
Model	L1 (mm)	L2 (mm)	n
R88L-EC-GW-0303-□	95.4	78	3
R88L-EC-GW-0306-□	155.4	138	6
R88L-EC-GW-0309-□	215.4	198	9



Motor with magnet track (separate order no.)

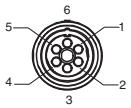


Motor with hall sensor (optional)



Units: mm

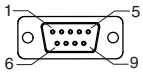
Wiring specifications for motor with connectors



Cable length 1000±30
Connector optional
Made by Hypertac
SROC06JMSCN169 (MALE)
Pin article code: 021.423.1020

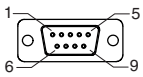
Power connector		
Pin No.	Wire	Function
1	Black-1	Phase U
2	Black-2	Phase V
3	Black-3	Phase W
4	Not used	-
5	Not used	-
6	Green/Yellow	Ground

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	-

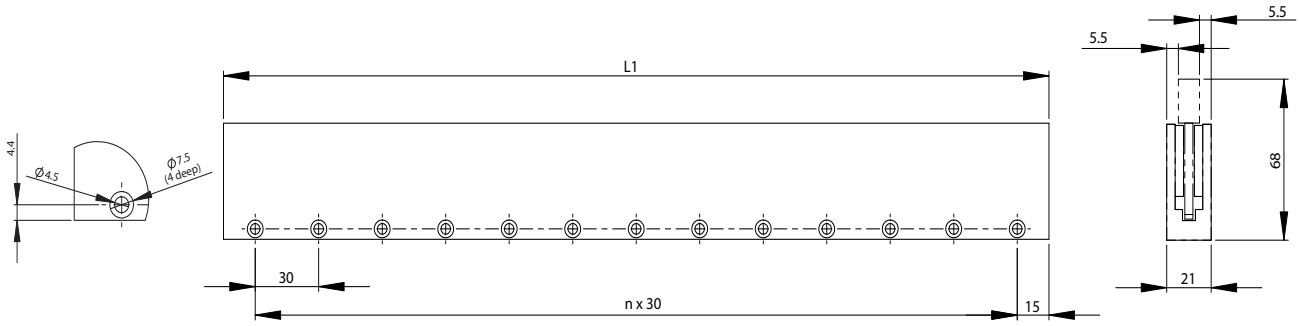


Cable length 500±30
D-Sub 9-pin (FEMALE)

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

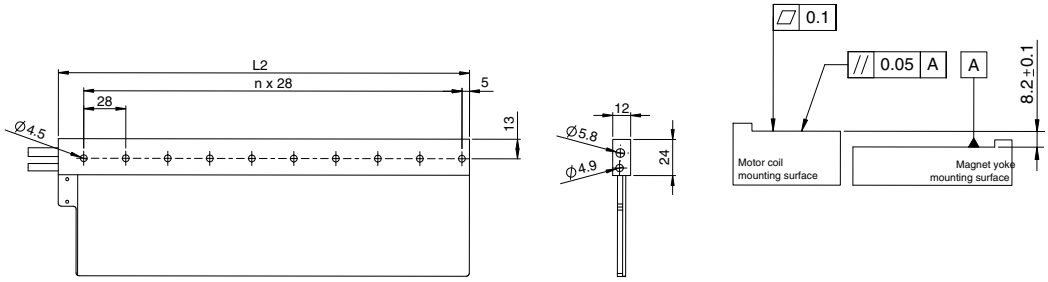
Model	L1 (mm)	n	Approx. weight (Kg/m)
R88L-EC-GM-03090-A	90	2	4.8
R88L-EC-GM-03120-A	120	3	
R88L-EC-GM-03390-A	390	12	



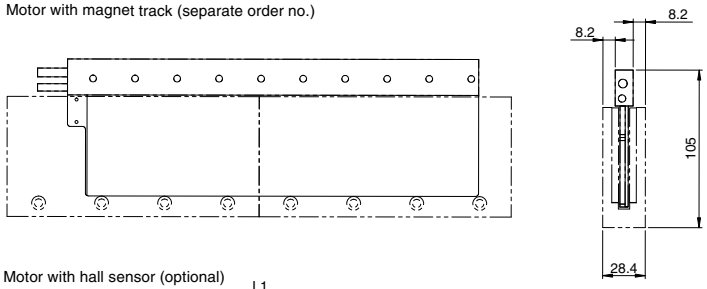
Ironless R88L-EC-GW-05□

Motor coil

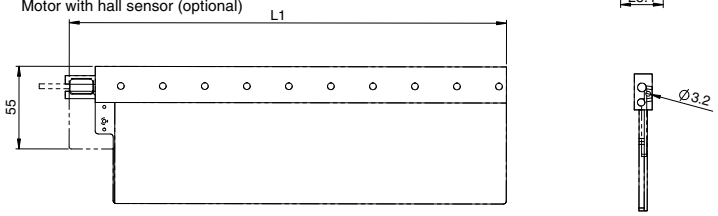
Model	L1 (mm)	L2 (mm)	n
R88L-EC-GW-0503-□	123.4	106	3
R88L-EC-GW-0506-□	207.4	190	6
R88L-EC-GW-0509-□	291.4	274	9



Motor with magnet track (separate order no.)

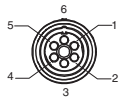


Motor with hall sensor (optional)



Units: mm

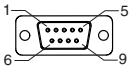
Wiring specifications for motor with connectors



Cable length 1000±30
Connector optional
Made by Hypertac
SROC06JMSCN169 (MALE)
Pin article code: 021.423.1020

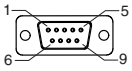
Power connector		
Pin No.	Wire	Function
1	Black-1	Phase U
2	Black-2	Phase V
3	Black-3	Phase W
4	Not used	-
5	Not used	-
6	Green/Yellow	Ground

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	-

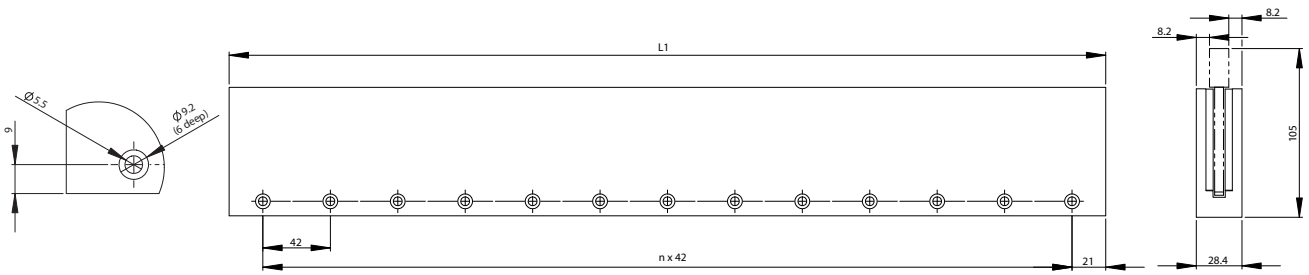


Cable length 500±30
D-Sub 9-pin (FEMALE)

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

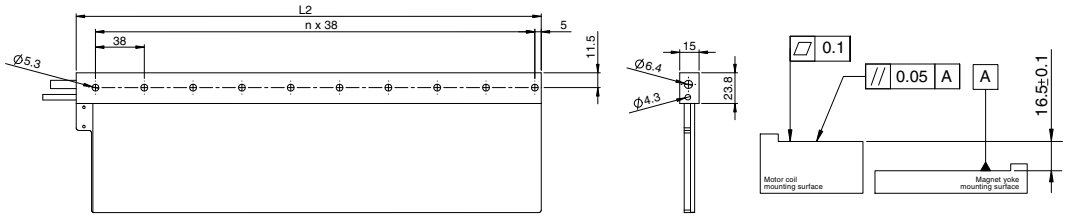
Model	L1 (mm)	n	Approx. weight (Kg/m)
R88L-EC-GM-05126-A	126	2	11.2
R88L-EC-GM-05168-A	168	3	
R88L-EC-GM-05210-A	210	4	
R88L-EC-GM-05546-A	546	12	



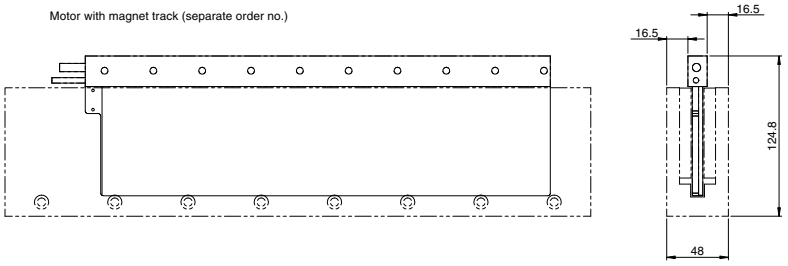
Ironless R88L-EC-GW-07□

Motor coil

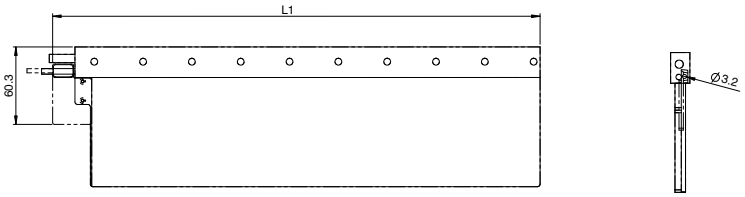
Model	L1 (mm)	L2 (mm)	n
R88L-EC-GW-0703-□	151.4	134	3
R88L-EC-GW-0706-□	265.4	248	6
R88L-EC-GW-0709-□	379.4	362	9



Motor with magnet track (separate order no.)

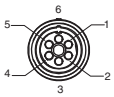


Motor with hall sensor (optional)



Units: mm

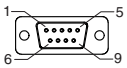
Wiring specifications for motor with connectors



Cable length 1000±30
Connector optional
Made by Hypertac
SROC06JMSCN169 (MALE)
Pin article code: 021.423.1020

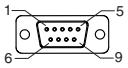
Power connector		
Pin No.	Wire	Function
1	Black-1	Phase U
2	Black-2	Phase V
3	Black-3	Phase W
4	Not used	-
5	Not used	-
6	Green/Yellow	Ground

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	-

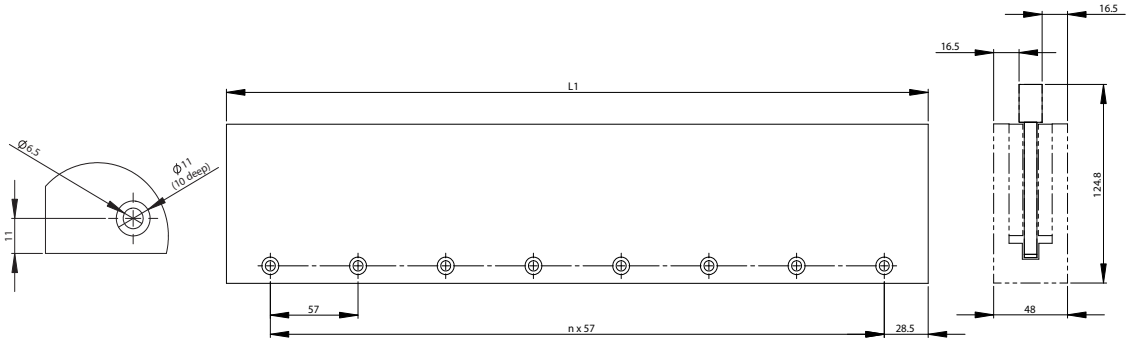


Cable length 500±30
D-Sub 9-pin (FEMALE)

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

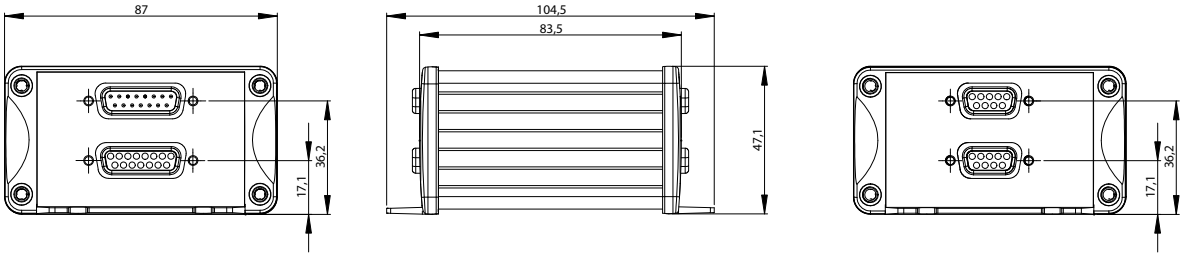
Model	L1 (mm)	n	Approx. weight (Kg/m)
R88L-EC-GM-07114-A	114	1	25.5
R88L-EC-GM-07171-A	171	2	
R88L-EC-GM-07456-A	456	7	

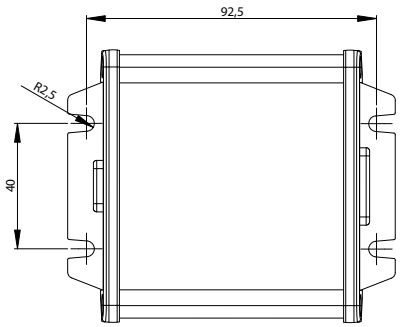


Optional serial Converter unit

Specifications

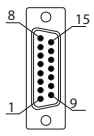
Serial converter model R88A-		SC01K-E	SC02K-E
Description		Serial converter from 1 Vpp to G5 serial data transmission and with hall sensor input	
Temperature sensor		KTY sensor detection of iron-core motor coil	NTC sensor detection of ironless motor coil
Electrical characteristics	Power supply voltage	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 °C to 55 °C	
	Storage temperature	-20 °C to +80 °C	
	Humidity	20% to 90% relative humidity (without condensation)	





CN4

Serial data output to Linear Servo drive

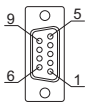


Connector D-Sub 15-pin (male)

Pin No.	Signal
1	PS
2	/PS
3	Not used
4	Not used
5	Not used
6	Not used
7	Not used
8	5V
9	0V
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

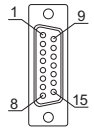


Connector D-Sub 9-pin (female)

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



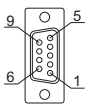
Connector D-Sub 15-pin (female)

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	5V
9	0V
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

CN2

Hall & temperature sensors interface

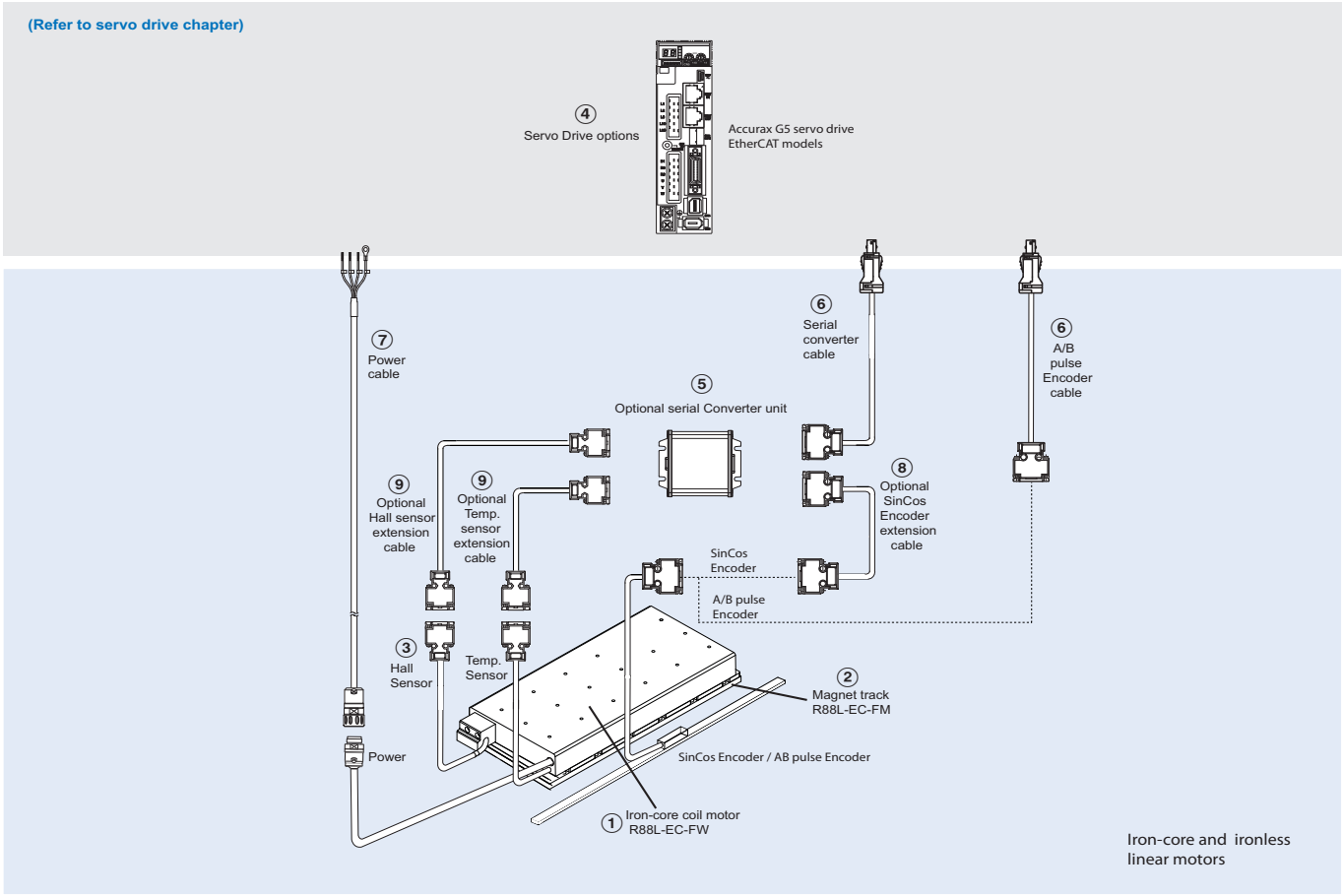


Connector D-Sub 9-pin (female)

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

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 linear motor, cables and serial converter for a linear motor system.

Linear motors

R88L-EC-FW-□ Iron-core type

230VAC single phase/three phase, 400VAC three phase

Linear motor parts							Linear Servo drive ④Accurax G5 EtherCAT	
Symbol	Rated force	Peak force	①Iron-core motor coil		②Magnet track	③Hall Sensor	230V	400V
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

200VAC single phase/ three phase

Linear motor parts							Linear Servo drive
							④Accurax G5 EtherCAT
Type	Rated force	Peak force	①Ironless motor coil		②Magnet track	③Hall Sensor	230V
①②③④ 	26,5N	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
	53 N	200 N		R88L-EC-GW-0306-ANPS			R88D-KN08H-ECT-L
	80 N	300 N		R88L-EC-GW-0309-ANPS			R88D-KN10H-ECT-L
	58 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
	117 N	480 N		R88L-EC-GW-0506-ANPS			R88D-KN04H-ECT-L
	175 N	720 N		R88L-EC-GW-0509-ANPS			R88D-KN08H-ECT-L
	117 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
	232 N	1400 N		R88L-EC-GW-0706-ANPS			R88D-KN08H-ECT-L
	348 N	2100 N		R88L-EC-GW-0709-ANPS			R88D-KN10H-ECT-L
	26,5N	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
	53 N	200 N		R88L-EC-GW-0306-APLS			R88D-KN08H-ECT-L
	80 N	300 N		R88L-EC-GW-0309-APLS			R88D-KN10H-ECT-L
	58 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
	117 N	480 N		R88L-EC-GW-0506-APLS			R88D-KN04H-ECTL
	175 N	720 N		R88L-EC-GW-0509-APLS			R88D-KN08H-ECT-L
	117 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
	232 N	1400 N		R88L-EC-GW-0706-APLS			R88D-KN08H-ECT-L
	348 N	2100 N		R88L-EC-GW-0709-APLS			R88D-KN10H-ECT-L

Servo Drive

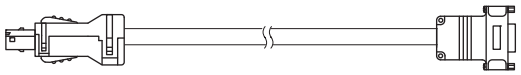
④ Refer to Accurax G5 Servo Srive chapter for detailed drive specifications and selection of drive accessories.

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

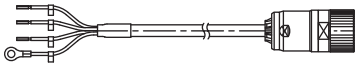
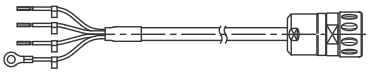
Note: If no temperature sensor is needed, then it does not matter which converter you use.

Serial Converter cable to Servo Drive

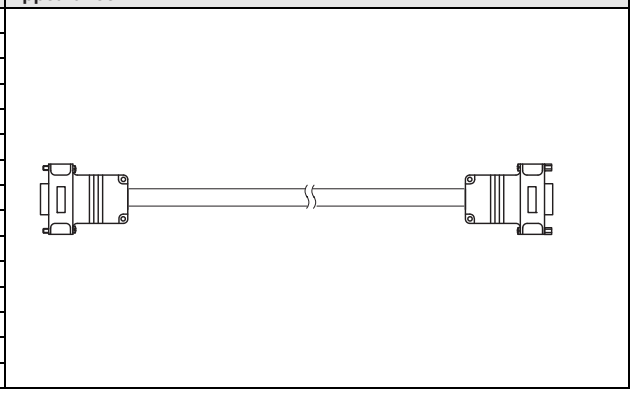
Symbol	Specifications		Model	Appearance
⑥	Accurax G5-Linear drive to Serial Converter cable. (Connectors R88A-CNK41L and DB-15)	1.5 m	R88A-CRKN001-5CR-E	
		3 m	R88A-CRKN003CR-E	
		5 m	R88A-CRKN005CR-E	
		10 m	R88A-CRKN010CR-E	
		15 m	R88A-CRKN015CR-E	
		20 m	R88A-CRKN020CR-E	

Note: This cable can be used also for A/B Pulse Encoder Numerik Jena standard pinout.

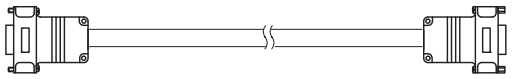
Power cable

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

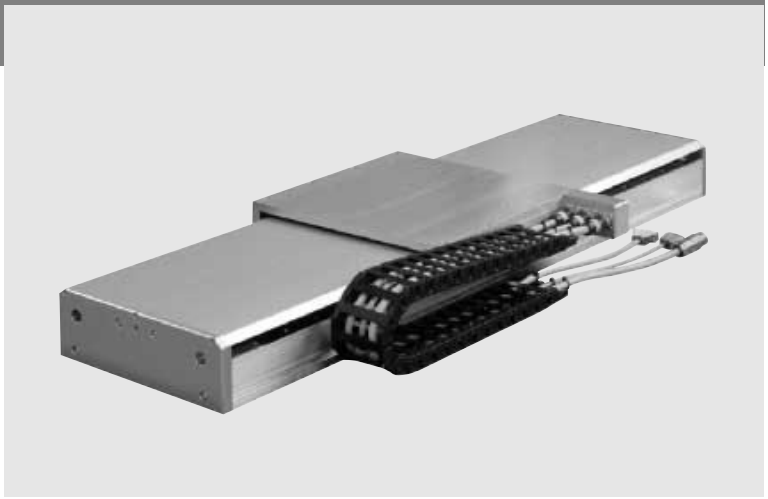
Specification	Model
Accurax G5 servo drive encoder connector (for CN4)	R88A-CNK41L
Hypertac power cable connector IP67 for iron-core linear motors	LPRA-06B-FRBN170
Hypertac power cable connector IP67 for ironless linear motors	SROC06JMSCN169

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

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 axes.

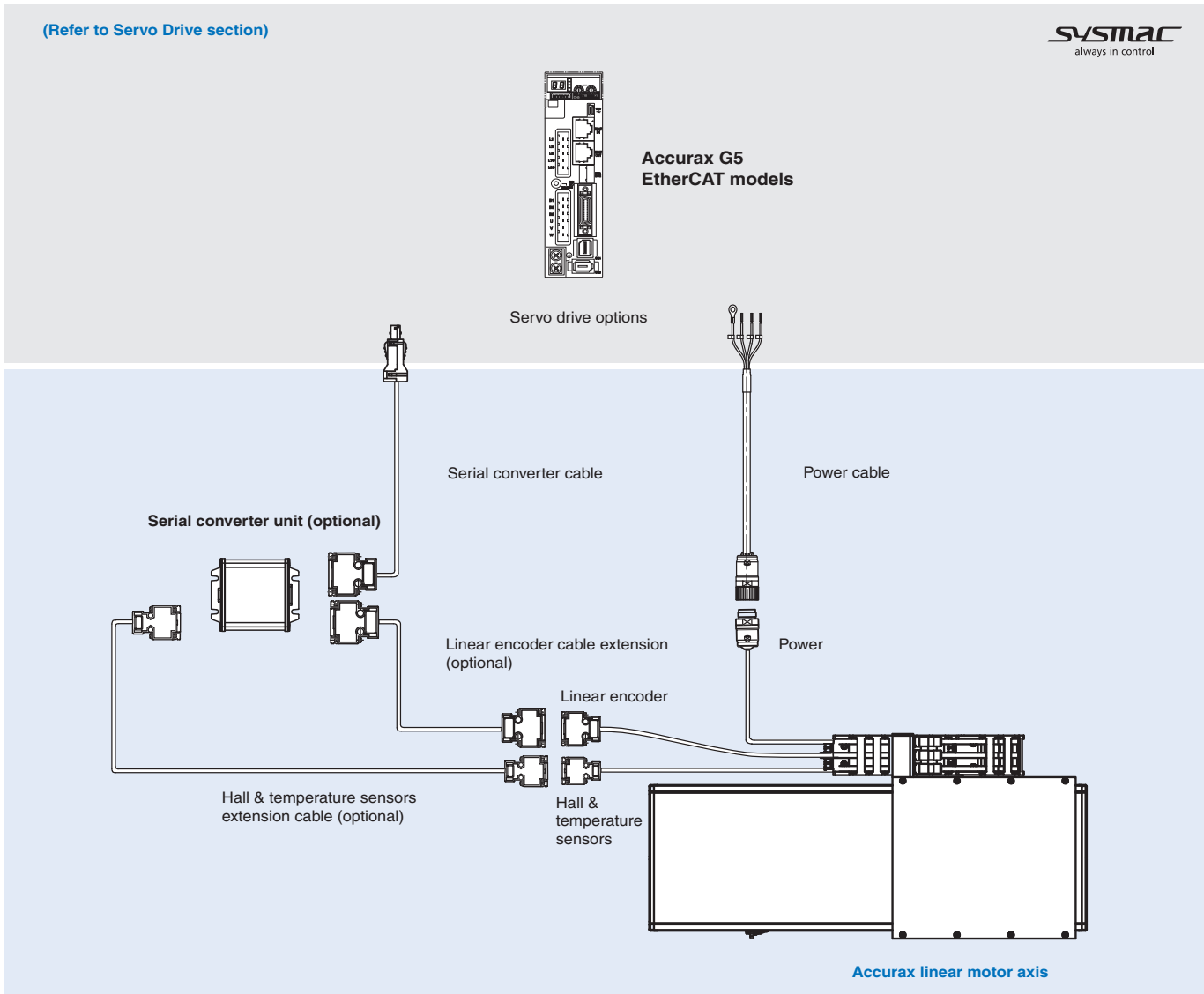
- Low moving mass to ensure a high degree of dynanism
- Optimized stroke/ product length ratio
- Up to 5 m/s maximum speed with 1 µm repeatibility
- Compact and efficieny oriented design
- Highly versatile and ready-to-use

Ratings

- 230/ 400 VAC 48 to 760 N (2000 N peak force)

System configuration

(Refer to Servo Drive section)



Linear axis					Servo drive	
					Accurax G5 EtherCAT	
Type	Voltage	Rated force	Peak force	Model	230 V	400 V
R88L-EA-AF-□ Linear motor axes 	230/ 400 V	48 N	105 N	R88L-EA-AF-0303-□	R88D-KN02H-ECT-L	R88D-KN10F-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 - □

- R88L - EA - AF: Accurax linear motor axis
- 0303: 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

- 0110: Stroke lenght (for effective stroke distances available see dimensions section)
- □: Customised versions

Note: the standard linear motor axis includes 1 Vpp SinCos encoder. For another encoder options or customised versions of linear axis please contact your OMRON representative.

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	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	1.2	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	VDC/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		1 Vptp SIN/COS & Reference mark, metalcase, optical, incremental						
	Encoder resolution		20µm						
	Accuracy class		+/-5µm/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 24VDC, 25 mA						
	Encoder reading head supply		5 VDC, max. 250 mA						
	Insulation class		Class B						
	Max. bus voltage		560 VDC						
	Insulation resistance		500 VDC						
	Ambient humidity		20 to 80% (non-condensing)						
	Altitude		1000 m						
	Max. allowable magnet temperature		70°C						

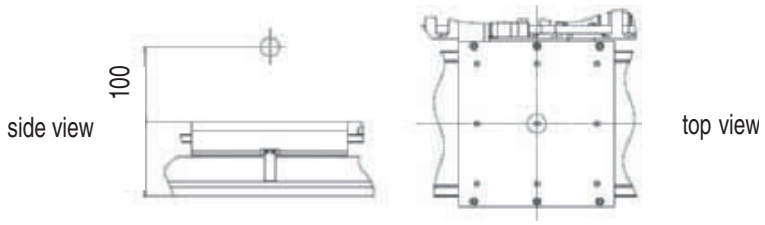
*1 Coil temperature rising by 6K/s.

*2 Values at 100ºC coil temperature and magnets at 25ºC. An airstream of 2.5 m/s (25ºC) has to be applied.

*3 Refering to the center of gravity, for higher payload or different position of payload please contact your OMRON representative.

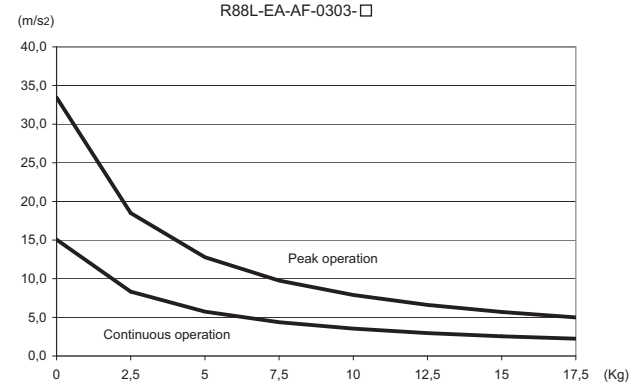
*4 I^2t has to be set properly for high current applications.

All other values at 25ºC (+/-10%).

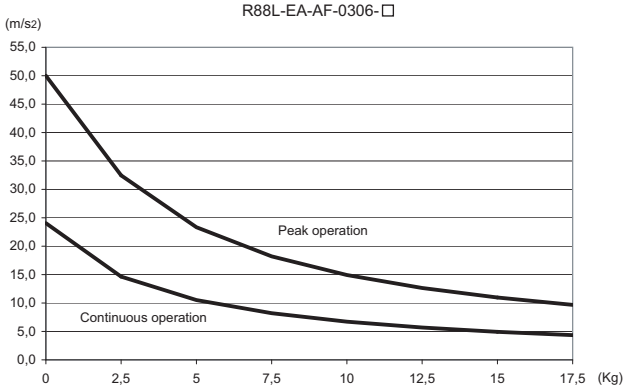


Acceleration-Payload characteristics

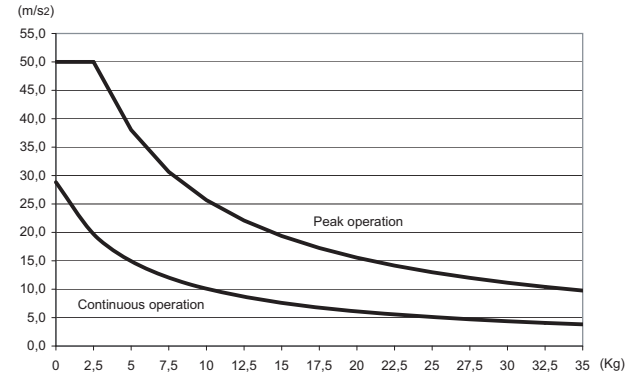
R88L-EA-AF-0303-□



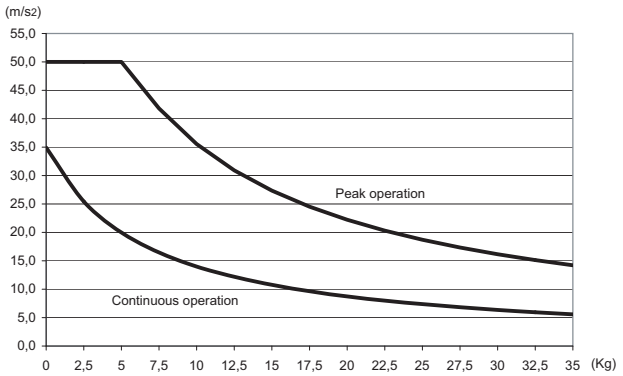
R88L-EA-AF-0306-□



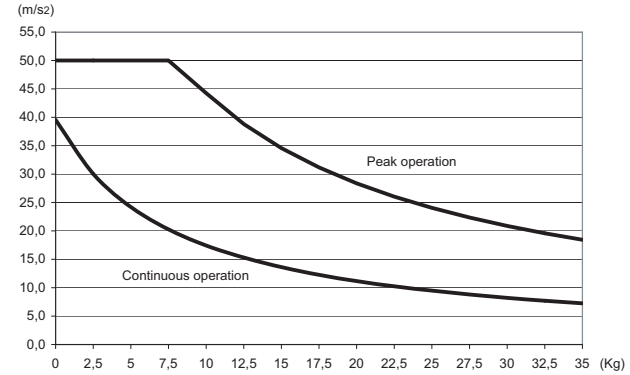
R88L-EA-AF-0606-□



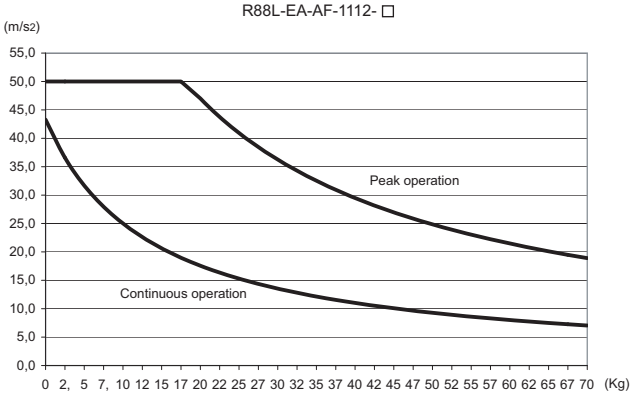
R88L-EA-AF-0609-□



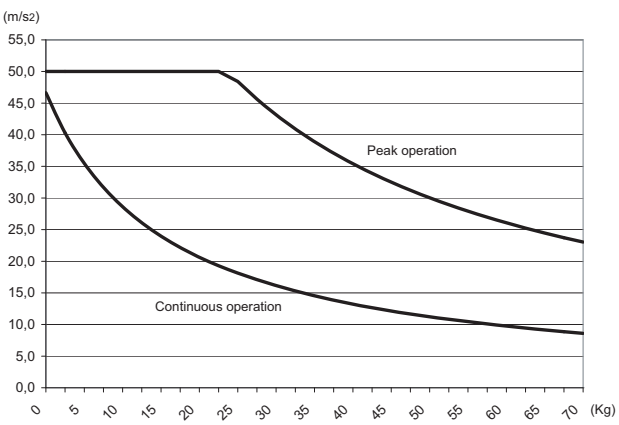
R88L-EA-AF-0612-□



R88L-EA-AF-1112- □



R88L-EA-AF-1115- □



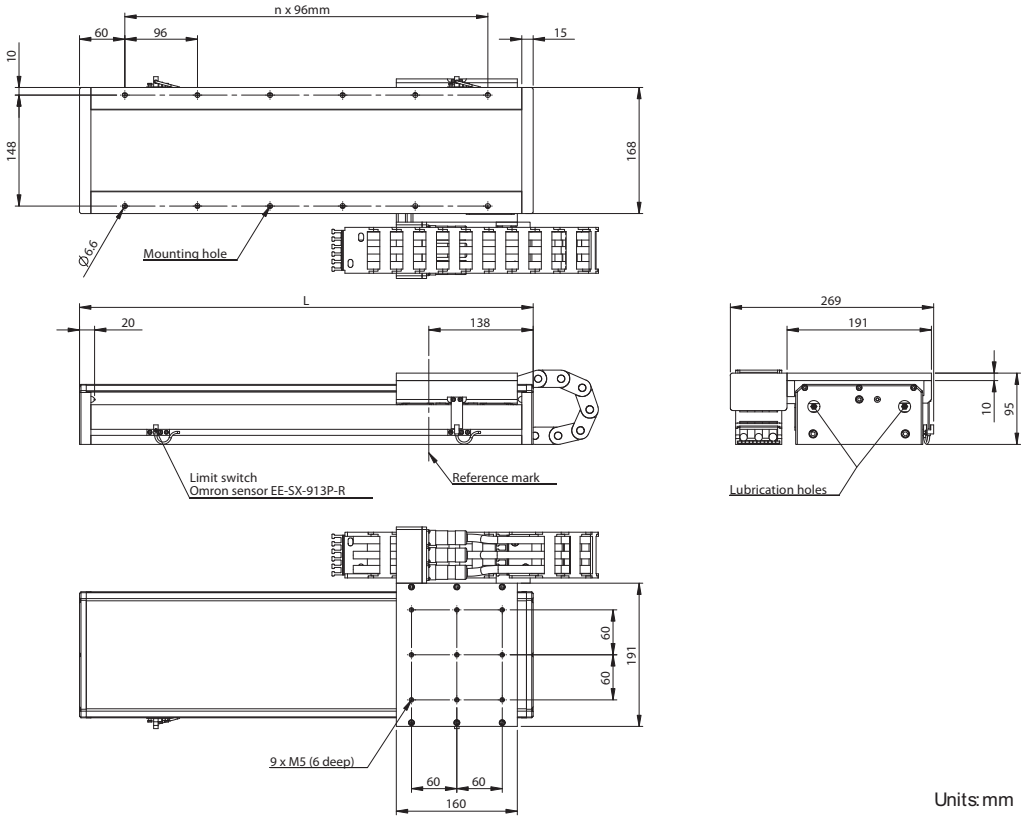
Note: The values on the above curves are calculated based on the below formula and with horizontal orientation:

$$Acceleration = (Force – Force_{Friction}) / Weigth_{Total}$$

Dimensions

R88L-EA-AF-0303-□ (230/ 400 VAC)

Linear axis model	Effective stroke in mm	L in mm	n	Nº of mounting holes	Weigth of moving table including motor coil (kg)	Weigth of the complete axis (kg)
R88L-EA-AF-0303-0110	110	312	2	6	3.1	9.5
R88L-EA-AF-0303-0206	206	408	3	8	3.1	10.9
R88L-EA-AF-0303-0302	302	504	4	10	3.1	12.4
R88L-EA-AF-0303-0398	398	600	5	12	3.1	13.8
R88L-EA-AF-0303-0494	494	696	6	14	3.1	15.2
R88L-EA-AF-0303-0590	590	792	7	16	3.1	16.7
R88L-EA-AF-0303-0686	686	888	8	18	3.1	18.1
R88L-EA-AF-0303-0782	782	984	9	20	3.1	19.6
R88L-EA-AF-0303-0878	878	1080	10	22	3.1	21.0
R88L-EA-AF-0303-0974	974	1176	11	24	3.1	22.5
R88L-EA-AF-0303-1070	1070	1272	12	26	3.1	23.9
R88L-EA-AF-0303-1166	1166	1368	13	28	3.1	25.4
R88L-EA-AF-0303-1262	1262	1464	14	30	3.1	26.8
R88L-EA-AF-0303-1358	1358	1560	15	32	3.1	28.2
R88L-EA-AF-0303-1454	1454	1656	16	34	3.1	29.7
R88L-EA-AF-0303-1550	1550	1752	17	36	3.1	31.1
R88L-EA-AF-0303-1646	1646	1848	18	38	3.1	32.6
R88L-EA-AF-0303-1742	1742	1944	19	40	3.1	34.0
R88L-EA-AF-0303-1838	1838	2040	20	42	3.1	35.5
R88L-EA-AF-0303-1934	1934	2136	21	44	3.1	36.9
R88L-EA-AF-0303-2030	2030	2232	22	46	3.1	38.3
R88L-EA-AF-0303-2126	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

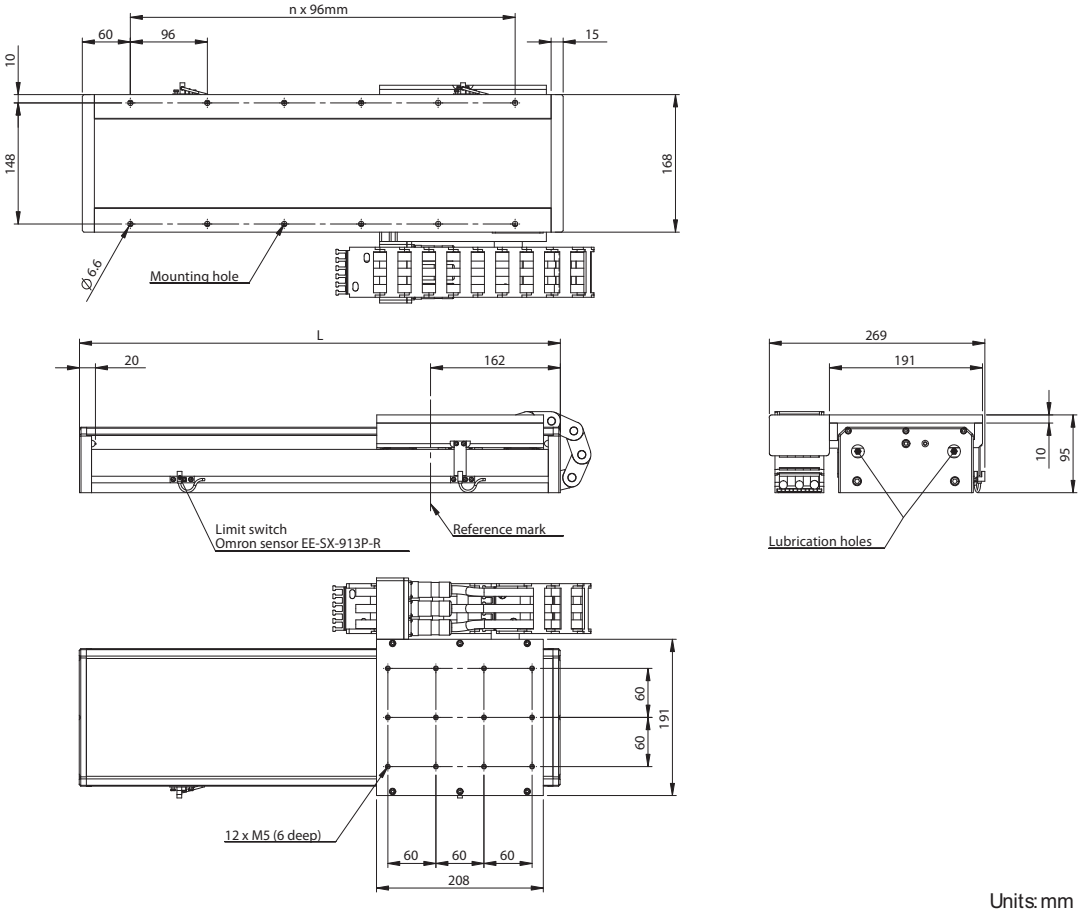
Cable length 500 mm approx.
Connector Hypertac
LRRA06AMBPN182 (male)
Pin article code: 021.279.1020

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	Weigth of moving table including motor coil (kg)	Weigth of the complete axis (kg)
R88L-EA-AF-0306-0158	158	408	3	8	3.9	11.6
R88L-EA-AF-0306-0254	254	504	4	10	3.9	13.1
R88L-EA-AF-0306-0350	350	600	5	12	3.9	14.5
R88L-EA-AF-0306-0446	446	696	6	14	3.9	15.9
R88L-EA-AF-0306-0542	542	792	7	16	3.9	17.4
R88L-EA-AF-0306-0638	638	888	8	18	3.9	18.8
R88L-EA-AF-0306-0734	734	984	9	20	3.9	20.3
R88L-EA-AF-0306-0830	830	1080	10	22	3.9	21.7
R88L-EA-AF-0306-0926	926	1176	11	24	3.9	23.2
R88L-EA-AF-0306-1022	1022	1272	12	26	3.9	24.6
R88L-EA-AF-0306-1118	1118	1368	13	28	3.9	26.1
R88L-EA-AF-0306-1214	1214	1464	14	30	3.9	27.5
R88L-EA-AF-0306-1310	1310	1560	15	32	3.9	28.9
R88L-EA-AF-0306-1406	1406	1656	16	34	3.9	30.4
R88L-EA-AF-0306-1502	1502	1752	17	36	3.9	31.8
R88L-EA-AF-0306-1598	1598	1848	18	38	3.9	33.3
R88L-EA-AF-0306-1694	1694	1944	19	40	3.9	34.7
R88L-EA-AF-0306-1790	1790	2040	20	42	3.9	36.2
R88L-EA-AF-0306-1886	1886	2136	21	44	3.9	37.6
R88L-EA-AF-0306-1982	1982	2232	22	46	3.9	39.0
R88L-EA-AF-0306-2078	2078	2328	23	48	3.9	40.5



Units: mm

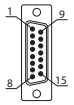
Hall sensor & temperature cable

Cable length 500 mm approx.
Connector D-Sub 9 pins (male)

Pin No.	Name
1	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

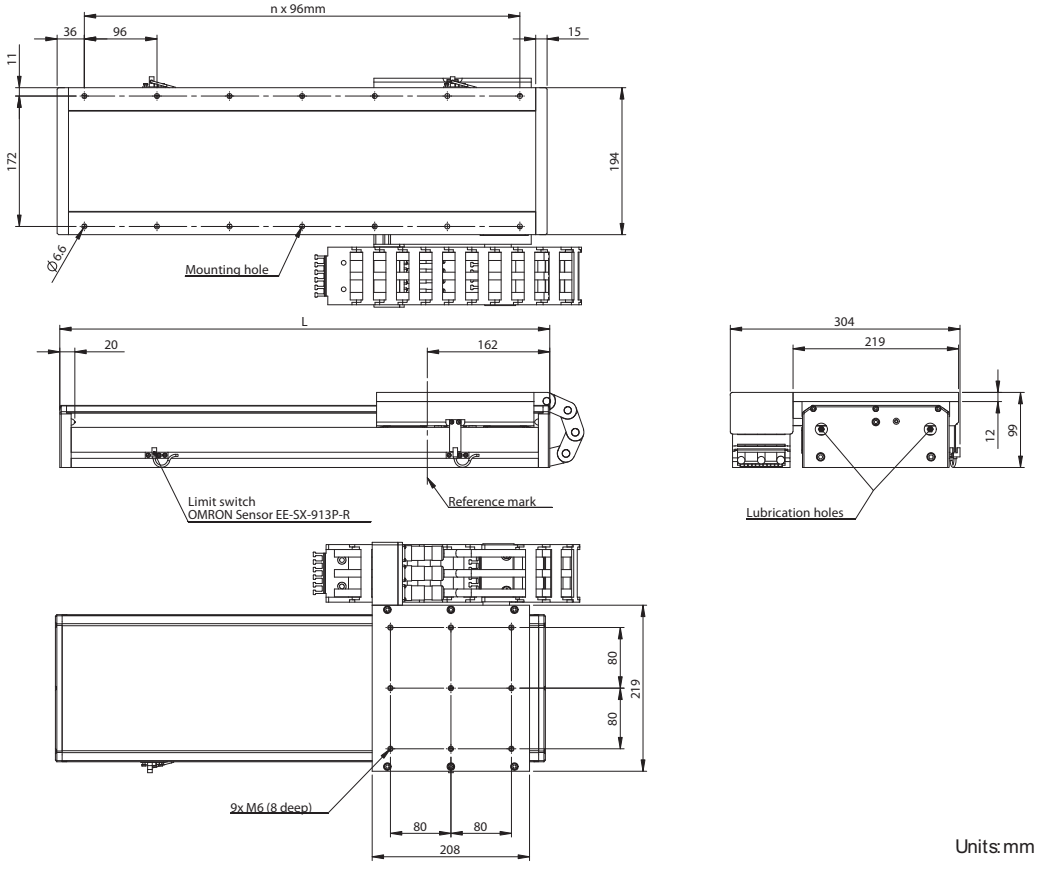
Cable length 500 mm approx.
Connector Hypertac
LRRA06AMRPN182 (male)
Pin article code: 021.279.1020

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	Weigth of moving table including motor coil (kg)	Weigth of the complete axis (kg)
R88L-EA-AF-0606-0110	110	360	3	8	5.4	14.1
R88L-EA-AF-0606-0206	206	456	4	10	5.4	15.9
R88L-EA-AF-0606-0302	302	552	5	12	5.4	17.6
R88L-EA-AF-0606-0398	398	648	6	14	5.4	19.3
R88L-EA-AF-0606-0494	494	744	7	16	5.4	21.0
R88L-EA-AF-0606-0590	590	840	8	18	5.4	22.8
R88L-EA-AF-0606-0686	686	936	9	20	5.4	24.5
R88L-EA-AF-0606-0782	782	1032	10	22	5.4	26.2
R88L-EA-AF-0606-0878	878	1128	11	24	5.4	28.0
R88L-EA-AF-0606-0974	974	1224	12	26	5.4	29.7
R88L-EA-AF-0606-1070	1070	1320	13	28	5.4	31.4
R88L-EA-AF-0606-1166	1166	1416	14	30	5.4	33.2
R88L-EA-AF-0606-1262	1262	1512	15	32	5.4	34.9
R88L-EA-AF-0606-1358	1358	1608	16	34	5.4	36.6
R88L-EA-AF-0606-1454	1454	1704	17	36	5.4	38.4
R88L-EA-AF-0606-1550	1550	1800	18	38	5.4	40.1
R88L-EA-AF-0606-1646	1646	1896	19	40	5.4	41.8
R88L-EA-AF-0606-1742	1742	1992	20	42	5.4	43.6
R88L-EA-AF-0606-1838	1838	2088	21	44	5.4	45.3
R88L-EA-AF-0606-1934	1934	2184	22	46	5.4	47.0
R88L-EA-AF-0606-2030	2030	2280	23	48	5.4	48.8
R88L-EA-AF-0606-2126	2126	2376	24	50	5.4	50.5



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

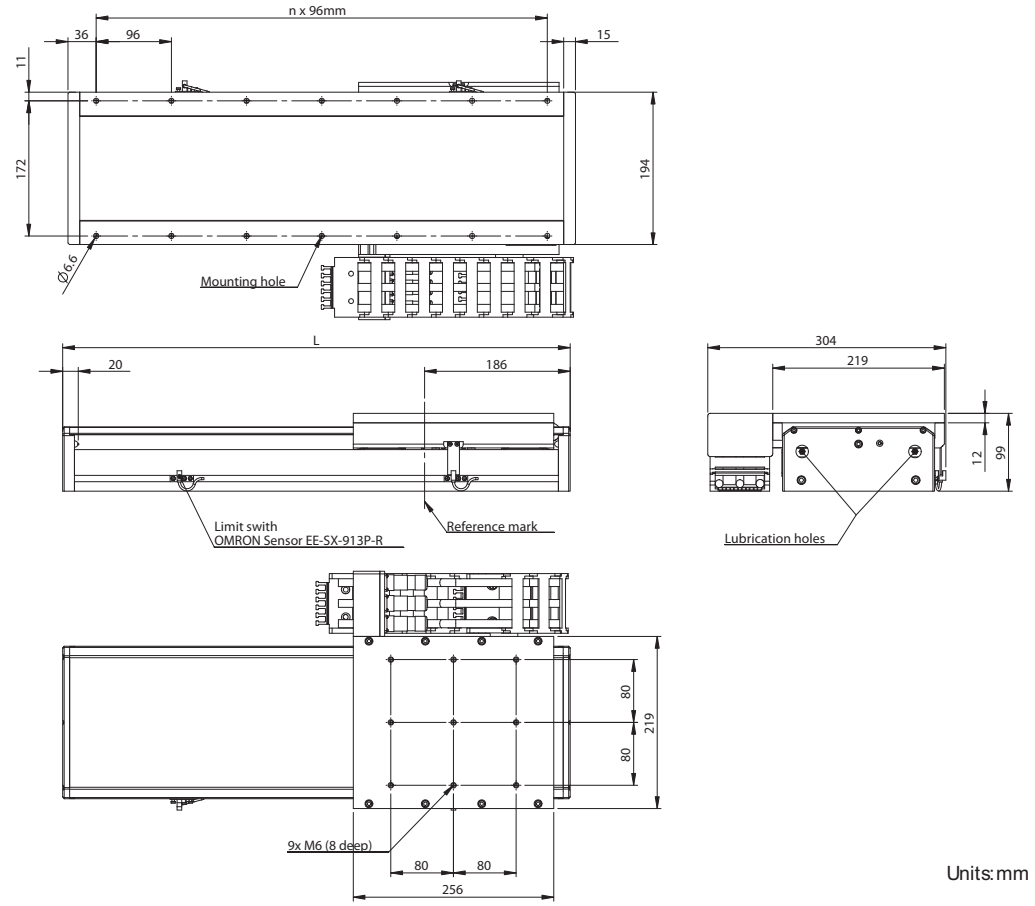
Cable length 500 mm approx.
Connector Hypertac
LRRA06AMRPN182 (male)
Pin article code: 021.279.1020

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-0609-□ (230/ 400 VAC)

Linear axis model	Effective stroke in mm	L in mm	n	Nº of mounting holes	Weigth of moving table including motor coil (kg)	Weigth of the complete axis (kg)
R88L-EA-AF-0609-0158	158	456	4	10	6.7	17.2
R88L-EA-AF-0609-0254	254	552	5	12	6.7	18.9
R88L-EA-AF-0609-0350	350	648	6	14	6.7	20.6
R88L-EA-AF-0609-0446	446	744	7	16	6.7	22.3
R88L-EA-AF-0609-0542	542	840	8	18	6.7	24.1
R88L-EA-AF-0609-0638	638	936	9	20	6.7	25.8
R88L-EA-AF-0609-0734	734	1032	10	22	6.7	27.5
R88L-EA-AF-0609-0830	830	1128	11	24	6.7	29.3
R88L-EA-AF-0609-0926	926	1224	12	26	6.7	31.0
R88L-EA-AF-0609-1022	1022	1320	13	28	6.7	32.7
R88L-EA-AF-0609-1118	1118	1416	14	30	6.7	34.5
R88L-EA-AF-0609-1214	1214	1512	15	32	6.7	36.2
R88L-EA-AF-0609-1310	1310	1608	16	34	6.7	37.9
R88L-EA-AF-0609-1406	1406	1704	17	36	6.7	39.7
R88L-EA-AF-0609-1502	1502	1800	18	38	6.7	41.4
R88L-EA-AF-0609-1598	1598	1896	19	40	6.7	43.1
R88L-EA-AF-0609-1694	1694	1992	20	42	6.7	44.9
R88L-EA-AF-0609-1790	1790	2088	21	44	6.7	46.6
R88L-EA-AF-0609-1886	1886	2184	22	46	6.7	48.3
R88L-EA-AF-0609-1982	1982	2280	23	48	6.7	50.1
R88L-EA-AF-0609-2078	2078	2376	24	50	6.7	51.8



Units: mm

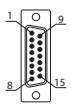
Hall sensor & temperature cable

Cable length 500 mm approx.
Connector D-Sub 9 pins (male)

Pin No.	Name
1	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

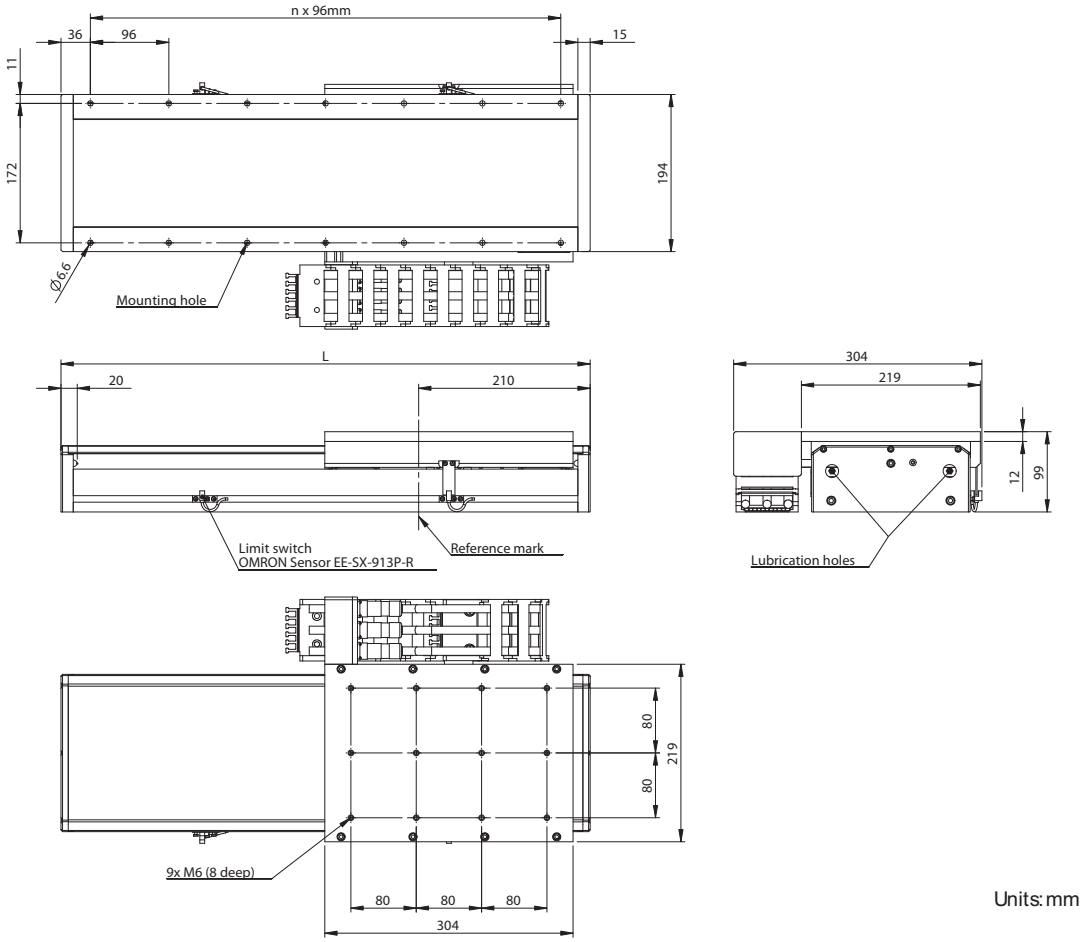
Cable length 500 mm approx.
Connector Hypertac
LRRA06AMRPN182 (male)
Pin article code: 021.279.1020

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	Weigth of moving table including motor coil (kg)	Weigth of the complete axis (kg)
R88L-EA-AF-0612-0110	110	456	4	10	7.9	18.3
R88L-EA-AF-0612-0206	206	552	5	12	7.9	20.0
R88L-EA-AF-0612-0302	302	648	6	14	7.9	21.7
R88L-EA-AF-0612-0398	398	744	7	16	7.9	23.4
R88L-EA-AF-0612-0494	494	840	8	18	7.9	25.2
R88L-EA-AF-0612-0590	590	936	9	20	7.9	26.9
R88L-EA-AF-0612-0686	686	1032	10	22	7.9	28.6
R88L-EA-AF-0612-0782	782	1128	11	24	7.9	30.4
R88L-EA-AF-0612-0878	878	1224	12	26	7.9	32.1
R88L-EA-AF-0612-0974	974	1320	13	28	7.9	33.8
R88L-EA-AF-0612-1070	1070	1416	14	30	7.9	35.6
R88L-EA-AF-0612-1166	1166	1512	15	32	7.9	37.3
R88L-EA-AF-0612-1262	1262	1608	16	34	7.9	39.0
R88L-EA-AF-0612-1358	1358	1704	17	36	7.9	40.8
R88L-EA-AF-0612-1454	1454	1800	18	38	7.9	42.5
R88L-EA-AF-0612-1550	1550	1896	19	40	7.9	44.2
R88L-EA-AF-0612-1646	1646	1992	20	42	7.9	46.0
R88L-EA-AF-0612-1742	1742	2088	21	44	7.9	47.7
R88L-EA-AF-0612-1838	1838	2184	22	46	7.9	49.4
R88L-EA-AF-0612-1934	1934	2280	23	48	7.9	50.2
R88L-EA-AF-0612-2030	2030	2376	24	50	7.9	52.9



Units: mm

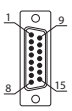
Hall sensor & temperature cable

Cable length 500 mm approx.
Connector D-Sub 9 pins (male)

Pin No.	Name
1	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)



*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

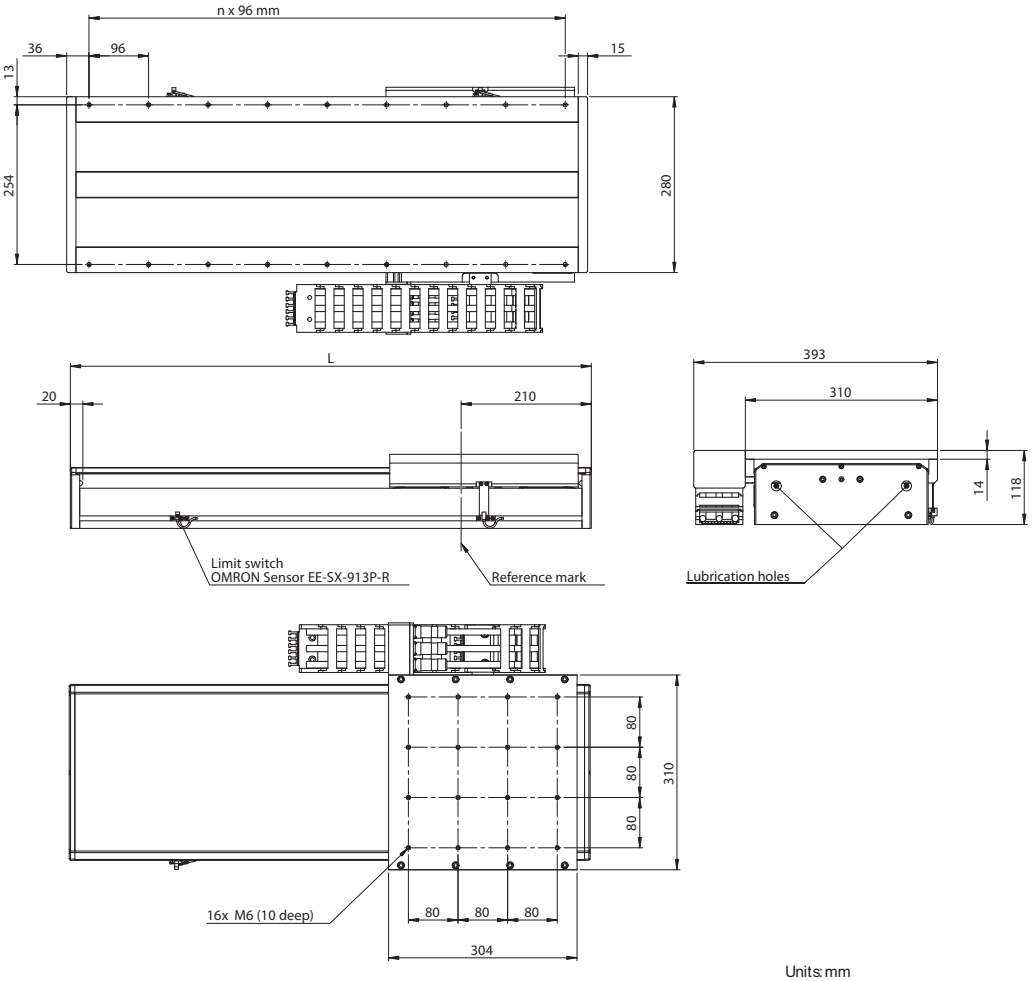
Cable length 500 mm approx.
Connector Hypertac
LRRA06AMRPN182 (male)
Pin article code: 021.279.1020

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-1112-□ (230/ 400 VAC)

Linear axis model	Effective stroke in mm	L in mm	n	Nº of mounting holes	Weigth of moving table including motor coil (kg)	Weigth of the complete axis (kg)
R88L-EA-AF-1112-0110	110	456	4	10	13.7	31.9
R88L-EA-AF-1112-0206	206	552	5	12	13.7	35.2
R88L-EA-AF-1112-0302	302	648	6	14	13.7	38.5
R88L-EA-AF-1112-0398	398	744	7	16	13.7	41.7
R88L-EA-AF-1112-0494	494	840	8	18	13.7	45.0
R88L-EA-AF-1112-0590	590	936	9	20	13.7	48.3
R88L-EA-AF-1112-0686	686	1032	10	22	13.7	51.5
R88L-EA-AF-1112-0782	782	1128	11	24	13.7	54.8
R88L-EA-AF-1112-0878	878	1224	12	26	13.7	58.1
R88L-EA-AF-1112-0974	974	1320	13	28	13.7	61.3
R88L-EA-AF-1112-1070	1070	1416	14	30	13.7	64.6
R88L-EA-AF-1112-1166	1166	1512	15	32	13.7	67.9
R88L-EA-AF-1112-1262	1262	1608	16	34	13.7	71.1
R88L-EA-AF-1112-1358	1358	1704	17	36	13.7	74.4
R88L-EA-AF-1112-1454	1454	1800	18	38	13.7	77.7
R88L-EA-AF-1112-1550	1550	1896	19	40	13.7	80.9
R88L-EA-AF-1112-1646	1646	1992	20	42	13.7	84.2
R88L-EA-AF-1112-1742	1742	2088	21	44	13.7	87.5
R88L-EA-AF-1112-1838	1838	2184	22	46	13.7	90.8
R88L-EA-AF-1112-1934	1934	2280	23	48	13.7	94.0
R88L-EA-AF-1112-2030	2030	2376	24	50	13.7	97.3
R88L-EA-AF-1112-2126	2126	2472	25	52	13.7	100.6



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

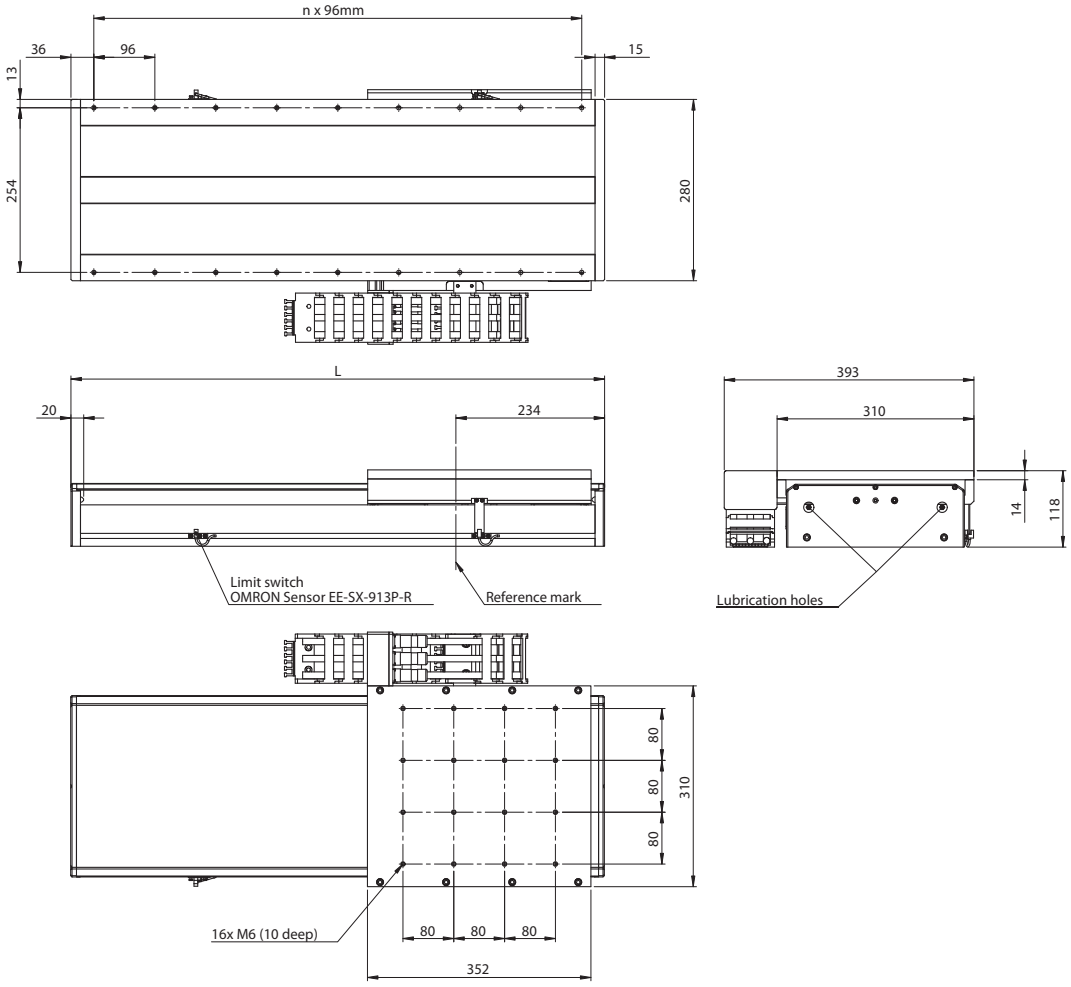
Cable length 500 mm approx.
Connector Hypertac
LRRA06AMRPN182 (male)
Pin article code: 021.279.1020

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-1115-□ (230/ 400 VAC)

Linear axis model	Effective stroke in mm	L in mm	n	Nº of mounting holes	Weigth of moving table including motor coil (kg)	Weigth of the complete axis (kg)
R88L-EA-AF-1115-0158	158	552	5	12	15.9	37.4
R88L-EA-AF-1115-0254	254	648	6	14	15.9	40.6
R88L-EA-AF-1115-0350	350	744	7	16	15.9	43.9
R88L-EA-AF-1115-0446	446	840	8	18	15.9	47.2
R88L-EA-AF-1115-0542	542	936	9	20	15.9	50.4
R88L-EA-AF-1115-0638	638	1032	10	22	15.9	53.7
R88L-EA-AF-1115-0734	734	1128	11	24	15.9	57.0
R88L-EA-AF-1115-0830	830	1224	12	26	15.9	60.2
R88L-EA-AF-1115-0926	926	1320	13	28	15.9	63.5
R88L-EA-AF-1115-1022	1022	1416	14	30	15.9	66.8
R88L-EA-AF-1115-1118	1118	1512	15	32	15.9	70.0
R88L-EA-AF-1115-1214	1214	1608	16	34	15.9	73.3
R88L-EA-AF-1115-1310	1310	1704	17	36	15.9	76.6
R88L-EA-AF-1115-1406	1406	1800	18	38	15.9	79.8
R88L-EA-AF-1115-1502	1502	1896	19	40	15.9	83.1
R88L-EA-AF-1115-1598	1598	1992	20	42	15.9	86.4
R88L-EA-AF-1115-1694	1694	2088	21	44	15.9	89.6
R88L-EA-AF-1115-1790	1790	2184	22	46	15.9	92.9
R88L-EA-AF-1115-1886	1886	2280	23	48	15.9	96.2
R88L-EA-AF-1115-1982	1982	2376	24	50	15.9	99.4
R88L-EA-AF-1115-2078	2078	2472	25	52	15.9	102.7
R88L-EA-AF-1115-2174	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	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

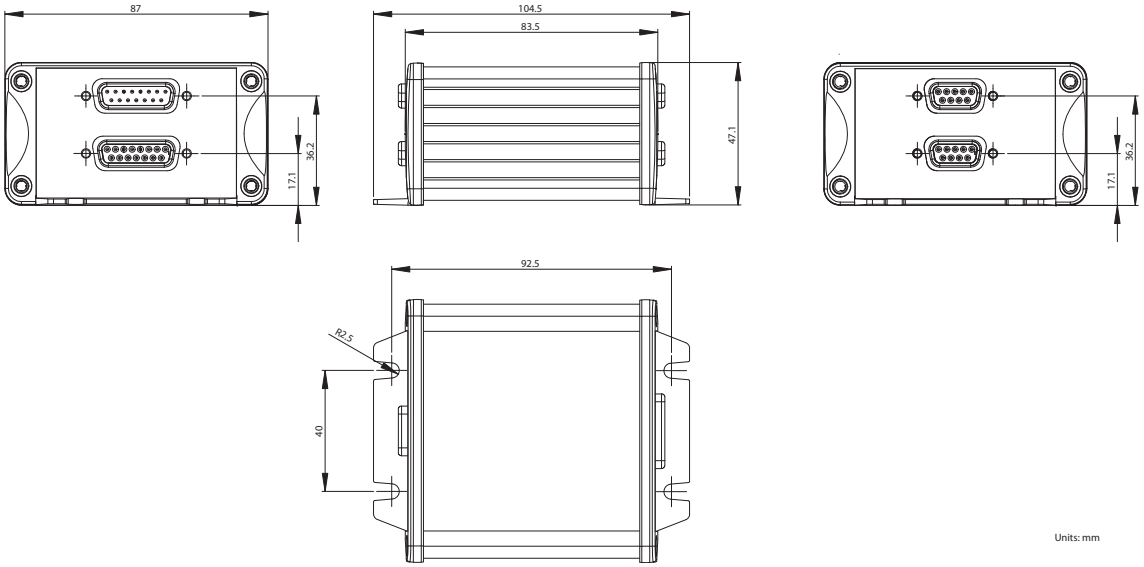
Mating connector:
Plug type: LPRA06BFRBN170

Pin No.	Name
1	Phase U
2	Phase V
3	Ground
4	Phase W
5	Not used
6	Not used

Optional serial converter unit

Specifications

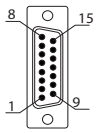
Serial converter model R88A-		SC01K-E	SC02K-E
Description		Serial converter from 1 Vpp to G5 serial data transmission and with hall sensor input	
Temperature sensor		KTY sensor detection of iron-core motor coil	NTC sensor detection of ironless motor coil
Electrical characteristics	Power supply voltage	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 °C to 55 °C	
	Storage temperature	-20 °C to +80 °C	
	Humidity	20% to 90% relative humidity (without condensation)	



Units: mm

CN4

Serial data output to Linear Servo drive

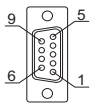


Connector D-Sub 15-pin (male)

Pin No.	Signal
1	PS
2	/PS
3	Not used
4	Not used
5	Not used
6	Not used
7	Not used
8	5V
9	0V
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

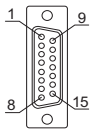


Connector D-Sub 9-pin (female)

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



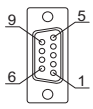
Connector D-Sub 15-pin (female)

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	5V
9	0V
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

CN2

Hall & temperature sensors interface



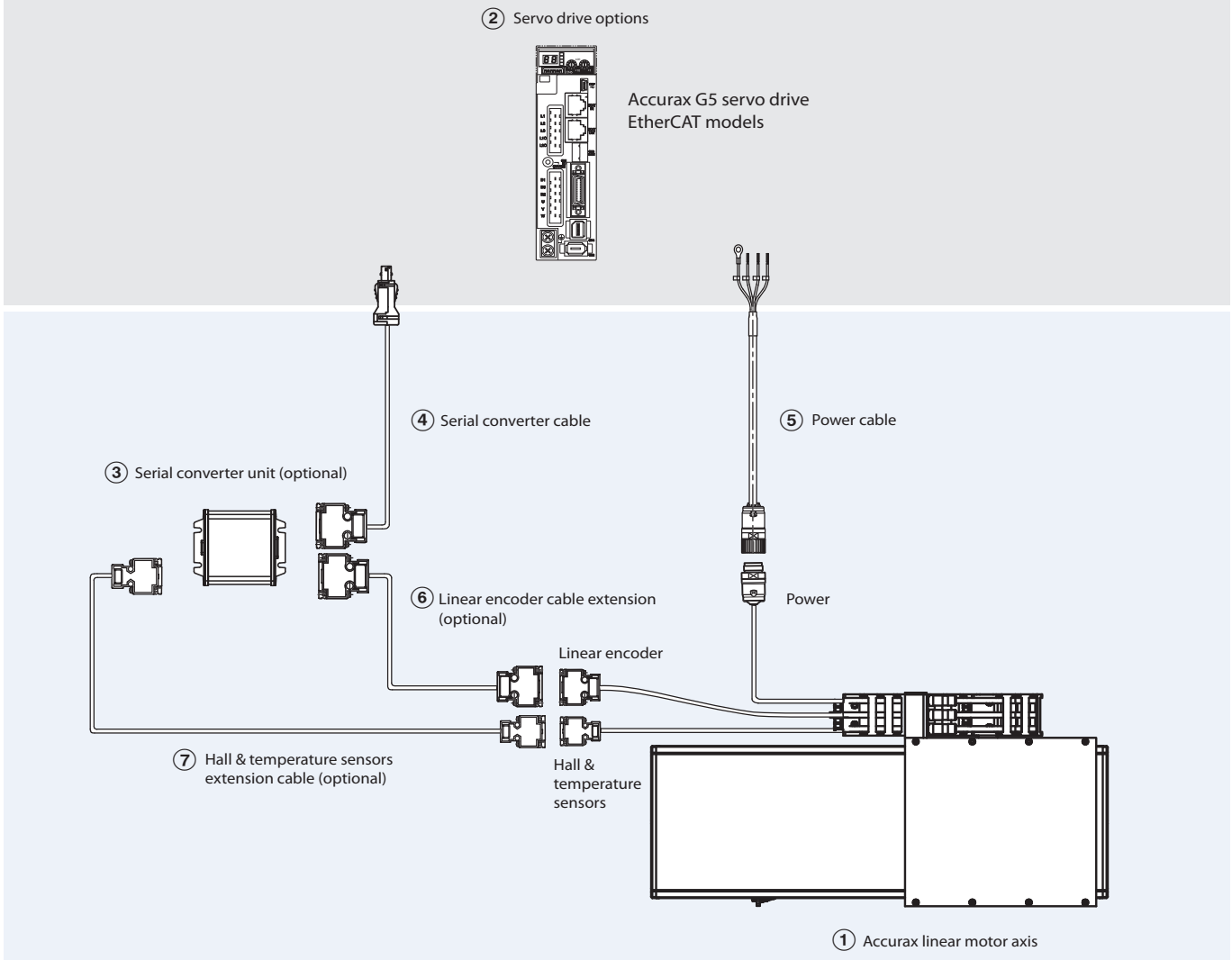
Connector D-Sub 9-pin (female)

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

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 section)



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 Compatible linear drive	
	Rated force	Peak force		Accurax G5 EtherCAT	
				230 V	400 V
①②	48 N	120 N	R88L-EA-AF-0303-□	R88D-KN02H-ECT-L	R88D-KN10F-ECT-L
	96 N	240 N	R88L-EA-AF-0306-□	R88D-KN04H-ECT-L	R88D-KN10F-ECT-L
	160 N	450 N	R88L-EA-AF-0606-□	R88D-KN08H-ECT-L	R88D-KN15F-ECT-L
	240 N	675 N	R88L-EA-AF-0609-□	R88D-KN10H-ECT-L	R88D-KN20F-ECT-L
	320 N	900 N	R88L-EA-AF-0612-□	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	608 N	1800 N	R88L-EA-AF-1112-□	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L
	760 N	2250 N	R88L-EA-AF-1115-□	R88D-KN15H-ECT-L	R88D-KN30F-ECT-L

Note: For effective stroke distances available see dimensions section.

Servo drive

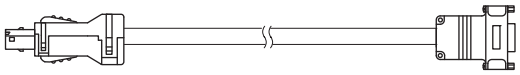
② Refer to Accurax G5 servo drive chapter for detailed drive specifications and selection of drive accessories.

Serial Converter unit

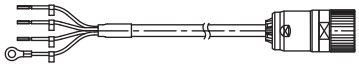
Symbol	Specifications	Model
③	Serial converter unit from 1 Vpp to G5 serial data transmission (with KTY sensor detection of iron-core motor coil)	R88A-SC01K-E
	Serial converter unit from 1 Vpp to G5 serial data transmission (with NTC sensor detection of ironless motor coil)	R88A-SC02K-E

Note: If no temperature sensor is needed, then it does not matter which converter you use.

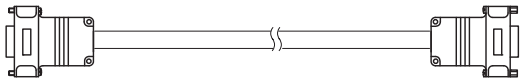
Serial converter cable to servo drive

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	

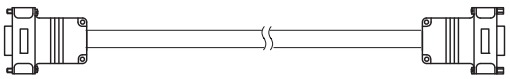
Power cable

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.

In the interest of product improvement, specifications are subject to change without notice.

MX2 frequency inverter

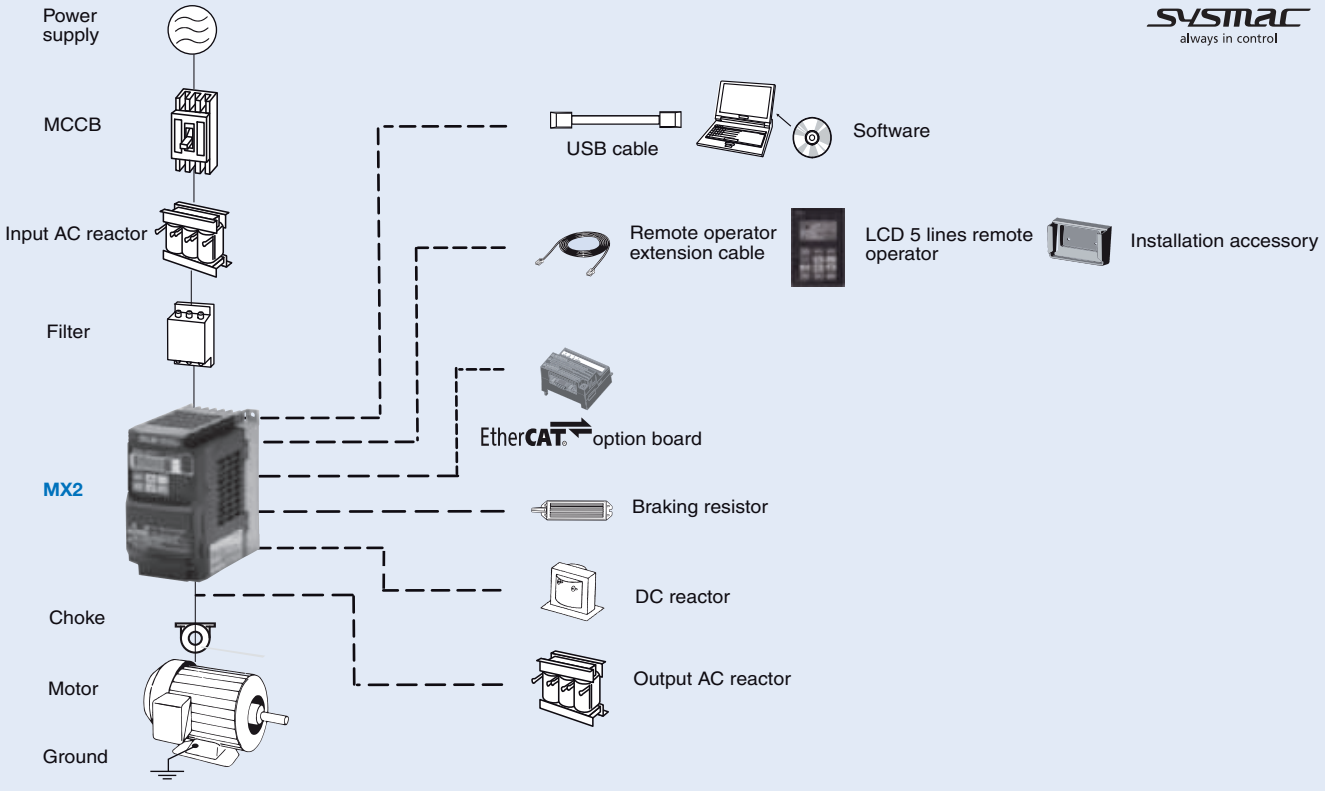
Born to drive machines

- Current vector control
- High starting torque: 200% at 0.5 Hz
- Double rating VT 120%/1 min and CT 150%/1 min
- Speed range up to 1000 Hz
- 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

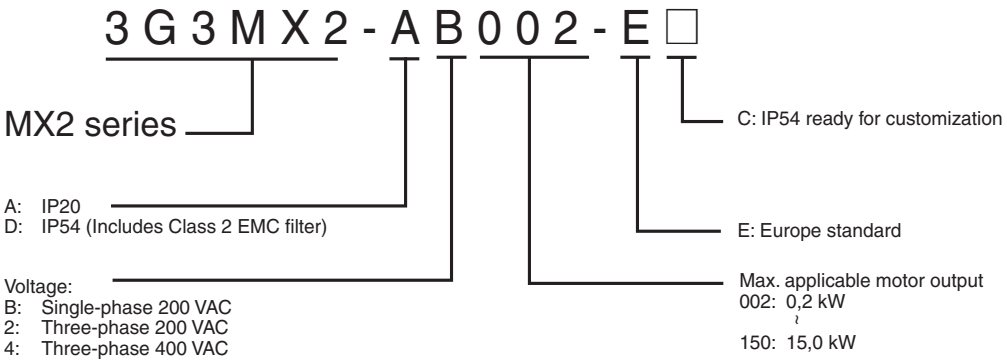
- 200 V Class single-phase 0.1 to 2.2 kW
- 200 V Class three-phase 0.1 to 15.0 kW
- 400 V Class three-phase 0.4 to 15.0 kW

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..240 V										
	Max. output frequency		1000 Hz[3]										
Power supply	Rated input voltage and frequency		Single-phase 200..240 V 50/60 Hz 3-phase 200..240 V 50/60 Hz										
	Allowable voltage fluctuation		-15%..+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[4]				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. Above 400 Hz with some function limitation.
4. 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..480 V									
	Max. output frequency		1000 Hz[2]									
Power supply	Rated input voltage and frequency		3-phase 380..480 V 50/60 Hz									
	Allowable voltage fluctuation		-15%..+10%									
	Allowable frequency fluctuation		5%									
Braking torque		At short-time deceleration *3 At capacitor feedback	100%: <50Hz 50%: <60Hz				70%: <50Hz 50%: <60Hz	-				
Cooling method			Self cooling[3]		Forced-air-cooling							

1. Based on a standard 3-Phase standard motor.
2. Above 400 Hz with some function limitation.
3. Forced air cooling for IP54 models

Specifications

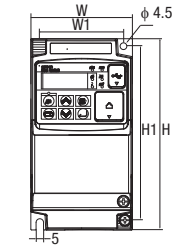
Common specifications

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..1000.00 Hz (with restrictions above 400Hz)
	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
		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)
	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 10 V (up to 24 V), up to 32 kHz
	Accel/Decel times	0.01 to 3600.0 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	-20ºC..+65ºC (short-term temperature during transportation)
	Ambient temperature[1]	–10°C to 50ºC (Both the carrier frequency and output current need to be reduced over 40ºC)
	Installation	Indoor (no corrosive gas, dust, etc.)
	Installation height	Max. 1000 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

IP20



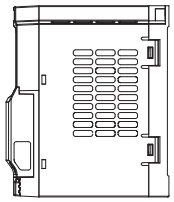
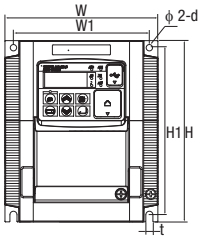


Figure 1



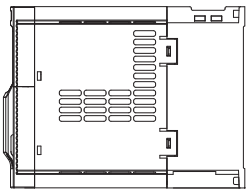
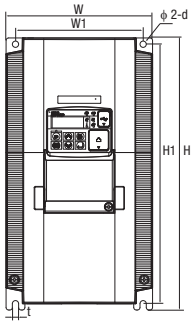


Figure 2



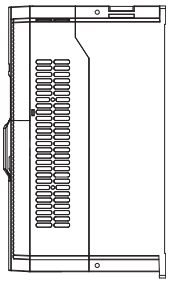
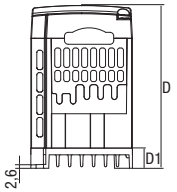
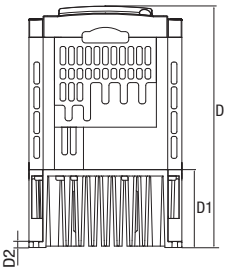
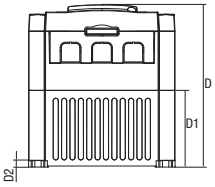


Figure 3

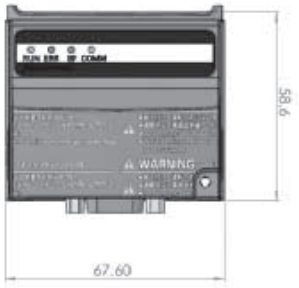


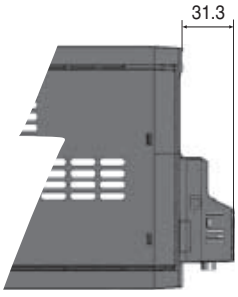




Voltage class	Inverter model 3G3MX2-A□	Figure	Dimensions in mm									
			W	W1	H	H1	t	D	D1	D2	d	Weight (KG)
Single-phase 200 V	B001	1	68	56	128	118	-	109	13.5	-	-	1.0
	B002	1										1.0
	B004	1						122.5	27			1.1
	B007	2	108	96	128	118		170.5	55	4.4	4.5	1.4
	B015	2										1.8
	B022	2										1.8
Three-phase 200 V	2001	1	68	56	128	118	-	109	13.5	-	-	1.0
	2002	1										1.0
	2004	1						122.5	27			1.1
	2007	1						145.5	50			1.2
	2015	2	108	96	128	118		170.5	55	4.4	4.5	1.6
	2022	2										1.8
	2037	3	140	128	128	118	5	170.5	55	4.4		2.0
	2055	3	140	122	260	248	6	155	73.3	6	6	3.0
	2075	3										3.4
	2110	3	180	160	296	284	7	175	97	5	7	5.1
	2150	3	220	192	350	336	7	175	84	5	7	7.4
Three-phase 400 V	4004	2	108	96	128	118	-	143.5	28	-	-	1.5
	4007	2						170.5	55			1.6
	4015	2						170.5				1.8
	4022	2										1.9
	4030	2										1.9
	4040	3	140	128	128	118	5	170.5	55	4.4	4.5	2.1
	4055	3		122	260	248	6	155	73.3	6	6	3.5
	4075	3										3.5
	4110	3	180	160	296	284	7	175	97	5	7	4.7
	4150	3										5.2

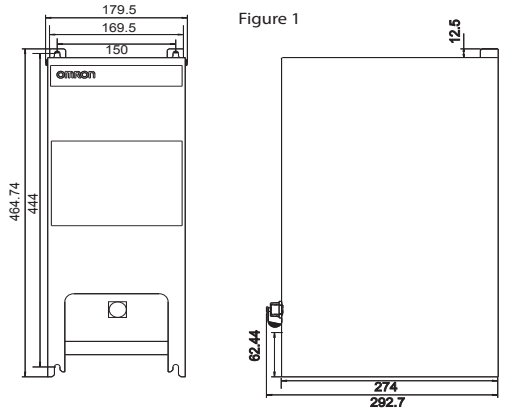
Option board

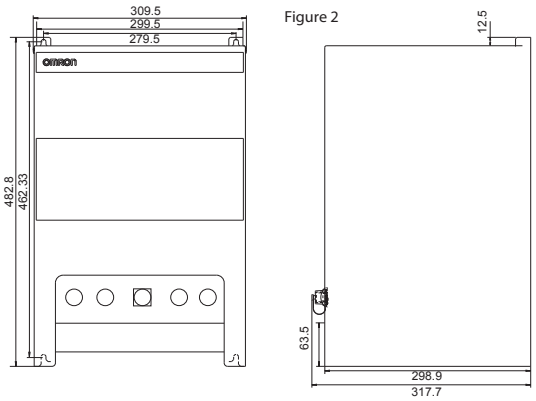


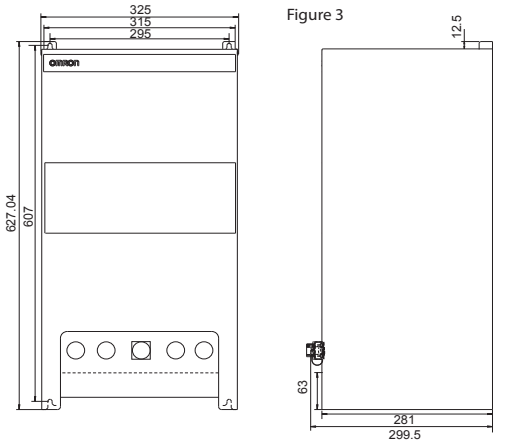


Note: Option boards could be fitted inside the IP54 model

IP54







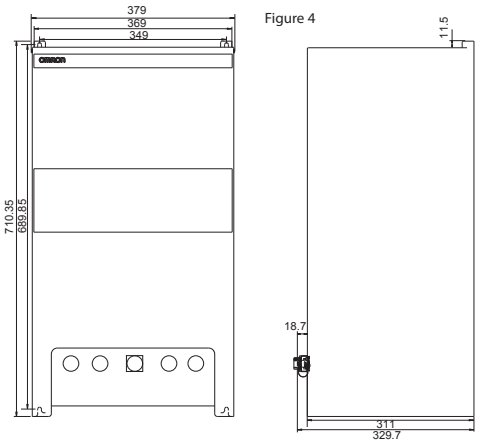
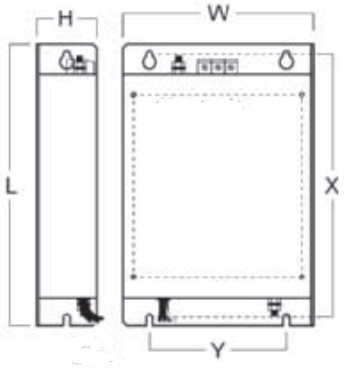


Figure 1	Figure 2	Figure 3	Figure 4
3G3MX2-DB001-E	3G3MX2-DB001-EC	3G3MX2-D2055-EC	3G3MX2-D2110-EC
3G3MX2-DB002-E	3G3MX2-DB002-EC	3G3MX2-D2075-EC	3G3MX2-D2150-EC
3G3MX2-DB004-E	3G3MX2-DB004-EC	3G3MX2-D4055-EC	3G3MX2-D4110-EC
3G3MX2-D2001-E	3G3MX2-DB007-EC	3G3MX2-D4075-EC	3G3MX2-D4150-EC
3G3MX2-D2002-E	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		

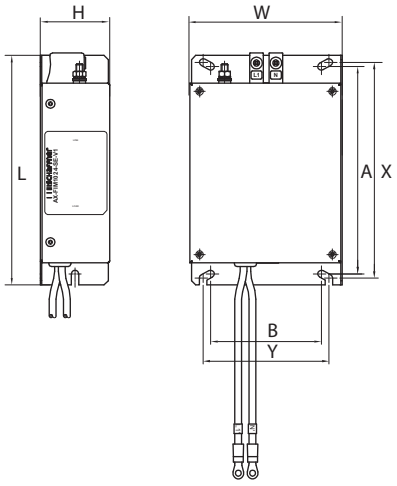
Rasmi footprint filters

Rasmi model		Dimensions					
		W	H	L	X	Y	M
1x200 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
3x200 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
3x400 V	AX-FIM3005-RE	114	46	169	156	91	M4
	AX-FIM3010-RE	114	46	169	156	91	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



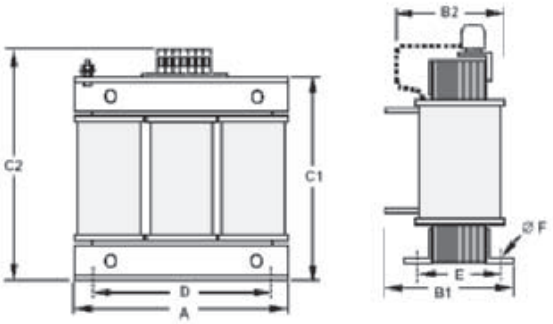
Schaffner footprint filters

Rasmi model		Dimensions							
		W	H	L	X	Y	A	B	M
1x200 V	AX-FIM1010-SE-V1	70	40	166	156	51	150	50	M5
	AX-FIM1024-SE-V1	110	50	166	156	91	150	80	M5
3x200 V	AX-FIM2010-SE-V1	80	40	191	181	62	150	50	M5
	AX-FIM2020-SE-V1	110	50	160	156	91	150	80	M5
	AX-FIM2030-SE-V1	142	50	171	161	120	150	112	M5
	AX-FIM2060-SE-V1	140	55	304	290	122	286	112	M5
	AX-FIM2080-SE-V1	180	55	344	330	160	323	140	M5
	AX-FIM2100-SE-V1	220	65	394	380	192	376	180	M5
3x400 V	AX-FIM3005-SE-V1	110	50	166	156	91	150	80	M5
	AX-FIM3010-SE-V1	110	50	166	156	91	150	80	M5
	AX-FIM3014-SE-V1	142	50	171	161	120	150	112	M5
	AX-FIM3030-SE-V1	140	55	304	290	122	286	112	M5
	AX-FIM3050-SE-V1	180	55	344	330	160	323	140	M5



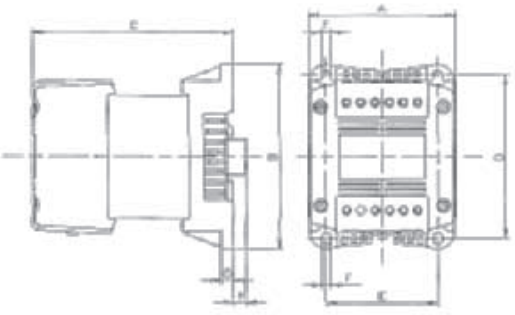
Input AC Reactor

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

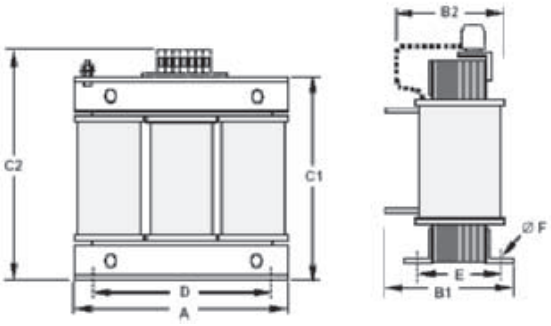
Voltage	Reference	Dimensions								Weight kg
		A	B	C	D	E	F	G	H	
200 V	AX-RC21400016-DE	84	113	96	101	66	5	7.5	2	1.22
	AX-RC10700032-DE									
	AX-RC06750061-DE			105						1.60
	AX-RC03510093-DE									
	AX-RC02510138-DE			116						1.95
	AX-RC01600223-DE	108	135	124	120	82	6.5	9.5	9.5	3.20
	AX-RC01110309-DE	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



Voltage	Reference	Dimensions								Weight kg
		A	B	C	D	E	F	G	H	
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

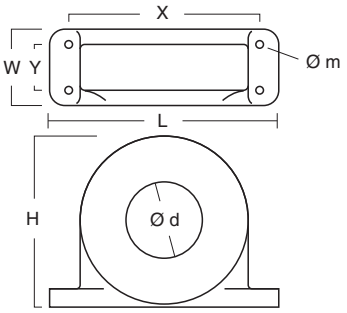
Output AC Reactor

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-REM00K1200

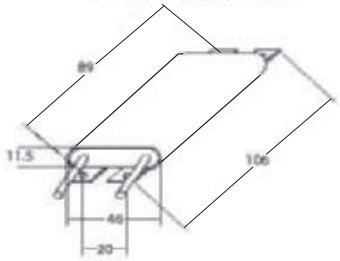


Fig 1

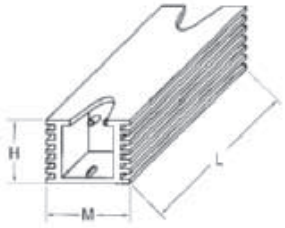


Fig 2

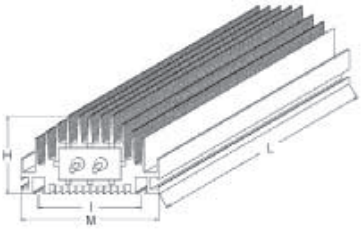


Fig 3

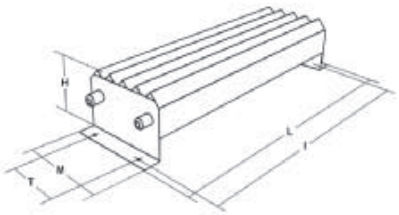
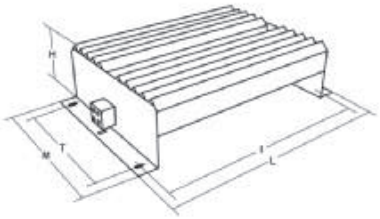
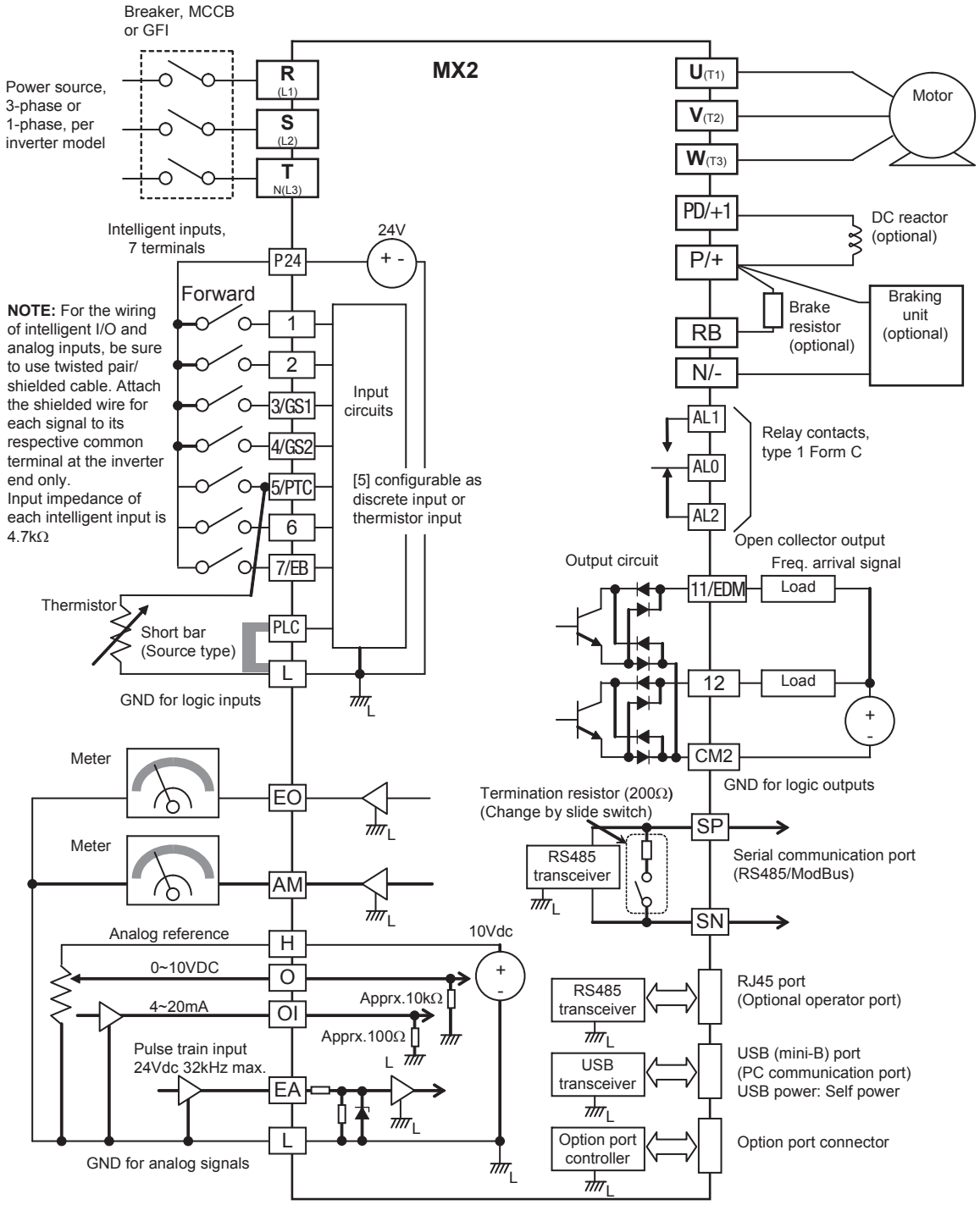


Fig 4



Type	Fig.	Dimensions					Weight
		L	H	M	I	T	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	62	100	74	-	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



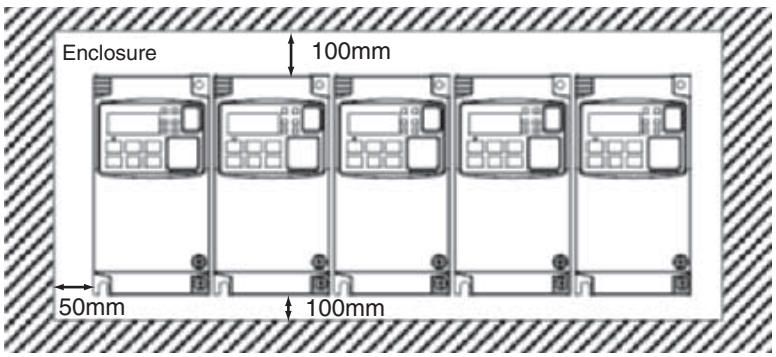
Terminal Block Specifications

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

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							

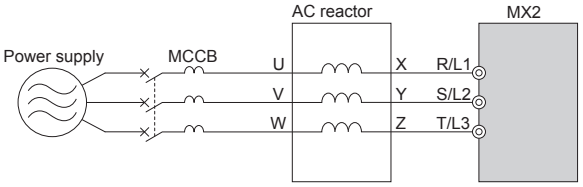
Single-phase 200 V class

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 400 V class

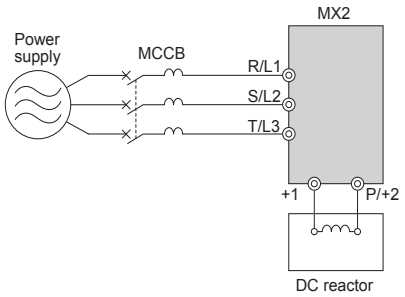
Model 3G3MX2		A4004	A4007	A4015	A4022	A4030	A4040	A4055	A4075	A4110	A4150
Inverter capacity kVA	380V VT	1.3	2.6	3.5	4.5	5.7	7.3	11.5	15.1	20.4	25.0
	380V CT	1.1	2.2	3.1	3.6	4.7	6.0	9.7	11.8	15.7	20.4
	480V VT	1.7	3.4	4.4	5.7	7.3	9.2	14.5	19.1	25.7	31.5
	480V CT	1.4	2.8	3.9	4.5	5.9	7.6	12.3	14.9	19.9	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



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
1.5	AX-RAI02800080-DE	8.0	2.8	1.5	AX-RAI07700050-DE	5.0	7.7
3.7	AX-RAI00880200-DE	20.0	0.88	4.0	AX-RAI03500100-DE	10.0	3.5
7.5	AX-RAI00350335-DE	33.5	0.35	7.5	AX-RAI01300170-DE	17.0	1.3
15	AX-RAI00180670-DE	67.0	0.18	15	AX-RAI00740335-DE	33.5	0.74

DC Reactor

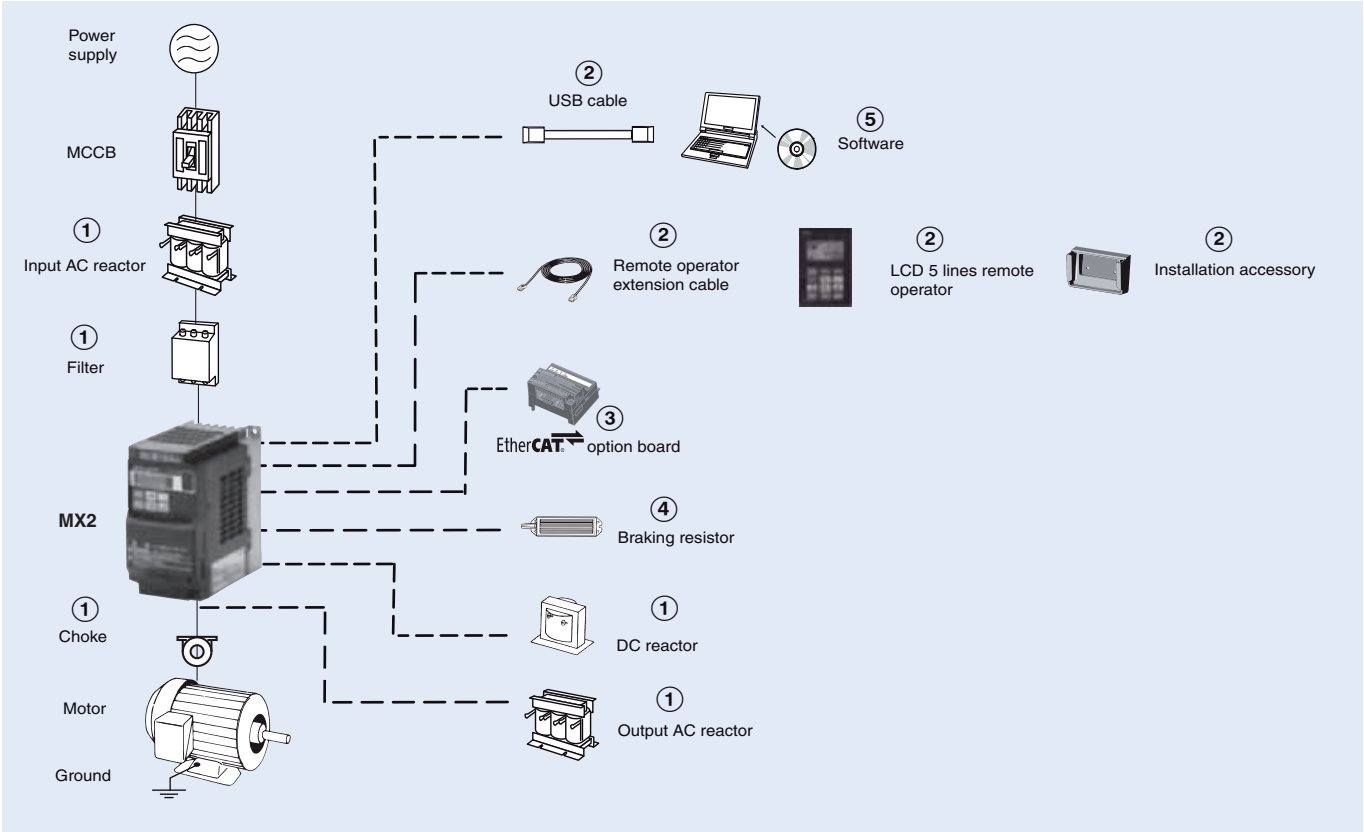


200 V class				400 V class			
Max. applicable motor output kW	Reference	Current value A	Inductance mH	Max. applicable motor output kW	Reference	Current value A	Inductance mH
0.2	AX-RC21400016-DE	1.6	21.4	0.4	AX-RC43000020-DE	2.0	43.0
0.4	AX-RC10700032-DE	3.2	10.7	0.7	AX-RC27000030-DE	3.0	27.0
0.7	AX-RC06750061-DE	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		IP20	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-DB001-E/EC
	0.2	1.6	0.4	1.9	3G3MX2-AB002-E	3G3MX2-DB002-E/EC
	0.4	3.0	0.55	3.5	3G3MX2-AB004-E	3G3MX2-DB004-E/EC
	0.75	5.0	1.1	6.0	3G3MX2-AB007-E	3G3MX2-DB007-EC
	1.5	8.0	2.2	9.6	3G3MX2-AB015-E	3G3MX2-DB015-EC
	2.2	11.0	3.0	12.0	3G3MX2-AB022-E	3G3MX2-DB022-EC
Three-phase 200 V	0.1	1.0	0.2	1.2	3G3MX2-A2001-E	3G3MX2-D2001-E/EC
	0.2	1.6	0.4	1.9	3G3MX2-A2002-E	3G3MX2-D2002-E/EC
	0.4	3.0	0.55	3.5	3G3MX2-A2004-E	3G3MX2-D2004-E/EC
	0.75	5.0	1.1	6.0	3G3MX2-A2007-E	3G3MX2-D2007-E/EC
	1.5	8.0	2.2	9.6	3G3MX2-A2015-E	3G3MX2-D2015-EC
	2.2	11.0	3.0	12.0	3G3MX2-A2022-E	3G3MX2-D2022-EC
	3.7	17.5	5.5	19.6	3G3MX2-A2037-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-D4004-EC
	0.75	3.4	1.5	4.1	3G3MX2-A4007-E	3G3MX2-D4007-EC
	1.5	4.8	2.2	5.4	3G3MX2-A4015-E	3G3MX2-D4015-EC
	2.2	5.5	3.0	6.9	3G3MX2-A4022-E	3G3MX2-D4022-EC
	3.0	7.2	4.0	8.8	3G3MX2-A4030-E	3G3MX2-D4030-EC
	4.0	9.2	5.5	11.1	3G3MX2-A4040-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		Line filter Rasmi		Line filter Schaffner	
Voltage	Model 3G3MX2-□	Reference AX-FIM	Current (A)	Reference AX-FIM	Current (A)
1Phase 200 VAC	AB001 / AB002 / AB004	1010-RE	10	1010-SE-V1	8
	AB007	1014-RE	14	1024-SE-V1	27
	AB015 / AB022	1024-RE	24	1024-SE-V1	27
3Phase 200 VAC	A2001 / A2002 / A2004 / A2007	2010-RE	10	2010-SE-V1	7.8
	A2015 / A2022	2020-RE	20	2020-SE-V1	16
	A2037	2030-RE	30	2030-SE-V1	25
	A2055 / A2075	2060-RE	60	2060-SE-V1	50
	A2110	2080-RE	80	2080-SE-V1	75
	A2150	2100-RE	100	2100-SE-V1	100
3Phase 400 VAC	A4004 / A4007	3005-RE	5	3005-SE-V1	6
	A4015 / A4022 / A4030	3010-RE	10	3010-SE-V1	12
	A4040	3014-RE	14	3014-SE-V1	15
	A4055 / A4075	3030-RE	30	3030-SE-V1	29
	A4110 / A4150	3050-RE	50	3050-SE-V1	48

① Input AC reactors

Inverter		AC Reactor
Voltage	Model 3G3MX2-□	Reference
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
1-Phase 200 VAC	AB002 / AB004	Under development
	AB007	
	AB015 / AB022	
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 single 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-A4011	AX-RC02330307-DE
		3G3MX2-A2011	AX-RC00590614-DE	3G3MX2-A4015	AX-RC01750430-DE
		3G3MX2-A2015	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	A2001 / A2002 / A2004 AB001 / AB002 / AB004	AX-RAO11500026-DE
	A2007/AB007	AX-RAO07600042-DE
	A2015 / AB015	AX-RAO04100075-DE
	A2022 / AB022	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 %
		3-phase	1-phase		Type AX-	Resist Ω		Type AX-	Resist Ω	
200 V (Single-/ Three-phase)	0.12	2001	B001	100	REM00K1400-IE	400	200	REM00K1400-IE	400	200
	0.25	2002	B002				180			180
	0.55	2004	B004		REM00K1200-IE	200	180	REM00K1200-IE	200	180
	1.1	2007	B007	50			100	REM00K2070-IE	70	200
	1.5	2015	B015		REM00K2070-IE	70	140	REM00K4075-IE	75	130
	2.2	2022	B022	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.

In the interest of product improvement, specifications are subject to change without notice.

GRT1-□

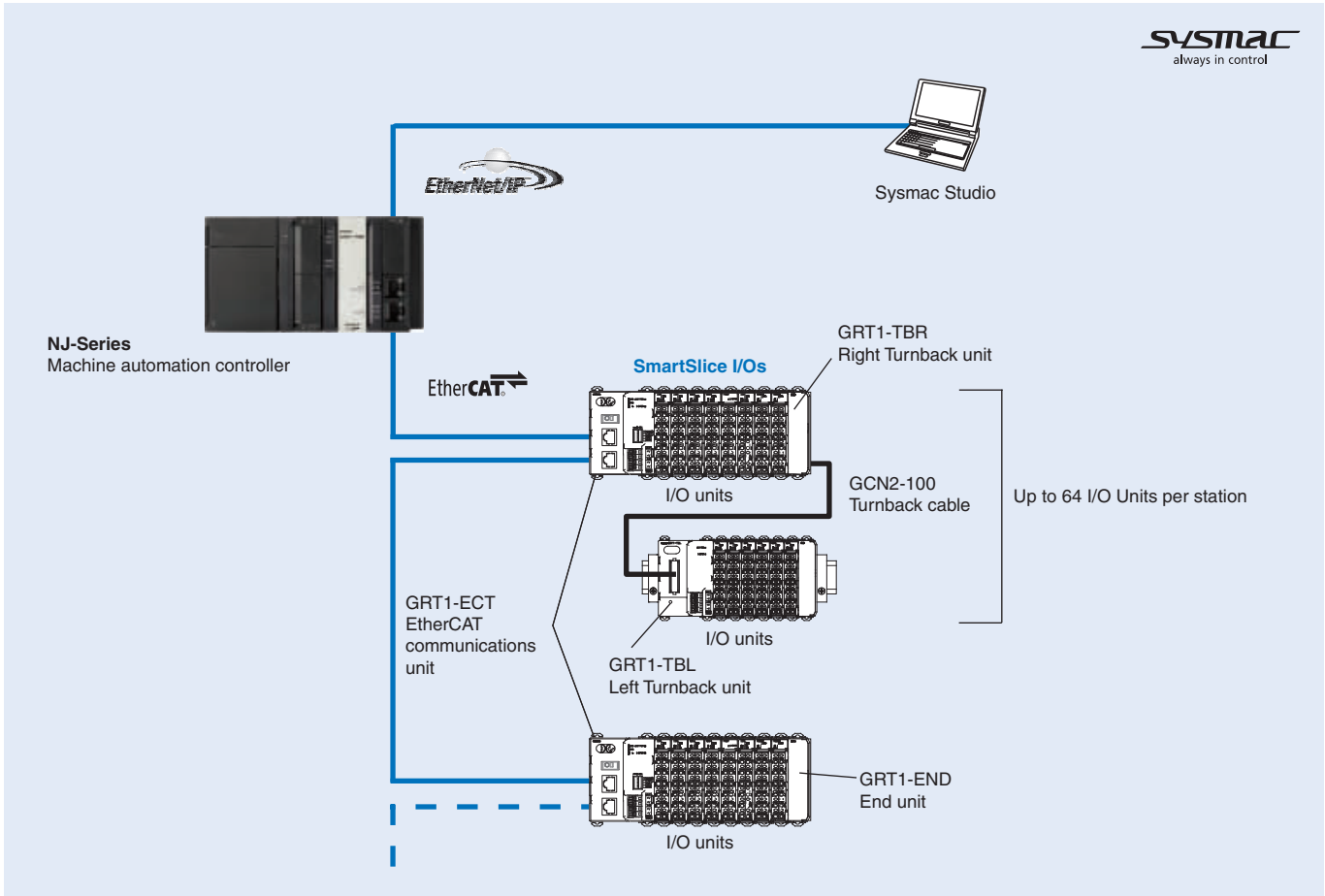
SmartSlice I/O

Plug-and-Play I/O

Remote I/O with digital and analogue I/O units, relay outputs and configurable temperature inputs. All SmartSlice units feature screwless 'push-in' I/O wiring, detachable I/O connector, and hot-swap capability. The EtherCAT 'coupler' automatically scans the connected I/O units at startup. The NJ-Series controller will verify the detected configuration against the registered configuration at startup.

- Up to 64 I/O units per station
- Screwless wiring
- Automatic I/O assignment
- Easy configuration backup
- Hot-swap with auto-restore
- Optional address setting

System Configuration



Specifications

General Specifications

Common SmartSlice Specifications	
Unit power supply voltage	24 VDC (20.4 to 26.4 VDC)
I/O power supply voltage	24 VDC (20.4 to 26.4 VDC)
I/O connection	Screwless push-in technology
Noise immunity	Conforms to IEC61000-4-4, 2.0 kV (power supply line)
Vibration resistance	10 to 60 Hz: 0.7 mm double amplitude 60 to 150 Hz: 50 m/s^2
Shock resistance	150 m/s^2, 3 times in each direction
Dielectric strength	500 VAC (between isolated circuits)
Insulation resistance	20 MΩ min. (between isolated circuits)
Ambient operating temperature	-10 to 55°C (with no icing or condensation)
Ambient operating humidity	25% to 85%
Operating environment	No corrosive gases
Ambient storage temperature	-25 to 65°C (with no icing or condensation)
Mounting	35 mm DIN rail

Communication Units

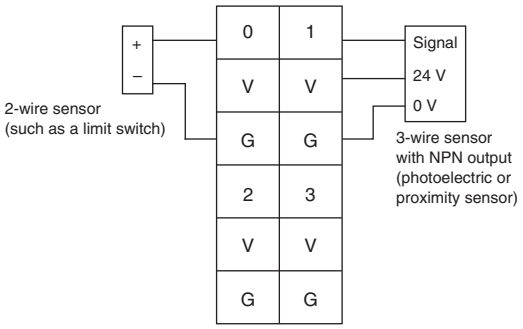
Model name	GRT1-ECT
Network Specification	EtherCAT for Sysmac (NJ)
Network connector	2 x RJ45
Network interface power supply	External 24 VDC (+10% - 15%)
Number of I/O points	1,024 inputs and outputs max. (128 bytes total)
Number of connectable Units	64 SmartSlice I/O Units max.
I/O power supply	24 VDC, 4 A max.
Status flags	1 word for Communications Unit status flag
Parameter backup and restore	Up to 2 KB of data per I/O Unit

Digital Input Units

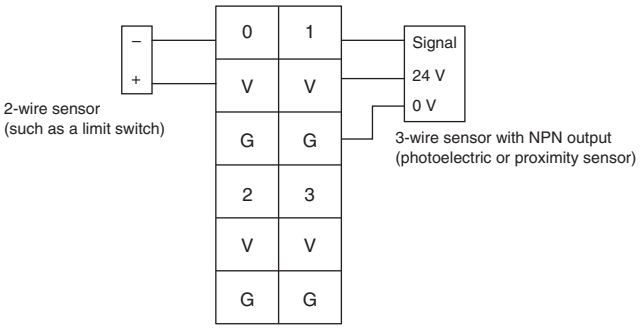
Model name	GRT1-ID4	GRT1-ID4-1	GRT1-ID8	GRT1-ID8-1
Signal type	DC input (for sinking outputs, NPN type)	DC input (for sourcing outputs, PNP type)	DC input (for sinking outputs, NPN type)	DC input (for sourcing outputs, PNP type)
Number of input points	4 inputs		8 inputs	
Power terminals	4 x V (24 V) + 4 x G (0 V)		4 x G (0 V)	4 x V (24 V)
ON voltage	15 VDC min.			
ON current	6 mA max./point (at 24 VDC)		4 mA max./point (at 24 VDC)	
OFF voltage	5 VDC max.			
OFF current	1 mA max.			
ON delay / OFF delay	1.5 ms max.			

Model name	GRT1-IA4-1	GRT1-IA4-2
Signal type	AC input, 110 V	AC input, 230 V
Number of input points	4 inputs	
Power terminals	None	
Input voltage	100 to 120 VAC -15% to +10%, 50/60 Hz	200 to 240 VAC -15% to +10%, 50/60 Hz
ON voltage	70 VAC min.	120 VAC min.
ON current	4 mA min.	
OFF voltage	20 VAC max.	
OFF current	2 mA max.	
ON delay / OFF delay	10 ms max./55 ms max.	10 ms max./40 ms max.

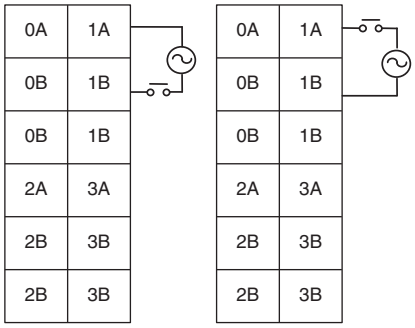
GRT1-ID4 (NPN)



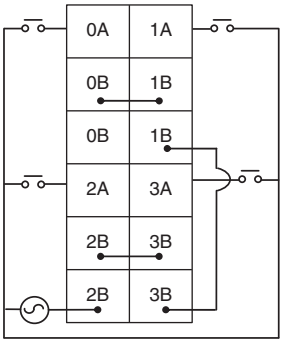
GRT1-ID4 -1 (PNP)



GRT1-IA4-1/GRT1-IA4-2

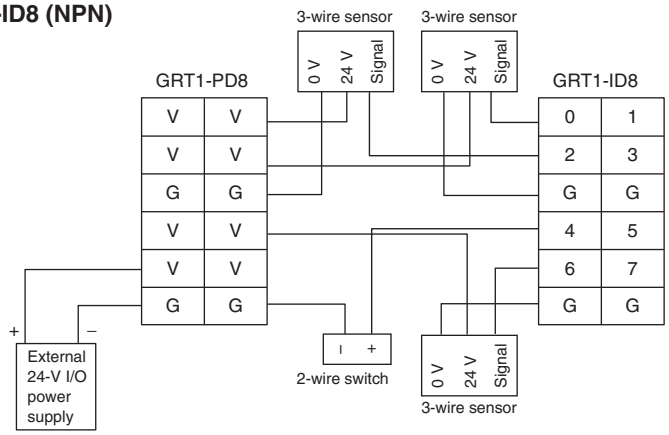


Note: No common signal for inputs.

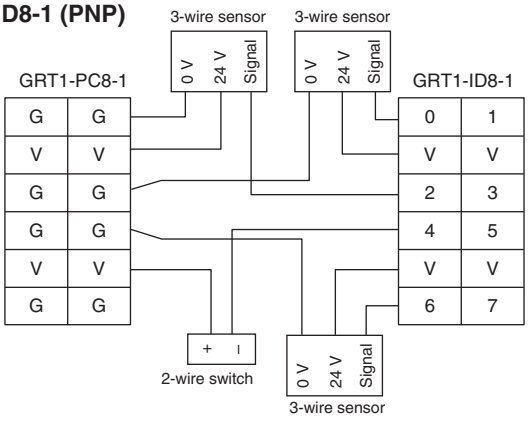


Note: Common signal for four inputs.

GRT1-ID8 (NPN)



GRT1-ID8-1 (PNP)

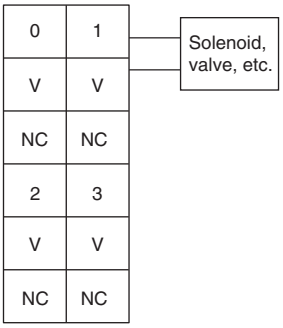


Digital Output Units

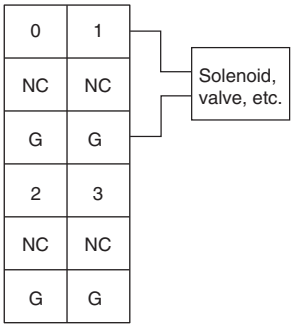
Model name	GRT1-OD4	GRT1-OD4-1	GRT1-OD4G-1	GRT1-OD4G-3
Signal type	Transistor output (NPN type, sinking)	Transistor output (PNP type, sourcing)	Transistor output (PNP type, sourcing), with short-circuit protection	
Number of output points	4 outputs			
Power terminals	4 x V (24 V)	4 x G (0 V)	4 x V (24 V) + 4 x G (0 V)	
Rated voltage	24 VDC (20.4 to 26.4 VDC)			24 V I/O power supply via the front terminal of the unit.
Rated output current	500 mA max./point			from 4 x 2.0 A at 30 °C to 4 x 1.0 A at 55 °C
Residual voltage	1.2 VDC max. (at 500 mA)			1.2 VDC max. (at 2 A)
Leakage cuurent	0.1 mA max.			
ON delay / Off delay	0.5 / 1.5 ms max.			

Model name	GRT1-OD8	GRT1-OD8-1	GRT1-OD8G-1	GRT1-ROS2
Signal type	Transistor output (NPN type, sinking)	Transistor output (PNP type, sourcing)	Transistor output (PNP type, sourcing), with short-circuit protection	Relay output (normally open)
Number of output points	8 outputs			2 outputs (with 2 terminals per connection)
Power terminals	4 x V (24 V)	4 x G (0 V)		n.a.
Rated voltage	24 VDC (20.4 to 26.4 VDC)			250 VAC / 24 VDC
Rated output current	500 mA max./point			2 A (min. 1 mA @ 5 VDC)
Residual voltage	1.2 VDC max. (at 500 mA)			-
Leakage cuurent	0.1 mA max.			-
ON delay / Off delay	0.5 / 1.5 ms max.			15 ms max.
Mechanical life expectancy	-			20,000,000 times min.
Electrical life expectancy	-			100,000 times min.

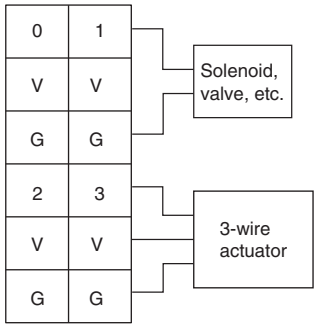
GRT1-OD4



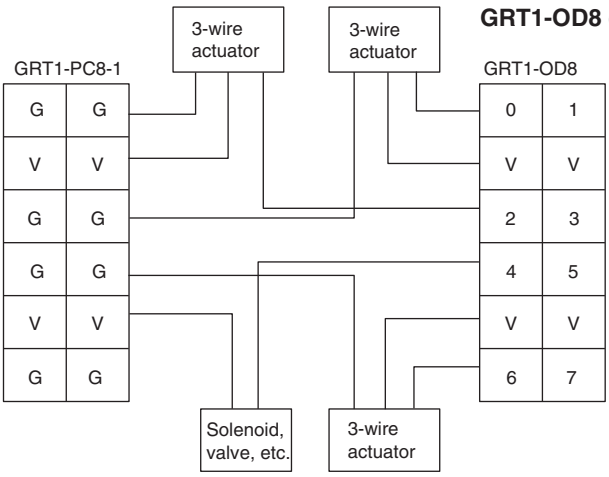
GRT1-OD4-1



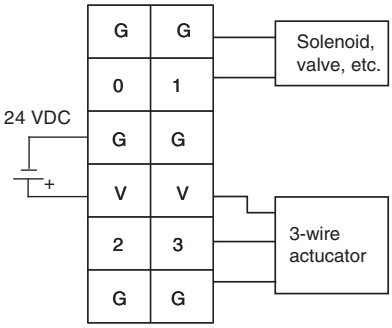
GRT1-OD4G-1 (PNP)



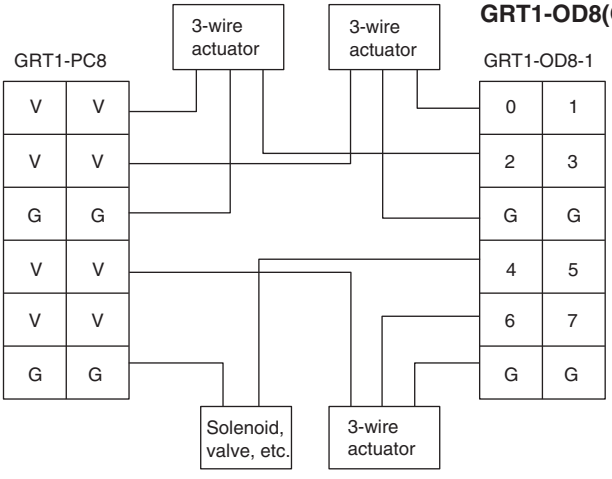
GRT1-OD8 (NPN)



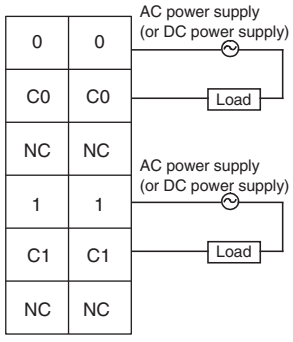
GRT1-OD4G-3 (PNP)



GRT1-OD8(G)-1 (PNP)



GRT1-ROS2

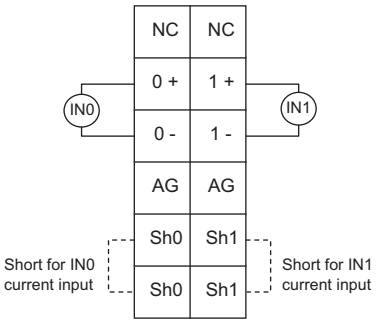


Analog I/O Units

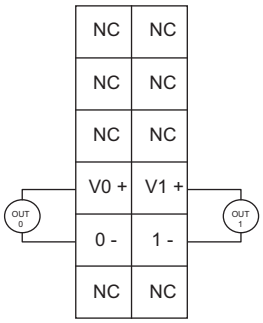
Model name	GRT1-AD2	GRT1-DA2V	GRT1-DA2C
Signal type	Analog Input: 0-20mA, 4-20mA, ±10V, 0-10V, 0-5V, 1-5V	Analog Output: ±10V, 0-10V, 0-5V, 1-5V	Analog Output: 0-20mA, 4-20mA,
Number of points	2 inputs	2 outputs	
Resolution	1/6000 full scale		
Conversion time	2ms / 2points		

Model name	GRT1-TS2P	GRT1-TS2PK	GRT1-TS2T
Signal type	Temperature input, Pt100, (2-wire, 3-wire)	Temperature input, Pt1000, (2-wire, 3-wire)	Thermocouple, R, S, K, J, T, E, B, N, L, U, W, or PL2
Number of points	2 inputs		
Indication range	-200 to +200 °C / -200 to +850 °C		Depends on thremocouple type
Accuracy	±0.3% of PV or ±0.8 °C* (whichever is larger) ±1 digit max. * (or ±0.5 °C for -200 °C to +200 °C input range)		±2°C ±1 digit max. Mounting restrictions apply. See Operation Manual W455
Resolution	0.1 °C, 16-bit signed integer, or 0.01 °C, 32-bit signed double integer		
Conversion time	250 ms / 2 points		

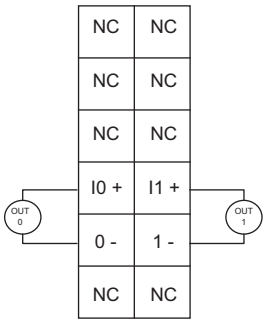
GRT1-AD2



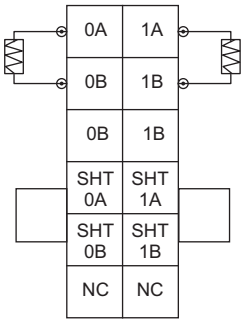
GRT1-DA2V



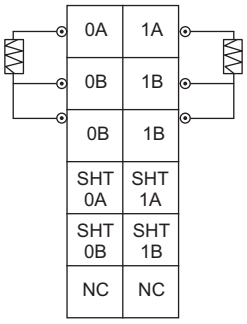
GRT1-DA2C



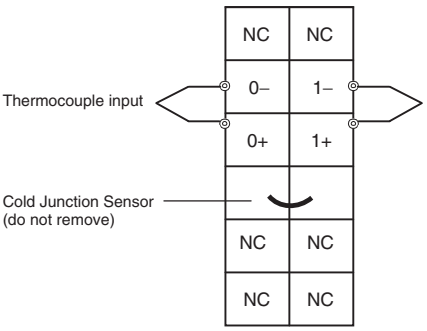
GRT1-TS2P/PK (2-wire)



GRT1-TS2P/PK (3-wire)

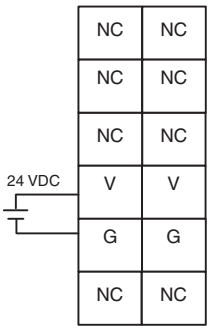


GRT1-TS2T

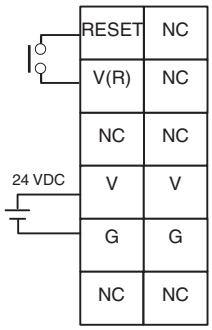


Power Feed and Distribution Units

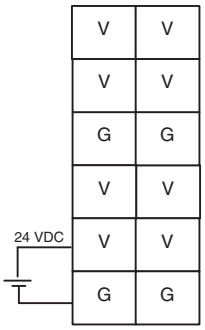
GRT1-PD2



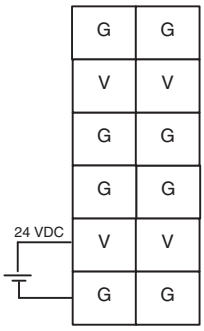
GRT1-PD2G



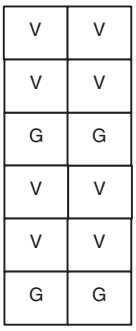
GRT1-PD8



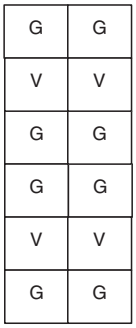
GRT1-PD8-1



GRT1-PC8

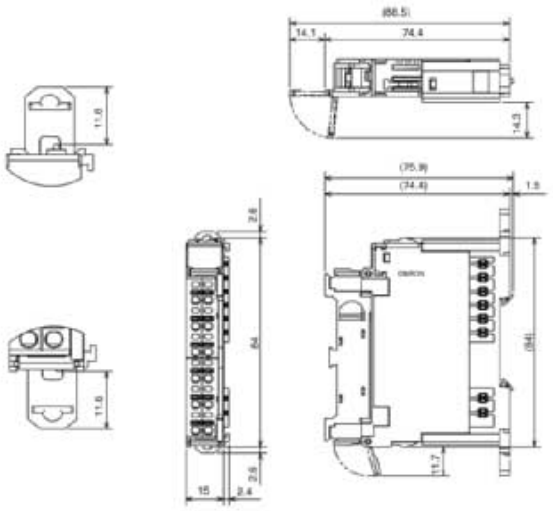


GRT1-PC8-1



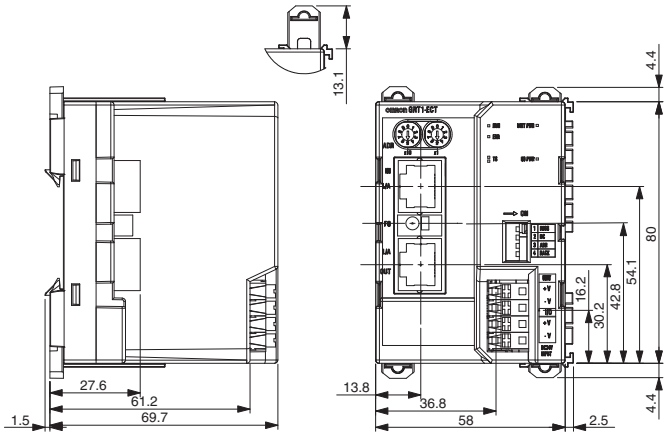
Dimensions

I/O-units



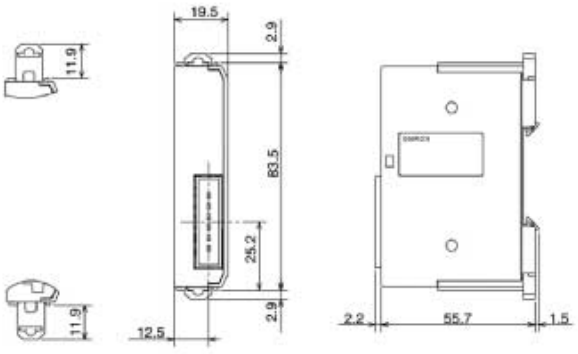
Communication Units

GRT1-ECT



End units

GRT1-END
GRT1-END-M
GRT1-TBR



Ordering Information

Communication Units

Function	Specification		Model code
EtherCAT interface unit	For up to 64 I/O units (slave to Sysmac controller)	84x58x70	GRT1-ECT
End plate	One unit required per bus interface	84x20x58	GRT1-END
End plate with memory function	Supports toolless replacement of PROFINET-IO interface unit	84x20x58	GRT1-END-M

I/O units

Function	Specification		Model code
4 NPN inputs	24 VDC, 6 mA, 3-wire connection	84x15x74	GRT1-ID4
4 PNP inputs	24 VDC, 6 mA, 3-wire connection	84x15x74	GRT1-ID4-1
8 NPN inputs	24 VDC, 4 mA, 1-wire connection + 4xG	84x15x74	GRT1-ID8
8 PNP inputs	24 VDC, 4 mA, 1-wire connection + 4xV	84x15x74	GRT1-ID8-1
4 AC inputs	110 VAC, 2-wire connection	84x15x74	GRT1-IA4-1
4 AC inputs	230 VAC, 2-wire connection	84x15x74	GRT1-IA4-2
4 NPN outputs	24 VDC, 500 mA, 2-wire connection	84x15x74	GRT1-OD4
4 PNP outputs	24 VDC, 500 mA, 2-wire connection	84x15x74	GRT1-OD4-1
4 PNP outputs with short-circuit protection	24 VDC, 500 mA, 3-wire connection	84x15x74	GRT1-OD4G-1
4 PNP outputs with short-circuit protection	24 VDC, 2 A, 2-wire connection	84x15x74	GRT1-OD4G-3
8 NPN outputs	24 VDC, 500 mA, 1-wire connection + 4xV	84x15x74	GRT1-OD8
8 PNP outputs	24 VDC, 500 mA, 1-wire connection + 4xG	84x15x74	GRT1-OD8-1
8 PNP outputs with short-circuit protection	24 VDC, 500 mA, 1-wire connection + 4xG	84x15x74	GRT1-OD8G-1
2 relay outputs	240 VAC, 2A, normally-open contacts	84x15x74	GRT1-ROS2
2 analog inputs, current/voltage	±10 V, 0-10 V, 0-5 V, 1-5 V, 0-20 mA, 4-20 mA	84x15x74	GRT1-AD2
2 analog outputs, voltage	±10 V, 0-10 V, 0-5 V, 1-5 V	84x15x74	GRT1-DA2V
2 analog outputs, current	0-20 mA, 4-20 mA	84x15x74	GRT1-DA2C
2 Pt100 inputs	Pt100, 2-wire or 3-wire connection	84x15x74	GRT1-TS2P
2 Pt1000 inputs	Pt1000, 2-wire or 3-wire connection	84x15x74	GRT1-TS2PK
2 Thermocouple inputs	Types B, E, J, K, N, R, S, T, U, W, PL2, with cold junction compensation	84x15x74	GRT1-TS2T

Other units

Function		Model code
I/O power feed unit, separates power supply between groups of I/O units	84x15x74	GRT1-PD2
I/O power feed unit with electronic overload protection, separates power supply between groups of I/O units	84x15x74	GRT1-PD2G
I/O power feed and distribution unit, separates power supply between groups of I/O units, 8xV + 4xG	84x15x74	GRT1-PD8
I/O power feed and distribution unit, separates power supply between groups of I/O units, 4xV + 8xG	84x15x74	GRT1-PD8-1
I/O power connection unit, 8xV + 4xG	84x15x74	GRT1-PC8
I/O power connection unit, 4xV + 8xG	84x15x74	GRT1-PC8-1
Turnback Unit, right-hand side	84x20x58	GRT1-TBR
Turnback Unit, left-hand side	84x58x70	GRT1-TBL
Turnback cable, one meter	1 m	GCN2-100

Accessories

Function	Model code
Replacement front connectors, pack of 5 pcs.	GRT1-BT1-5

EtherCAT controllers

Name		Model code
NJ-Series	CPU Units	NJ501-1300 (16 axes)
		NJ501-1400 (32 axes)
		NJ501-1500 (64 axes)
	Power Supply Units	NJ-PA3001 (220 VAC)
		NJ-PD3001 (24 VDC)

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

In the interest of product improvement, specifications are subject to change without notice.

GX-□

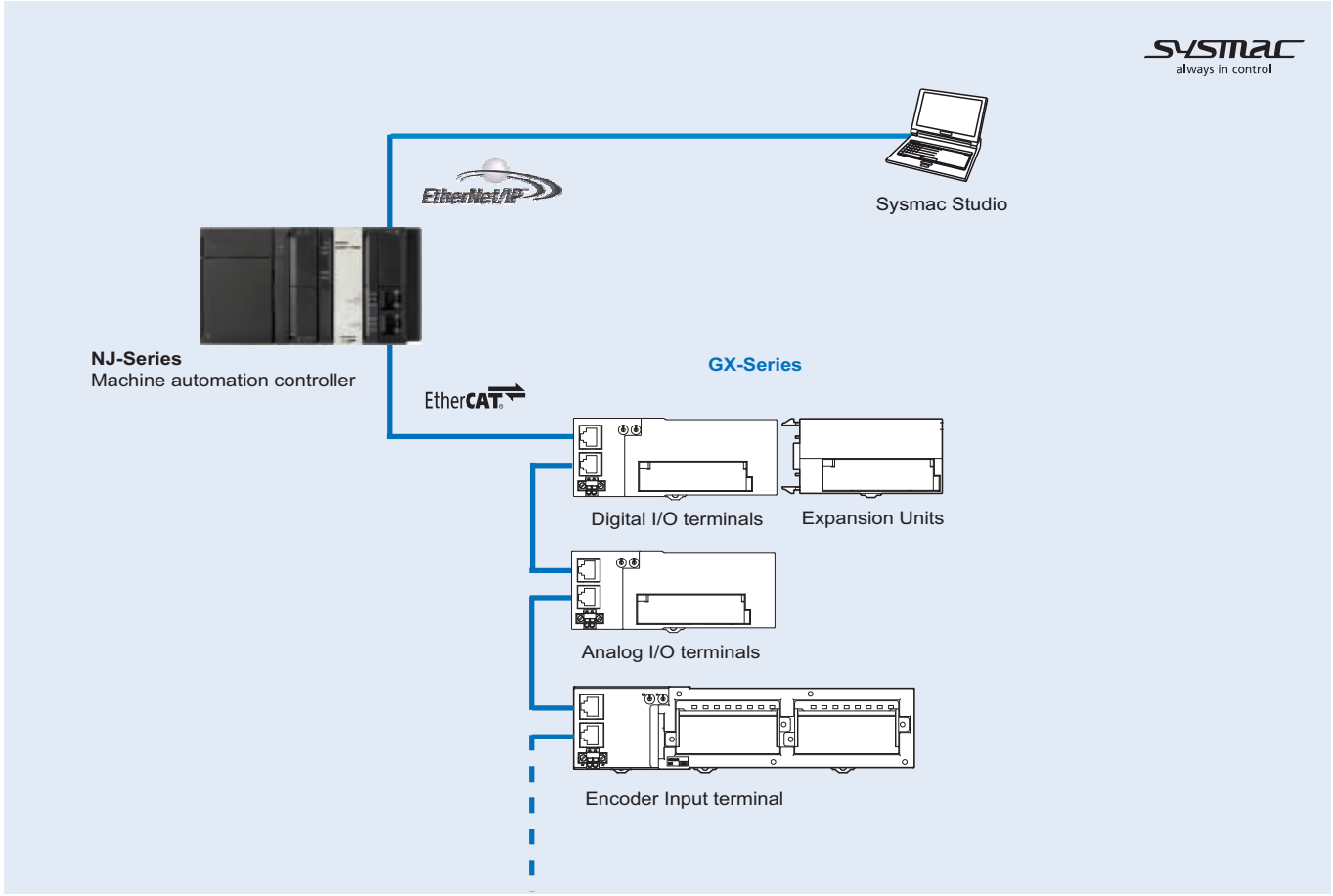
GX-Series I/O

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.

- Easy set-up: automatic and manual address setting
- Digital I/O terminals with high-speed input functionality, ON/OFF delay of 200 us 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



Type designation

GX-ID1612

EtherCAT Remote I/O Terminal GX-Series

Type
ID: DC Input
OD: DC Output
MD: DC Input/Output
OC: Relay Output
AD: Analog Input
DA: Analog Output
EC: Encoder Input

Number of I/O
02: 2 points (2CH)
04: 4 points (4CH)
16: 16 points
32: 32 points

Connecting
1: Screw (Common) (2-tier Terminal Block)
2: Screw (Divided common) (3-tier Terminal Block)

Input/Output Type

Code	Digital I/O type	Analog I/O type	Encoder Input type
1	NPN	-	Open collector
2	PNP	-	-
4	-	-	Line driver
7	-	Current/Voltage	-

Specifications

General specifications

GX-Series	Specification
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 (See Note.)	M3 wiring screws: 0.5 Nm M3 terminal block mounting screws: 0.5 Nm
Mounting method	35-mm DIN track mounting

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

EtherCAT Communications Specifications

Item	Specification
Communication protocol	Dedicated protocol for EtherCAT
Modulation	Base band
Baud rate	100 Mbps
Physical layer	100BASE-TX (IEEE802.3)
Connectors	RJ45 shielded connector x 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 x 1 L/A IN (Link/Activity IN) x 1 L/A OUT (Link/Activity OUT) x 1 RUN x 1 ERR x 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	Specification	
	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	Specification	
	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 ADC, between each output terminal and the G terminal)	1.2 V max. (0.5 ADC, 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	Specification
	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

Item	Specification
	GX-OC1601
Output handling for communications errors	Select either hold or clear
Short-circuit protection function	No

* 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	Specification	
	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 ADC, between each output terminal and the G terminal)	1.2 V max. (0.5 ADC, 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	Specification	
	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	Specification	
	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 ADC, between each output terminal and the G terminal)	1.2 V max. (0.5 ADC, 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	Specification	
	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 ADC, between each output terminal and the G terminal)	1.2 V max. (0.5 ADC, 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		Specification	
		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	25ºC	± 0.3% FS	± 0.4% FS
	-10 to 55ºC	± 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) *	

* 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		Specification	
		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	25ºC	± 0.4% FS	
	-10 to 55ºC	± 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		Specification			
		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.

Item	Specification			
	GX-EC0211			
Input restriction resistance	2.7 KΩ	430 Ω	2.7 KΩ	430 Ω
Maximum response frequency	Single phase 500 kHz (phase difference Multiplication x 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	Specification	
	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 x 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	Specification	
	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	Specification	
	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	Specification	
	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.	

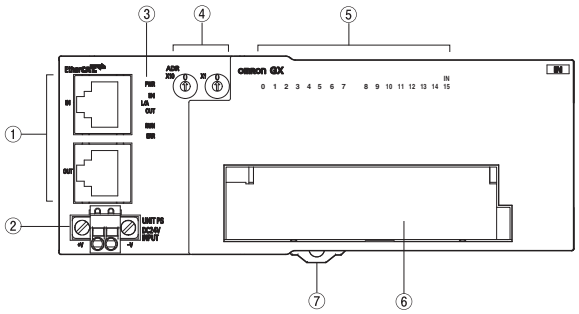
16-point output-point

Item	Specification	
	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.	

Nomenclature

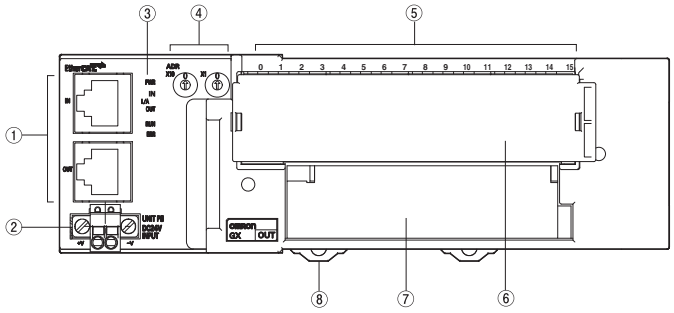
Digital I/O

16-point input (GX-ID1611/ID1621), 16-point output (GX-OD1611/OD1621)



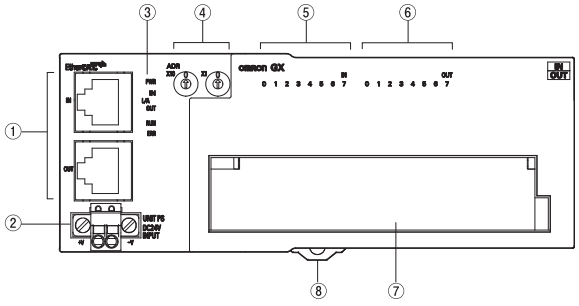
No.	Name	Function
1	Communications connector	(CN IN) Connects the communications cable which comes from the Master Unit side. (CN OUT) Connects the communications cable of the next I/O terminal.
2	Unit Power Supply Connector	Connect the unit power supply (24 VDC).
3	Status indicator	It indicates the communication state and the operation state of I/O terminals.
4	Node address Switch	It sets node addresses of terminals (decimal). Setting range is 00 to 99.
5	Input terminal: Input indicator (0 to 15) Output terminal: Output indicator (0 to 15)	Indicates the state of input/output contact (ON/OFF). Input terminal: Not lit: Contact OFF (input OFF state) Lit in yellow: Contact ON (input ON state) Output terminal: Not lit: Contact OFF (output OFF state) Lit in yellow: Contact ON (output ON state)
6	Terminal Block	Connects external devices and the I/O power supply. V, G: I/O power supply terminals 0 to 15: Input terminals
7	DIN track mounting hook	Fixes a slave to a DIN track.

16 relay output (GX-OC1601)



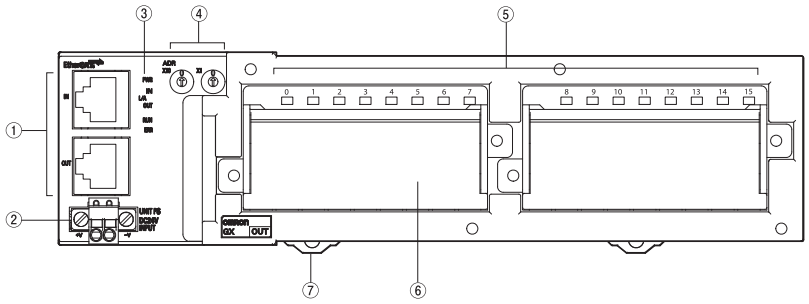
No.	Name	Function
1	Communications connector	(CN IN) Connects the communications cable which comes from the Master Unit side. (CN OUT) Connects the communications cable of the next I/O terminal.
2	Unit Power Supply Connector	Connect the unit power supply (24 VDC).
3	Status indicator	It indicates the communication state and the operation state of I/O terminals.
4	Node address Switch	It sets node addresses of terminals (decimal). Setting range is 00 to 99.
5	Output indicator (0 to 15)	Indicates the state of output contact (ON/OFF). Not lit: Contact OFF (input OFF state) Lit in yellow: Contact ON (input ON state)
6	Output Relay	Turn ON/OFF the contacts.
7	Terminal Block	Connects external devices and the I/O power supply. COM0, COM1: Common terminals 0 to 15: Output terminals
8	DIN track mounting hook	Fixes a slave to a DIN track.

8-point input and 8-point output (GX-MD1611/MD1621)



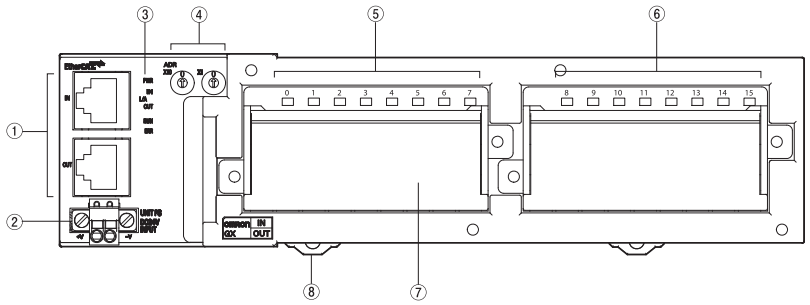
No.	Name	Function
1	Communications connector	(CN IN) Connects the communications cable which comes from the Master Unit side. (CN OUT) Connects the communications cable of the next I/O terminal.
2	Unit Power Supply Connector	Connect the unit power supply (24 VDC).
3	Status indicator	It indicates the communication state and the operation state of I/O terminals.
4	Node address Switch	It sets node addresses of terminals (decimal). Setting range is 00 to 99.
5	Input indicator (0 to 7)	Indicates the state of input contact (ON/OFF). Not lit: Contact OFF (input OFF state) Lit in yellow: Contact ON (input ON state)
6	Output indicator (0 to 7)	Indicates the state of output contact (ON/OFF). Not lit: Contact OFF (output OFF state) Lit in yellow: Contact ON (output ON state)
7	Terminal Block	Connects external devices and the I/O power supply. <Left side> V1, G1: Input I/O terminals 0 to 7: Input terminals <Right side> V2, G2: Output I/O terminals 0 to 7: Output terminals
8	DIN track mounting hook	Fixes a slave to a DIN track.

16-point input (GX-ID1612/ID1622), 16-point output (GX-OD1612/OD1622)



No.	Name	Function
1	Communications connector	(CN IN) Connects the communications cable which comes from the Master Unit side. (CN OUT) Connects the communications cable of the next I/O terminal.
2	Unit Power Supply Connector	Connect the unit power supply (24 VDC).
3	Status indicator	It indicates the communication state and the operation state of I/O terminals.
4	Node address Switch	It sets node addresses of terminals (decimal). Setting range is 00 to 99.
5	Input terminal: Input indicator (0 to 15) Output terminal: Output indicator (0 to 15)	Indicates the state of input/output contact (ON/OFF). Input terminal: Not lit: Contact OFF (input OFF state) Lit in yellow: Contact ON (input ON state) Output terminal: Not lit: Contact OFF (output OFF state) Lit in yellow: Contact ON (output ON state)
6	Terminal Block	Connects external devices and the I/O power supply. <Left side> V1, G1: I/O power supply terminals 0 to 7: Output terminals <Right side> V2, G2: I/O power supply terminals 8 to 15: Input terminals (Output terminals)
7	DIN track mounting hook	Fixes a slave to a DIN track.

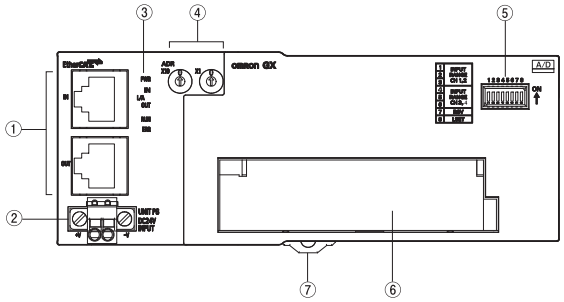
8-point input and 8-point output (GX-MD1612/MD1622)



No.	Name	Function
1	Communications connector	(CN IN) Connects the communications cable which comes from the Master Unit side. (CN OUT) Connects the communications cable of the next I/O terminal.
2	Unit Power Supply Connector	Connect the unit power supply (24 VDC).
3	Status indicator	It indicates the communication state and the operation state of I/O terminals.
4	Node address Switch	It sets node addresses of terminals (decimal). Setting range is 00 to 99.
5	Input indicator (0 to 7)	Indicates the state of input contact (ON/OFF). Not lit: Contact OFF (input OFF state) Lit in yellow: Contact ON (input ON state)
6	Output indicator (0 to 7)	Indicates the state of output contact (ON/OFF). Not lit: Contact OFF (output OFF state) Lit in yellow: Contact ON (output ON state)
7	Terminal Block	Connects external devices and the I/O power supply. <Left side> V1, G1: Input I/O puwer supply terminals 0 to 7: Input terminals <Right side> V2, G2: Output I/O power supply terminals 0 to 7: Output terminals
8	DIN track mounting hook	Fixes a slave to a DIN track.

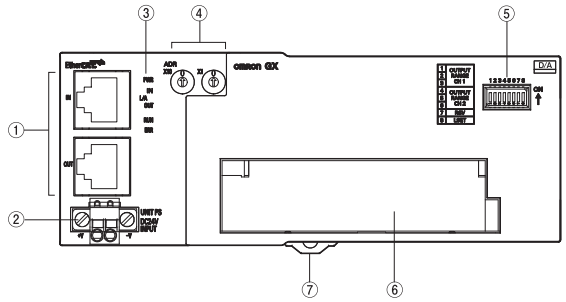
Analog I/O

4-Channel analogue input (GX-AD0471)



No.	Name	Function
1	Communications connector	(CN IN) Connects the communications cable which comes from the Master Unit side. (CN OUT) Connects the communications cable of the next I/O terminal.
2	Unit Power Supply Connector	Connect the unit power supply (24 VDC).
3	Status indicator	It indicates the communication state and the operation state of I/O terminals.
4	Node address Switch	It sets node addresses of terminals (decimal). Setting range is 00 to 99.
5	Input range switch	DIP switch for setting input range.
6	Terminal Block	Terminal block for analog input signals V1 to V4: Voltage input terminals I1 to I4: Current input terminals AG: Analog GND NC: Not used
7	DIN track mounting hook	Fixes a slave to a DIN track.

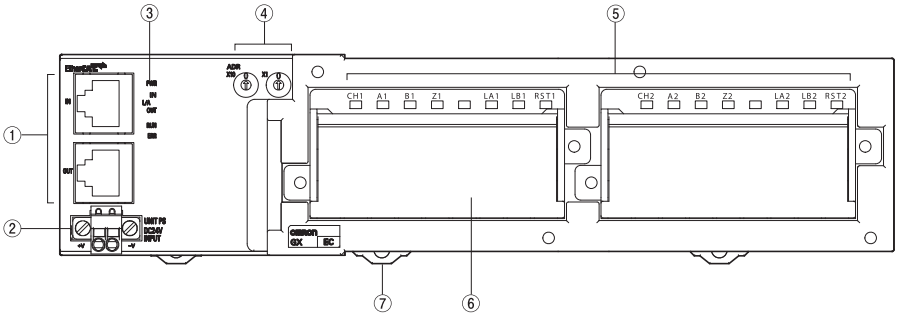
2-Channel analog output (GX-DA0271)



No.	Name	Function
1	Communications connector	(CN IN) Connects the communications cable which comes from the Master Unit side. (CN OUT) Connects the communications cable of the next I/O terminal.
2	Unit Power Supply Connector	Connect the unit power supply (24 VDC).
3	Status indicator	It indicates the communication state and the operation state of I/O terminals.
4	Node address Switch	It sets node addresses of terminals (decimal). Setting range is 00 to 99.
5	Output range switch	DIP switch for setting output range.
6	Terminal Block	Terminal block for analog output signals V1+, V2+: Voltage output positive terminals I1+, I2+: Current output positive terminals 1–, 2- : Voltage/current output negative terminals NC: Not used
7	DIN track mounting hook	Fixes a slave to a DIN track.

Encoder Input

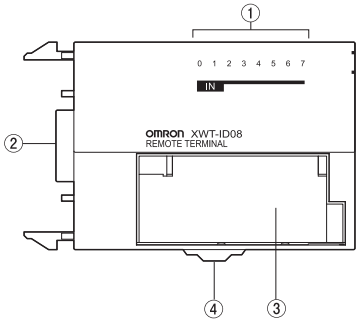
2 Open collector inputs (GX-EC0211), 2 Line-driver inputs (GX-EC0241)



No.	Name	Function
1	Communications Connectors	(CN IN) Connects the communications cable which comes from the Master Unit side. (CN OUT) Connects the communications cable of the next I/O terminal.
2	Unit Power Supply Connector	Connect the unit power supply (24 VDC).
3	Status Indicators	It indicates the communication state and the operation state of I/O terminals.
4	Node address Switches	It sets node addresses of terminals (decimal). Setting range is 00 to 99.
5	Inputs Indicators	The indicators show the status of the inputs of each channel. For details, refer to GX Series Operation Manual (Cat.No.W488).
6	Terminal Block	Connects external devices and the I/O power supply. For details, refer to GX Series Operation Manual (Cat.No.W488).
7	DIN track mounting hook	Fixes Slave Unit to a DIN track.

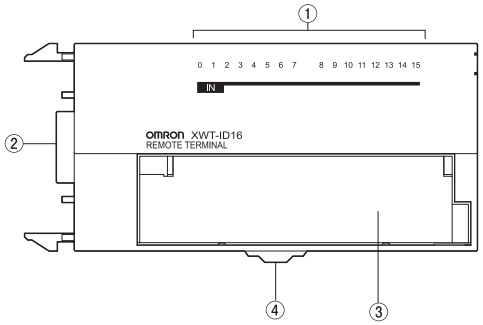
Expansion Units

8-point input expansion unit (XWT-ID08/ID08-1)



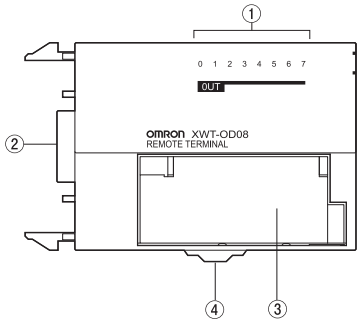
No.	Name	Function
1	Input indicator (0 to 7)	Indicates the state of input contact (ON/OFF). Not lit: Contact OFF (input OFF state) Lit in yellow: Contact ON (input ON state)
2	Terminal connector	Connects the connector on the right side of the slave.
3	Terminal block	Connects external devices and the I/O power supply. V, G: I/O power supply terminals 0 to 7: Input terminals
4	DIN track mounting hook	Fixes a slave to a DIN track.

16-point input expansion unit (XWT-ID16/ID16-1)



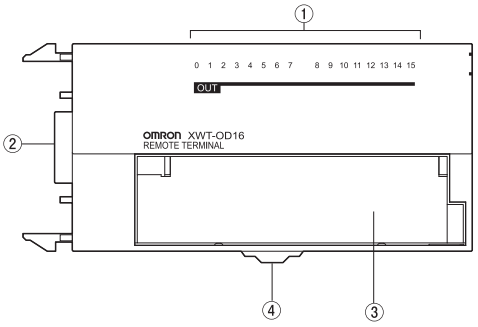
No.	Name	Function
1	Input indicator (0 to 15)	Indicates the state of input contact (ON/OFF). Not lit: Contact OFF (input OFF state) Lit in yellow: Contact ON (input ON state)
2	Terminal connector	Connects the connector on the right side of the slave.
3	Terminal block	Connects external devices and the I/O power supply. V, G: I/O power supply terminals 0 to 15: Input terminals
4	DIN track mounting hook	Fixes a slave to a DIN track.

8-point output expansion unit (XWT-OD08/OD08-1)



No.	Name	Function
1	Output indicator (0 to 7)	Indicates the state of output contact (ON/OFF). Not lit: Contact OFF (output OFF state) Lit in yellow: Contact ON (output ON state)
2	Terminal connector	Connects the connector on the right side of the slave.
3	Terminal block	Connects external devices and the I/O power supply. V, G: I/O power supply terminals 0 to 7: Output terminals
4	DIN track mounting hook	Fixes a slave to a DIN track.

16-point output expansion unit (XWT-OD16/OD16-1)

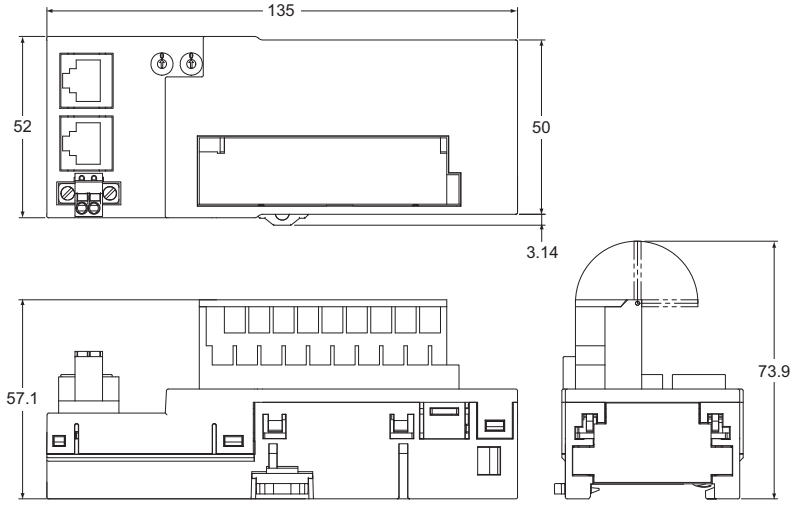


No.	Name	Function
1	Output indicator (0 to 15)	Indicates the state of output contact (ON/OFF). Not lit: Contact OFF (output OFF state) Lit in yellow: Contact ON (output ON state)
2	Terminal connector	Connects the connector on the right side of the slave.
3	Terminal block	Connects external devices and the I/O power supply. V, G: I/O power supply terminals 0 to 15: Output terminals
4	DIN track mounting hook	Fixes a slave to a DIN track.

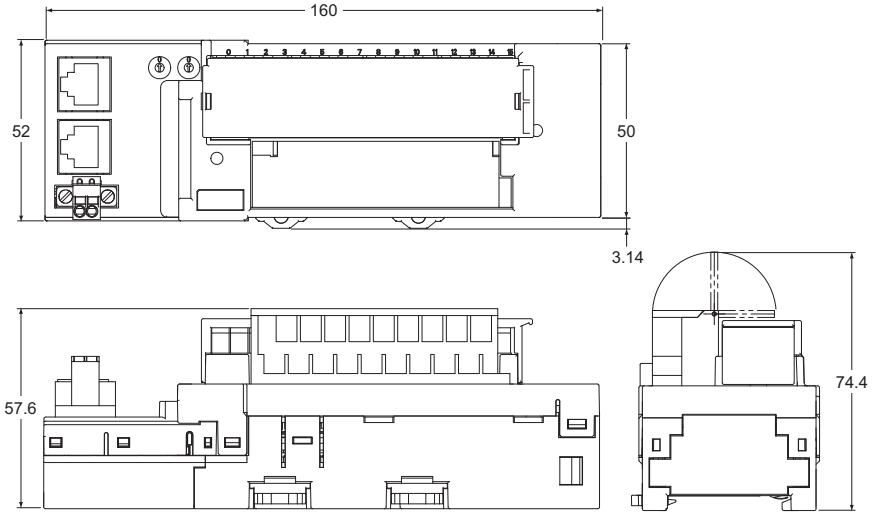
Dimensions

Digital I/O

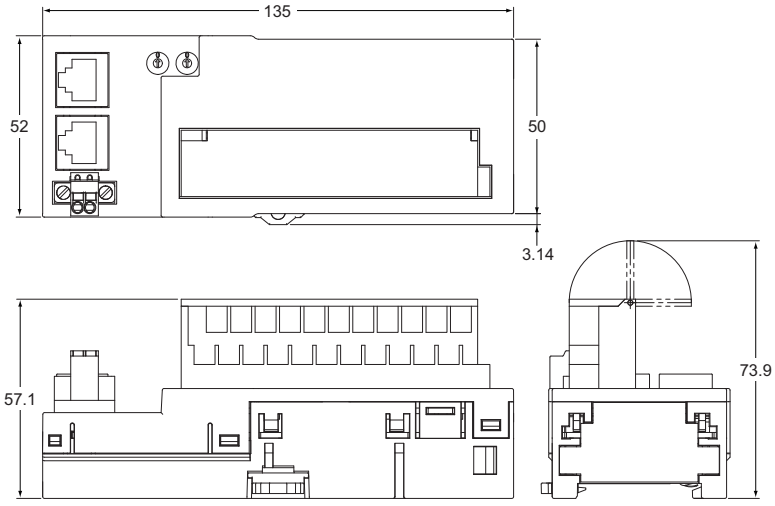
GX-ID1611/ID1621, GX-OD1611/OD1621



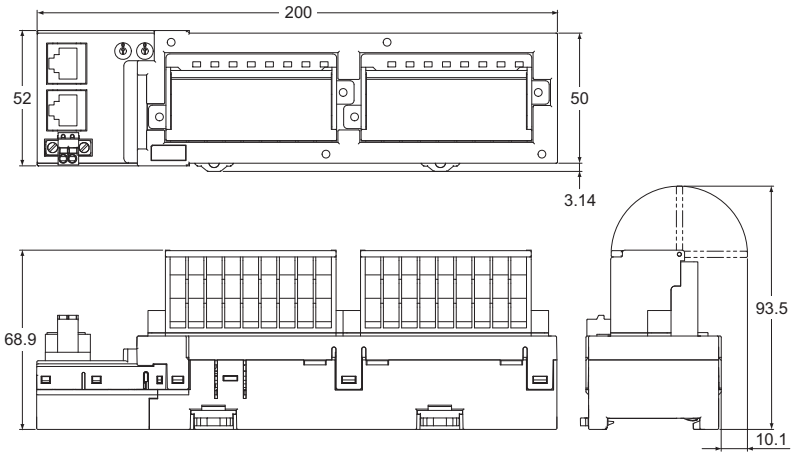
GX-OC1601



GX-MD1611/MD1621

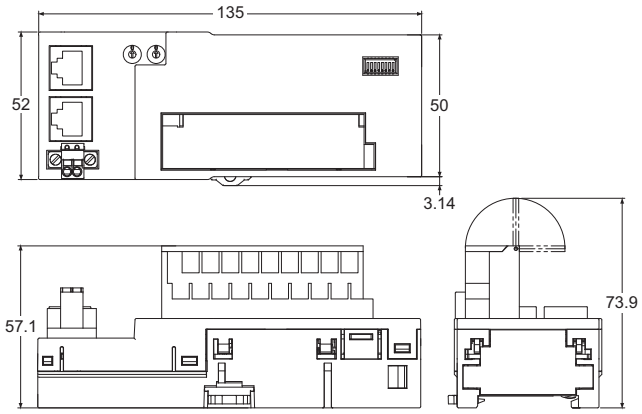


GX-ID1612/ID1622, GX-OD1612/OD1622, GX-MD1612/MD1622



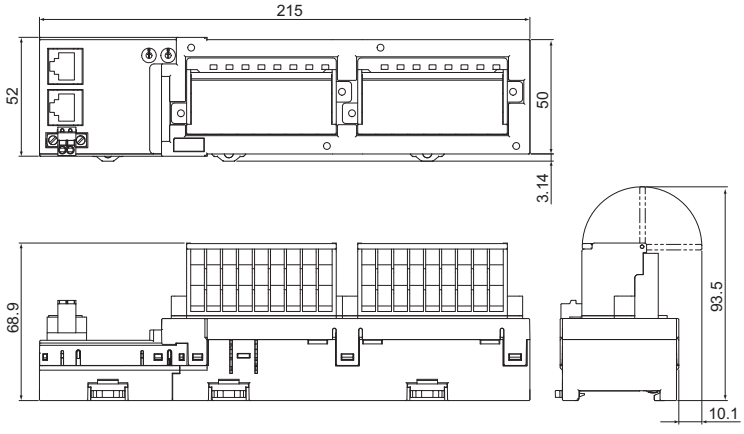
Analog I/O

GX-AD0471/DA0271



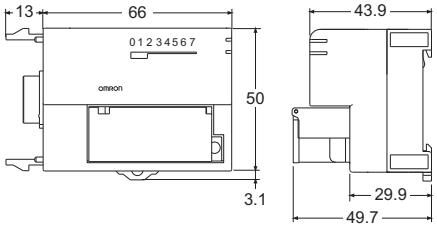
Encoder Input

GX-EC0211/EC0241

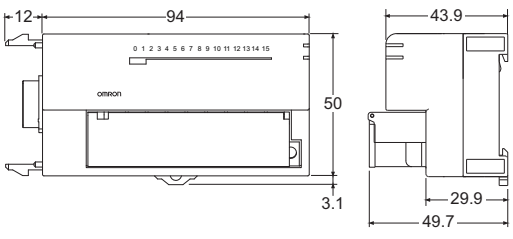


Expansion Units

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



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



Ordering information

Digital I/O

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

Encoder Input

Description	Specification	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	Specification	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.

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 servo, inverter, vision and I/O
- Fully compliant with open standard IEC 61131-3
- Supports Ladder, Structured Text, Function Block and in-line ST 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 Requeriments

Item	Requeriment
Operating system (OS) *1 *2 **Japanese or English system**	Windows XP (Service Pack 3 or higher, 32-bit version) / Vista (32-bit version) / 7 (32-bit/64 bit version)
CPU	Windows computers with Celeron 540 (1.8 GHz) or faster CPU Core i5 M520 (2.4 GHz) or equivalent or faster recommended
Main memory *3	2 GB min.
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	At least 1.6 GB of available space
Display	XGA, 1.024 x 768, 1.600 million colors, WXGA 1.280 x 800 min. recommended
Disk drive	DVD-ROM drive
Communications ports	USB port corresponded to USB 2.0, or Ethernet port *4

***1** Sysmac Studio Operating System Precaution: System requeriments and hard disk space may vary with the system environment.

***2** The following restrictions apply when Sysmac Studio is used with Microsoft Windows Vista or Windows 7.

1) Some Help files cannot be accessed.

The Help files can be accessed if the Help program distributed by Microsoft for Windows (WinHlp32.exe) is installed. Refer to the Microsoft homepage listed below or contact Microsoft for details on installing the file. (The download page is automatically displayed if the Help files are opened while the user is connected to the Internet.)
http://support.microsoft.com/kb/917607/en-us

2) The following restrictions apply to some application operations.

Application	Restriction
CX-Designer	If a new Windows Vista or Windows 7 font (e.g., Meiryo) is used in a project, the font size on labels may be bigger and the 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 Vista or Windows 7 imposes the following restrictions on the use of the software after installation. These restrictions will not exist if application data is installed using Run as Administrator. • If another user logs in, the applications data will need to be installed again. • The CPS files will not be automatically updated.

***3** 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.

***4** Refer to the hardware manual for your controller for hardware connection methods and cables to connect the computer and Controller.

Function Specifications

Category			Function
Setting parameters	EtherCAT Configuration and Setup	-	You create a configuration in the Sysmac Studio of the EtherCAT slaves connected to the built-in EtherCAT port of the Controller and setup the EtherCAT masters and slaves in that configuration.
		Registering slaves	You can set up devices bu dragging slaves from the device list displayed in the Toolbox Pane to the locations where you want to connect them.
		Setting master parameters	You set the common parameters of the EtherCAT network (e.g., the failt-soft operation and wait time for slave startup settings.)
		Setting slave parameters	You set the standard slave parameters and assign PDOs (process data object).
		Comparing and merging network configuration information	The EtherCAT network configuration information in the NJ-Series CPU Unit 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 NJ-Series CPU Unit. Or, the EtherCAT network configuration information in the NJ-Series CPU Unit is transferred to the Sysmac Studio and displayed in the EtherCAT Editor.
		Importing ESI files	ESI (EtherCAT slave information) files are imported.
	CPU/Expansion Rack Configuration and Setup	-	You create the configuration in the Sysmac Studio of the Units mounted in the NJ-Series CPU Rack and Expansion Racks and the Special Units. You can build a Rack by dragging Units from the device list displayed in the Toolbox Pane to the locations where you want to mount them.
		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	The model number, unit number and slot number are displayed.
		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	The Rack widths, current consumption and power consumption are displayed based on the Unit configuration information.
		Comparing the CPU/Expansion Rack configuration information	When online, you can compare the configurate 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 to the CPU Unit. The synchronize function is used.
		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, Write Protection at Startup and other settings are made.
		Transferring Operation Settings	Use the synchronize operation to transfer the operation settings to the Controller.
		Built-in EtherNet/IP Port Settings	These settings are made to perform communications using the built-in EtherNet/IP port of the Controller.
		Transferring Built-in EtherNet/IP Port Setting	Use the synchronize operation to transfer the Built-in EtherNet/IP port Settings to the Controller.
	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.
		Axis Setting	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 Setup	-	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.
	Cam Data Settings	-	The curve that defines the relationship between the phases and displacements of the cam data is called the cam profile curve. You can create cam profile curves with the Cam Editor.
		Creating cam data	Cam data is added to the project.
		Editing cam data	The profile data is set.
		Transferring cam data	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.
		Exporting cam tables	You can export cam data in the data format of the master and slave axes that is used by the Controller.
		Transferring cam data from the Controller to files	You can save a cam table that was transferred to the Controller to a file in the data format of the master and slave axes.
		Transferring cam data from files to the Controller	You can transfer the data from a cam data file in the data format of the master and slave axes to update the contents of the cam data that is already in the Controller.
	Task Setup	-	Programs are executed in tasks in an NJ-Series CPU Unit. The Task Setup defines 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.
		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.

Category			Function
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 to insert the instruction,
	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 run components	You can copy and past rung components.
		Inserting and deleting jump labels and jumps	You can inserta 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 parameteres, each character that you enter from the keyboard narrows the list of candidates that is displayed for selection.
	Programming structured text	-	You combine different ST statements to build algorithms.
		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.
	Finding and replacing		You can search for and replace strings in the data of a project.
	Jumping		You can jump to the specified rung number or line number in the program.
	Building	-	The programs in the project are converted into a format that is executable in the Controller.
		Rebuilding	A rebuild is used to build project programs that have already been built.
		Aborting a build operation	You can abort a build operation.
File operations	File options	Creating, Opening, Saving or Rename a project file	You can create, open, save or save under a different name a project file.
		Exporting a project file	You can convert a project file to a .smc file and export it.
		Importing a project file	You can import a project file that was saved in .txs format.
	Cuting, copying and pasting		You can cut, copy or paste items that are selected in the Multiview Explorer or any of the editors.
	Synchronize		The project file in the computer is compared with the data in the online NJ-Series CPU Unit and any differences are displayed. You can specify the transfer direction for any type of data and transfer all of the data.
	Printing		You can print various data. You can select the items to print.
	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 Controller and to copy files between the SD Memory Card and the 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 is 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 computer	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.
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 Controller. You can monitor operation on the Ladder Editor, ST Editor, Watch Tab Page or I/O Map.
	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.
	Changing the present values of variables		You can change the present values of user-defined variables, system-defined variables and device variables as required. You can do this in the Watch Tab Page or I/O Map.
	Forced refreshing		You select a BOOL variable and make the assigned I/O port or AT specification bit in memory for CJ-Series Units change to TRUE or FALSE to force refreshing with external devices. The specified values 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.

Category			Function
Debugging	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 Controller 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 save to a file.
		Displaying trace results	You view the results of the traced data in either a chart or in 3D Motion Trace Display Mode. 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.
		Exporting 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.
		Printing trace results	You can print out data trace settings along with digital and analog charts.
Simulation	Programs for debugging		You can create programs for debugging that are used only to execute simulations.
	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.
		Changing the simulation speed	You can change the execution speed.
		Task period simulation	You can display the task period.
	Setting virtual equipment	Creating 3D device models	You can create a 3D device model at the control target to monitor with the 3D motion trace function.
		Displaying 3D motion traces	You set the axis variables for each element of the 3D device model, and then set the 3D device 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 Controller 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 a Controller 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.
	Troubleshooting	-	You can use troubleshooting to check the errors that occurred in the Controller, display corrections for the errors and clear the errors.
		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 an HMIs for userdefined events that occur for execution of the Create Userdefined Information (SetInfo) instruction.
	User memory usage monitor		The space that is used by the project file you are editing in the Sysmac Studio is displayed in relation to the size of the Controller's memory. The file cannot be transferred to the Controller if the files size exceeds the space.
	Setting clock information		You can read and set the Controller's clock. The computer's clock information is also displayed.
Communications	Going online with a Controller		An online connection is established with the Controller.
	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 NJ-Series Controllers, 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.
	Backing up variables and memory		When you replace an NJ-Series Controller, you can back up the retained memory in the Controller to a file and restore the backed up data from the file to the new Controller.
Security Measures	Prevention of incorrect connections	Confirming Controller names and serial IDs	If the name or the serial ID is different between the project and the Controller when an online connection is established, a confirmation dialog box is displayed.
	Prevention of incorrect operation	Operation authority verification	Two levels of operation authority, Administrator and Maintainer, are set for access to the NJ-Series CPU Unit to restrict the operations that can be performed.
		Controller write protection	You can prevent rewriting of data in the Controller 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 (.smc)	When you export a project file, you can place a password on the file to protect your assets.
Online Help	Sysmac Studio help system		You can access Sysmac Studio operating procedures.
	Instructions reference		Information is provided on how to use the instructions that are supported by the NJ-Series CPU Units.
	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.

Applicable Models

Series		Unit version	Model
CPU	**NJ-Series**	-	NJ501-1300/1400/1500
Servo Drives	**G5-Series**	Unit version 2.1 or higher recommended	R88D-KNA5L-ECT/KN01L-ECT/KN02L-ECT/KN04L-ECT R88D-KN01H-ECT/KN02H-ECT/KN04H-ECT/KN08H-ECT/KN10H-ECT/ KN15H-ECT/KN20H-ECT/KN30H-ECT/KN50H-ECT/KN75H-ECT/KN150H-ECT R88D-KN06F-ECT/KN10F-ECT/KN15F-ECT/KN20F-ECT/KN30F-ECT/ KN50F-ECT/KN75F-ECT/KN150F-ECT
Inverters	**MX2-Series**	Version 1.1 or higher *1	3G3MX2-A2001/A2002/A2004/A2007/A2015/A2022/A2037/A2055/A2075/A2110/A2150 3G3MX2-A4004/A4007/A4015/A4022/A4030/A4040/A4055/A4075/A4110/A4150 3G3MX2-AB001/AB002/AB004/AB007/AB015/AB022
Remote I/O Terminals	**GX-Series**	Unit version 1.1 or higher recommended	GX-ID1611/1612/1621/1622/1618/1628/3218/3228 GX-OD1611/1612/1621/1622/1618/1628/3218/3228 GX-MD1611/1612/1621/1622/1618/1628/3218/3228 GX-OC1601 GX-AD0471 GX-DA0271 GX-EC0211/0241
	GRT1-Series	Unit version 2.0 or higher	GRT1-ECT + SmartSlice I/O units
HMIs	**NS-Series**	NS system program version 8.5 or higher CX-Designer version 3.3 or higher	NS5-MQ11-V2/MQ11B-V2 NS5-SQ11-V2/SQ11B-V2 NS5-TQ11-V2/TQ11B-V2 NS8-TV01-V2/TV01B-V2 NS10-TV01-V2/TV01B-V2 NS12-TS01-V2/TS01B-V2 NS15-TX01S-V2/TX01B-V2
Vision Sensors *2	**FQ-Series**	-	FQ-MS120-ECT/125-ECT FQ-MS120-M-ECT/125-M-ECT

***1** A communications unit for connecting to EtherCAT network (3G3AX-MX2-ECT with unit version 1.1 or higher) is additionally required.
***2** Available as of autumn 2011.

Ordering Information

Automation Software

Please purchase a DVD and licenses the first time you purchase the Sysmac Studio. DVDs and licenses are available individually.
The license does not include the DVD.

Product	Specifications			Model
	-	Number of licenses	Media	
Sysmac Studio Standard Edition Ver. 1.□□	The Sysmac Studio provides an integrated development environment to design, program, debug and mantain SYSMAC NJ-Series Controllers and other Machine Automation Controllers, as well as EtherCAT slaves. Sysmac Studio runs on the following OS. Windows XP (Service Pack 3 or higher), Vista or 7	- (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

Note: 1. Site licenses are available for users who will run Sysmac Studio on multiple computers. Ask your OMRON sales representative for details.
2. If CX-One is installed on the same computer as Sysmac Studio, it must be CX-One v4.2 or higher

Components

DVD (SYSMAC-SE200D)

Components	Description
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)

Name	Description
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

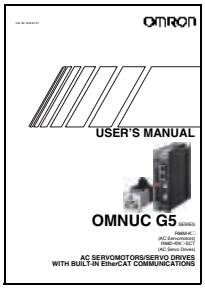
Sysmac Studio includes the following software.

Included Support Software		Outline
CX-Designer	**Ver. 3.□**	The CX-Designer is used to create screens for NS-Series PTs.
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.
CX-ConfiguratorFDT	**Ver. 1.□**	CX-ConfiguratorFDT is the configuration software for PROFIBUS and PROFINET networks using open FDT/DTM technology.

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

In the interest of product improvement, specifications are subject to change without notice.

Technical documentation



	Product	Title	Cat. No.
Machine Automation Controller	NJ-Series CPU Unit Hardware	User manual	W500-E1
	NJ-Series CPU Unit Software	User manual	W501-E1
	NJ-Series CPU Unit Motion Control	User manual	W507-E1
	NJ-Series CPU Unit Built-in EtherCAT Port	User manual	W505-E1
	NJ-Series CPU Unit Built-in EtherNet/IP Port	User manual	W506-E1
	NJ-Series Instructions	Reference manual	W502-E1
	NJ-Series Motion Control Instructions	Reference manual	W508-E1
	NJ-Series Troubleshooting	Troubleshooting manual	W503-E1
	CJ-Series Analog I/O Units for NJ-Series CPU Unit	Operation manual	W490-E1
	CJ-Series Analog I/O Units for NJ-Series CPU Unit	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	Z310-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 DeviceNet Units for NJ-Series CPU Unit	Operation manual	W497-E1
Software	Sysmac Studio Version 1	Operation manual	W504-E1
AC Servo system	Accurax G5 EtherCAT rotary motor	User manual	I576-E1
	Accurax G5 EtherCAT linear drive	User manual	I164E-EN
	Accurax G5 Servo system for rotary motor	Brochure	CD_EN-__+Accurax-G5+Brochure
Frequency inverter	MX2 inverter	User manual	I570-E2
	MX2 inverter	Quick Start Guide	I129E-EN
	MX2 EtherCAT option board	User manual	I574-E1
	MX2 inverter	Brochure	KPP_MX2_EN_INT
Remote I/O	SmartSlice I/O	Operation manual	W18E-EN
	GX-Series	Operation manual	W488-E1
Human Machine Interface	NS-Series Programmable Terminals	Setup Manual	V083
		Programming Manual	V073

Note:

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