

FAgoods

Network Devices

General Catalog

Time and Wire Saving Devices



Network Devices



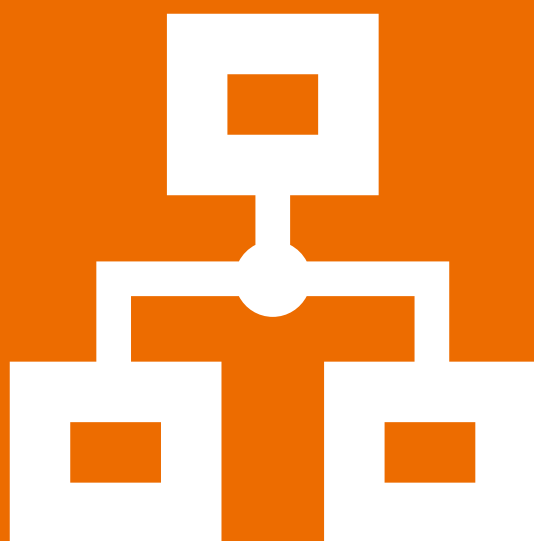
Products for Monitoring and Traceability



Upgrade Tool Products

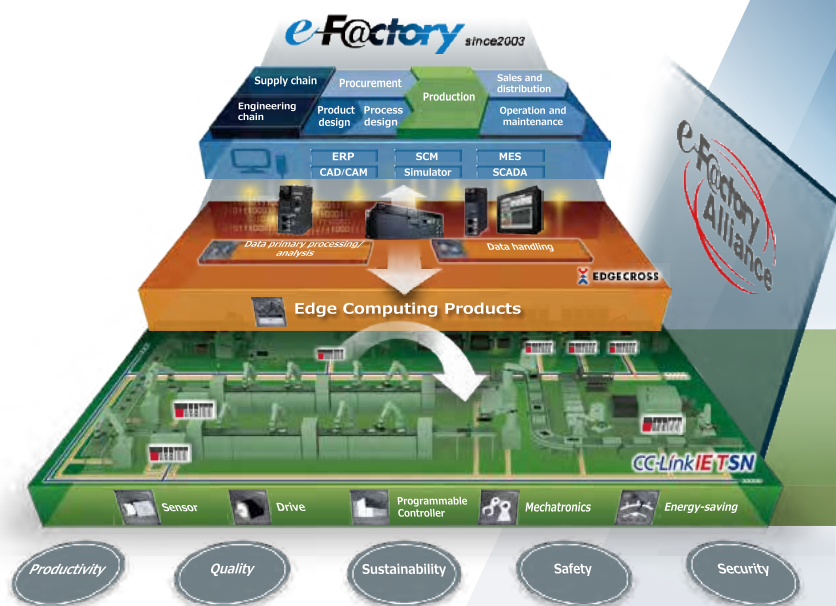


Products for System Maintenance



2022-23

Toward the network-connected
new age



Source: Mitsubishi Electric Corporation

e-F@ctory

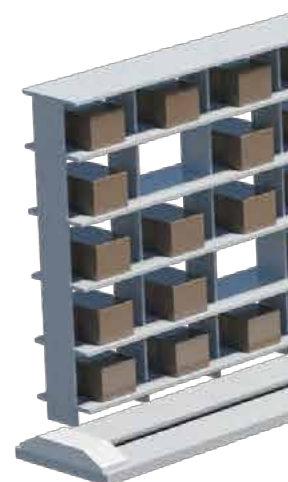
Manufacturing can be optimized by analyzing and utilizing the data collected from various devices and equipment connected with IoT in developing, manufacturing, and logistics processes.

Our high technical capability and quality and technique to link FA devices and IT system will offer solutions for next-generation manufacturing such as mass customization, preventive maintenance, and traceability.

Fields of manufacturing are changing and to be changed

Labor-saving will support future manufacturing as the number of workers is decreasing today.

Our products provide five methods for innovative solutions according to fields of manufacturing.



Five methods for smart factory

Time and wire saving devices



01

Easy wiring for innovative solutions

Network devices



02

Introduction of small-scale IoT to reform production sites

Products for monitoring and traceability



03

Visualization (monitoring and diagnosis) of production sites

Upgrade tool products



04

Upgrading system leading to smart factory

Products for system maintenance



05

Stable operation for productivity improvement



Time and wire saving devices

Easy wiring for innovative solutions

Our products can offer innovative solutions by reducing wiring work for PLCs (programmable controllers), servo systems, HMIs (Human Machine Interfaces), and computerized numerical controllers (CNCs).



Network devices

Introduction of small-scale IoT to reform production sites

We provide products to use the CC-Link family, SSCNET, or FL-net communication.



Products for monitoring and traceability

Visualization (monitoring and diagnosis) of production sites

Our products and solutions enable monitoring and diagnosis.



Upgrade tool products

Upgrading system leading to smart factory

System can be upgraded for smart factory using our products for upgrading PLCs (programmable controllers) and devices and software for servo system.



Products for system maintenance

Stable operation for productivity improvement

We provide products to reduce cost and time for maintenance in production sites.



Network devices

Introduction of small-scale IoT to reform production sites

We provide products to be connected to industrial networks, which is necessary to rapidly-advancing introduction of IoT in factories.

We support introduction of IoT in factories by providing methods to use networks to visualize data and images and to link devices and machines, and providing contracted development of network devices.



Our products
solve your issues.

Wire saving by connecting devices to a network

Integrating data from devices by connecting the devices to a network

Connecting non-Mitsubishi devices through a network

Visualizing production status

Using the same program for servo motors and hydraulic cylinders

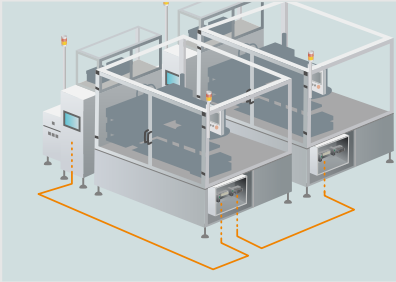
Introducing a coexisting system of servo motors and hydraulic cylinders

High-precise hydraulic control



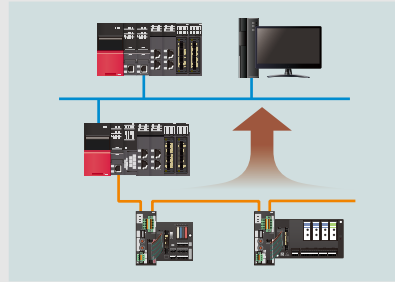
Production site where sensors, switches, CNC, and other devices are all connected

Wire saving with network connection



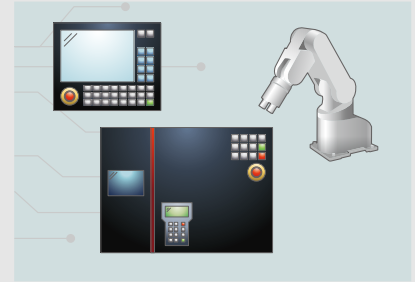
The network interface module allows easy network connection from the inside of the control panel to a device and relay box.

Small-scale IoT



The network interface module collects data from a digital signal converter (terminal module) and an analog signal converter, enabling small-scale IoT.

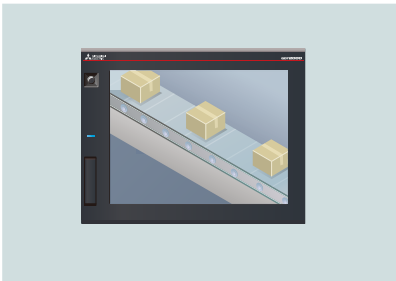
Open network connection



The FL-net interface module allows to connect non-Mitsubishi PLCs, computerized numerical controllers (CNC), personal computers, and other devices.

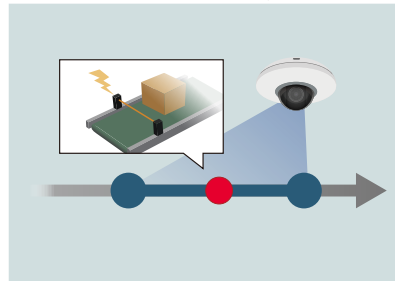
Production site where processes are visible (monitored and diagnosed) with network connection

Checking images using an HMI (GOT)



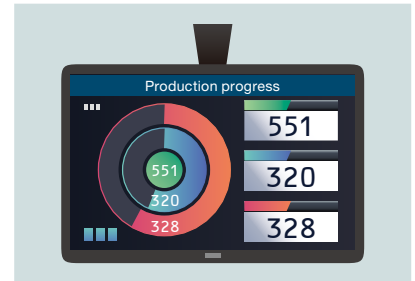
The network camera interface module enables the production site to be monitored remotely using an on-site HMI (GOT).

Downtime countermeasures (camera monitoring)



When a trouble is detected, the network camera interface module enables recording images before and after the trouble for the trouble analysis.

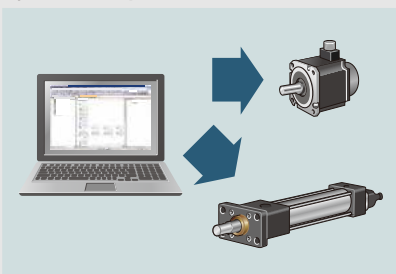
ANDON system



The RFID interface "visualizes" the production status and quality of all processes.

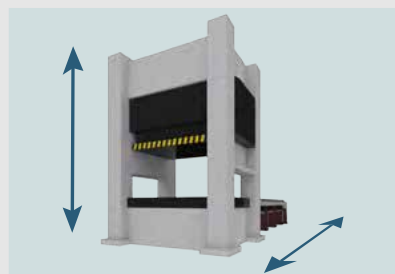
Production site where hydraulic control is easily performed with SSCNET connection

Same program for all hydraulic cylinder operations



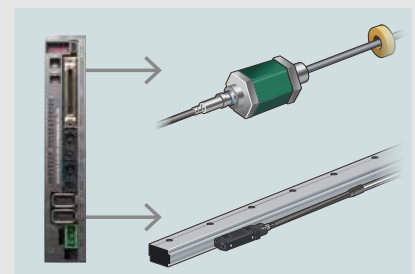
The same program can be applied to positioning of a hydraulic cylinder and operation of a servo motor.

Hybrid drive



The hydraulic cylinder and the servo motor can be operated synchronously.

Compatible position sensors



An analog input module, a pulse encoder, a Mitsubishi Electric serial encoder, and an SSI encoder can be used as a position sensor.

Configuration diagram

Small-scale IoT system for integrated data management

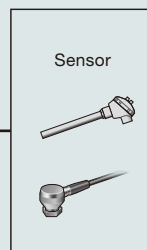
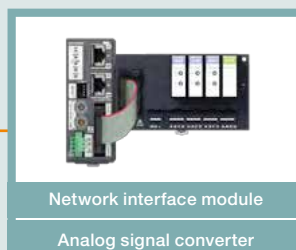
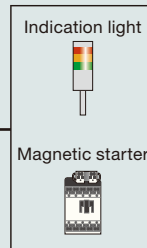
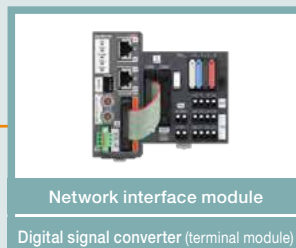
Visualization of production lines and systems with sensors and switches

Network distributed type



Refer to P.10. >

CC-Link IE TSN
CC-Link IE Field
CC-Link IE Field Basic
CC-Link
SLMP (standard Ethernet)
MODBUS/TCP



Monitoring and Traceability (RFID)

Visualization of production status with data from RF tags

Slot-in type



Network distributed type



Refer to P.48. >

Slot-in type



MELSEC iQ-R series
MELSEC-Q series



Network distributed type



CC-Link IE Field
CC-Link

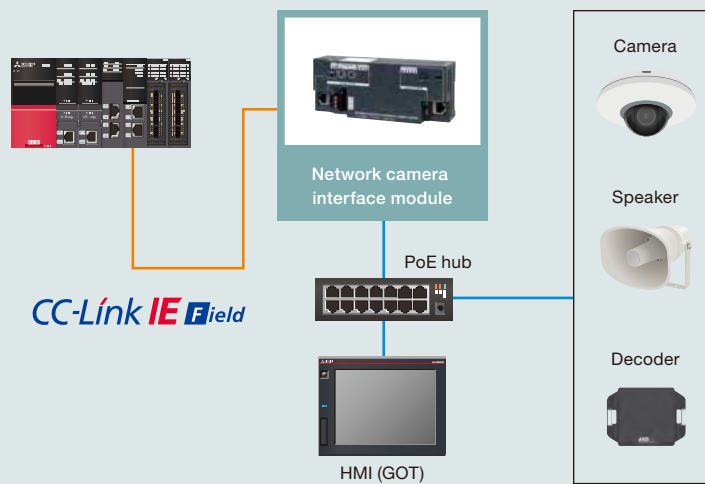
Monitoring and Traceability (camera monitoring)

Visualization of production sites with network cameras

Network distributed type



Refer to P.42. >



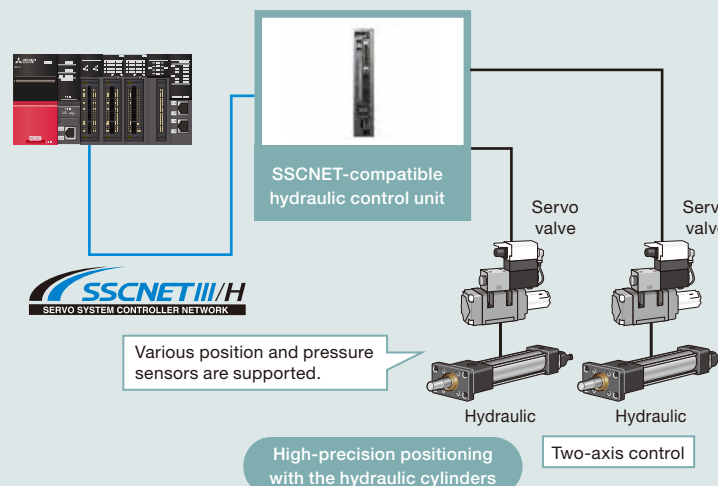
Hydraulic control

Easy synchronous operation of hydraulic cylinders using the SSCNET-compatible hydraulic control unit

Network distributed type



Refer to P.64. >



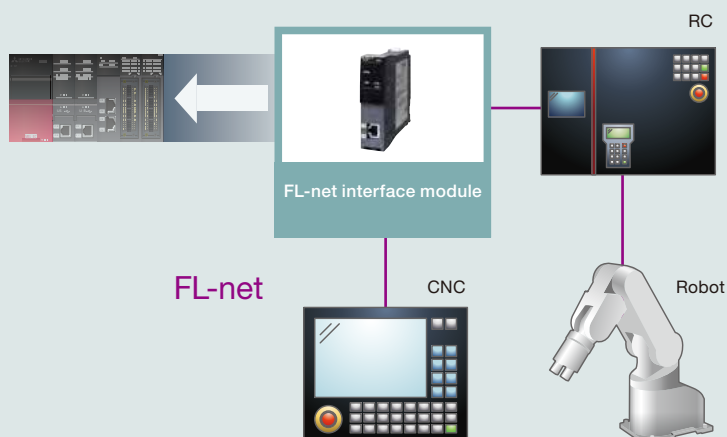
Open network connection

Connection with non-Mitsubishi PLCs and robots through FL-net (OPCN-2)

Slot-in type



Refer to P.72. >



Network devices

Small-scale IoT / Economical network setup

Small-scale IoT / Economical network setup

INDEX

Small-scale IoT (Network interface module)

Features	P.10
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Related products (Analog signal converter)	P.18
Model list	P.19
Specifications	P.20

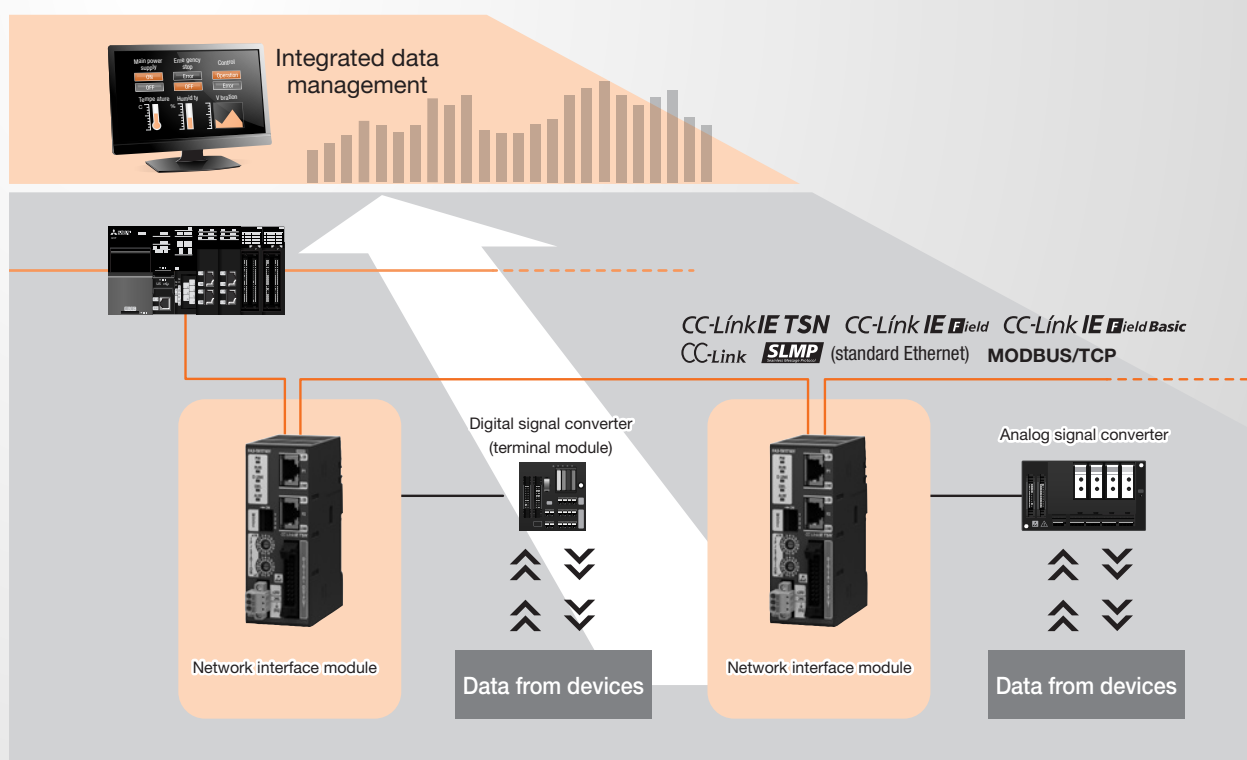
Economical network setup (CC-Link)

Features	P.26
Model list	P.27
Specifications	P.29

Small-scale IoT (Network interface module)

Connecting the digital signal converter (terminal module) and the analog signal converter through a network to

collect data from devices enables small-scale IoT.



P.11

Small-scale IoT system for integrated data management

Data from devices is collected in upper hierarchical levels through a network, visualizing the data.

P.11

Saving cost and time for wiring in panel and system

Wiring from the inside of the control panel to the device and relay box can be performed using only one CC-Link dedicated cable. Wiring can be also simply performed when increasing devices.

P.11

Switching the network using switches

The network can be switched among CC-Link IE TSN, CC-Link IE Field, CC-Link IE Field Basic, SLMP (standard Ethernet), and MODBUS/TCP using the switches on the network interface module.
(CC-Link-compatible products are also available.)

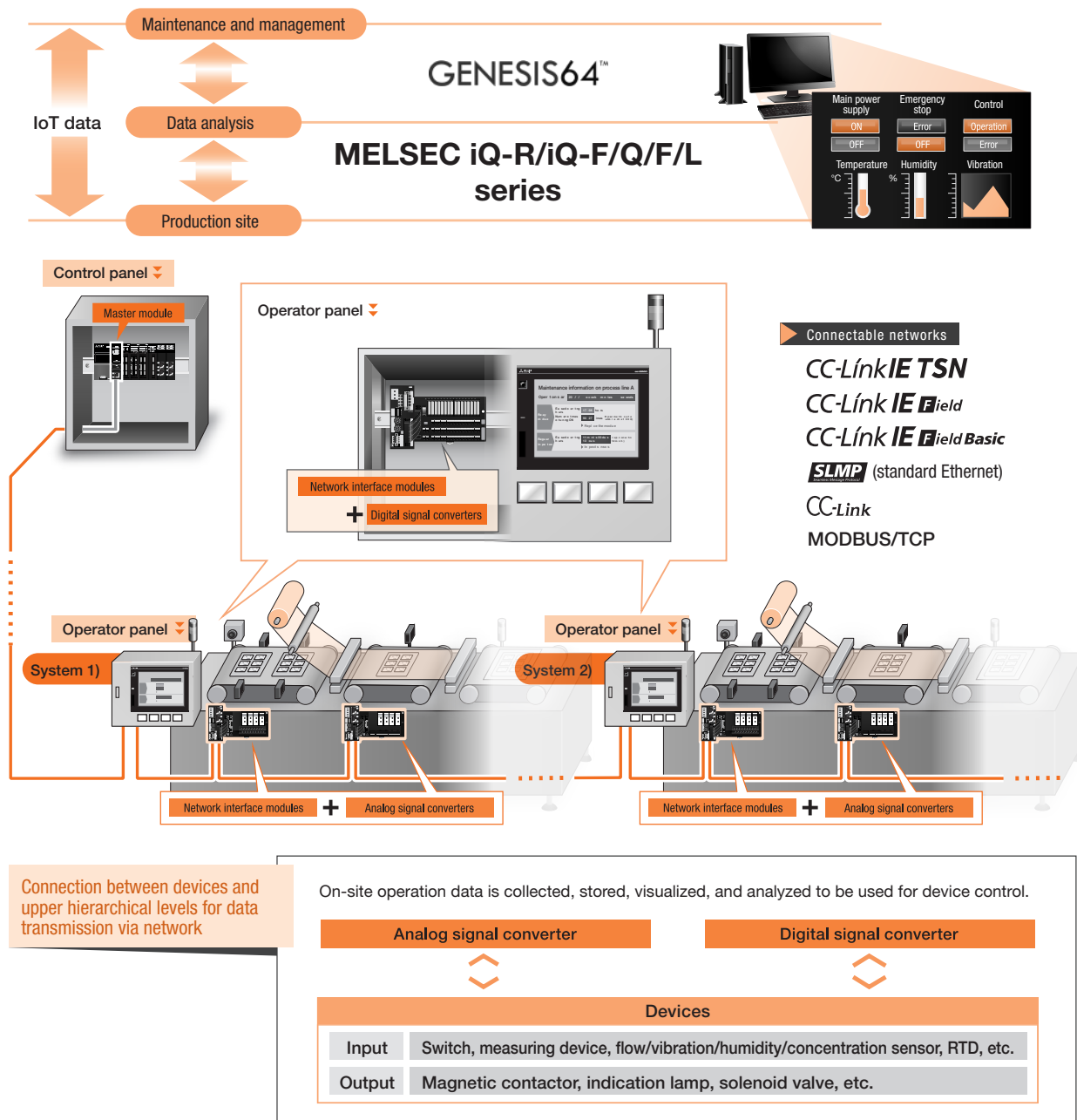
P.15

Module selectable configuration

Modules can be selected individually, contributing to cost and space saving.

Small-scale IoT system for integrated data management

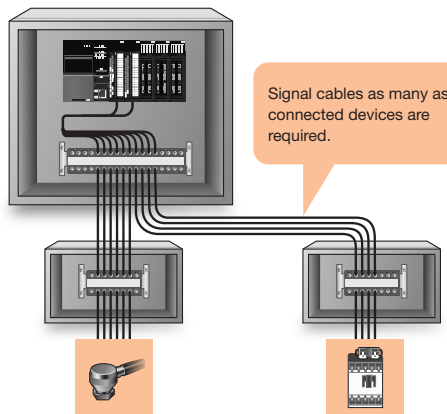
By connecting devices of a digital signal converter (terminal module) and analog signal converter via network using the network interface modules, data from connected devices at production sites is collected, visualized, and analyzed. This enables users to establish systems that improve productivity and quality.



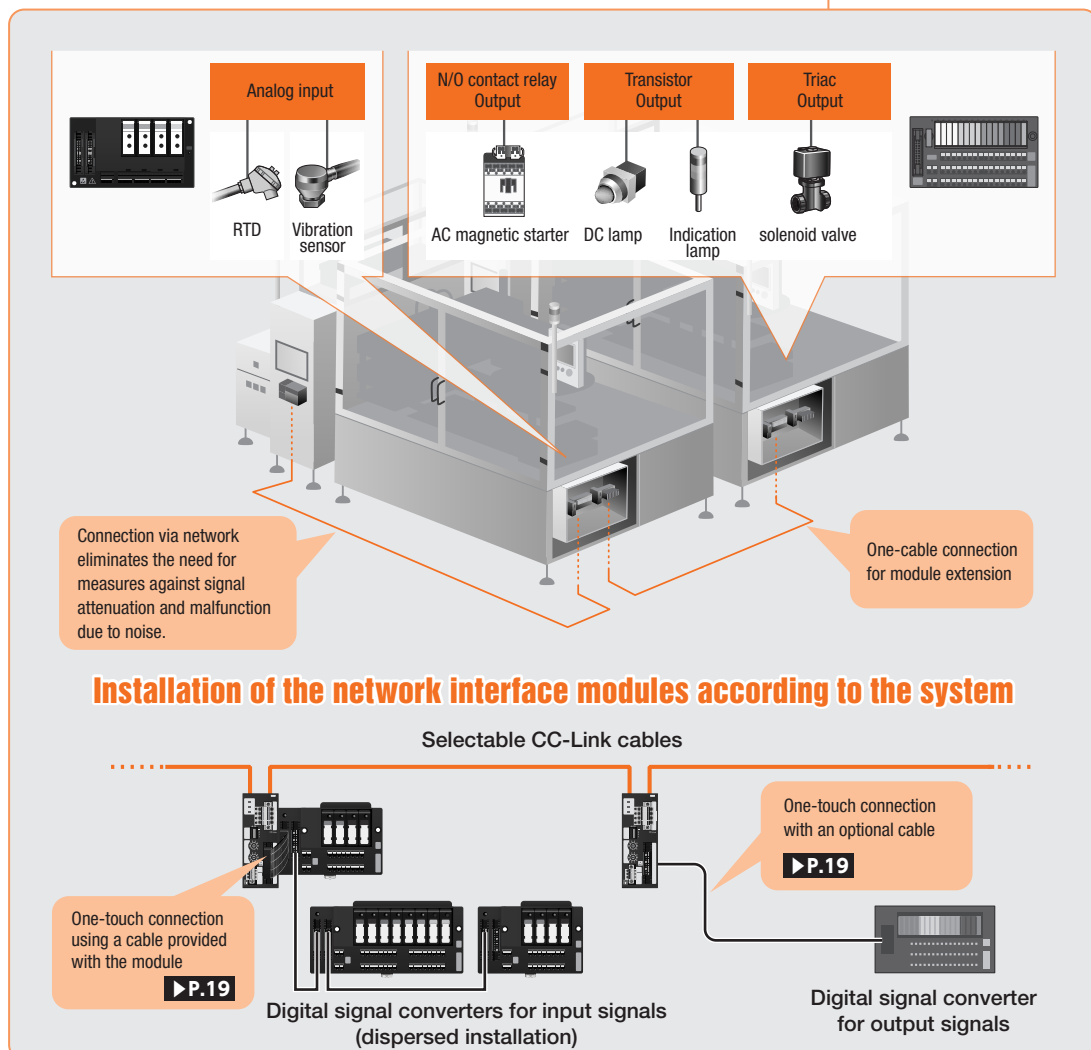
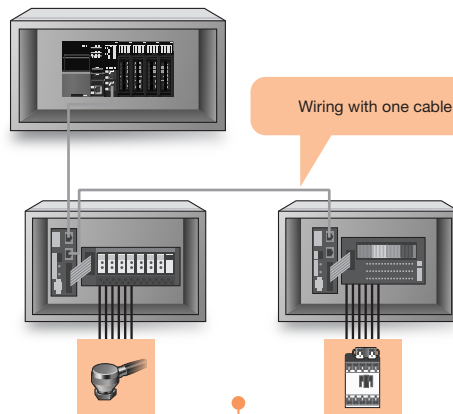
Saving cost and time for wiring in panel and system and easy wiring

A programmable controller and devices can be connected using an Ethernet cable and CC-Link cable. Wiring can be easy even when devices are added. A digital signal converter (terminal module) can be easily connected to an analog signal converter using a dedicated one-touch connector cable.

Before . . .

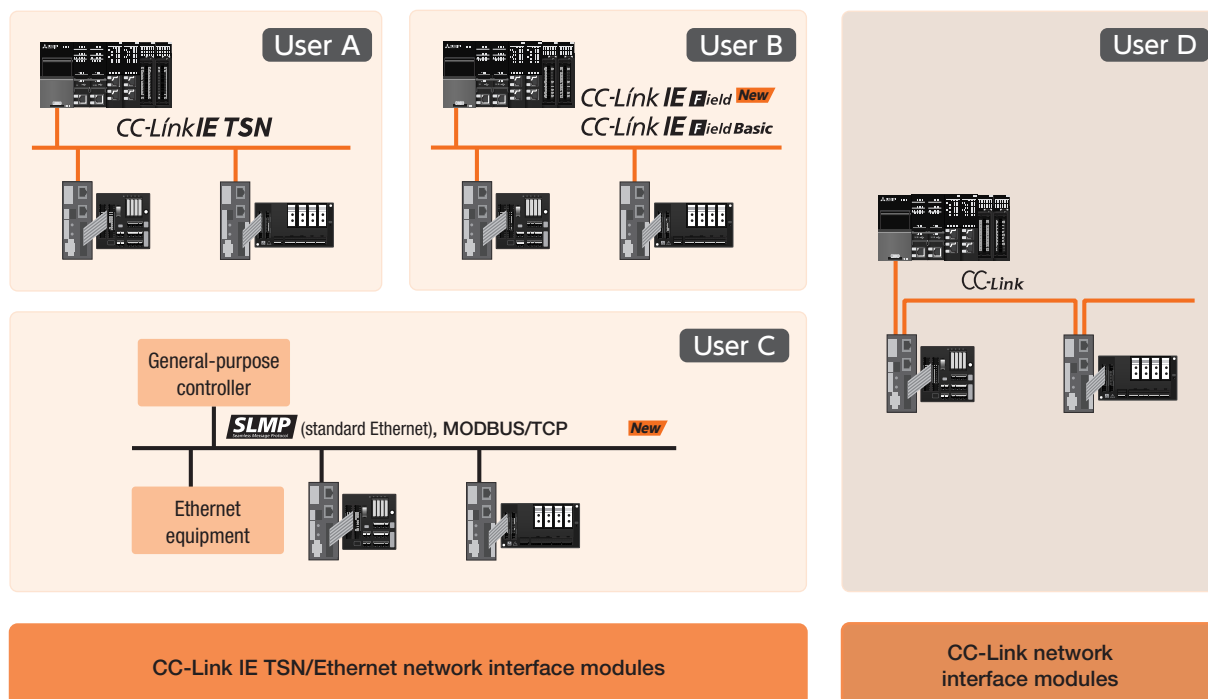


. . . After



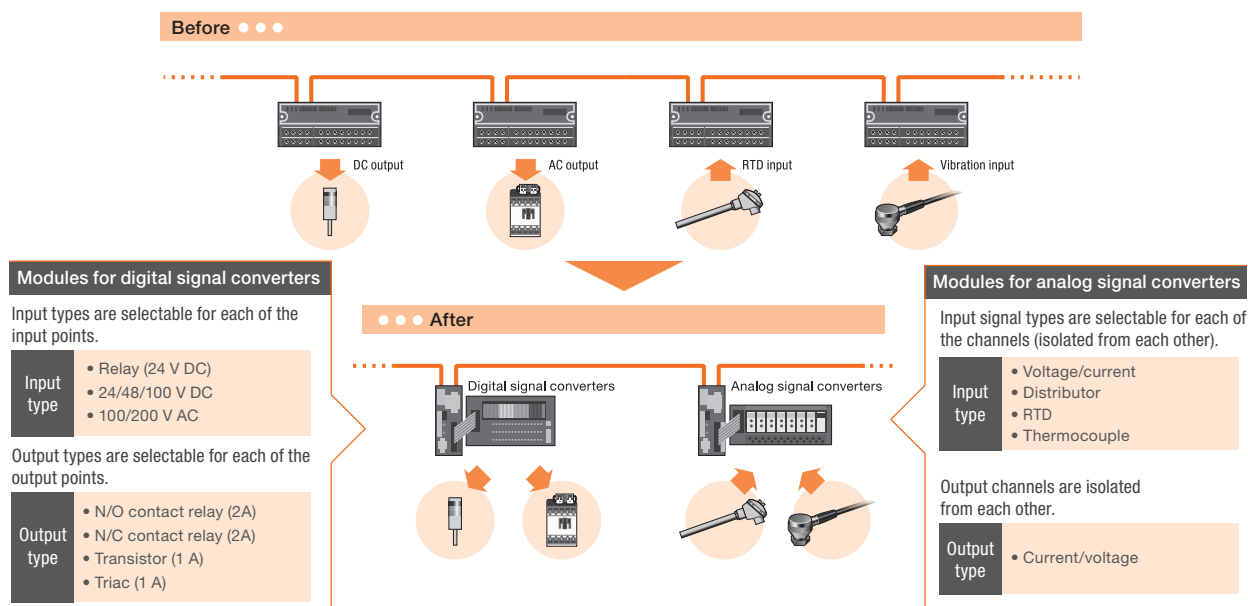
Switching the network using switches

The network can be selected among CC-Link IE TSN, CC-Link IE Field, CC-Link IE Field Basic, SLMP (standard Ethernet), and MODBUS/TCP using the switches on the network interface module. (CC-Link-compatible products are also available.)



Module selectable configuration

Individually selecting a module (control method) corresponding to each device enables optimal system configuration and cost and space saving. Also, control methods that are not supported by remote modules can also be available by using a digital/analog signal converter.





Related system

Supporting the trouble prevention and troubleshooting with the operation information recording function

Preventive maintenance is possible because information such as the life of relays can be visualized.

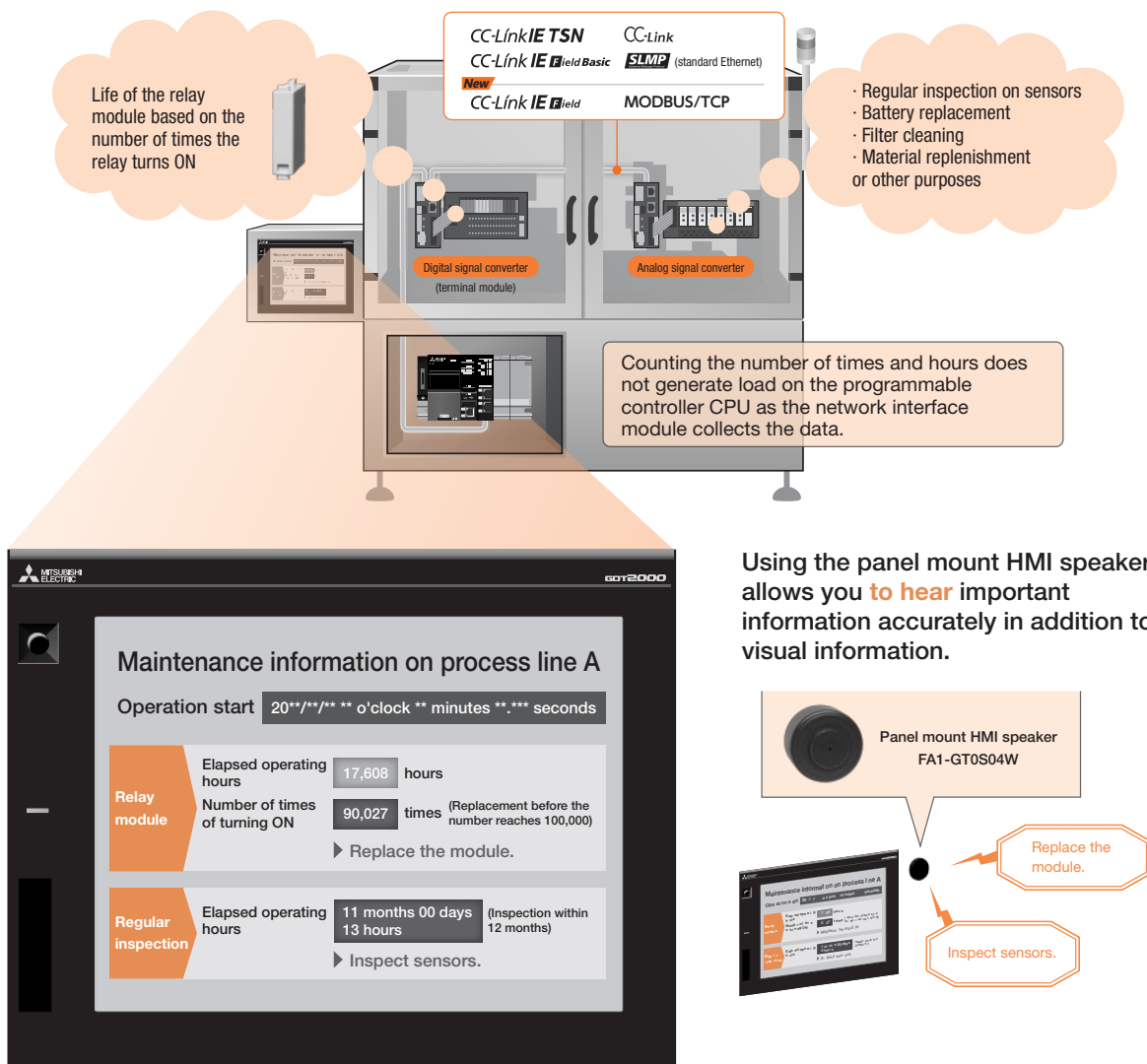
Maintenance time notification is based on how many times relay signals turn ON and operating hours. This helps prevent troubles.

Maintenance information recording function

This function records the operation start date^{*1} and elapsed operating hours^{*1} of the network interface module and the number of times I/O signal relays of the digital signal converter turn ON^{*2}.

Maintenance alarm function

This function outputs an alarm signal to the master station when the specified operating hours^{*1} have elapsed or the number of times a relay turns ON^{*2} has exceeded the preset value.



*1: Recording of the operation start date (year, month, and day) and elapsed operating hours is available when the modules are used in the CC-Link IE TSN, CC-Link IE Field Network, or CC-Link IE Field Network Basic.

*2: Available for network interface modules for digital signal converters.

The cause of troubles can be investigated through analysis of operation history.

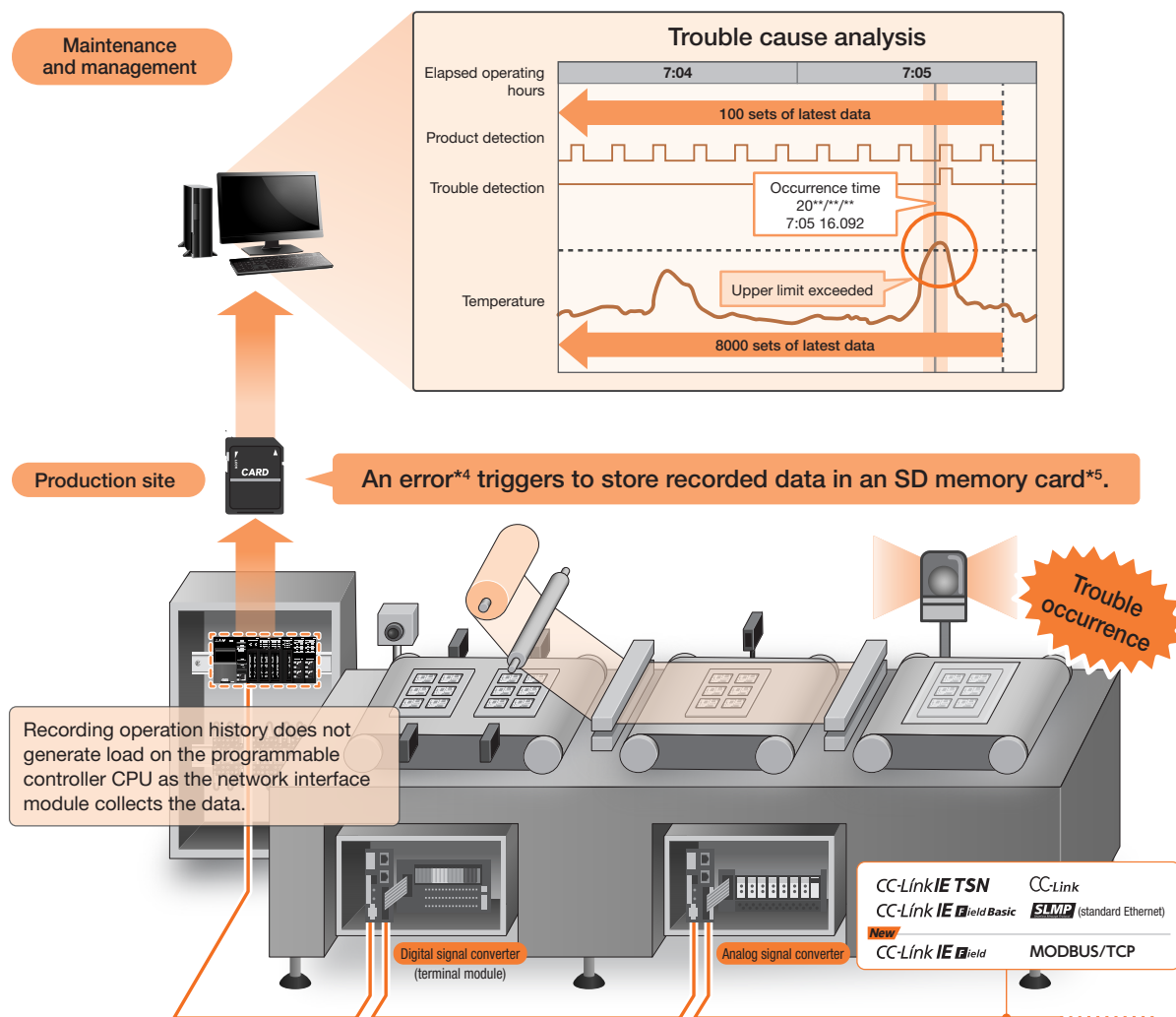
Recording the status history of digital and analog signals allows you to investigate the cause of troubles.

Operation history recording function (digital signal converters)

This function records the times at which I/O signals turn ON or OFF*¹ (up to 100 data sets per signal).

Logging function*² (analog signal converters)

For analog input, this function records digital values at intervals specified with a digital conversion value*³ (1 ms to 3600 s) and occurrence times. For analog output, it records the digital value settings and occurrence times*¹ (a total of 8000 data sets in all I/O channels).



*1: Recording of occurrence times is available when the modules are used in the CC-Link IE TSN, CC-Link IE Field Network, or CC-Link IE Field Network Basic.

*2: The logging function is available when the modules are used in the CC-Link IE TSN or CC-Link IE Field Network Basic.

*3: Numerical data digitally converted by the network interface module

*4: Configure your system so that it detects errors.

*5: The sequence program (function block) saves data in the SD memory card inserted into the programmable controller CPU as a CSV file.

Product lineup and combinations



When a digital signal converter (terminal module) is used

Check the compliance with the overseas standards of the products to be used in combination.

Programmable controller module IPC	Network interface module		Digital signal converter (terminal module)							
	Product	Model	Control method			Terminal block type	Model			
CC-Link IE TSN master station · MELSEC IQ-R · MELSEC IQ-F CC-Link IE Field master station · MELIPC · MELSEC IQ-R · MELSEC IQ-F · MELSEC-Q · MELSEC-L · MELSEC-F CC-Link IE Field Basic master station · MELIPC · MELSEC IQ-R · MELSEC IQ-F · MELSEC-Q · MELSEC-L SLMP client · MELIPC · MELSEC IQ-R · MELSEC IQ-F · MELSEC-Q · MELSEC-L · MELSEC-F MODBUS/TCP · MELSEC IQ-R · MELSEC-Q · MELSEC-L CC-Link master station · MELSEC IQ-R · MELSEC IQ-F · MELSEC-Q · MELSEC-L · MELSEC-F General-purpose controller (standard Ethernet)	Digital signal converter for input signals	With a dedicated cable FA3-TH1□16XC-01C Without a dedicated cable FA3-TH1□16XC	Installation base unit (module selectable type)		4 points, independent	Spring clamp	FA1-TH4X2SC20S1E			
					8 points, independent		FA1-TH8X2SC20S1E			
			Module pre-mounted type	24VDC (N/O contact)	4 points, independent (positive)	Spring clamp	FA1-TH4X24RA1L20S1E			
					4 points, independent (negative)		FA1-TH4X24RA1H20S1E			
					8 points, independent (positive)	Spring clamp	FA1-TH8X24RA1L20S1E			
					8 points, independent (negative)		FA1-TH8X24RA1H20S1E			
					16 points, independent (positive)	Spring clamp	FA1-TH16X24RA1L20S1E			
					16 points, independent (negative)		FA1-TH16X24RA1H20S1E			
					16 points, independent	Screw (M3)	FA-TH16XRA20S			
			Module built-in type	24VDC 48VDC 100VDC 100VAC 200VAC	16 points/common, 2-wire type	Screw (M3)	FA-TH16X24D31			
						Screw (M3.5)	FA-TH16X24D31L			
					16 points/common, 2-wire type	Screw (M3.5)	FA-TH16X48D31L			
						Screw (M3.5)	FA-TH16X100D31L			
					16 points/common, 2-wire type	Screw (M3)	FA-TH16X100A31			
						Screw (M3.5)	FA-TH16X100A31L			
	Digital signal converter for output signals (sink)	With a dedicated cable FA3-TH1□16Y-01C Without a dedicated cable FA3-TH1□16Y	Installation base unit (module selectable type)	4 points, independent (sink) 8 points, independent (sink) 16 points, independent (sink)		Spring clamp	FA1-TH4Y2SC20S1E			
							FA1-TH8Y2SC20S1E			
							FA1-TH16Y2SC20S1E			
				Module pre-mounted type	N/O contact relay	16 points, independent	Spring clamp	FA1-TH16Y2RA20S1E		
							Screw (M3)	FA-TH16YRA20S		
							Screw (M3.5)	FA-TH16YRA20		
						16 points/common, 1-wire type	Screw (M3)	FA-TH16YRA11S		
								FA-TH16YRA11		
							16 points/common, 2-wire type	Screw (M3)	FA-TH16YRA21S	
					N/C contact relay	Screw (M3.5)	FA-TH16YRAB20SL			
						C/O contact relay	Screw (M3)	FA-TH16YRAC20S		
							Triac	16 points, independent	Spring clamp	FA1-TH16Y1SR20S1E
					Screw (M3)			FA-TH16YSR20S		
16 points/common, 1-wire type					Screw (M3)	FA-TH16YSR11S				
Transistor (sink)					16 points/common, 2-wire type	Screw (M3)	FA-TH16YSR21S			
				16 points, independent (sink)	Spring clamp	FA1-TH16Y1TR20S1E				
				16 points/common, 1-wire type (sink)	Screw (M3)	FA-TH16YTL11S				
				16 points/common, 2-wire type (sink)	Screw (M3)	FA-TH16YTL21S				
				16 points/common, 1-wire type (source)	Screw (M3)	FA-TH16YTH11S				
				16 points, independent (sink/source shared type)	Screw (M3)	FA-TH16YTR20S				
Module built-in type				16 points, independent, 2A (sink/source shared type)		Screw (M3)	FA-TH16Y2TR20			
Digital signal converter for output signals (source)				With a dedicated cable FA3-TH1□16YE-01C Without a dedicated cable FA3-TH1□16YE	Installation base unit (module selectable type)	4 points, independent (sink) 8 points, independent (sink) 16 points, independent (source)		Spring clamp	FA1-TH1E4Y2SC20S1E	
									FA1-TH1E8Y2SC20S1E	
									FA1-TH1E16Y2SC20S1E	
						Module pre-mounted type	N/O contact relay	16 points, independent (source)	Spring clamp	FA1-TH1E16Y2RA20S1E
								16 points, independent (source)	Screw (M3)	FA1-TH1E16Y2RA20S
								16 points, independent (source)	Spring clamp	FA1-TH1E16Y1SR20S1E
							Triac	16 points, independent (source)	Spring clamp	FA1-TH1E16Y1SR20S1E
								16 points, independent (source)	Screw (M3)	FA-TH1E16YTR20S
								16 points/common, 1-wire type (source)	Screw (M3)	FA-TH1E16YTH11S
	Transistor (source)	16 points, independent (source)	Spring clamp				FA1-TH1E16Y1TR20S1E			
		16 points, independent (sink/source shared type)	Screw (M3)				FA-TH1E16YTR20S			
		16 points/common, 1-wire type (source)	Screw (M3)				FA-TH1E16YTH11S			

Supported network

<input type="checkbox"/> = M	CC-Link IE TSN, CC-Link IE Field, CC-Link IE Field Basic, SLMP (standard Ethernet), MODBUS/TCP
<input type="checkbox"/> = T	CC-Link IE TSN, CC-Link IE Field, CC-Link IE Field Basic, SLMP (standard Ethernet)
<input type="checkbox"/> = C	CC-Link

Module						
Specifications (Signal pass-through modules cannot be used.)					Model	
Functional module	Input		24VDC relay isolation (navy blue)		Quantity: 1 Quantity: 2 Quantity: 4	FA1-TM1X24RA-*
			24VDC photocoupler isolation (black)			FA1-TM1X24D-*
			48VDC photocoupler isolation (sky blue)			FA1-TM1X48D-*
			100VDC photocoupler isolation (purple)			FA1-TM1X100D-*
			100VAC photocoupler isolation (orange)			FA1-TM1X100A-*
			200VAC photocoupler isolation (red)			FA1-TM1X200A-*
			Dummy (for dustproof) (green)		Quantity: 4	FA1-TM1ND4
Slim module	Input/output		N/O contact relay (beige)	Input: 24VDC	Quantity: 2 Quantity: 4	FA-NYP24WK*
			N/C contact relay (sky blue)	Output: 24VDC, 100 to 240VAC, 2A		FA-NYBP24WK*
	Output		C/O contact relay (white)	24VDC, 100 to 240VAC, 6A	Quantity: 4	FA-LYCA024VSK4
			Triac (black)	30 to 240VAC, 1A	Quantity: 2	FA-SN24A01FS*
			Transistor (red)	3 to 30VDC, 1A	Quantity: 4	FA-SN24D01HZS*

The asterisk in the model name is replaced by a number indicating the quantity.
It is replaced by "2" when the quantity is two, or "4" when the quantity is four.

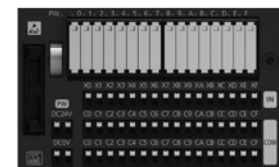
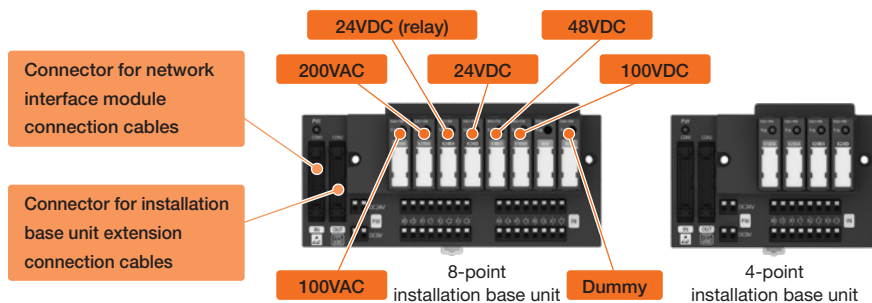
Related products

Digital signal converter (terminal module)

Digital signals will be converted between devices such as the network interface module and sensor.
For terminal blocks, the spring clamp terminal block type and screw terminal block type are available.

● Input Spring clamp terminal block Screw terminal block

Modules for different input voltage loads (24VDC, 48VDC, 100VDC, 100VAC, 200VAC) can be selected and mixed per point depending on the connected device.



Unit with a 16-point relay module

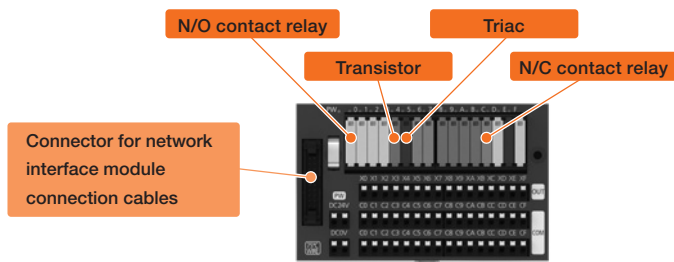
New

Unit with a 8-point relay module

Unit with a 4-point relay module

● Output Spring clamp terminal block Screw terminal block

Modules for different control methods (relay, triac, transistor) can be selected and mixed per point depending on the connected device.



Unit with a 16-point relay module selectable type (installation base unit)

Unit with a 16-point relay module

New

Unit with a 8-point relay module selectable type (installation base unit)

Unit with a 4-point relay module selectable type (installation base unit)

When an analog signal converter is used

Check the compliance with the overseas standards of the products to be used in combination.

Programmable controller module IPC	Network interface module		Analog signal converter	
	Product	Model	Installation base unit	Mountable module (Pass-through modules cannot be used.)
			Model	Specifications
CC-Link IE TSN master station · MELSEC IQ-R · MELSEC IQ-F CC-Link IE Field master station · MELIPC · MELSEC IQ-R · MELSEC IQ-F · MELSEC-Q · MELSEC-L · MELSEC-F CC-Link IE Field Basic master station · MELIPC · MELSEC IQ-R · MELSEC IQ-F · MELSEC-Q · MELSEC-L SLMP client · MELIPC · MELSEC IQ-R · MELSEC IQ-F · MELSEC-Q · MELSEC-L · MELSEC-F MODBUS/TCP · MELSEC IQ-R · MELSEC-Q · MELSEC-L	Analog signal converter for input signals	With a dedicated cable FA3-AT1□8X-01C Without a dedicated cable FA3-AT1□8X	4-channel spring clamp terminal block FA1-AT1B4X1TE	Voltage input 0 to 5V 1 to 5V -10 to 10V Current input 4 to 20mA Distributor (2-wire transmitter) 4 to 20mA RTD input Pt100 -200 to +650°C Pt100 0 to +100°C Pt100 0 to +200°C JPt100 -200 to +600°C Thermocouple input Type B thermocouple +600 to +1700°C Type R thermocouple 0 to +1600°C Type S thermocouple 0 to +1600°C Type K thermocouple -200 to +1200°C 0 to +400°C 0 to +600°C 0 to +800°C Type E thermocouple -200 to +900°C Type J thermocouple -40 to +750°C Type T thermocouple -200 to +350°C Type N thermocouple -200 to +1250°C Dummy Quantity: 5
			4-channel screw terminal block FA1-AT1B4X1TB 8-channel screw terminal block FA-ATB8XTB	Type K thermocouple -200 to +1200°C 0 to +400°C 0 to +600°C 0 to +800°C Type E thermocouple -200 to +900°C Type J thermocouple -40 to +750°C Type T thermocouple -200 to +350°C Type N thermocouple -200 to +1250°C Dummy Quantity: 5
CC-Link master station · MELSEC IQ-R · MELSEC IQ-F · MELSEC-Q · MELSEC-L · MELSEC-F General-purpose controller (standard Ethernet)	Analog signal converter for output signals	With a dedicated cable FA3-AT1□8Y-01C Without a dedicated cable FA3-AT1□8Y	4-channel spring clamp terminal block FA1-AT1B4Y1TE 4-channel screw terminal block FA1-AT1B4Y1TB 8-channel screw terminal block FA-ATB8YTB	Voltage output 0 to 5V 1 to 5V 0 to 10V -10 to 10V Current output 0 to 20mA 4 to 20mA Dummy Quantity: 5

Supported network

□ = M	CC-Link IE TSN, CC-Link IE Field, CC-Link IE Field Basic, SLMP (standard Ethernet), MODBUS/TCP
□ = T	CC-Link IE TSN, CC-Link IE Field, CC-Link IE Field Basic, SLMP (standard Ethernet)
□ = C	CC-Link

Related products

Analog signal converter

Analog signals will be converted between devices such as the network interface module and temperature sensor. Isolation is implemented between channels.

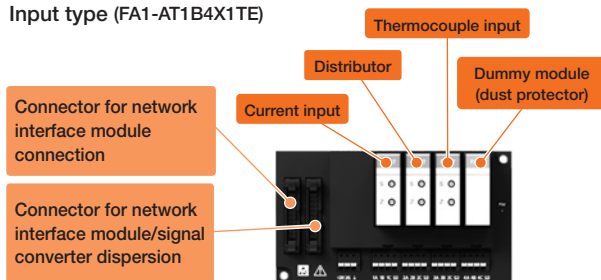
Spring clamp terminal block **New**

Screw terminal block

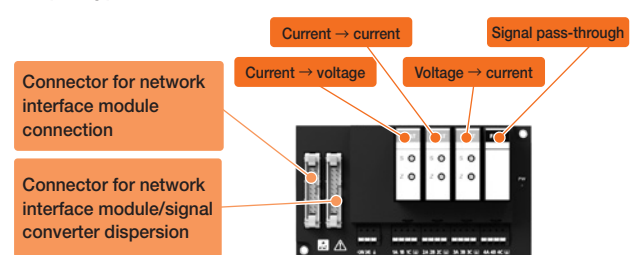
For input, modules for different analog inputs (voltage, current, distributor, thermocouple, RTD) can be selected and mixed per channel.

For output, modules for different analog outputs (voltage, current) can be selected and mixed per channel.

Input type (FA1-AT1B4X1TE)



Output type (FA1-AT1B4Y1TE)



Model list

Network interface module

Supported network	Dedicated cable	Type		Model
CC-Link IE TSN CC-Link IE Field CC-Link IE Field Basic SLMP (standard Ethernet) MODBUS/TCP	Included	For digital signal converter	Input	FA3-TH1M16XC-01C
			Output (sink)	FA3-TH1M16Y-01C
			Output (source)	FA3-TH1M16YE-01C
		For analog signal converter	Input	FA3-AT1M8X-01C
	Output		FA3-AT1M8Y-01C	
	Not included Use an optional cable.		For digital signal converter	Input
		Output (sink)		FA3-TH1M16Y
		Output (source)		FA3-TH1M16YE
		For analog signal converter	Input	FA3-AT1M8X
			Output	FA3-AT1M8Y
CC-Link IE TSN CC-Link IE Field CC-Link IE Field Basic SLMP (standard Ethernet)	Included	For digital signal converter	Input	FA3-TH1T16XC-01C
			Output (sink)	FA3-TH1T16Y-01C
			Output (source)	FA3-TH1T16YE-01C
		For analog signal converter	Input	FA3-AT1T8X-01C
			Output	FA3-AT1T8Y-01C
			Not included Use an optional cable.	For digital signal converter
	Output (sink)	FA3-TH1T16Y		
	Output (source)	FA3-TH1T16YE		
	For analog signal converter	Input		FA3-AT1T8X
		Output		FA3-AT1T8Y
	CC-Link	Included	For digital signal converter	Input
Output (sink)				FA3-TH1C16Y-01C
Output (source)				FA3-TH1C16YE-01C
For analog signal converter			Input	FA3-AT1C8X-01C
			Output	FA3-AT1C8Y-01C
			Not included Use an optional cable.	For digital signal converter
Output (sink)		FA3-TH1C16Y		
Output (source)		FA3-TH1C16YE		
For analog signal converter		Input		FA3-AT1C8X
		Output	FA3-AT1C8Y	
Product line	Basically included items: Module, User's Manual (Hardware), mounting bracket			

Product line

Basically included items: Module, User's Manual (Hardware), mounting bracket

*1: For the model with a dedicated cable, the dedicated cable is also included.

*2: The terminating resistor kit (110Ω: 2 pcs, 130Ω: 2 pcs) is included with the CC-Link-compatible model.

Connection cable

Network interface module dedicated cable

Product	Remarks	Cable length	Model
Dedicated cable	Included with the product (FA3-□□-01C)	0.1m	-
Extension cable for signal converter ^{*1}	Optional cables for modules for which dedicated cables are not included with modules	1m	FA3-CB2L10MM1H20
		2m	FA3-CB2L20MM1H20
		3m	FA3-CB2L30MM1H20

*1: For information on other cables, please consult your local Mitsubishi representative.

CC-Link cable

Supported version	Specifications	Cable length	Model
Ver.1.00	Standard cable	200m ^{*1}	FA-CBL200SB
	High-performance cable		FA-CBL200SBH
	Vibration-resistant cable (for movable part)		FA-CBL200SBZ
	Cable with a built-in 24VDC power cable	100m ^{*2}	FA-CBL100PWSB
Ver.1.10	Standard cable	200m ^{*1}	FA-CBL200PSBH
	Vibration-resistant cable (for movable part)		FA-CBL200PSBZ
	Cold-resistant cable		FA-CBL200LTPSBH
	Cable with a built-in 24VDC power cable	100m ^{*2}	FA-CBL100PWPSBH

*1: Custom lengths are not available, but a 1000-meter option is available.

*2: Custom lengths are not available, but a 500-meter option is available.

Specifications



CC-Link IE TSN/Ethernet-compatible network interface modules (MODBUS/TCP-compatible products)

Digital signal converter	FA3-TH1M16XC	FA3-TH1M16XC-01C
	FA3-TH1M16Y	FA3-TH1M16Y-01C
	FA3-TH1M16YE	FA3-TH1M16YE-01C
Analog signal converter	FA3-AT1M8X	FA3-AT1M8X-01C
	FA3-AT1M8Y	FA3-AT1M8Y-01C

- Productivity and quality are improved by connecting a device such as a sensor connected to a digital signal converter (terminal module) or an analog signal converter via network to collect the operating information of the facility and control the device depending on the circumstances.
- All devices at dispersed sites can be connected to the network with only one master module.
- One-touch connection using a dedicated cable for the network interface module and a digital signal converter (terminal module) or analog signal converter reduces the time for wiring.

Specifications

For digital signal converter connection (input)

Item		FA3-TH1M16XC
Input type		Positive common/negative common shared type
No. of inputs		16 points
Input response time	OFF → ON	0.1/0.2/1/1.5/5/10/20/70ms or less ^{*1}
	ON → OFF	0.4/0.5/1/1.5/5/10/20/70ms or less ^{*1}
Current consumption		0.11A
Weight		160g

*1: The module response time is not included.

For digital signal converter connection (output)

Item		FA3-TH1M16Y	FA3-TH1M16YE
Output type		Sink type	Source type
No. of outputs		16 points	
Response time	OFF → ON	0.5ms or less ^{*2}	
	ON → OFF	1.5ms or less ^{*2}	
Current consumption		0.12A	
Weight		160g	

*2: The module response time is not included.

For analog signal converter connection (input)

Item		FA3-AT1M8X
No. of analog input points		8 channels/module
I/O characteristics	Analog input range	1 to 5V
	Digital output	0 to 16000
Accuracy (accuracy for the maximum digital output value)	Ambient temperature 0 to 55°C	±0.3% (±48 digits) ^{*3}
	Ambient temperature 25±5°C	±0.1% (±16 digits) ^{*3}
	Maximum resolution	0.25mV
Maximum conversion speed		1ms/channel ^{*4}
Current consumption		0.14A
Weight		160g

*3: The module's accuracy is not taken into account.

*4: The module response time is not included.

For analog signal converter connection (output)

Item		FA3-AT1M8Y
No. of analog output points		8 channels/module
I/O characteristics	Digital input value	0 to 16000
	Analog output range	1 to 5V
Accuracy	Ambient temperature 0 to 55°C	±0.3% (±12mV) ^{*5}
	Ambient temperature 25±5°C	±0.1% (±4mV) ^{*5}
	Maximum resolution	0.25mV
Maximum conversion speed		1ms/channel ^{*6}
Current consumption		0.14A
Weight		160g

*5: The module's accuracy is not taken into account.

*6: The module response time is not included.

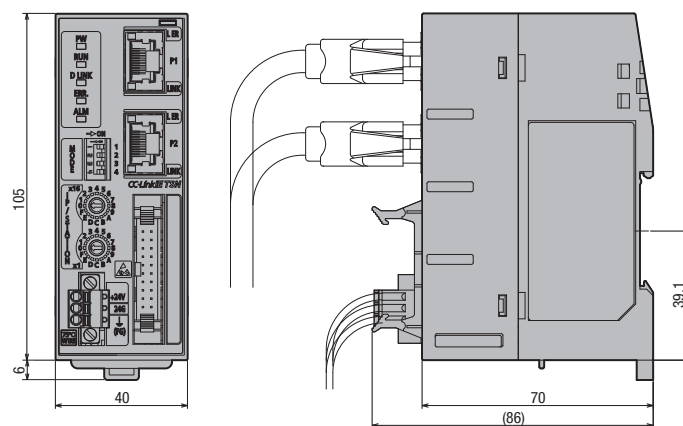
Common specifications

Item		CC-Link IE TSN	CC-Link IE Field	CC-Link IE Field Basic	SLMP (standard Ethernet)	MODBUS/TCP
Operating ambient temperature		0 to 55°C				
Operating ambient humidity		5 to 95%RH, non-condensing				
Network specifications	Communication speed	1Gbps/100Mbps	1Gbps	100Mbps	100Mbps	100Mbps/10Mbps
	Station type	Remote station	Remote device station	Remote station	Server	Remote station
	Authentication class	Authentication class B	—	—	—	—
	Topology	· Line/star topology · Mixture of line topology and star topology	· Line/star topology · Mixture of line topology and star topology · Ring topology	Star topology	Star topology	Star topology
External interface	Communication part	RJ45 connector				
	Module power supply part	Two-piece spring clamp terminal block				
Module installation		DIN rail installation or installation using the mounting bracket included with the module				
Communication cable	1Gbps	Ethernet cable that satisfies the 1000BASE-T standard, Category 5e or higher (double shielded/STP) straight cable				
	100Mbps	Ethernet cable that satisfies the 100BASE-TX standard, Category 5 or higher (double shielded/STP) straight cable				
	10Mbps	Ethernet cable that satisfies the 10BASE-T standard, Category 3 or higher (shielded/STP) straight cable				
Module power supply	Voltage	24VDC (ripple ratio: within 5%) (allowable voltage range: 20.4 to 28.8VDC)				
	Current	Refer to the individual specifications. ⁷				
External dimensions		105 (H) × 40 (W) × 70 (D) mm (not including the projections)				
Applicable standard		UL, CE, KC				

⁷: The digital signal converter or the analog signal converter requires a separate 24VDC power supply. For specifications, refer to the manuals for the modules used.

External dimensions

Common external dimensions for digital signal converter (terminal module) connection and analog signal converter connection



(Unit: mm)



CC-Link IE TSN/Ethernet-compatible network interface module

Digital signal converter (Terminal module)

FA3-TH1T16XC

FA3-TH1T16XC-01C

FA3-TH1T16Y

FA3-TH1T16Y-01C

FA3-TH1T16YE

FA3-TH1T16YE-01C

Analog signal converter

FA3-AT1T8X

FA3-AT1T8X-01C

FA3-AT1T8Y

FA3-AT1T8Y-01C

- Productivity and quality are improved by connecting a device such as a sensor connected to a digital signal converter (terminal module) or an analog signal converter via network to collect the operating information of the facility and control the device depending on the circumstances.
- All devices at dispersed sites can be connected to the network with only one master module.
- One-touch connection using a dedicated cable for the network interface module and a digital signal converter (terminal module) or analog signal converter reduces the time for wiring.

Specifications

For digital signal converter connection (input)

Item		FA3-TH1T16XC
Input type		Positive common/negative common shared type
No. of inputs		16 points
Input response time	OFF → ON	0.1/0.2/1/1.5/5/10/20/70ms or less ^{*1}
	ON → OFF	0.4/0.5/1/1.5/5/10/20/70ms or less ^{*1}
Current consumption		0.11A
Weight		160g

*1: The module response time is not included.

For digital signal converter connection (output)

Item		FA3-TH1T16Y	FA3-TH1T16YE
Output type		Sink type	Source type
No. of outputs		16 points	
Response time	OFF → ON	0.5ms or less ^{*2}	
	ON → OFF	1.5ms or less ^{*2}	
Current consumption		0.12A	
Weight		160g	

*2: The module response time is not included.

For analog signal converter connection (input)

Item		FA3-AT1T8X
No. of analog input points		8 channels/module
I/O characteristics	Analog input range	1 to 5V
	Digital output	0 to 16000
Accuracy (accuracy for the maximum digital output value)	Ambient temperature 0 to 55°C	±0.3% (±48 digits) ^{*3}
	Ambient temperature 25±5°C	±0.1% (±16 digits) ^{*3}
	Maximum resolution	0.25mV
Maximum conversion speed		1ms/channel ^{*4}
Current consumption		0.14A
Weight		160g

*3: The module's accuracy is not taken into account.

*4: The module response time is not included.

For analog signal converter connection (output)

Item		FA3-AT1T8Y
No. of analog output points		8 channels/module
I/O characteristics	Digital input value	0 to 16000
	Analog output range	1 to 5V
Accuracy	Ambient temperature 0 to 55°C	±0.3% (±12mV) ^{*5}
	Ambient temperature 25±5°C	±0.1% (±4mV) ^{*5}
	Maximum resolution	0.25mV
Maximum conversion speed		1ms/channel ^{*6}
Current consumption		0.14A
Weight		160g

*5: The module's accuracy is not taken into account.

*6: The module response time is not included.

Common specifications

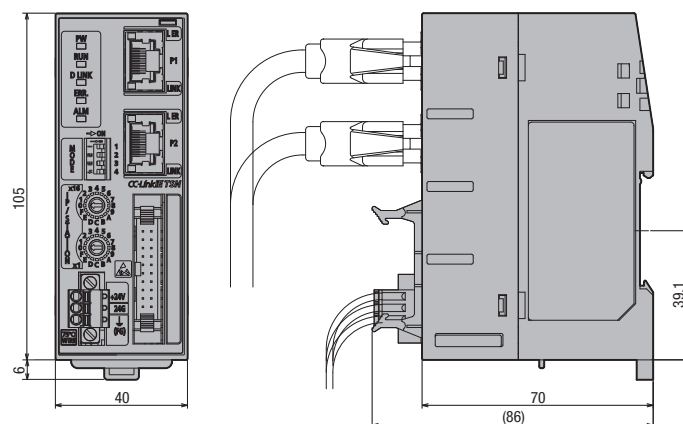
Item		CC-Link IE TSN	CC-Link IE Field	CC-Link IE Field Basic	SLMP (standard Ethernet)
Operating ambient temperature		0 to 55°C			
Operating ambient humidity		5 to 95%RH, non-condensing			
Network specifications	Communication speed	1Gbps/100Mbps	1Gbps	100Mbps	100Mbps
	Station type	Remote station	Remote device station	Remote station	Server
	Authentication class	Authentication class B	—	—	—
	Topology	· Line/star topology · Mixture of line topology and star topology	Star topology	Star topology	Star topology
External interface	Communication part	RJ45 connector			
	Module power supply part	Two-piece spring clamp terminal block			
Module installation		DIN rail installation or installation using the mounting bracket included with the module			
Communication cable	1Gbps	Ethernet cable that satisfies the 1000BASE-T standard, Category 5e or higher (double shielded/STP) straight cable			
	100Mbps	Ethernet cable that satisfies the 100BASE-TX standard, Category 5 or higher (double shielded/STP) straight cable			
Module power supply	Voltage	24VDC (ripple ratio: within 5%) (allowable voltage range: 20.4 to 28.8VDC)			
	Current	Refer to the individual specifications.*7			
External dimensions		105 (H) × 40 (W) × 70 (D) mm (not including the projections)			
Applicable standard		UL, CE, KC			

*7: The digital signal converter or the analog signal converter requires a separate 24VDC power supply. For specifications, refer to the manuals for the modules used.

External dimensions

Common external dimensions for digital signal converter (terminal module) connection and analog signal converter connection

(Unit: mm)





CC-Link-compatible network interface module

Digital signal converter
(terminal module)

FA3-TH1C16XC

FA3-TH1C16XC-01C

FA3-TH1C16Y

FA3-TH1C16Y-01C

FA3-TH1C16YE

FA3-TH1C16YE-01C

Analog signal converter

FA3-AT1C8X

FA3-AT1C8X-01C

FA3-AT1C8Y

FA3-AT1C8Y-01C

- Productivity and quality are improved by connecting a device such as a sensor connected to a digital signal converter (terminal module) or an analog signal converter via network to collect the operating information of the facility and control the device depending on the circumstances.
- All devices at dispersed sites can be connected to the network with only one master module.
- One-touch connection using a dedicated cable for the network interface module and a digital signal converter (terminal module) or analog signal converter reduces the time for wiring.

Specifications

For digital signal converter connection (input)

Item		FA3-TH1C16XC
Input type		Positive common/negative common shared type
CC-Link station type		Remote I/O station
No. of occupied stations		32 points are assigned to a station. (16 points are used.)
No. of inputs		16 points
Input response time	OFF → ON	1.5ms or less ^{*1}
	ON → OFF	
Current consumption		90mA
Weight		160g

*1: The module response time is not included.

For digital signal converter connection (output)

Item		FA3-TH1T16Y	FA3-TH1T16YE
Output type		Sink type	Source type
CC-Link station type		Remote I/O station	
No. of occupied stations		32 points are assigned to a station. (16 points are used.)	
No. of outputs		16 points	
Response time	OFF → ON	0.5ms or less ^{*2}	
	ON → OFF	1.5ms or less ^{*2}	
Current consumption		100mA	90mA
Weight		160g	

*2: The module response time is not included.

For analog signal converter connection (input)

Item		FA3-AT1C8X
No. of analog input points		8 channels/module
CC-Link station type		Remote device station
CC-Link version		Ver.1.10
No. of occupied stations		2
I/O characteristics	Analog input range	1 to 5V
	Digital output	0 to 16000
Accuracy (accuracy for the maximum digital output value)	Ambient temperature 0 to 55°C	±0.3% (±48 digits) ^{*3}
	Ambient temperature 25±5°C	±0.1% (±16 digits) ^{*3}
	Maximum resolution	0.25mV
Maximum conversion speed		1ms/channel ^{*4}
Current consumption		120mA
Weight		170g

*3: The module's accuracy is not taken into account.

*4: The module response time is not included.

For analog signal converter connection (output)

Item		FA3-AT1C8Y
No. of analog output points		8 channels/module
CC-Link station type		Remote device station
CC-Link version		Ver.1.10
No. of occupied stations		2
I/O characteristics	Digital input value	0 to 16000
	Analog output range	1 to 5V
Accuracy	Ambient temperature 0 to 55°C	±0.3% (±12mV) ^{*5}
	Ambient temperature 25±5°C	±0.1% (±4mV) ^{*5}
	Maximum resolution	0.25mV
Maximum conversion speed		1ms/channel ^{*6}
Current consumption		120mA
Weight		170g

*5: The module's accuracy is not taken into account.

*6: The module response time is not included.

Common specifications

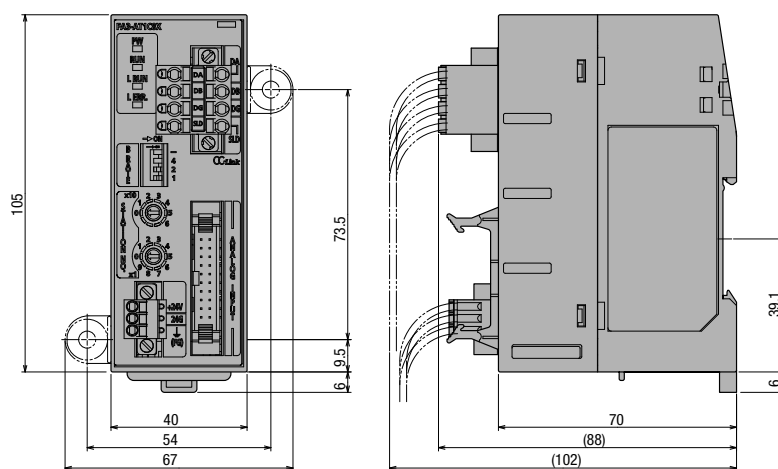
Item		Specifications
Operating ambient temperature		0 to 55°C
Operating ambient humidity		5 to 95%RH, non-condensing
Network specifications	Communication speed	10M/5M/2.5M/625k/156kbps
	Network topology	Bus topology (EIA RS485 compliant)
External interface	Communication part	Two-piece spring clamp terminal block
	Module power supply part	
Module installation		DIN rail installation or installation using the mounting bracket included with the module
Module power supply	Voltage	24VDC (ripple ratio: within 5%) (allowable voltage range: 20.4 to 28.8VDC)
	Current	Refer to the individual specifications. ^{*7}
External dimensions		105 (H) × 40 (W) × 70 (D) mm (not including the projections)
Applicable standard		UL, CE, KC

*7: The digital signal converter or the analog signal converter requires a separate 24VDC power supply. For specifications, refer to the manuals for the modules used.

External dimensions

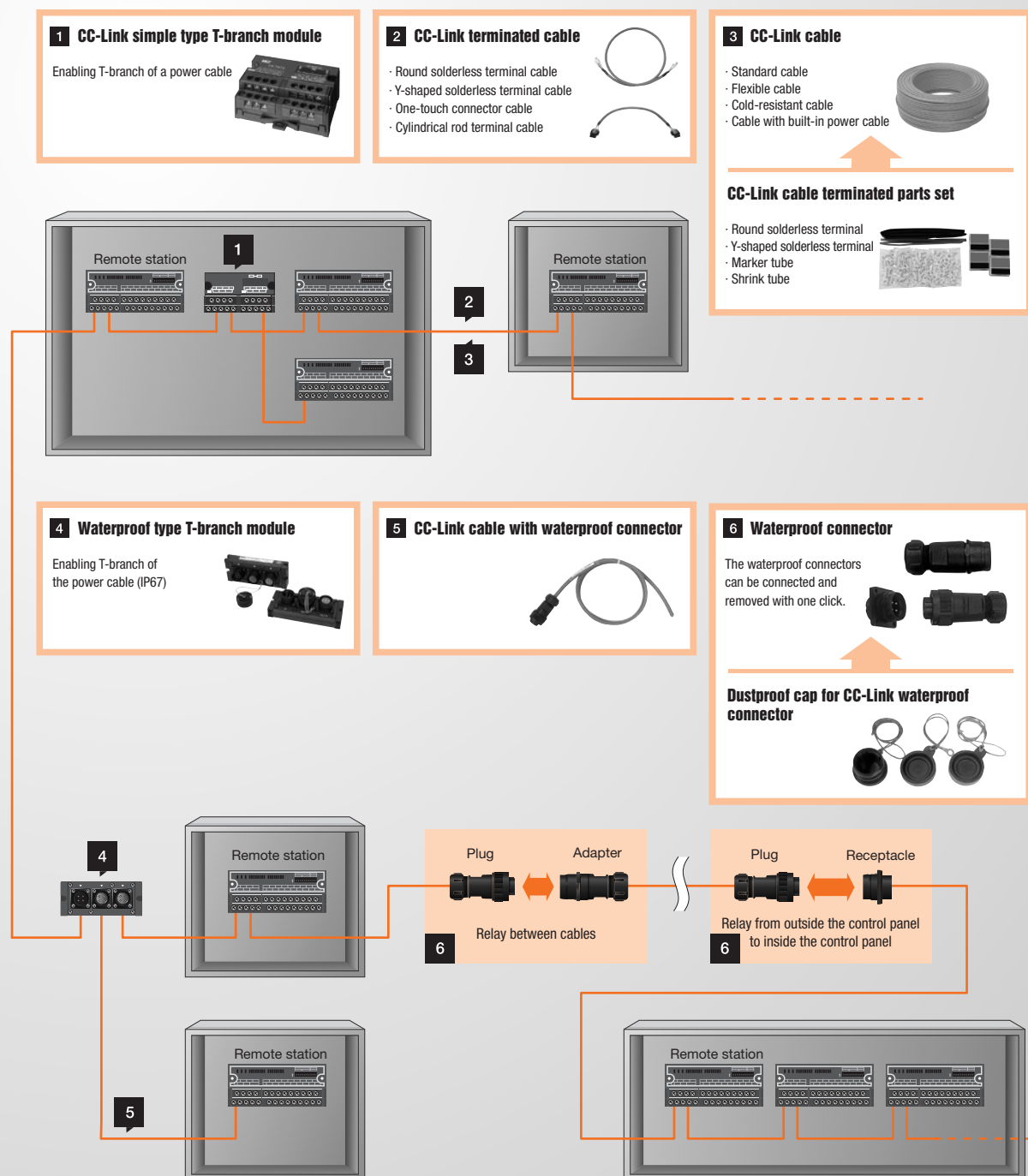
Common external dimensions for digital signal converter (terminal module) connection and analog signal converter connection

(Unit: mm)



Economical network setup (CC-Link)

Various types of cables and branch modules are available
for connection to the CC-Link network.



Model list

CC-Link simple type T-branch module

Supported version	Specifications	Cable length	Model
Simple type	Built-in 110Ω terminating resistor (Switching between on and off)	M3 screw	FA-TK72

CC-Link terminated cable

Supported version	Specifications	Cable length	Model
Ver.1.00	Round solderless terminal	0.3m	FA-CBL03CC
		0.5m	FA-CBL05CC
		1m	FA-CBL10CC
		2m	FA-CBL20CC
	Y-shaped solderless terminal	0.3m	FA-CBL03CCY
		0.5m	FA-CBL05CCY
		0.7m	FA-CBL07CCY
		1m	FA-CBL10CCY
Ver.1.10	Round solderless terminal	2m	FA-CBL20CCY
		0.3m	FA-CBL03CCPH
		0.4m	FA-CBL04CCPH
		1m	FA-CBL10CCPH
	Y-shaped solderless terminal	2m	FA-CBL20CCPH
		0.2m	FA-CBL02CCPHY
		0.3m	FA-CBL03CCPHY
		0.5m	FA-CBL05CCPHY
		0.7m	FA-CBL07CCPHY
		1m	FA-CBL10CCPHY
		1.5m	FA-CBL15CCPHY
		2m	FA-CBL20CCPHY
	Cylindrical bar terminal	0.2m	FA-CBL02CCPHF
		0.5m	FA-CBL05CCPHF
		0.7m	FA-CBL07CCPHF
	One-touch connector	0.2m	FA-CBL02CCPHP

CC-Link cable

Supported version	Specifications	Cable length	Model
Ver.1.00	Standard cable	200m ^{*1}	FA-CBL200SB
	High-performance cable		FA-CBL200SBH
	Vibration-resistant cable (for movable part)		FA-CBL200SBZ
	Cable with a built-in 24VDC power cable	100m ^{*2}	FA-CBL100PWSB
Ver.1.10	Standard cable	200m ^{*1}	FA-CBL200PSBH
	Vibration-resistant cable (for movable part)		FA-CBL200PSBZ
	Cold-resistant cable		FA-CBL200LTPSBH
	Cable with a built-in 24VDC power cable	100m ^{*2}	FA-CBL100PWPSBH

*1: Custom lengths are not available, but a 1000-meter option is available.

*2: Custom lengths are not available, but a 500-meter option is available.

CC-Link cable terminated parts set

Specifications	Model
Round solderless terminal type, Quantity: 100	FA-R100SET
Y-shaped solderless terminal type, Quantity: 100	FA-Y100SET

CC-Link waterproof type T-branch module

Waterproof type	Specifications		Model
	Dedicated to communication cables	4-pin connector	FA-TW43
	For cables with a built-in power cable	7-pin connector	FA-TW73

Cable with CC-Link waterproof connector

Supported version	Specifications	Cable length	Model
Ver.1.10	With a female connector (FA-204-PF8) on one end	5m	FA-CBL05PSBH4F
	With a male connector (FA-204-PM8) on one end	5m	FA-CBL05PSBH4M
Ver. 1.00, Cable with a built-in power cable	With a female connector (FA-207-PF12) on one end	10m	FA-CBL10PWSB7F
	With a male connector (FA-207-PM12) on one end	10m	FA-CBL10PWSB7M
	With a male connector (FA-207-PM12) and a female connector (FA-207-PF12)	1m	FA-CBL01PWSB7MF

CC-Link waterproof connector

Specifications			Model
4-pin adapter	Female (connecting to the plug, FA-204-PM*)	Packing diameter: φ6	FA-204-AdF6
		Packing diameter: φ8	FA-204-AdF8
		Packing diameter: φ10	FA-204-AdF10
		Packing diameter: φ12	FA-204-AdF12
	Male (connecting to the plug, FA-204-PF*)	Packing diameter: φ6	FA-204-AdM6
		Packing diameter: φ8	FA-204-AdM8
		Packing diameter: φ10	FA-204-AdM10
		Packing diameter: φ12	FA-204-AdM12
7-pin adapter	Female (connecting to the plug, FA-207-PM*)	Packing diameter: φ6	FA-207-AdF6
		Packing diameter: φ8	FA-207-AdF12
	Male (connecting to the plug, FA-207-PF*)	Packing diameter: φ6	FA-207-AdM6
		Packing diameter: φ8	FA-207-AdM8
4-pin plug	Female	Packing diameter: φ12	FA-207-AdM12
		Packing diameter: φ6	FA-204-PF6
		Packing diameter: φ8	FA-204-PF8
		Packing diameter: φ10	FA-204-PF10
	Male	Packing diameter: φ12	FA-204-PF12
		Packing diameter: φ6	FA-204-PM6
		Packing diameter: φ8	FA-204-PM8
		Packing diameter: φ10	FA-204-PM10
7-pin plug	Female	Packing diameter: φ12	FA-204-PM12
		Packing diameter: φ6	FA-207-PF6
		Packing diameter: φ8	FA-207-PF8
		Packing diameter: φ10	FA-207-PF10
	Male	Packing diameter: φ12	FA-207-PF12
		Packing diameter: φ8	FA-207-PM8
		Packing diameter: φ10	FA-207-PM10
		Packing diameter: φ12	FA-207-PM12
4-pin receptacle	Female		FA-204-RF
	Male		FA-204-RM
7-pin receptacle	Female		FA-207-RF
	Male		FA-207-RM
Built-in 110Ω terminating resistor (4-pin)	Male		FA-CONW4P110E
Built-in 110Ω terminating resistor (7-pin)	Male		FA-CONW7P110E

Dustproof cap for CC-Link waterproof connector

Specifications		Model
For adapter	Used for FA-204-AdM*/AdF*, FA-207-AdM*/AdF* (IP67 non-compliant)	FA-NRW-20-AdCa
For plug	Used for FA-204-PM*/PF*, FA-207-PM*/PF* (IP67 non-compliant)	FA-NRW-20-PCa1
For receptacle	Used for FA-204-RM/RF, FA-207-RM/RF, FA-TW43/73 (IP67 non-compliant)	FA-NRW-20-RCa

Specifications



CC-Link cable

FA-CBL200SB

FA-CBL200SBH

FA-CBL200SBZ

FA-CBL200PSBH

FA-CBL200PSBZ

FA-CBL200LTPSBH

FA-CBL100PWSB

FA-CBL100PWPSBH

- Vibration-resistant cables (for movable part) and cold-resistant cables are available.
- Cables with a built-in 24VDC power cable for CC-Link remote station is available.

Related products

CC-Link cable terminated parts set P.32
Waterproof connector P. 35 to 37

Specifications

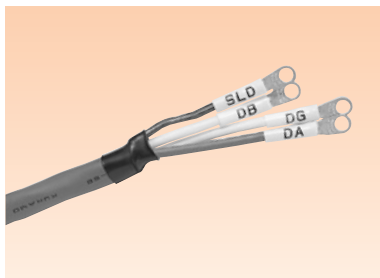
Item	Specifications						Specifications (power supply)	
	CC-Link cable	CC-Link high-performance cable	CC-Link vibration-resistant cable	Ver. 1.10-compatible CC-Link cable	Ver. 1.10-compatible vibration-resistant CC-Link cable*3	Ver. 1.10-compatible cold-resistant CC-Link cable	CC-Link cable with a power cable*1	Ver. 1.10-compatible CC-Link cable with a power cable*2
	FA-CBL200SB	FA-CBL200SBH	FA-CBL200SBZ	FA-CBL200PSBH	FA-CBL200PSBZ	FA-CBL200LTPSBH	FA-CBL100PWSB	FA-CBL100PWPSBH
Version	Ver. 1.00			Ver. 1.10			Ver. 1.00	Ver. 1.10
Application	For fixed part		For movable part	For fixed part	For movable part	For fixed part	For fixed part	
Conductor	Material	Annealed copper assembled wire		Annealed copper stranded wire	Annealed copper composite stranded wire	Annealed copper stranded wire	Annealed copper assembled wire	
	No. of wires/wire diameter	20 wires/0.18mm		3×33 wires/0.08mm	7 wires/0.32mm	3×33 wires/0.08mm	7 wires/0.32mm	30 wires/0.18mm
	Nominal cross sectional area	0.5mm ²						0.75mm ²
	Resistance (20°C)	37.8Ω/km or less		43.4Ω/km or less	34.5Ω/km or less	43.4Ω/km or less	34.5Ω/km or less	25.1Ω/km or less
Characteristic impedance (1MHz)	100±15Ω	130±15Ω	100±15Ω	110±15Ω	110±15Ω	110±15Ω		
Capacitance (1kHz)	60nF/km or less	40nF/km or less	60nF/km or less	50nF/km or less	60nF/km or less	50nF/km or less		
Maximum specification voltage/current							26.4VDC/7A (30°C)	
Insulation resistance	1000MΩ·km or more						10MΩ·km or more	
Withstand voltage	500VDC for one minute						1000VAC for one minute	
Outside diameter	Approx. 7.0mm	Approx. 8.0mm	Approx. 8.0mm	Approx. 7.6mm	Approx. 8.0mm	Approx. 7.6mm	Approx. 12.0mm	
Weight	Approx. 13kg/200m	Approx. 12kg/200m	Approx. 14kg/200m	Approx. 14kg/200m	Approx. 14kg/200m	Approx. 14kg/200m	Approx. 15kg/100m	Approx. 16kg/100m
Length	200m						100m	
Cable type	Shielded twisted pair cable						Shielded twisted pair cable	
Color of sheath	Brown		Dark brown	Brown	Dark brown	Black	Brown	
Operating temperature	-15 to 75°C		0 to 75°C	-15 to 75°C	0 to 75°C	-40 to 60°C	-15 to 75°C	
Cross section	<p>Shielding Insulated core (color of an insulator) DA: Blue DB: White DG: Yellow SLD: Shielding + Ground cable</p> <p>Tape</p> <p>Sheath</p> <p>Interposition (FA-CBL200PSBH, FA-CBL200LTPSBH)</p> <p>Ground cable (FA-CBL200SB, FA-CBL200PSBH, FA-CBL200LTPSBH)</p>						<p>Equivalent to FA-CBL200SB</p> <p>Shielding Power cable</p>	<p>Equivalent to FA-CBL200PSBH</p> <p>Shielding Power cable</p>
Manufacturer (KURAMO ELECTRIC CO., LTD.) model	FANC-SB	FANC-SBH	FANC-SBZ	FANC-110SBH	FANC-110SBZ-5	LT-FANC-110SBH	FANC-(SB)	PW110SBH

*1: The specifications of the FA-CBL100PWSB are only for the power supply. Since the specifications of the communication cable is equivalent to the FA-CBL200SB, refer to the specifications for the FA-CBL200SB.

*2: The specifications of the FA-CBL100PWPSBH are only for the power supply. Since the specifications of the communication cable is equivalent to the FA-CBL200PSBH, refer to the specifications for the FA-CBL200PSBH.

*3: The maximum transmission distance of the FA-CBL200PSBZ (vibration-resistant cable) is 50% of that of the FA-CBL200PSBH (fixing cable).

When using them together, double the transmission distance to achieve the maximum transmission distance. (FA-CBL200PSBH maximum transmission distance ≥ [FA-CBL200PSBH cable length] + [FA-CBL200PSBZ cable length] × 2)



CC-Link terminated cable (Round/Y-shaped solderless terminal type)

FA-CBL**CC

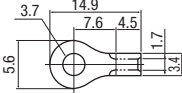
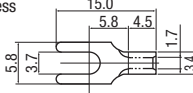
FA-CBL**CCY

FA-CBL**CCPH

FA-CBL**CCPHY

- Since the cable terminal is processed to match the terminal block of the CC-Link remote station, wiring can be easier.
- A marker tube with a signal name is attached to each wire to prevent incorrect wiring.

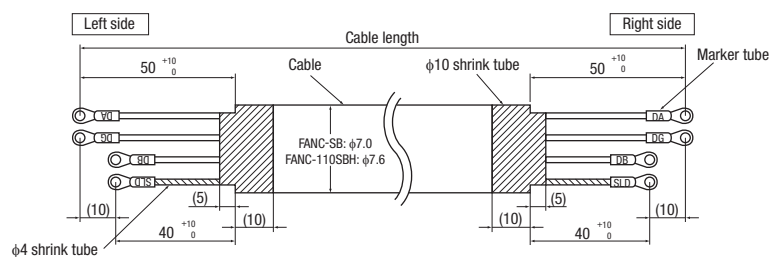
Specifications

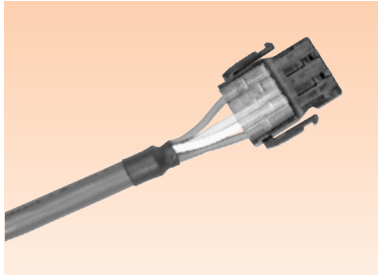
Item	Specifications			
	FA-CBL**CC	FA-CBL**CCY	FA-CBL**CCPH	FA-CBL**CCPHY
Cable	CC-Link cable (FA-CBL200SB)		Ver. 1.10-compatible CC-Link cable (FA-CBL200PSBH)	
Solderless terminal	Round solderless terminal	Y-shaped solderless terminal	Round solderless terminal	Y-shaped solderless terminal
Solderless terminal dimensions	<div>Round solderless terminal</div> <div></div> <div>(Unit: mm)</div>		<div>Y-shaped solderless terminal</div> <div></div> <div>(Unit: mm)</div>	
Marker tube printing	Blue core: "DA", White core: "DB", Yellow core: "DG", Shielding (green): "SLD"			
Shrink tube for shielding	Green φ4			
Shrink tube for cable	Black φ10			

Model	FA-CBL**CC	FA-CBL**CCY	FA-CBL**CCPH	FA-CBL**CCPHY
**	Length	Weight	Weight	Weight
02	0.2m	—	—	Approx. 20g
03	0.3m	Approx. 30g	Approx. 30g	Approx. 30g
04	0.4m	—	—	—
05	0.5m	Approx. 50g	Approx. 50g	Approx. 50g
07	0.7m	—	Approx. 70g	Approx. 70g
10	1.0m	Approx. 100g	Approx. 100g	Approx. 100g
15	1.5m	—	—	Approx. 150g
20	2.0m	Approx. 200g	Approx. 200g	Approx. 200g

External dimension

(Unit: mm)





CC-Link terminated cable (one-touch connector type)

FA-CBL**CCPHP

- Cost and time spent on cable processing can be saved.

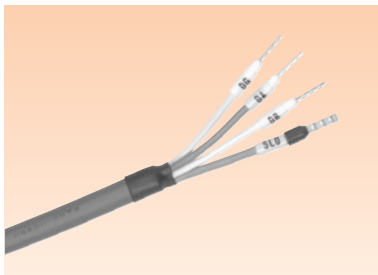
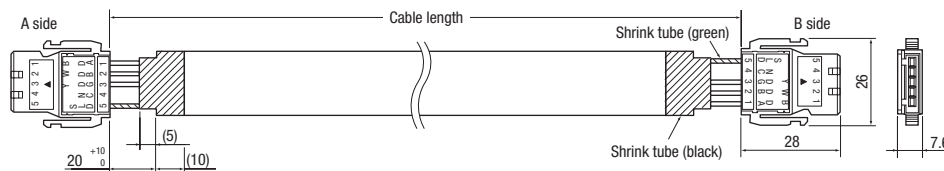
Specifications

Item	Specifications
Cable	Ver. 1.10-compatible CC-Link cable (FA-CBL200PSBH)
Connector manufacturer model	35505-6000-B0M GF manufactured by 3M Japan Limited
Model to be connected	35610-6234-B00 PE manufactured by 3M Japan Limited
Applicable model	CC-Link partner products to which the one-touch connectors of Mitsubishi Electric CC-Link modules, the AJ65VBT series, can be connected

Model		FA-CBL**CCPHP
**	Length	Weight
02	0.2m	Approx. 50g

External dimension

(Unit: mm)



CC-Link terminated cable (Cylindrical rod terminal type)

FA-CBL**CCPHF

- Cost and time spent on cable processing can be saved.
- A marker tube with a signal name is attached to each wire to prevent incorrect wiring.

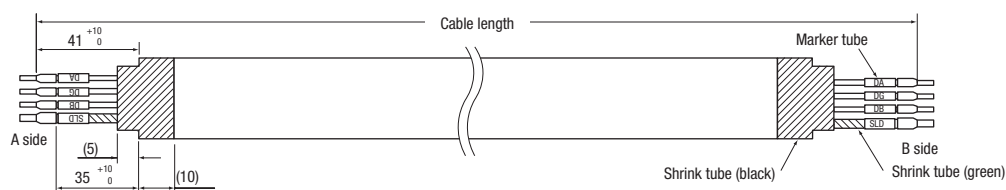
Specifications

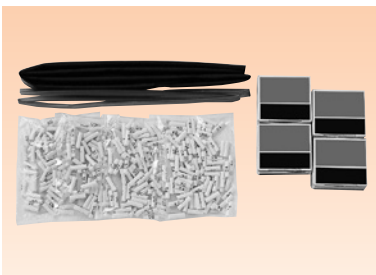
Item	Specifications
Cable	Ver. 1.10-compatible CC-Link cable (FA-CBL200PSBH)
Connector manufacturer model	35505-60 00-B0M GF manufactured by 3M Japan Limited AI 0.5-10 WH (signal line), AI 2.5-10 BU (shielding)
Model to be connected	35610-6234-B00 PE manufactured by 3M Japan Limited
Marker tube printing	Blue core: "DA", White core: "DB", Yellow core: "DG", Shielding (green): "SLD"
Applicable model	CC-Link partner products to which the one-touch connectors of Mitsubishi Electric CC-Link modules, the AJ65VBT series, can be connected

Model		FA-CBL**CCPHF
**	Length	Weight
02	0.2m	Approx. 20g
05	0.5m	Approx. 50g
07	0.7m	Approx. 70g

External dimension

(Unit: mm)





CC-Link terminated parts set (Round/Y-shaped solderless terminal type)

FA-R100SET

FA-Y100SET

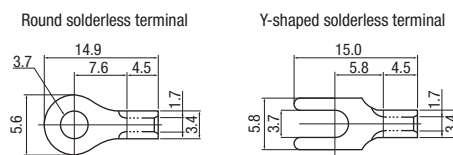
■ The CC-Link terminated parts set can be purchased.

Specifications

Item		Specifications	
		FA-R100SET	FA-Y100SET
Solderless terminal		Round solderless terminal, Quantity: 400	Y-shaped solderless terminal, Quantity: 400
Marker tube	Marking and size	Marking: "DA", "DB", "DG", "SLD" Size: $\phi 3 \times 15$ mm (inside diameter \times length)	
	Quantity	100/each marking	
Shrink tube	For shielding	$\phi 4$ green 4m	
	For cable sheath	$\phi 10$ black 2m	
Weight		Approx. 350g	Approx. 340g

External dimension

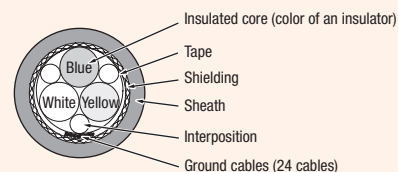
(Unit: mm)



CC-Link cable terminal processing

Required tools

- (1) Crimping tool Used for crimping the solderless terminals
- (2) Nipper Used for cutting interposed materials for a cable
- (3) Hot air generator Used for shrinking tubes
(The generators that can generate hot air of 120°C or higher. Example: HAKKO heating gun 880B manufactured by HAKKO Corporation.)



Structure diagram of Ver. 1.10-compatible CC-Link cable

Procedure (Example: When processing one end of a cable)

Round/Y-shaped solderless terminal processing

- (1) Cut the cable to a length of minus 14mm from the length of cable you want to complete.
- (2) Cut the $\phi 4$ (green) shrink tube to a length of about 36mm.
- (3) Cut the $\phi 10$ (black) shrink tube to a length of about 15mm.
- (4) Peel the cable sheath about 52mm from the cable end.
- (5) Untie the shield (tin-plated soft copper braided wire) and twist it from the root together with the ground wire to make one stranded wire.
- (6) Peel the tape and cut the tape and interposed material at the root.
- (7) Cut the insulating core (white) and the shielded stranded wire so that they are a length of about 42mm from the peeled end of the sheath.
- (8) Insert the $\phi 4$ (green) shrink tube up to the root of the peeled end of the shielded stranded wire.
- (9) Shrink the shrink tubing using a hot air generator. (Be careful not to apply excessive heat as the insulator melts easily.).
- (10) Insert the $\phi 10$ (black) shrink tube into the cable and set it at a position of about 5mm from the peeled end to the peeled side and about 10mm to the non-peeled side.
- (11) Shrink the shrink tubing using a hot air generator. (Be careful not to apply excessive heat as the insulator melts easily.).
- (12) Peel off the insulator of each core wire by about 5mm from the end.
- (13) Insert the marker tubes "DA" into the blue core, "DB" into the white core, "DG" into the yellow core, and "SLD" into the green (shielded stranded wire).
(Insert the marker tubes with the solderless terminals on the right so that characters on the marker tubes can be read.)
- (14) Place a solderless terminal on the isolator-peeled part of each core and crimp the terminal using a crimping tool.
Caulking wire diameter of the crimping tool ... 1.25mm²





CC-Link simple type T-branch module FA-TK72

- The 24VDC power cable can be T-branched.
- Since a 110Ω terminating resistor is built in the module, it can be used as a terminating resistor.
(Switching between on and off)
- Terminal block can be removed from the module, enabling easy wiring and maintain.

Related products

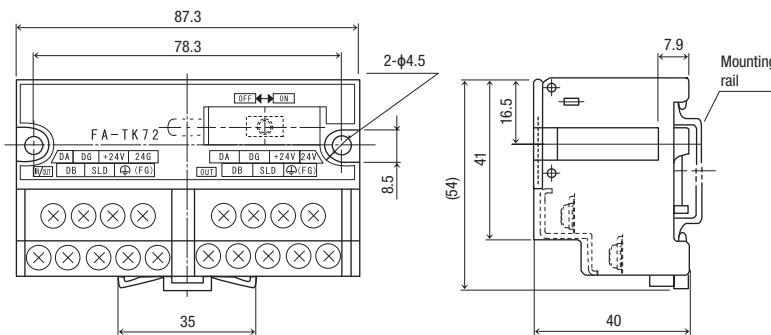
CC-Link cable	P.29
CC-Link terminated cable	P.30 and 31
CC-Link terminated parts set	P.32

Specifications

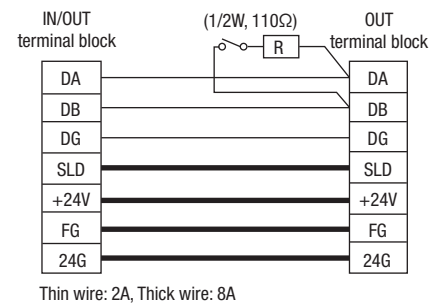
Item	Specifications
Maximum operating voltage/current	Voltage: 26.4VDC/Current: Signal 2A, Power supply, ground wire 8A
Terminal screw	M3 screw, spring-up, 7.62mm pitch
Applicable wire, tightening torque	0.3 to 2mm ² (with solderless terminal used), 58.8 to 88.2N-cm (6 to 9kgf-cm)
Module installation	DIN rail
	TH35-7.5Fe, TH35-7.5Al (IEC 60715 compliant)
Screw type	M4 × 0.7mm × 15mm or more, tightening torque: 78 to 118N-cm (8 to 12kgf-cm)
Withstand voltage, insulation resistance	500VAC for one minute, 100MΩ or more (between charged areas and ground)
Weight	Approx. 140g

External dimension

(Unit: mm)

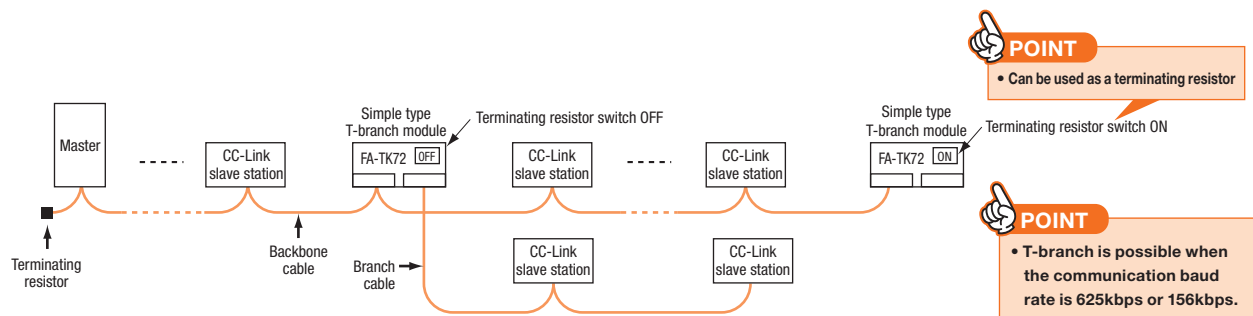


Connection diagram



Application example

An example of T-branched connection of a CC-Link cable by using the CC-Link simple type T-branch module is shown below.



Note: There are restrictions on the T-branch connection of the CC-Link cable. For details on the restrictions, refer to the CC-Link Master/Local Module User's Manual (Detailed) and the CC-Link catalogs.



CC-Link Waterproof type T-branch module

FA-TW43

FA-TW73

- One-touch connection and removal of the waterproof connectors reduces cost and time for wiring.
- The 24VDC power cable can be branched.

Related products

CC-Link cable	P.29
Dustproof cap	P.38
Terminating connector	P.35
Waterproof connector	P.35 to 37
Cable with waterproof connector	P.39

Specifications

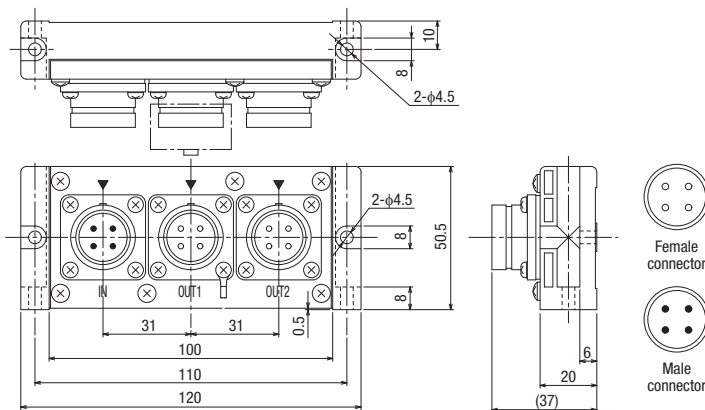
Item	Specifications	
	FA-TW43	FA-TW73
Connector	4-pin connector	7-pin connector
Protection level	IP67*	
Maximum operating voltage/current	26.4VDC/Signal 2A, Ground wire 8A	26.4VDC/Signal, Ground wire 2A, Power supply 8A
Applicable wire	1.25mm ² or less	
Module installation	Horizontal	M4 × 0.7mm × 13mm or more, tightening torque: 78 to 118N·cm (8 to 12kgf·cm)
	Vertical	M4 × 0.7mm × 15mm or more, tightening torque: 78 to 118N·cm (8 to 12kgf·cm)
Withstand voltage, insulation resistance	2000VAC for one minute, 100MΩ or more (between charged areas and ground)	
Weight	Approx. 200g	Approx. 200g

*: This specification is for when applicable connectors are connected to these models.

External dimension

(Unit: mm)

Connection diagram



FA-TW43

IN Male connector	OUT1 Female connector	OUT2 Female connector
1 DA	1 DA	1 DA
2 DB	2 DB	2 DB
3 DG	3 DG	3 DG
4 SLD	4 SLD	4 SLD

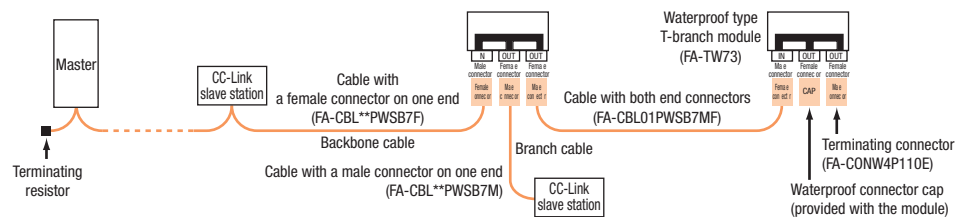
FA-TW73

IN Male connector	OUT1 Female connector	OUT2 Female connector
1 DA	1 DA	1 DA
2 DB	2 DB	2 DB
3 DG	3 DG	3 DG
4	4	4
5 +24V	5 +24V	5 +24V
6 24G	6 24G	6 24G
7 SLD	7 SLD	7 SLD

Thin wire: 2A, Thick wire: 8A

Application example

An example of T-branched connection of a CC-Link cable using the CC-Link waterproof type T-branch module is shown below.



POINT

- T-branch is possible when the communication baud rate is 625kbps or 156kbps.

Note: There are restrictions on the T-branch connection of the CC-Link cable. For details on the restrictions, refer to the CC-Link Master/Local Module User's Manual (Detailed) and the CC-Link uncatalogued.



CC-Link waterproof connector (with a built-in terminating resistor)

FA-CONW4P110E

FA-CONW7P110E

■ The CC-Link waterproof connectors are a connector with a 110Ω built-in terminating resistor and connected to the waterproof type T-branch modules.

Related products

Waterproof type
T-branch module

P.34

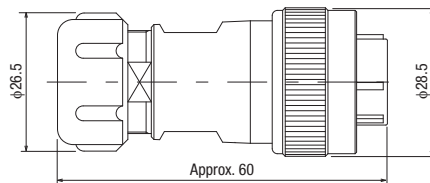
Specifications

Item	Specifications	
	FA-CONW4P110E	FA-CONW7P110E
Protection level	IP67*	
Terminating resistor	110Ω, 1/2W	
Contact	4-pin male	7-pin male
Weight	Approx. 40g	Approx. 40g

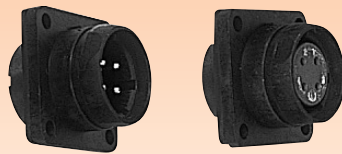
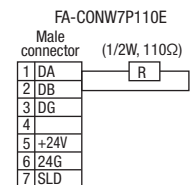
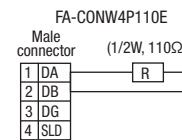
*: This specification is for when applicable connectors are connected to these models.

External dimension

(Unit: mm)



Connection diagram



CC-Link waterproof connector (receptacle)

FA-204-RM

FA-204-RF

FA-207-RM

FA-207-RF

■ The CC-Link waterproof connectors (receptacle) are a one-touch connection/removal junction connector and connected to the panels.

Specifications

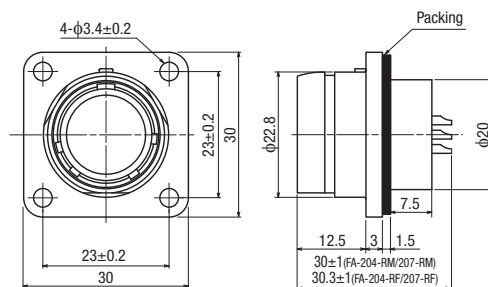
Item	Specifications			
	FA-204-RM	FA-204-RF	FA-207-RM	FA-207-RF
Protection level	IP67 ^{*1}			
Applicable wire	Cross-sectional area: 1.25mm ² or less, Connection method: Soldering			
Contact	4-pin male	4-pin female	7-pin male	7-pin female
	Material: Brass, gold plating, Contact resistance: 5mΩ or less			
Withstand voltage, insulation resistance	1500VAC for one minute, 2000MΩ or more (between contacts)		1000VAC for one minute, 2000MΩ or more (between contacts)	
Operating temperature range	-25 to 85°C			
Vibration resistance, shock resistance, corrosion resistance	Vibration resistance: JIS C 0040 compliant, Shock resistance: 500m/s ² (50G) 3 times for each shaft, Corrosion resistance: JIS C 0023 compliant			
Weight	Approx. 30g	Approx. 30g	Approx. 30g	Approx. 30g

*1: This specification is for when applicable connectors are connected to these models.

*2: A packing must be fitted into a panel.

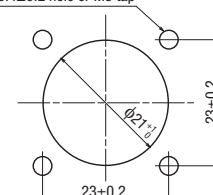
External dimension

(Unit: mm)



Panel mounting hole size (reference value)

4-φ3.4±0.2 hole or M3 tap



Panel thickness: 2mm or more
(When a fixing screw hole is a M3 tap, the thickness needs 6mm or more.)



CC-Link waterproof connector (plug)

FA-204-PM**

FA-204-PF**

FA-207-PM**

FA-207-PF**

■ The CC-Link waterproof connectors (plug) are a one-touch connection/removal connector and reduce cost and time for wiring.

Related products

CC-Link cable

P.29

Specifications

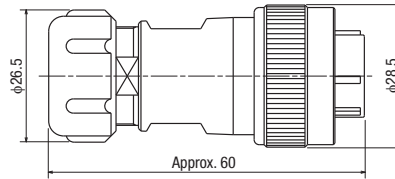
Item	Specifications			
	FA-204-PM**	FA-204-PF**	FA-207-PM**	FA-207-PF**
Protection level	P67 ^{*1}			
Applicable wire	Cross-sectional area: 1.25mm ² or less, Connection method: Soldering			
Contact	4-pin male	4-pin female	7-pin male	7-pin female
	Material: Brass, gold plating, Contact resistance: 5mΩ or less			
Packing diameter	**: 6 ∅5.5 to 6.3, 8 ∅7.0 to 8.5, 10 ∅8.6 to 10.5, 12 ∅10.6 to 12.5 ^{*2}			
Withstand voltage, insulation resistance	1500VAC for one minute, 2000MΩ or more (between contacts)		1000VAC for one minute, 2000MΩ or more (between contacts)	
Operating temperature range	-25 to 85°C			
Vibration resistance, shock resistance, corrosion resistance	Vibration resistance: JIS C 0040 compliant, Shock resistance: 500m/s ² (50G) 3 times for each shaft, Corrosion resistance: JIS C 0023 compliant			

*1: This specification is for when applicable connectors are connected to these models.

*2: Use a cable that matches each packing diameter.

External dimension

(Unit: mm)



CC-Link waterproof connector (adapter)

FA-204-AdM**

FA-204-AdF**

FA-207-AdM**

FA-207-AdF**

■ The CC-Link waterproof connectors (adapter) are a one-touch connection/removal connector and reduce cost and time for wiring.

Related products

CC-Link cable

P.29

Specifications

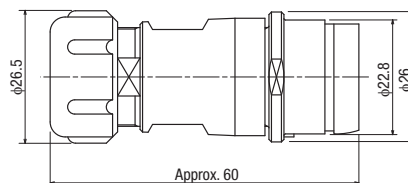
Item	Specifications			
	FA-204-AdM**	FA-204-AdF**	FA-207-AdM**	FA-207-AdF**
Protection level	IP67 ¹			
Applicable wire	Cross-sectional area: 1.25mm ² or less, Connection method: Soldering			
Contact	4-pin male	4-pin female	7-pin male	7-pin female
	Material: Brass, gold plating, Contact resistance: 5mΩ or less			
Packing diameter	**: 6 …… ø5.5 to 6.3, 8 …… ø7.0 to 8.5, 10 …… ø8.6 to 10.5, 12 …… ø10.6 to 12.5 ²			
Withstand voltage, insulation resistance	1500VAC for one minute, 2000MΩ or more (between contacts)		1000VAC for one minute, 2000MΩ or more (between contacts)	
Operating temperature range	-25 to 85°C			
Vibration resistance, shock resistance, corrosion resistance	Vibration resistance: JIS C 0040 compliant, Shock resistance: 500m/s ² (50G) 3 times for each shaft, Corrosion resistance: JIS C 0023 compliant			

*1: This specification is for when applicable connectors are connected to these models.

*2: Use a cable that matches each packing diameter.

External dimension

(Unit: mm)



Description of the waterproof connectors

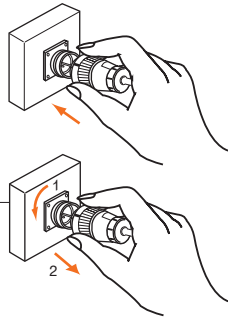
Waterproof connector connecting/removing method

• Connection

Align the plug guide with the receptacle guide and push in the plug straight. (Since this connector is a 5-pin plug, insert the plug into the receptacle and turn the plug so that the guides can be aligned.)

• Removal

Turn the coupling nut 45 degrees to the left as shown by the arrow and pull out the connector.



Applicable CC-Link cables

Refer to the table on the right for CC-Link cables that can be fitted to the packing diameters of the waterproof connectors.

Packing diameter	CC-Link cable
6	—
8	FA-CBL200SB/SBH/SBZ/PSBH/PSBZ/LTPSBH
10	—
12	FA-CBL100PWSB/PWPSBH

Applicable waterproof connector

4-pin connector		7-pin connector	
FA-204-RM	FA-204-PF**	FA-207-RM	FA-207-PF**
FA-204-RF	FA-204-PM**	FA-207-RF	FA-207-PM**
4-pin relay connector		7-pin relay connector	
FA-204-AdM	FA-204-PF**	FA-207-AdM	FA-207-PF**
FA-204-AdF	FA-204-PM**	FA-207-AdF	FA-207-PM**

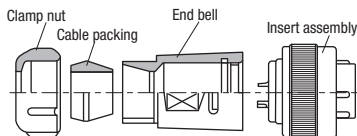
Waterproof connector connecting method

• Waterproof connector pin No.

Item	4-pin connector	7-pin connector
Pin No. (on the connector attaching surface)		

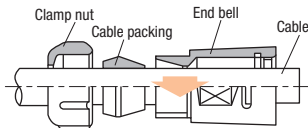
• Procedure for connecting the waterproof connector to the cable

(1) Disassembling the connector



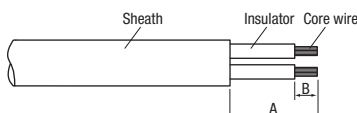
- 1) Turn the insert assembly counterclockwise and remove it from the end bell.
- 2) Loosen the clamp nut and remove the cable packing from the end bell.

(2) Fitting each disassembled part through the cable in the order as shown below.



Note 1: Ensure that the order (position) and orientation of each dissembled part are correct.

(3) Remove the sheath and insulator from each cable used. The length to be removed is shown in the following table.



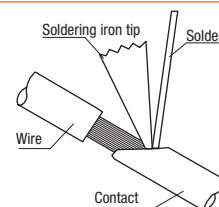
Shell size 20

Length A (mm)	Length B (mm)	Cross-sectional area (mm ²)
18	5.2	1.25 or less

(4) Preliminary soldering of the core wire in the terminated cable

Note 2: Ensure that the cable sheath is not preliminarily soldered.
Note 3: Solder within the hole diameter of the contact evenly.

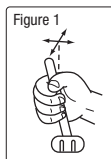
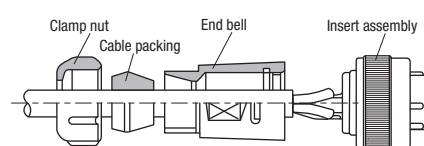
(5) Soldering



- 1) Insert the preliminarily-soldered wire into the solder pot of the contact.
- 2) Heat the contact and core wire using a soldering iron.
- 3) Solder to fill the gap between the contact and the core wire.

Soldering iron	Cross-sectional area (mm ²)	Temperature of soldering iron tip (°C)
30W	0.5	280
60W	1.25	350

(6) Assembling the connector as shown below



- 1) Hold the insert assembly and turn the end bell to tighten it.
 - Tightening torque.....10kgf-cm to 15kgf-cm
- 2) Press the cable packing into the end bell and fix the end bell to tighten the clamp nut.
 - Tightening torque.....15kgf-cm to 20kgf-cm
- 3) Move the cable back, forth, left, and right to fit it (Figure 1). Tighten it again with the specified torque value.



Dustproof cap for CC-Link waterproof connector

FA-NRW-20-PCa1
FA-NRW-20-RCa
FA-NRW-20-AdCa

■ The dustproof caps are used to protect unused CC-Link waterproof connectors from dust.

Related products

Waterproof type T-branch module P.34
Waterproof connector P.35 to 37

Specifications

Item	Specifications		
	FA-NRW-20-PCa1	FA-NRW-20-RCa	FA-NRW-20-AdCa
Material	Nylon	Synthetic rubber	Synthetic rubber
Weight	Approx. 20g	Approx. 20g	Approx. 10g

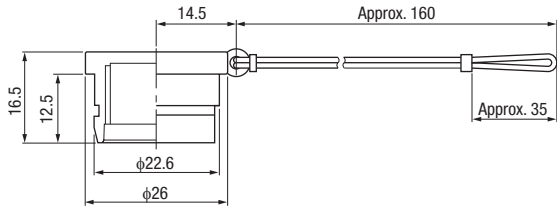
Note: They are not waterproof.

	Model	FA-NRW-20-PCa1	FA-NRW-20-RCa	FA-NRW-20-AdCa
Fitting connector	FA-204-PM*	○	—	—
	FA-204-PF*	○	—	—
	FA-207-PM*	○	—	—
	FA-207-PF*	○	—	—
	FA-TW43	—	○	—
	FA-TW73	—	○	—
	FA-204-RM	—	○	—
	FA-204-RF	—	○	—
	FA-207-RM	—	○	—
	FA-207-RF	—	○	—
	FA-204-AdM*	—	—	○
	FA-204-AdF*	—	—	○
	FA-207-AdM*	—	—	○
	FA-207-AdF*	—	—	○

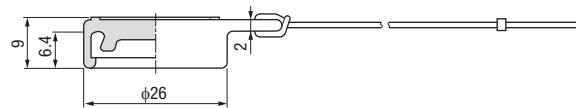
External dimension

(Unit: mm)

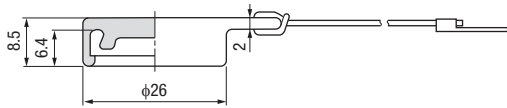
[FA-NRW-20-PCa1]

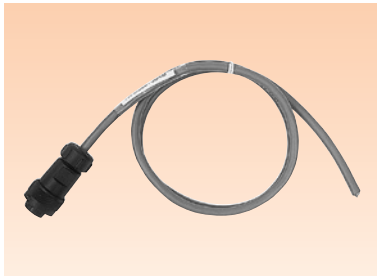


[FA-NRW-20-RCa]



[FA-NRW-20-AdCa]





CC-Link cable with a waterproof connector on one end

FA-CBL**PSBH4M
FA-CBL**PSBH4F
FA-CBL**PWSB7M
FA-CBL**PWSB7F

■ The CC-Link cables (with a waterproof connector on one end) are a one-touch connection/removal cable and reduce cost and time for wiring.

Related products

CC-Link cable P.29
Waterproof connector P.35 to 37

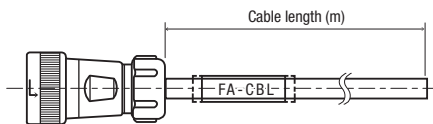
Specifications

Item	Specifications			
	FA-CBL**PSBH4M	FA-CBL**PSBH4F	FA-CBL**PWSB7M	FA-CBL**PWSB7F
Cable	FA-CBL200PSBH		FA-CBL100PWSB	
Connector	FA-204-PM8	FA-204-PF8	FA-207-PM12	FA-207-PF12
	4-pin male	4-pin female	7-pin male	7-pin female

Model		FA-CBL**PSBH4M	FA-CBL**PSBH4F	FA-CBL**PWSB7M	FA-CBL**PWSB7F
**	Length	Weight	Weight	Weight	Weight
05	5m	Approx. 590g	Approx. 590g	—	—
10	10m	—	—	Approx. 1.9kg	Approx. 1.9kg

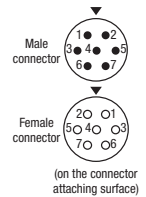
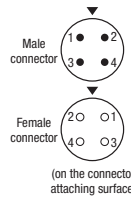
External dimension

(Unit: mm)



Connection diagram

4-pin connector			7-pin connector		
Pin No.	Signal	Wire color	Pin No.	Signal	Wire color
1	DA	Blue	1	DA	Blue
2	DB	White	2	DB	White
3	DG	Yellow	3	DG	Yellow
4	SLD	Shielding	4		
			5	+24V	White
			6	24G	Black
			7	SLD	Shielding



CC-Link cable with waterproof connectors on both ends

FA-CBL01PWSB7MF

■ The CC-Link cable (with waterproof connectors on both ends) is a one-touch connection/removal cable and reduces cost and time for wiring.

Related products

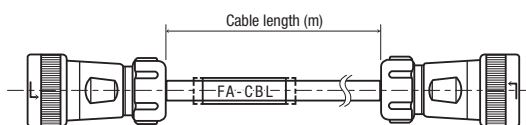
CC-Link cable P.29
Waterproof connector P.35 to 37

Specifications

Item	Specifications	
	FA-CBL01PWSB7MF	
Cable	FA-CBL100PWSB	
Connector	FA-207-PM12	FA-207-PF12
	7-pin male	7-pin female
Length	1m	
Weight	Approx. 330g	

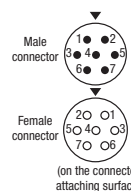
External dimension

(Unit: mm)



Connection diagram

7-pin connector	
Pin No.	Signal
1	DA
2	DB
3	DG
4	
5	+24V
6	24G
7	SLD



Network devices

Monitoring / Traceability

Monitoring and traceability

INDEX

Camera monitoring (Network camera interface module)

Features	P.42
Model list	P.46
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RFID (RFID interface module)

Features	P.48
Selection chart	P.54
Model list	P.56
Specifications	P.57

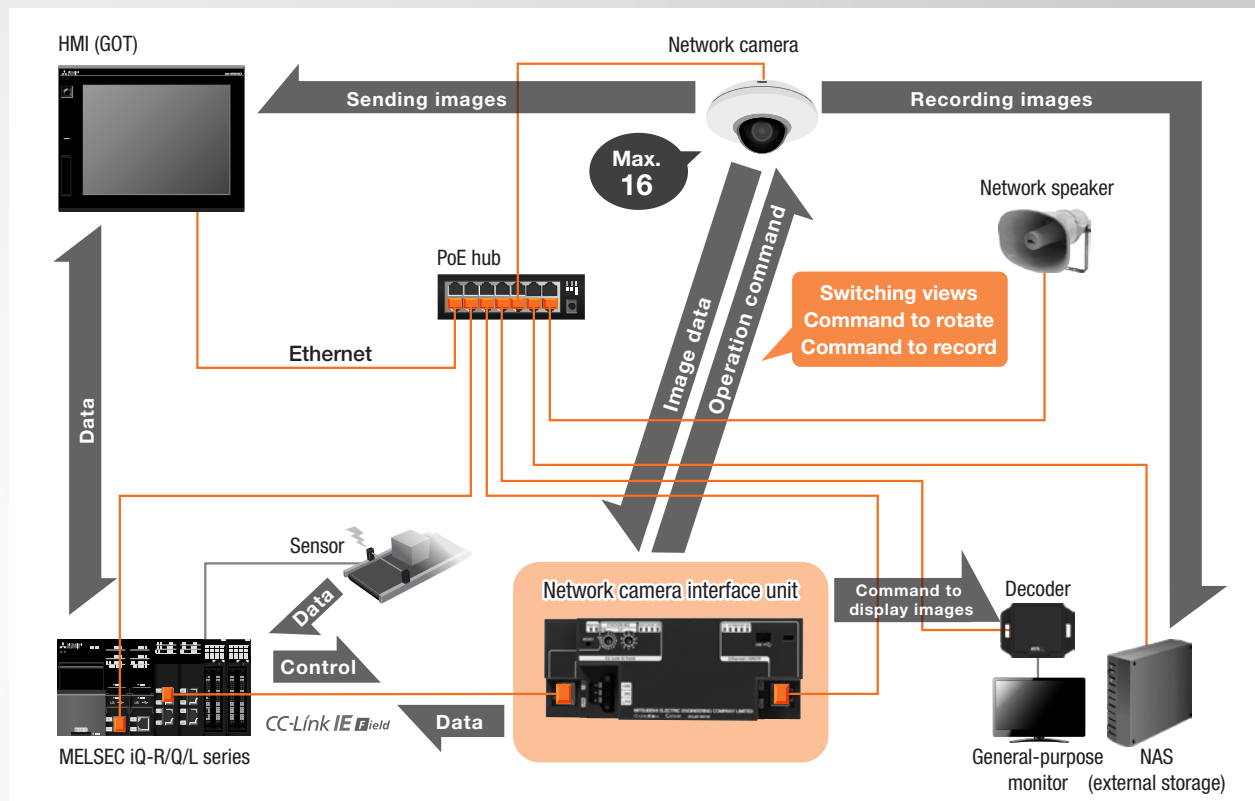
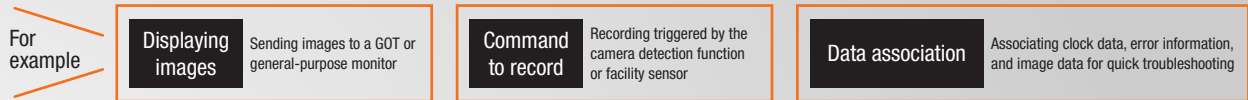
Related system

Traceability enhancement using drive recorder images	P.60
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Camera monitoring (Network camera interface module)

Streamlining on-site camera monitoring with an HMI (GOT)

An HMI (GOT) enables easier and more convenient camera monitoring.



P. 43

Checking images of the production site using an HMI (GOT)

Camera shooting directions can be changed while checking images on the screen of the HMI (GOT).

P. 43

Recording images at a downtime (drive recorder images)

Recording can be triggered by the camera detection function or facility sensor.

P. 44

Sending images to a general-purpose monitor for large-scale split screen display

Images can be sent from multiple cameras to the HMI (GOT) or general-purpose monitor, and displayed images can be switched.

P. 44

Voice messages via a speaker

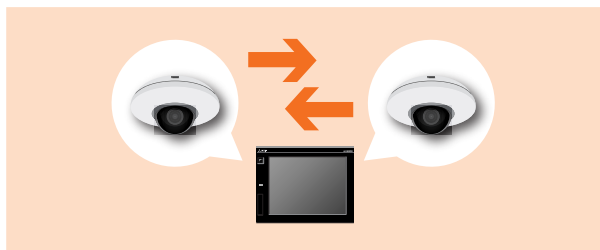
Error messages or other messages are given by voice using a network speaker.

Checking images of the production site using an HMI (GOT)

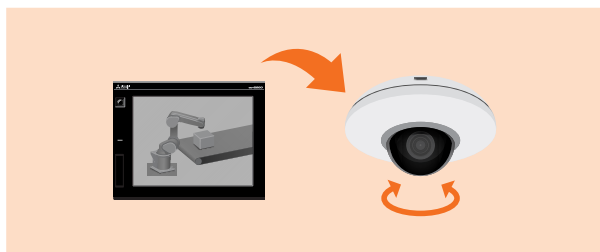
Live camera images can be checked on the HMI (GOT) without using a personal computer.

The displayed images can be switched to images sent from other cameras and camera shooting directions can be changed while checking images.

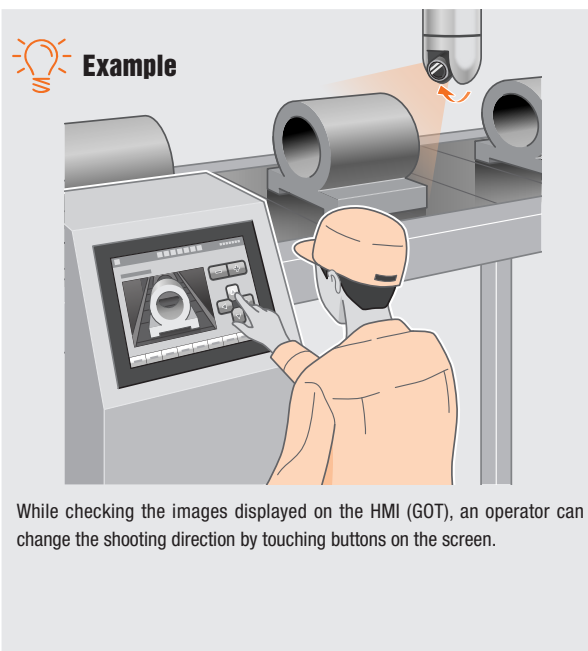
The GOT2000 series already used can be used for monitoring.



Switching views among multiple cameras



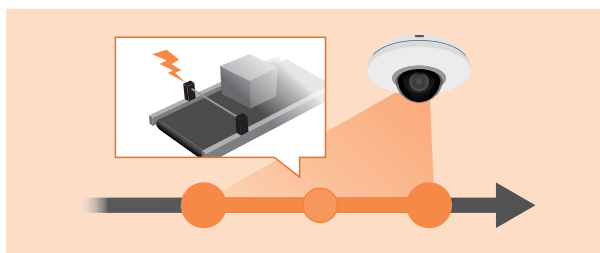
Changing the camera shooting direction using the HMI (GOT)



Recording images at a downtime (drive recorder images)

When a trouble occurs, the production status before and after the trouble occurrence can be recorded and used for the trouble analysis.

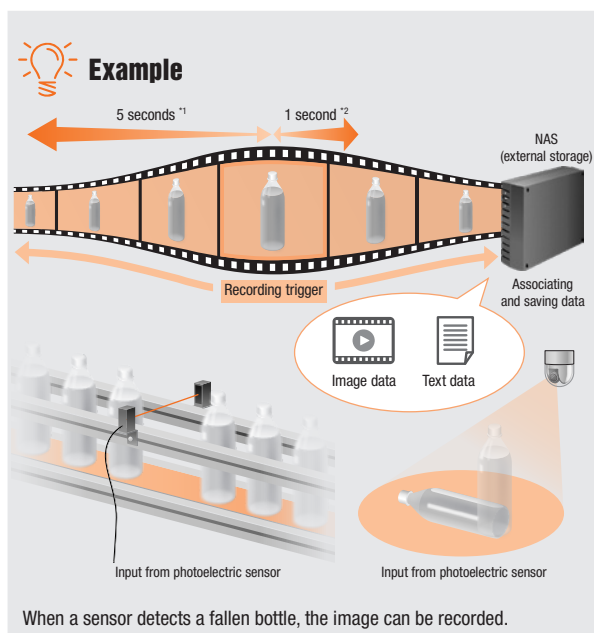
Camera motion detection, heat detection, and other functions are used to display alarms on the HMI (GOT).



Recording production status upon sensor detection



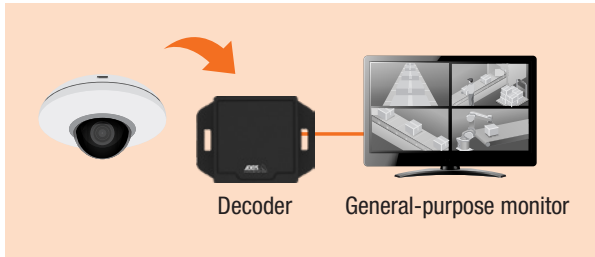
Using various camera detection functions



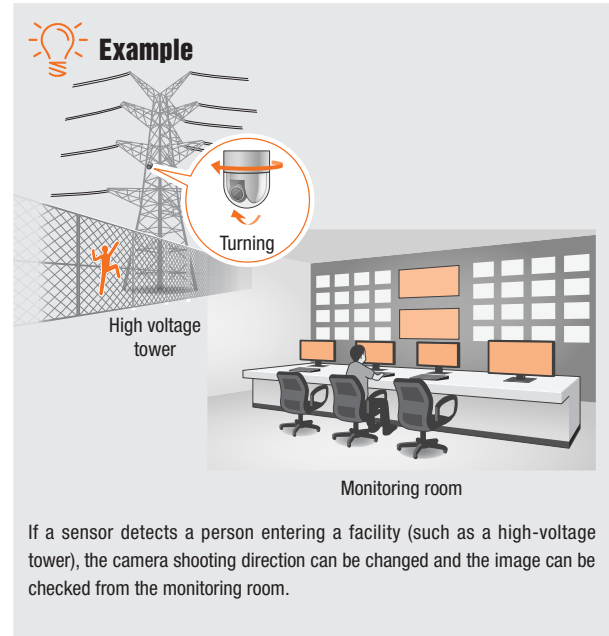
*1, *2: Time can be set individually as desired. The maximum value depends on the camera specifications.

Sending images to a general-purpose monitor for large-scale split screen display

Images from multiple cameras can be sent to a general-purpose monitor using the decoder. (Images can also be sent to a remote location.)

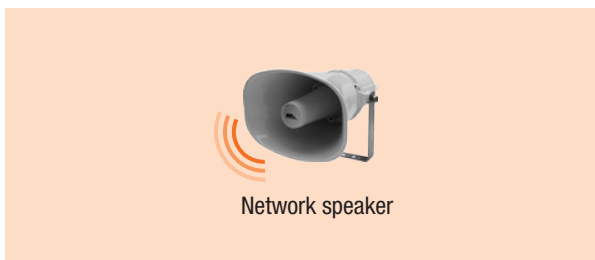


Large scale split display on a general-purpose monitor

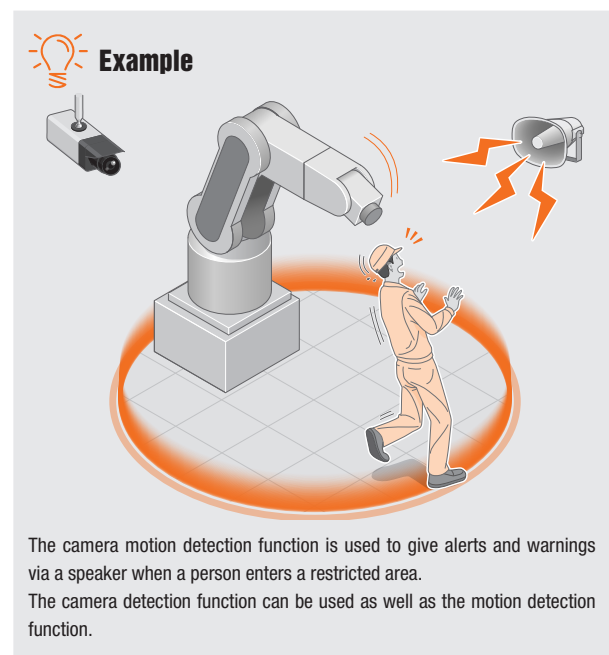


Voice messages via a speaker

Error messages or other messages are given by voice using a network speaker.



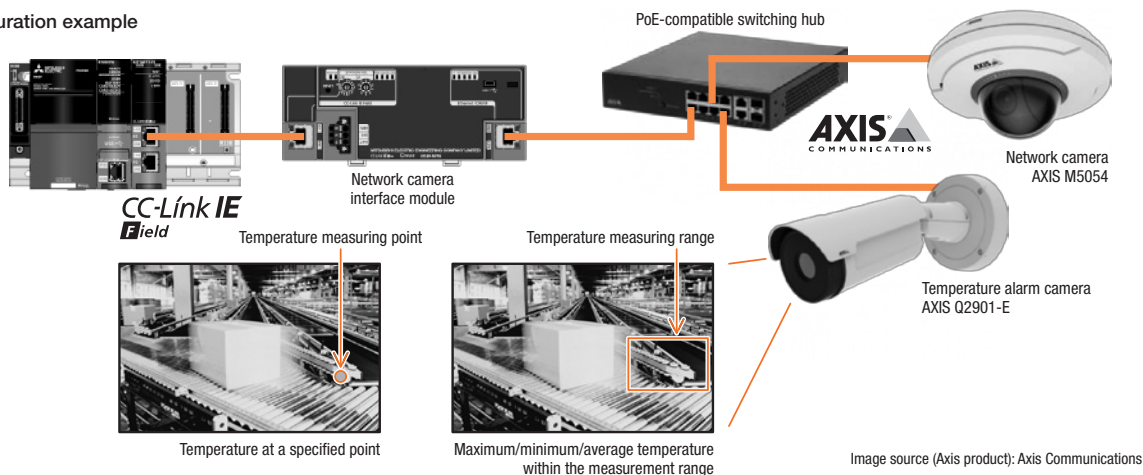
Voice messages



Application example Temperature monitoring system

- The absolute temperature is obtained at a specified point within the shooting range. (The obtained temperature can be used as numerical value data.)
- Up to six temperature measuring ranges are set within the shooting range.
- The maximum temperature, minimum temperature, and average temperature are obtained for each temperature measuring range. (The obtained temperatures can be used as numerical value data).
- The MELSEC iQ-R/Q/L series can be notified of the alarms that the specified temperature or temperature change rate ($^{\circ}\text{C}/\text{second}$) is exceeded.

■ Configuration example

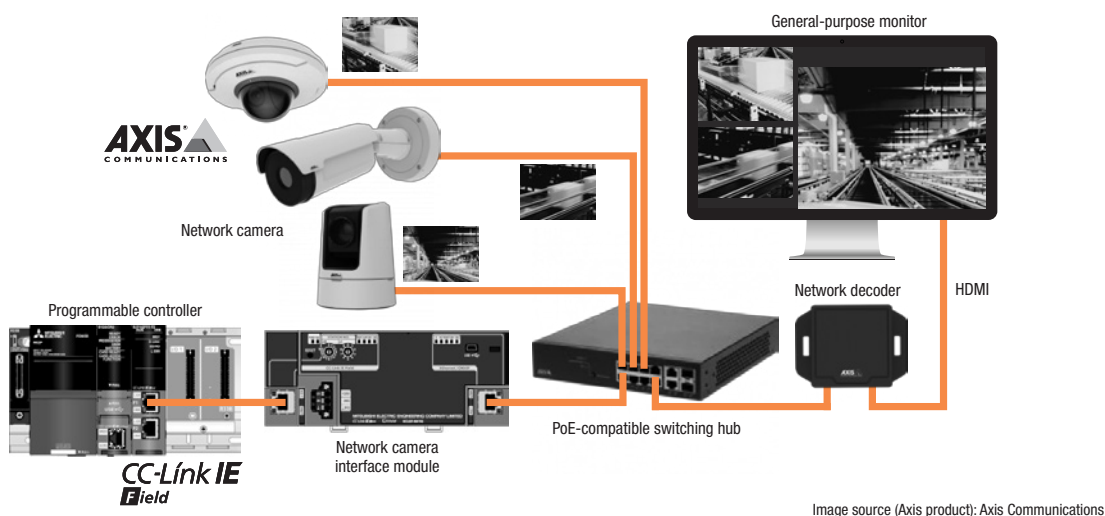


Application example General-purpose monitor display without a computer

- By using a network decoder, network camera images can be displayed on a general-purpose monitor without a computer.
- Up to 16 network cameras can be freely set for display.
- The display position and size can be freely set for each live image.

■ Configuration example

- The images displayed on the monitor can be changed by triggering signals that can be handled by the programmable controller, such as sensor input.
- A detection function (such as motion detection) equipped in the network camera can also be used as a trigger.



Model list

Network camera interface module

Product	Product line	No. of devices to be registered	Model
CC-Link IE Field Network-compatible network camera interface module	<ul style="list-style-type: none"> Module CD-ROM: Configuration tool, User's Manual (Detailed) in PDF format, USB device driver, CSP+ file User's Manual (Hardware) 	2	ECLEF-NV1G-02
		4	ECLEF-NV1G-04
		8	ECLEF-NV1G-08
		16	ECLEF-NV1G-16

Introduction of reference products^{*1}

Product	Manufacturer	Model	Remarks
Network camera	AXIS COMMUNICATIONS	AXIS M5054	Pan/tilt/zoom (PTZ) camera
		AXIS M5065	
		AXIS V5915	
		AXIS M2025-LE	Fixed bullet camera
		AXIS M2026-LE Mk II	
		AXIS Q1700-LE	
		AXIS Q1785-LE	
		AXIS P1244	Modular camera
		AXIS P1224-E	
		AXIS M1065-L	Fixed box camera
		AXIS P1367	
		AXIS Q1645	
		AXIS M3045-V	Fixed dome camera
		AXIS M3065-V	
AXIS Q2901-E	Temperature alarm camera		
AXIS Q2901-E PT Mount			
Network speaker	AXIS C1004-E	Network cabinet speaker	
	AXIS C1410	Network mini speaker	
	AXIS C3003-E	Network horn speaker	
Network decoder	AXIS T8705	Decoder	

Introduction of connectable products^{*2}

Product	Manufacturer	Model	Remarks
Network camera	Canon	VB-S30D	PTZ dome model
		VB-S30D Mk II	
		VB-H45	PTZ model
	Panasonic	BB-SC384B	Pan-tilt-zoom (PTZ) camera
		BB-SC364	
		WW-SC387	

*1: Reference products are products that have been verified by Mitsubishi Electric and satisfy the Mitsubishi Electric standards.

Use the reference products in accordance with their specifications (standards).

*2: Connectable products are products that satisfy the interface specifications with the Mitsubishi Electric modules.

Note that those connectable products have not been verified by Mitsubishi Electric. When using those connectable products, the user must verify that no operation problem occurs with the target system.

Also, use those connectable products in accordance with their specifications (standards).

*1, 2: The specifications for the reference products and connectable products are subject to change without notice due to circumstances of each manufacturer.

Before use, be sure to read "Safety Precautions" in the user's manual of each product.

For mounting and removal and wiring precautions, refer to the manual of the product to be used.

Specifications



CC-Link IE Field Network-compatible network camera interface module

ECLEF-NV1G-02

ECLEF-NV1G-04

ECLEF-NV1G-08

ECLEF-NV1G-16

- Camera shooting directions can be changed while checking images on the screen of the HMI (GOT).
- Recording can be controlled by triggering the camera detection function or facility sensor.
- Images can be sent from multiple cameras (maximum 16) to the HMI (GOT) or general-purpose monitor, and displayed images can be switched.
- Error messages or other messages are given by voice using a network speaker.
- The absolute temperature can be obtained as a numerical value from the thermal camera.
- Error messages or other messages are given by voice using a network speaker.
- Network devices can be controlled using HTTP (CGI control).

Specifications

Item		Specifications			
		ECLEF-NV1G-02	ECLEF-NV1G-04	ECLEF-NV1G-08	ECLEF-NV1G-16
No. of devices to be registered		2	4	8	16
Operating ambient temperature		0 to 55°C			
Operating ambient humidity		5 to 95%RH, non-condensing			
External power supply		20.4 to 28.8VDC (24VDC-15%, +20%) (ripple ratio: within 5%)			
Current consumption		0.16A			
External dimensions		70 (H) × 180 (W) × 50 (D) mm (When the DIN rail hook is included: 75mm (H)) (When the module power supply and terminal block for FG are included: 56mm (D))			
Weight		330g (including the module power supply and terminal block for FG)			
External interface	Ethernet/camera network	Ethernet: TCP/UDP/HTTP (GET/POST) ^{*1} Camera network: Compatible with ONVIF Core Spec Ver. 2.42, ONVIF Test Spec Ver. 21.06, Profile S			
	CC-Link IE Field Network	Station type: Intelligent device station			
Network device registration (camera parameter setting/reading)		[Item] IP address, user name, password, ONVIF enabled/disabled, etc. [Applicable tool ver.] GX Works2: Ver. 1.591R or later, GX Works3: Ver. 1.061P or later			
Connection target model (manufactured by Mitsubishi Electric)		GOT2000 series (GT25 models, GT27 models) ^{*2}			

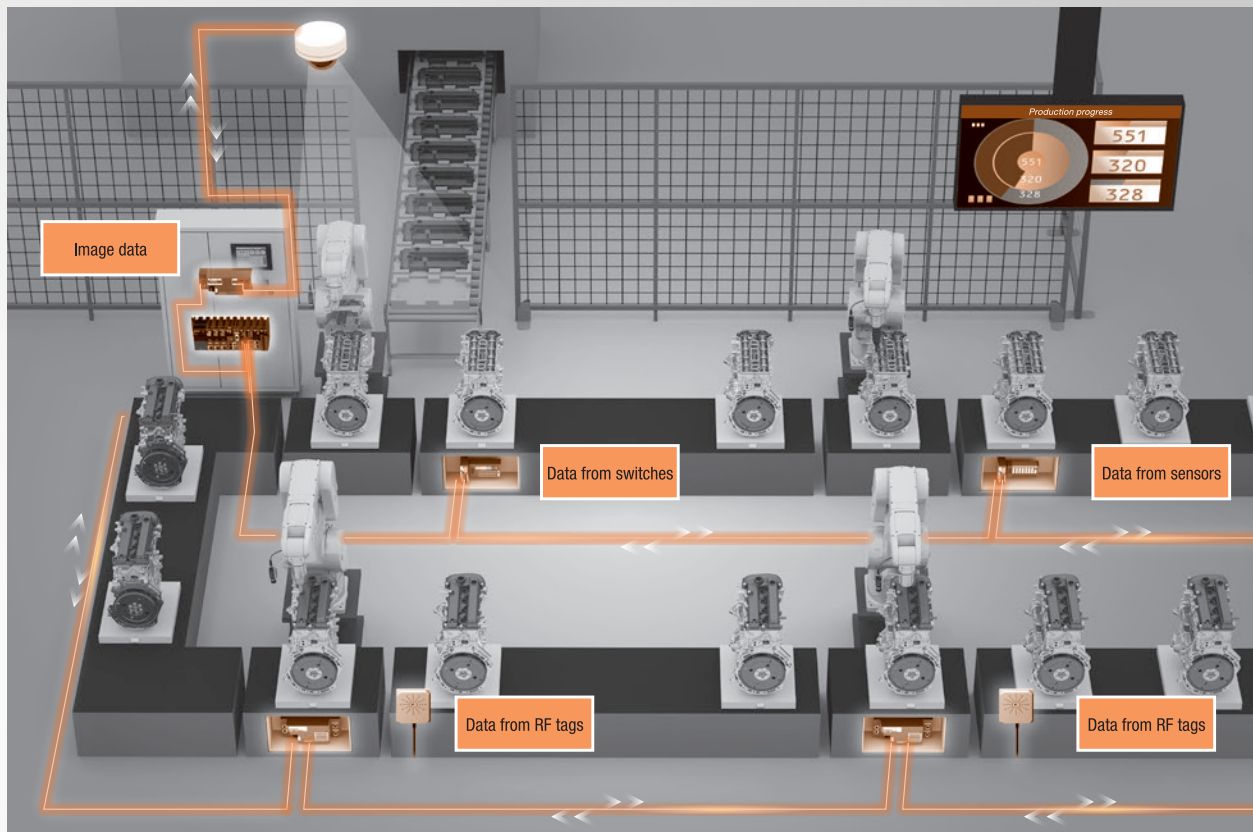
*1: BASIC/DIGEST authentication and WS-Security are supported. Standard Ethernet devices can be controlled using CGI.

*2: To display camera images on the GOT window, GT Designer3 Ver. 1.245F or later is required. If an older version of GT Designer3 is used, an SD card (such as NZ1MEM-2GBSD) must be inserted into the GOT.

RFID (RFID interface module)

Mitsubishi Electric programmable controller can be easily connected with the OMRON RFID system V680 series using the RFID interface module.

RFID system enables users to manage the production history and visualize the production status at production sites.



P.49

Visualization of data at production sites using RFID system

Every data at production sites is visualized to improve productivity and product quality.

P.49

Flexible configuration suitable for each system

The slot-in type and CC-Link IE Field/CC-Link-compatible network distributed type modules are available. This enables user to control the entire factory.

P.50

Easy system start-up

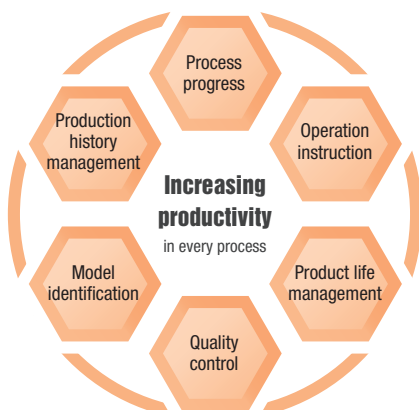
Programs can be easily created using FBs (function block) for Mitsubishi Electric MELSOFT, programmable controller engineering software.

P.53

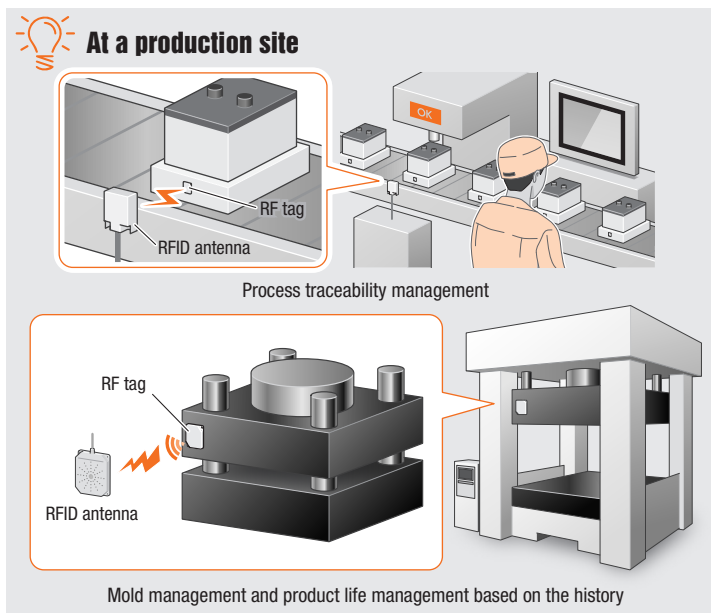
A wealth of test and measurement functions

Diagnosis, such as "communication test" and "noise level measurement", between the antenna and an RF tag can be performed during start-up and maintenance.

Visualization of data at production sites using RFID system



Every data at production sites is visualized to improve productivity and product quality.



Flexible configuration suitable for each system

MELSEC iQ-R

MELSEC-Q

CC-Link IE Field

CC-Link

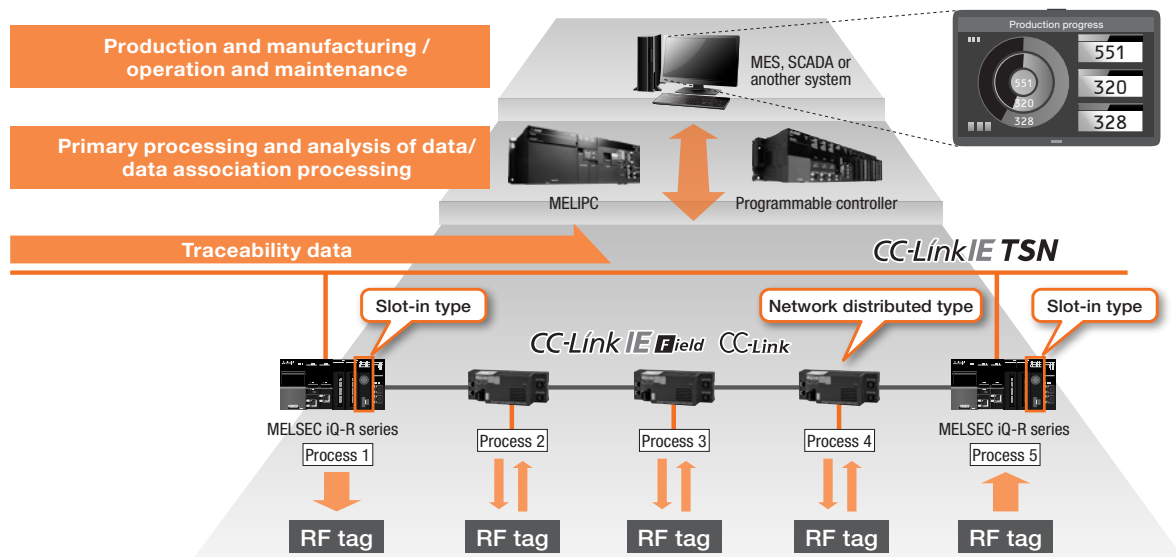
The MELSEC iQ-R series/MELSEC-Q series-compatible slot-in type modules are capable of the high-speed communications of the large-volume data (2048 bytes) with a programmable controller CPU.

The CC-Link IE Field/CC-Link-compatible network distributed type modules can be installed at dispersed sites as a device station for remote control.

- By using a slot-in type and a network distributed type modules together, all the production processes can be controlled.

Processes 1 and 5: MELSEC iQ-R series-compatible slot-in type module with high speed and large capacity to handle large-volume data generated by management information processing of all the processes

Processes 2, 3, and 4: For information processing of each process, CC-Link IE Field/CC-Link-compatible network distributed type modules to install them remotely



In this manual, **MELSEC iQ-R** is indicated for the descriptions related to the MELSEC iQ-R series-compatible slot-in type module, **MELSEC-Q** is indicated for the descriptions related to the MELSEC-Q series-compatible slot-in type module, **CC-Link IE Field** is indicated for the descriptions related to the CC-Link IE Field-compatible module, and **CC-Link** is indicated for the descriptions related to the CC-Link-compatible module.

Easy system start-up

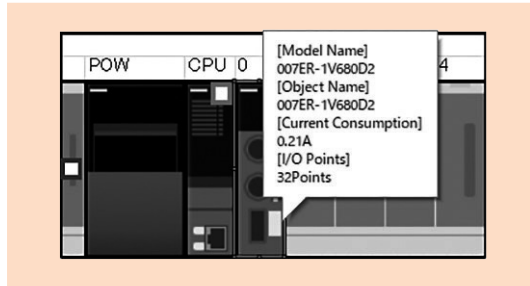
The MELSEC iQ-R series-compatible slot-in type module has the three features that utilize the features of the MELSEC iQ-R series programmable controller, enabling initial settings on the graphical user interface.

If the MELSEC-Q series-compatible slot-in type module (EQ-V680D1 or EQ-V680D2) is currently used, it can be easily replaced with the MELSEC iQ-R series-compatible slot-in type module (ER-1V680D1 or ER-1V680D2) because the same program can be applied.

For other models, programs can be easily created using the FB (function block) libraries for Mitsubishi Electric MELSOFT, programmable controller engineering software. They can be downloaded on MEEFAN site or Mitsubishi Electric FA site.

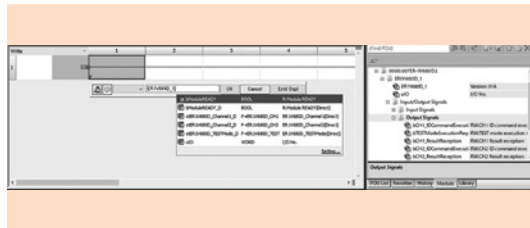
Three new features

MELSEC iQ-R



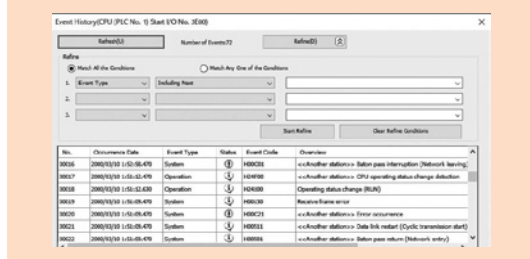
Initial setting on GUI

- Graphically configurable initial setting
- Module assignments by dragging and dropping



Module label

- Supporting label programming
- Enabling device selection from lists
- Auto-tracking of module assignments



Event history

- Managing CPU module event history
- Displaying error occurrence, causes, and corrective actions

Applying the same program

MELSEC iQ-R



Using an existing system

- Program for the MELSEC-Q series-compatible slot-in type module can be applied to the MELSEC iQ-R series-compatible slot-in type module.

FBs (function block) for easier program creation

MELSEC iQ-R

MELSEC-Q

CC-Link IE Field

CC-Link

By downloading the FB (function block) libraries for Mitsubishi Electric MELSOFT, programmable controller engineering software, on MEEFAN site or Mitsubishi Electric FA site, programs can be easily created.

FB library list

MELSEC iQ-R series slot-in type

FB name	Function
E_MEE-ER-1V680D_ParameterSet_R	Parameter setting
E_MEE-ER-1V680D_Read_R	RF tag read
E_MEE-ER-1V680D_Write_R	RF tag write
E_MEE-ER-1V680D_BitSet_R	RF tag bit set
E_MEE-ER-1V680D_BitClear_R	RF tag bit clear
E_MEE-ER-1V680D_MaskBitWrite_R	RF tag mask bit write
E_MEE-ER-1V680D_CalculationWrite_R	RF tag mask bit write
E_MEE-ER-1V680D_Fill_R	RF tag data fill
E_MEE-ER-1V680D_DataCheck_R	RF tag data check
E_MEE-ER-1V680D_CounterWrite_R	RF tag overwrite count control
E_MEE-ER-1V680D_Copy_R	Copy between RF tags (Available with EQ-V680D2 only)
E_MEE-ER-1V680D_ErrorCorrectionRead_R	RF tag read with error correction
E_MEE-ER-1V680D_ErrorCorrectionWrite_R	RF tag write with error correction
E_MEE-ER-1V680D_UIDRead_R	RF tag read UID
E_MEE-ER-1V680D_MeasureNoise_R	Measure noise
E_MEE-ER-1V680D_StatusRead_R	Module status read

*: FBs (function block) and sample ladders can be download on our website.

MELSEC-Q series slot-in type

FB name	Function
P+EQ-V680D_ParameterSet	Parameter setting
P+EQ-V680D_Read	RF tag read
P+EQ-V680D_Write	RF tag write
P+EQ-V680D_BitSet	RF tag bit set
P+EQ-V680D_BitClear	RF tag bit clear
P+EQ-V680D_MaskBitWrite	RF tag mask bit write
P+EQ-V680D_CalculationWrite	RF tag calculation write
P+EQ-V680D_Fill	RF tag data fill
P+EQ-V680D_DataCheck	RF tag data check
P+EQ-V680D_CounterWrite	RF tag overwrite count control
P+EQ-V680D_Copy	Copy between RF tags (Available with EQ-V680D2 only)
P+EQ-V680D_ErrorCorrectionRead	RF tag read with error correction
P+EQ-V680D_ErrorCorrectionWrite	RF tag write with error correction
P+EQ-V680D_UIDRead	RF tag read UID
P+EQ-V680D_MeasureNoise	Measure noise
P+EQ-V680D_StatusRead	Module status read

*: Sample ladders provided in the User's Manual (Detailed) can be download on our website.

CC-Link IE Field-compatible network distributed type

FB name	Function
P+MEE-ECLEF-V680D2_InitDateSet	Parameter setting
P+MEE-ECLEF-V680D2_Read	RF tag read
P+MEE-ECLEF-V680D2_Write	RF tag write
P+MEE-ECLEF-V680D2_Fill	RF tag data fill
P+MEE-ECLEF-V680D2_Copy	Copy between RF tags
P+MEE-ECLEF-V680D2_UIDRead	RF tag read UID
P+MEE-ECLEF-V680D2_MeasureNoise	Measure noise
P+MEE-ECLEF-V680D2_InitDateRead	Parameter setting status read
P+MEE-ECLEF-V680D2_StatusRead	Module status read

*: CSP+, FBs (function block), and sample ladders can be download on our website.

CC-Link-compatible network distributed type

FB name	Function
P+MEE-ECL2-V680D1_InitDateSet	Parameter setting
P+MEE-ECL2-V680D1_Read	RF tag read
P+MEE-ECL2-V680D1_Write	RF tag write
P+MEE-ECL2-V680D1_Fill	RF tag data fill
P+MEE-ECL2-V680D1_UIDRead	RF tag read UID
P+MEE-ECL2-V680D1_MeasureNoise	Measure noise
P+MEE-ECL2-V680D1_InitDateRead	Parameter setting status read
P+MEE-ECL2-V680D1_StatusRead	Module status read

*: CSP+, FBs (function block), and sample ladders can be download on our website.

Data read time and write time

MELSEC iQ-R

MELSEC-Q

CC-Link IE Field

CC-Link

RFID interface module	Conditions	Read	Write
MELSEC iQ-R series slot-in type MELSEC-Q series slot-in type	Communication speed: Standard mode Memory tag: 1k byte	100 bytes: 169ms + 2 scans ^{*1} 1000 bytes: 1339ms + 2 scans ^{*1}	100 bytes: 289ms + 2 scans ^{*1} 1000 bytes: 2296ms + 2 scans ^{*1}
CC-Link IE Field-compatible network distributed type	Communication speed: Standard mode Memory tag: 1k byte	100 bytes: 161ms + transmission delay time 1 ^{*2} + transmission delay time 2 ^{*3} 1000 bytes: 1331ms + transmission delay time 1 ^{*2} + transmission delay time 2 ^{*3}	100 bytes: 278ms + transmission delay time 1 ^{*2} + transmission delay time 2 ^{*3} 1000 bytes: 2258ms + transmission delay time 1 ^{*2} + transmission delay time 2 ^{*3}
CC-Link-compatible network distributed type	Communication speed: Standard mode Memory tag: 1k byte CC-Link transmission speed: 10Mbps Number of connected modules: 1	10 bytes: 59ms + 2 scans ^{*1} (Remote net Ver.1 mode 2 stations occupied setting) 122 bytes: 309ms + 2 scans ^{*1} (Remote net Ver.2 mode 2 stations occupied setting, Octuple setting)	10 bytes: 93ms + 2 scans ^{*1} (Remote net Ver.1 mode 2 stations occupied setting) 122 bytes: 407ms + 2 scans ^{*1} (Remote net Ver.2 mode 2 stations occupied setting, Octuple setting)

*1: Maximum number of scans from turning on the ID command execution request signal of the programmable controller until receiving the execution completion signal ON.

*2: Maximum time from turning on the ID command execution request signal of the programmable controller until a first communication between the RFID interface module and the amplifier/antenna starts.
For details, refer to the User's Manual (Detailed).

*3: Maximum time from the end of communications between the RFID interface module and the amplifier/antenna until the ID command completion signal of the programmable controller turns on.
For details, refer to the User's Manual (Detailed).

A wealth of test and measurement functions

MELSEC IQ-R

MELSEC-Q

CC-Link IE Field

CC-Link

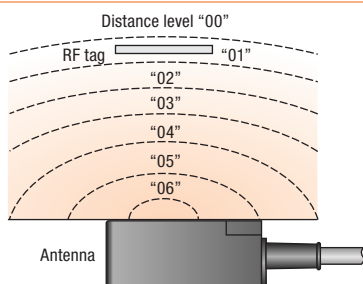
Diagnosis, such as "communication test" and "noise level measurement", between the antenna and an RF tag can be performed during start-up and maintenance.

Communication test

This function reads data from an RF tag without running a program. If an error occurs while the data is read from the RF tag, this function shows whether the error is caused by the program, antenna, or RF tag.

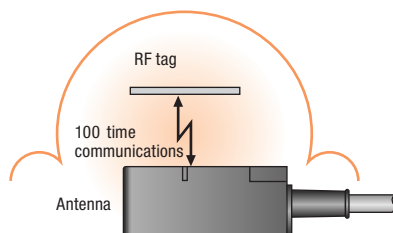
Distance level measurement

This function measures distance (level) at which an RF tag is present in the antenna communication area. Measurement results are shown with seven levels, 00 to 06.



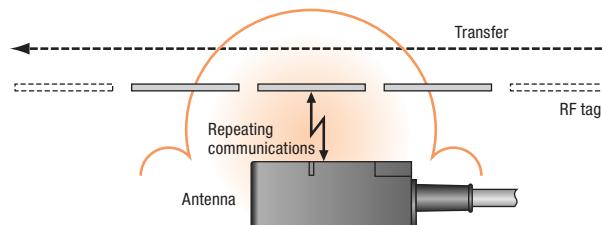
Communication success rate calculation

This function calculates the communication success rate that communications are performed 100 times with an RF tag stationary. Measurement results are shown with 0 to 100%.



Speed level measurement

This function measures the number of times that an RF tag can communicate continuously while it is moving. Measurement results are shown with 0 to 99 (times).

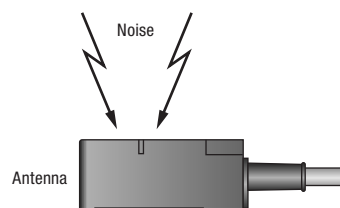


Noise level measurement

This function measures a noise level around an antenna. Measurement results are shown with 0 to 99. (Regard them as a guide value.)

The measurement results show current noise levels at antenna installation sites. This function allows users to monitor any changes in noise reduction measures for the occurrence of an RF tag communication error. Noise levels measured do not guarantee the communication performance.

*: The measurement results can be checked by reading them on HMI (Human Machine Interface) of the amplifier, from buffer memory in the RFID interface module, or from a remote register.

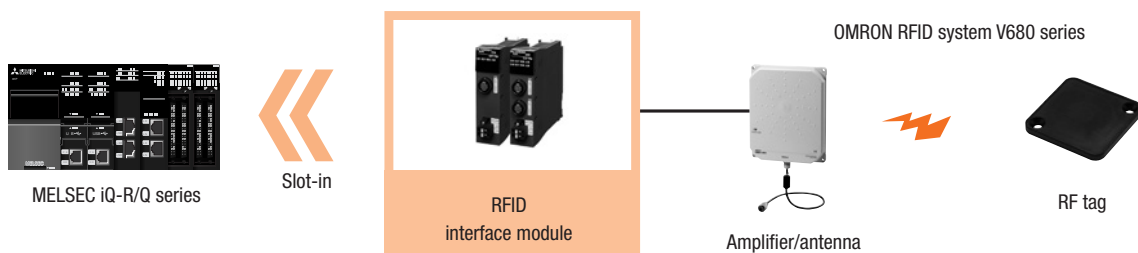


Function list

Function			Description	MELSEC IQ-R ER-1V680D1 ER-1V680D2	MELSEC-Q EQ-V680D1 EQ-V680D2	CC-Link IE Field ECLEF-V680D2	CC-Link ECL2-V680D1
Command	Read	Read	Reads data from an RF tag.	○	○	○	○
		Read with error correction	Reads data and check codes from an RF tag, inspects data reliability, and corrects any 1-bit errors.	○	○	—	—
		Read UID	Reads the UID (unit identification number) of an RF tag.	○	○	○	○
		Read initial data setting value	Reads setting values set for the initial data setting.	—	—	○	○
	Write	Write	Writes data to an RF tag.	○	○	○	○
		Set bit	Sets 1 to the specified bit in data of an RF tag.	○	○	—	—
		Clear bit	Sets 0 to the specified bit in data of an RF tag.	○	○	—	—
		Write mask bit	Protects the RF tag data that you do not want overwritten and writes other data.	○	○	—	—
		Write calculation	Writes an addition or subtraction calculation result (data) to data of an RF tag.	○	○	—	—
		Write with error correction	Writes data and check codes for inspecting data reliability to an RF tag.	○	○	—	—
	Duplicate	Copy	Copies data of an RF tag between the channel 1 and channel 2. (Available with ER-1V680D2, EQ-V680D2, and ECLEF-V680D2 only)	○	○	○	—
	Management	Fill data	Initializes data of an RF tag by using specified data.	○	○	○	○
		Check data	Checks whether or not an error occurred in data of an RF tag.	○	○	—	—
		Manage number of writes	Judges whether or not the number of RF tag writes exceeds the specified number of EEPROM-type RF tag writes.	○	○	—	—
		Noise level	Measures the noise level around an antenna.	○	○	○	○
Test function	Test/measure	Communication test	Reads data from RF tag.	○	○	○	○
		Distance level	Measures distance (level) at which an RF tag is present in the antenna communication area.	—	○	—	○
		Communication success rate	Performs communications 100 times, and calculates a success rate.	○	○	—	—
		Speed level	Measures the number of times that an RF tag passing through an antenna communication area can communicate continuously.	○	○	—	—
		Noise level	Measures the noise level around an antenna.	○	○	○	○

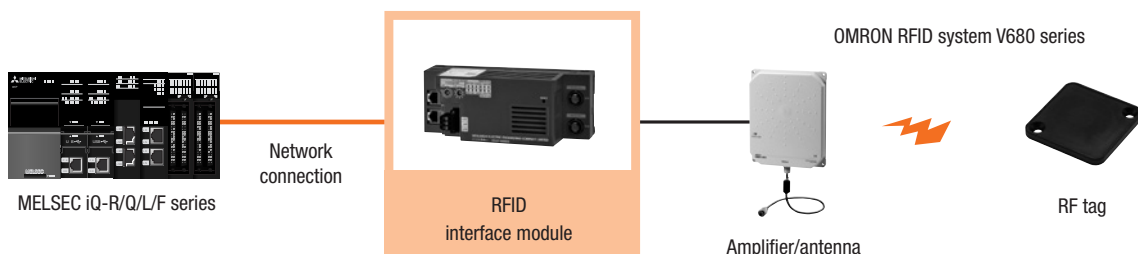
Selection chart

Slot-in type



Controller	Programmable controller module		RFID	
MELSEC iQ-R series	Programmable controller CPU	R00CPU, R01CPU, R02CPU, R04CPU, R08CPU, R16CPU, R32CPU, R120CPU, R04ENCPU, R08ENCPU, R16ENCPU, R32ENCPU, R120ENCPU	MELSEC iQ-R series-compatible RFID interface module	ER-1V680D1 (one-channel connection) ER-1V680D2 (two-channel connection)
	Process CPU	R08PCPU, R16PCPU, R32PCPU, R120PCPU		
	Safety CPU	R08SFCPU, R16SFCPU, R32SFCPU, R120SFCPU		
	CC-Link IE Field Network remote head module	RJ72GF15-T2		
MELSEC-Q series	Universal model	Q00UCPU, Q00UCPU, Q01UCPU, Q02UCPU, Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q10UDHCPU, Q13UDHCPU, Q20UDHCPU, Q26UDHCPU, Q03UDECPU, Q04UDEHCPU, Q06UDEHCPU, Q10UDEHCPU, Q13UDEHCPU, Q20UDEHCPU, Q26UDEHCPU, QnUDVCPU, QnUDPVCPU	MELSEC-Q series-compatible RFID interface module	EQ-V680D1 (one-channel connection) EQ-V680D2 (two-channel connection)
	Process CPU	Q02PHCPU, Q06PHCPU, Q12PHCPU, Q25PHCPU		
	Redundant CPU	Q12PRHCPU, Q25PRHCPU		
	Basic model	Q00JCPU, Q00CPU, Q01CPU		
	High performance model	Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU		
	MELSECNET/H network module	QJ72LP25-25, QJ72LP25G, QJ72BR15		

Network distributed type



Controller	Programmable controller module		RFID	
MELSEC iQ-R series	Ethernet module	RJ71EN71	CC-Link IE Field-compatible RFID interface module	ECLEF-V680D2 (two-channel connection)
	CC-Link IE Field Network master/local module	RJ71GF11-T2		
MELSEC-Q series	Motion module	QD77GF16	CC-Link-compatible RFID interface module	ECL2-V680D1 (one-channel connection)
	CC-Link IE Field Network master/local module	QJ71GF11-T2		
	CC-Link master/local module	QJ61BT11N, QJ61BT11	CC-Link-compatible RFID interface module	ECL2-V680D1 (one-channel connection)
MELSEC-L series	CC-Link IE Field Network master/local module	LJ71GF11-T2	CC-Link IE Field-compatible RFID interface module	ECLEF-V680D2 (two-channel connection)
	CPU module	L26CPU-BT	CC-Link-compatible RFID interface module	ECL2-V680D1 (one-channel connection)
MELSEC-F series	CC-Link master/local module	LJ61BT11		
	CC-Link system master block	FX3U-16CCL-M	CC-Link-compatible RFID interface module	ECL2-V680D1 (one-channel connection)

Combination chart: OMRON RFID system V680 series, amplifier, antenna, and RF tag

RF tag		Amplifier, antenna, extension cable	Separate amplifier type antenna								Built-in amplifier type antenna
			Maximum cable length: 62.5m								Maximum cable length: 30.5m
			Amplifier extension cable ¹								Model: V680-H01 Antenna extension cable
			Length (2/3/5/10/20/30)m								Length (2/5/10/20/30)m
			Model: V700-A40/41/42/43/44/45								Model: V700-A40-W
			Amplifier								Built-in type
			Length 0.5/5/10m								
			For 1-kbyte RF tag Model: V680-HA63A				For 2-/8-kbyte RF tag Model: V680-HA63B				
			Antenna (separate amplifier type)								Antenna (built-in amplifier type)
			Length: 2/12.5m								Length: 0.5m
		Model: V680-HS52	Model: V680-HS51	Model: V680-HS63	Model: V680-HS65	Model: V680-HS52	Model: V680-HS51	Model: V680-HS63	Model: V680-HS65	Model: V680-H01-V2	
1 kbyte	EEPROM type	Model: V680-D1KP52MT	○	○	○						
		Model: V680-D1KP53M	○	○							
		Model: V680-D1KP54T	○		○	○					
		Model: V680-D1KP66MT	○		○	○					
		Model: V680-D1KP66T	○		○	○					○
		Model: V680-D1KP66T-SP	○		○	○					
		Model: V680-D1KP58HTN				○					○
		Model: V680-D1KP52M-BT01	○	○							
Model: V680-D1KP52M-BT11	○	○									
2 kbytes	FRAM type	Model: V680-D2KF52M				○	○	○			
		Model: V680-D2KF52M-BT01					○	○			
		Model: V680-D2KF52M-BT11					○	○			
		Model: V680S-D2KF67M					○		○	○	
		Model: V680S-D2KF68M							○	○	
		Model: V680S-D2KF67					○		○	○	○
		Model: V680S-D2KF68							○	○	○
		Model: V680-D8KF67M					○		○	○	
8 kbytes	FRAM type	Model: V680S-D8KF67M						○	○		
		Model: V680-D8KF67					○		○	○	○
		Model: V680S-D8KF67					○		○	○	○
		Model: V680S-D8KF68M							○	○	
		Model: V680-D8KF68							○	○	○
		Model: V680S-D8KF68							○	○	○

*1: The maximum cable length is 40m (not including the amplifier). Two extension cables (maximum) can be connected to each other.

*2: The maximum cable length is 30m (not including the amplifier). Connection of the extension cables is not possible.

Model list

RFID interface module

Type	Specifications	No. of channel connections	Model	
MELSEC iQ-R series slot-in type	<ul style="list-style-type: none">ModuleUser's Manual (Hardware)	One-channel connection	ER-1V680D1	
		Two-channel connection	ER-1V680D2	
	User's Manual (Detailed)	<ul style="list-style-type: none">Japanese version	-	ER-1V680D-M1J
		<ul style="list-style-type: none">English version		ER-1V680D-M1E
MELSEC-Q series slot-in type	<ul style="list-style-type: none">ModuleUser's Manual (Hardware)	One-channel connection	EQ-V680D1	
		Two-channel connection	EQ-V680D2	
	User's Manual (Detailed)	<ul style="list-style-type: none">Japanese version	-	EQ-V680D-MAN-JP
		<ul style="list-style-type: none">English version		EQ-V680D-MAN-E
CC-Link IE Field-compatible network distributed type	<ul style="list-style-type: none">ModuleUser's Manual (Hardware)	Two-channel connection	ECLEF-V680D2	
		-	ECLEF-V680D-M1J	
	User's Manual (Detailed)		<ul style="list-style-type: none">Japanese version	ECLEF-V680D-M1E
		<ul style="list-style-type: none">English version		
CC-Link-compatible network distributed type	<ul style="list-style-type: none">ModuleUser's Manual (Hardware)	One-channel connection	ECL2-V680D1	
		-	ECL2-V680D1-MAN-JP	
	User's Manual (Detailed)		<ul style="list-style-type: none">Japanese version	ECL2-V680D1-MAN-E
		<ul style="list-style-type: none">English version		

Specifications



MELSEC iQ-R series-compatible RFID interface module

ER-1V680D1 (one-channel connection)

ER-1V680D2 (two-channel connection)

- Either one of the separate amplifier type antenna or the built-in amplifier type antenna can be connected to the one-channel connection module.
- Two separate amplifier type antennas can be connected to the two-channel connection module.
- Direct connection to a bus of the MELSEC iQ-R series programmable controller enables the high-speed communications of the large-volume data (2048 bytes) with the programmable controller CPU.
- The maximum cable length between the RFID interface module and the antenna is 62.5m. (When the built-in amplifier type antenna is used, it is 30.5m.)
- The three features that utilize the features of the MELSEC iQ-R series programmable controller are equipped.
"Initial setting on GUI", "Module label", "Event history"
- If the MELSEC-Q series-compatible slot-in type module (EQ-V680D1 or EQ-V680D2) is currently used, it can be easily replaced with the MELSEC iQ-R series-compatible slot-in type module because the same ladder diagram can be applied.

Specifications

Item	Specifications	
	ER-1V680D1	ER-1V680D2
No. of connectable antennas	1	2 (1 antenna when the built-in amplifier type antenna is used)
Operating ambient temperature	0 to 55°C	
Operating ambient humidity	5 to 95%RH, non-condensing	
24VDC external power supply current consumption (20.4 to 28.8VDC)	0.20A	0.32A
5VDC internal current consumption	0.18A	0.21A
External dimensions	106 (H) × 27.8 (W) × 125 (D)mm (excluding a connection antenna cable)	
Weight	200g	210g
Data transfer volume	2048 bytes max.	
No. of occupied I/O points	32 points	



MELSEC-Q series-compatible RFID interface module

EQ-V680D1 (one-channel connection)

EQ-V680D2 (two-channel connection)

- Either one of the separate amplifier type antenna or the built-in amplifier type antenna can be connected to the one-channel connection module.
- Two separate amplifier type antennas can be connected to the two-channel connection module.
- Direct connection to a bus of the MELSEC-Q series programmable controller enables the high-speed communications of the large-volume data (2048 bytes) with the programmable controller CPU.
- The maximum cable length between the RFID interface module and the antenna is 62.5m. (When the built-in amplifier type antenna is used, it is 30.5m.)
- The FBs (function blocks) are available to make program creation easier.
- The test and measurement functions required for the system start-up and maintenance are equipped as standard.

Specifications

Item	Specifications	
	EQ-V680D1	EQ-V680D2
No. of connectable antennas	1	2 (1 antenna when the built-in amplifier type antenna is used)
Operating ambient temperature	0 to 55°C	
Operating ambient humidity	5 to 95%RH, non-condensing	
24VDC external power supply current consumption (20.4 to 26.4VDC)	0.25A	0.37A
5VDC internal current consumption	0.42A	0.52A
External dimensions	98 (H) × 27.4 (W) × 106.5 (D)mm (excluding a connection antenna cable)	
Weight	200g	210g
Data transfer volume	2048 bytes max.	
No. of occupied I/O points	32 (I/O assignment: 32 for intelligent device station)	



CC-Link IE Field Network-compatible RFID interface module ECLEF-V680D2 (two-channel connection)

- Either two separate amplifier type antennas or one built-in amplifier type antenna can be connected to this module.
- This module can be installed distributedly 12100-meter (maximum) away from the CC-Link IE Field Network master station.
- The test and measurement functions required for the system start-up and maintenance are equipped as standard.
- The FBs (function block) are available to make program creation easier.

Specifications

Item		Specifications
		ECLEF-V680D2
No. of connectable antennas		2 (1 antenna when the built-in amplifier type antenna is used)
Operating ambient temperature		0 to 55°C
Operating ambient humidity		5 to 95%RH, non-condensing
CC-Link IE Field Network side	Station type	Intelligent device station
	Station number selection	1 to 120
	Network number	1 to 239
	Communication speed	1Gbps
	Data transfer volume	Data volume that can be written and read with one ID command Set 8 to 1016 bytes (variable) with the parameters.
Connection cable		Ethernet cable that satisfies 1000BASE-T Category 5e or higher, (Double shielded/STP) straight cable
External power supply		20.4 to 28.8VDC (24VDC-15%, +20%) (ripple ratio: within 5%) Current consumption: 0.60A or less
External dimension		55 (H) × 180 (W) × 70 (D)mm (excluding a connection antenna cable)
Weight		300g



CC-Link-compatible RFID interface module

ECL2-V680D1 (one-channel connection)

- Either one of the amplifier-isolated type antenna or the amplifier-built-in type antenna can be turned connection.
- This module can be installed distributedly 1200-meter (maximum) away from the CC-Link master station.
- The test and measurement functions required for the system start-up and maintenance are equipped as standard.
- The FBs (function block) are available to make program creation easier.
- Mitsubishi Electric iQSS (iQ Sensor Solution) is available soon.

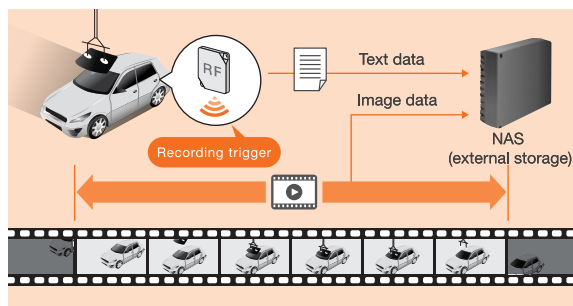
Specifications

Item		Specifications				
		ECL2-V680D1				
No. of connectable antennas		1				
Operating ambient temperature		0 to 55°C				
Operating ambient humidity		10 to 90%RH, non-condensing				
CC-Link specifications	CC-Link station type	Remote device station				
	CC-Link version	Ver. 1.10 or Ver. 2.0				
	Station number selection	2 stations occupied: Station numbers 1 to 63 4 stations occupied: Station numbers 1 to 61				
	Transmission speed	156kbps/625kbps/2.5Mbps/5Mbps/10Mbps (selectable)				
	No. of occupied stations and data transfer volume	CC-Link version	No. of occupied stations	Extended cyclic setting	Data transfer volume	Data volume that can be written and read with one ID command
		Ver.1.10	2 stations occupied		8 words	10 bytes
			4 stations occupied		16 words	26 bytes
		Ver.2.0	2 stations occupied	Double setting	16 words	26 bytes
				Quadruple setting	32 words	58 bytes
				Octuple setting	64 words	122 bytes
Connection cable	Ver. 1.10 compatible CC-Link dedicated cable CC-Link dedicated cable (Ver. 1.00 compatible) CC-Link dedicated high performance cable (Ver. 1.00 compatible)					
External power supply		20.4 to 26.4VDC (24VDC-15%, +10%) (ripple ratio: within 5%) Current consumption: 0.33A or less				
External dimension		65 (H) × 150 (W) × 45 (D)mm (excluding a connection antenna cable)				
Weight		300g				



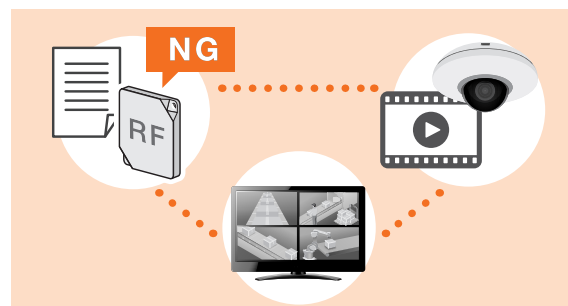
Building further advanced traceability system by combining RF tag data and camera images

Images and data to control production status



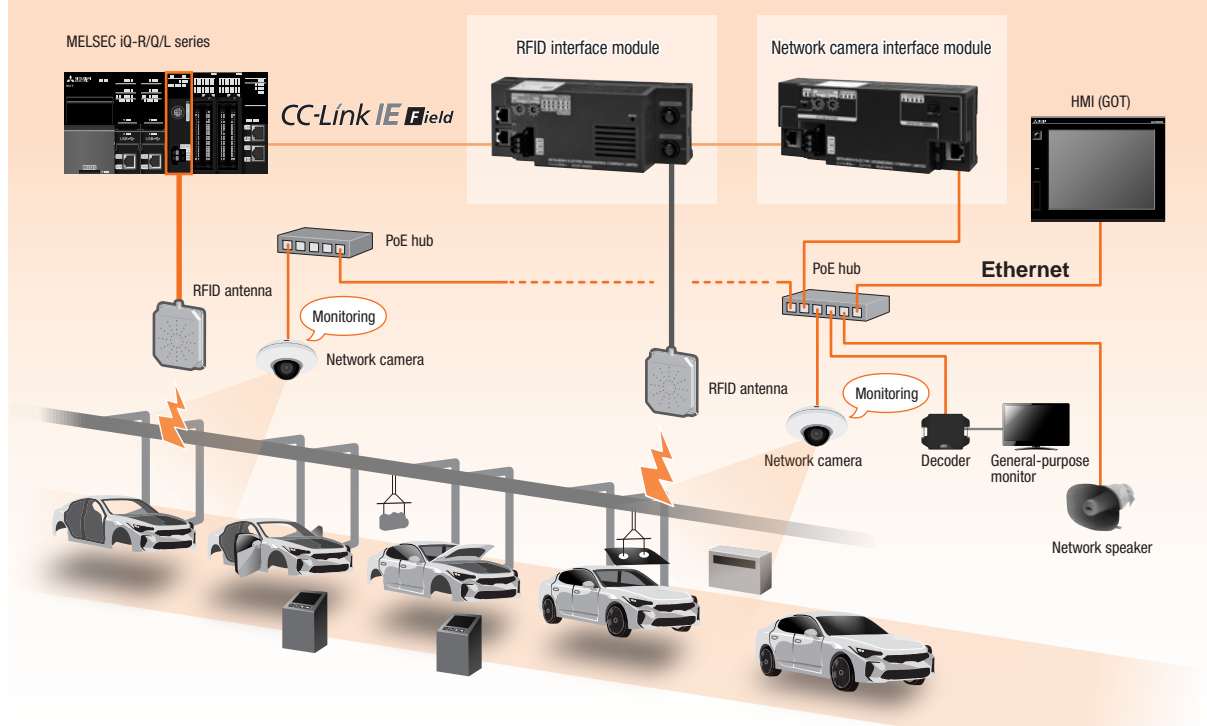
By recording production status before and after a trouble occurrence with RF tag data as a trigger using drive recorders, recorded images can be used for the trouble analysis.

Data associated with individual products



Data read from RF tags can be associated with data for individual management of products and images recorded by cameras. Associated data can be sent through a network and analyzed at remote locations.

System configuration example



MEMO

Network devices

Hydraulic control

Hydraulic control

INDEX

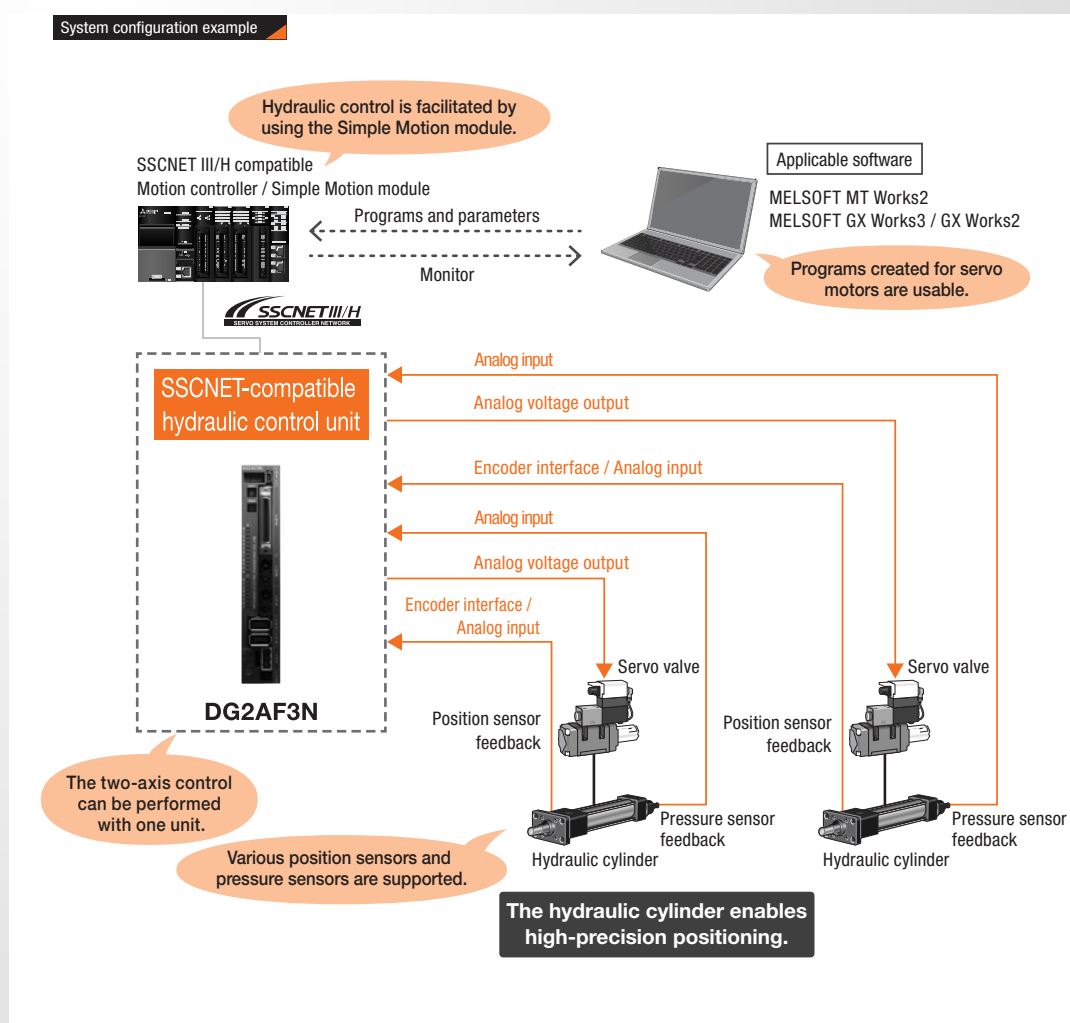
Hydraulic control (SSCNET-compatible hydraulic control unit)

Features	P.64
Introduction of a demonstration product	P.65
Model list	P.66
Specifications	P.67

Hydraulic control (SSCNET-compatible hydraulic control unit)

Positioning control or pressure control by hydraulic cylinder can be performed

when the SSCNET-compatible hydraulic control unit is connected with a Motion controller or Simple Motion module through SSCNET III/H, Mitsubishi Electric servo system network.



The hydraulic cylinder enables high-precision positioning.

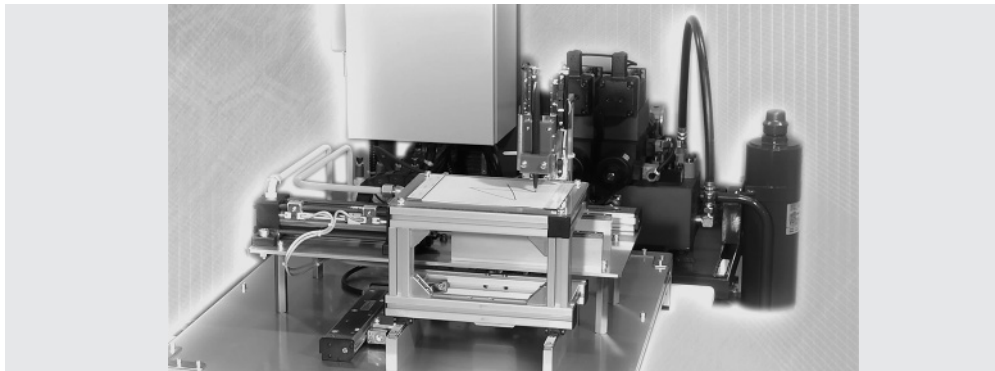
Various position sensors and pressure sensors are supported.

Pressure control is enabled without the need for an analog module.

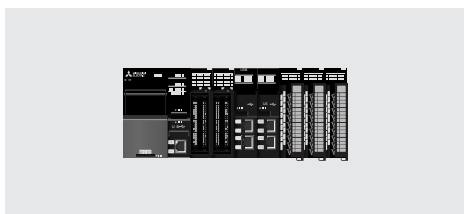
A single hydraulic control unit enables two-axis control.

Introduction of a demonstration product

The following is a demonstration of hydraulic control for an XY table.



1 Same program as the servo motor for all hydraulic cylinder operations



3 Compatible position sensors



2 Hybrid drive of hydraulic cylinders and servo motors



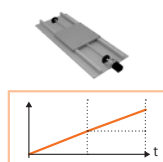
4 Pressure control



Linear, reciprocating, and feed motion controls are also supported. Cam control allows for easy synchronization control just by setting parameters.

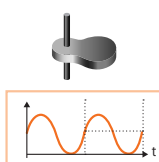
Linear motion

Ball screw



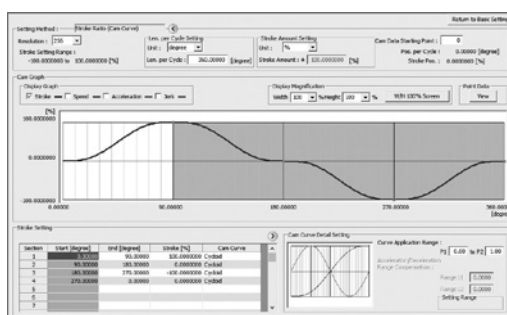
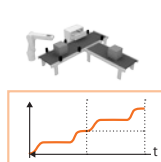
Reciprocating motion

Reciprocating cam



Feed motion

Belt conveyor



Model list

SSCNET-compatible hydraulic control unit

Product	Specifications		Model
SSCNET-compatible hydraulic control unit	Two-axis control of two SSCNET III/H stations per unit *: Power supply connector provided with the unit	Analog input voltage specifications	DG2AF3N
		Analog input current specifications	DG2AF3N-P01

Related products

Junction terminal block

Connection method	Specifications	Model
Spring clamp	<ul style="list-style-type: none"> Our general-purpose interface amplifier junction terminal block can be used. Sink/source shared type, full signal 	DG2SV1TB

Connection cable

Specifications	Cable length	Model
· A dedicated cable to connect an SSCNET-compatible hydraulic control unit and our general-purpose interface amplifier junction terminal block	0.5m	DG4AF3CB05
	1m	DG4AF3CB10

Mitsubishi Electric related products

Product	Specifications	Model/Product
SSCNET III/H cable	Cable for connection between the SSCNET-compatible hydraulic control unit and the SSCNET III/H-compatible Motion controller/Simple Motion module	MR-J3BUS□M
		MR-J3BUS□M-A
		MR-J3BUS□M-B
ABS serial synchronous encoder	Resolution: 4194304PLS/rev Allowable revolution: 3600r/min	Q171ENC-W8
Serial absolute synchronous encoder cable	Cable for connection between the SSCNET-compatible hydraulic control unit and the ABS serial synchronous encoder	Q170ENCCBL□M-A
ABS serial encoder battery/battery case/battery cable	3.6V, 2000mAh	MR-J3W03BATSET

Specifications



SSCNET-compatible hydraulic control unit

DG2AF3N

DG2AF3N-P01

- Two types of the SSCNET-compatible hydraulic control unit are available: DG2AF3N (voltage analog input) and DG2AF3N-P01 (current analog input).
- Hydraulic servos can be incorporated into the SSCNET III/H servo network. Positioning and pressure control with the hydraulic servo are possible.
- The 2-axis control can be performed with one hydraulic control unit.
- Setting the pressure feedback value enables automatic mode switch from the position control to the pressure control.
- The programming similar to the control program of the servo amplifier (MR-J4-B) can be applied to the control programs for the hydraulic servos and servo valves.
- The position feedback signal is supported by the Mitsubishi Electric serial and SSI (binary) encoders in addition to the analog input and ABZ phase encoders. (The supported encoders are only those meeting the specifications of the encoder interface.)

Product specifications

Item	Product specifications	
	SSCNET-compatible hydraulic control unit	
	DG2AF3N	DG2AF3N-P01
Analog input	Analog voltage input 0 to 10V, -10 to 10V, 4 points Resolution: 16 bits max.	Analog current input 4 to 20mA, 4 points Resolution: 16 bits max.
Analog voltage output	0 to 10V, -10 to 10V, 4 points Resolution: 16 bits max.	
No. of control axes	2	
SSCNET III/H communication cycle	SSCNET III/H (H) 0.222ms to 0.888ms	
Encoder interface	Serial encoder manufactured by Mitsubishi Electric, A/B/Z-phase differential input, SSI* (binary code), 2 points max.	
Digital input for emergency stop	24VDC, 1 point, photocoupler isolation, independent common (sink/source selectable)	
Digital input	24VDC, 12 points, photocoupler isolation (sink/source collectively selectable for the common)	
Digital output	24VDC, 8 points, photocoupler isolation (sink/source collectively selectable for the common)	
ABS serial encoder battery	3.6V battery (Also used for MR-J3BAT and MR-J3. Only required if using the ABS function.)	
Power supply	Voltage	20.4 to 26.4VDC (ripple ratio within 5%)
	Current consumption	0.3A
Compliance with global standards	CE, UL/cUL	
Structure	Natural cooling, open (IP20)	
Installation	Screw type	M5 × 10mm or more, tightening torque: 78 to 118N·cm
	DIN rail	Applicable DIN rail: TH35-7.5Fe, TH35-7.5Al (IEC 60715 compliant)
External dimension	168 (H) × 30 (W) × 100 (D)mm	
Weight	300g	
Operating ambient temperature	0 to 55°C	
Storage ambient temperature	-25 to 75°C	

*: Synchronous Serial Interface

Position sensors

GYSE-S Probe (SSI output) and GYSE-A Probe (High performance analogue output) manufactured by SANTEST CO., LTD

Absolute linear encoder SR67A manufactured by Magnescale Co., Ltd

*: These models are verified by Mitsubishi Electronic Engineering.

Apart from them, other position sensors which are compatible with the above encoder interface can be used.

Connectable controllers and main operating systems

Motion controller	Main operating system
Q173DSCPU	SW8DNC-SV22S84QJ
Q172DSCPU	SW8DNC-SV22S84QL
Q170MSCPU(-S1)	SW8DNC-SV22S84QN

*: Each of the Motion controllers shown above uses a customized operating system for the main operating system.

Compatible Simple Motion modules and supported versions

Simple Motion module	Serial No.
QD77MS□	First five digits: 20052 or later
LD77MS□	First five digits: 20072 or later
RD77MS□	First two digits: 12 or later

Specifications of the control signal input/output

Digital input

Item		Specifications
No. of input points		12
Input type		Sink/source shared type
Wiring method for common		12 points/common
Insulation method		Photocoupler insulation
Rated input voltage		24VDC
Rated input current		Approx. 5mA
Operating voltage range		21.6 to 26.4VDC (24VDC±10%, Ripple ratio: within 5%)
On voltage/current		17.5VDC or more/3.5mA or less
Off voltage/current		7VDC or more/1 mA or less
Input resistance		Approx. 6.8kΩ
Response time	OFF → ON	4ms or less
	ON → OFF	4ms or less

Emergency stop input

Item		Specifications
No. of input points		1
Input type		Sink/source shared type
Wiring method for common		1 point/common
Insulation method		Photocoupler insulation
Rated input voltage		24VDC
Rated input current (lin)		Approx. 5mA
Operating voltage range		21.6 to 26.4VDC (24VDC±10%, Ripple ratio: within 5%)
On voltage/current		17.5VDC or more/3.5mA or less
Off voltage/current		7VDC or more/1mA or less
Input resistance		Approx. 6.8kΩ
Response time	OFF → ON	4ms or less
	ON → OFF	4ms or less

Analog input

Item	Specifications	
Model	DG2AF3N	DG2AF3N-P01
No. of input points	4	
Input voltage/current	0 to 10V, -10 to +10V	4 to 20mA
Resolution	16 bits	

Specifications of the encoder

Mitsubishi Electronic encoder

Item	Specifications
Supported encoder	Q171ENC-W8 (four-wire type)
Supported signal type	Differential output type (equivalent to SN75C1168)
Transmission method	Serial communication
Synchronization method	Asynchronous system
Communication speed	2.5Mbps
Position detection method	Absolute (ABS) method
Resolution	4194304PLS/rev (22 bits)
No. of connectable encoders	2/per unit
External connection method	20-pin connector
Connection cable	Q170ENCBL□M-A (□ indicates the cable length.)
Length	30m max.
Backup method for absolute position	With the battery (MR-J3BAT)
Battery life (actual operating life)	12000 hours (with two encoders connected)
	24000 hours (with an encoder connected)

SSI encoder

Item	Specifications
Transmission method	Synchronous serial communication
Communication speed	100kbps to 5Mbps
Position detection method	Absolute (ABS) method
Data format	Binary (pure binary)
Data length	1 bit to 31 bits
No. of connectable encoders	2/per unit
Connection cable	Shielded twisted pair cable with a diameter of 0.2mm ² or more (24AWG or more)
Maximum cable length	Communication speed: Maximum cable length* 100kbps: 400m 200kbps: 190m 300kbps: 120m 400kbps: 80m 500kbps: 60m 1Mbps: 25m 1.5Mbps: 10m 2Mbps: 5m

*: The maximum cable length is indicated as a guide.

Digital output

Item		Specifications
No. of output points		8
Output type		Sink/source shared type
Wiring method for common		8 points/common
Insulation method		Photocoupler insulation
Rated load voltage		24VDC
Maximum load current		0.3A/point, 1A/common
Operating voltage range		21.6 to 26.4VDC (24VDC±10%, Ripple ratio: within 5%)
Maximum voltage drop at ON		1VDC or less
Leakage current at OFF		5VDC or more/0.1mA or less
Response time	OFF → ON	1ms or less
	ON → OFF	1ms or less (Rated load, resistive load)

Analog output

Item	Specifications
No. of output points	4
Output voltage	0 to 10V, -10 to +10V
Resolution	16 bits

ABZ phase encoder (differential input type)

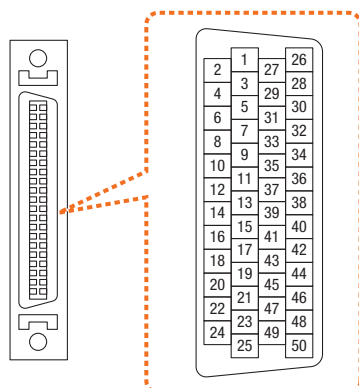
Item	Specifications
No. of connectable encoders	2/per unit
Supported signal type	Differential output type (equivalent to 26LS31)
Maximum input pulse frequency	1Mpps (Up to 4Mpps after multiplication by 4)
Pulse width	1μs or more
Rise/fall time	0.25μs or less
Phase difference	0.25μs or more
High-state voltage	2.0 to 5.25VDC
Low-state voltage	0 to 0.8VDC
Differential voltage	±0.2V
Length	30m max.

External connection

Control signal I/O connector

Digital input/output signals, analog input/output signals, and emergency stop input signal are connected using the control signal I/O connector. The following is the front view of the I/O connector pin arrangement.

■ Control signal I/O connector



Signal name			Signal name			Signal name			Signal name		
Pin No.	General-purpose	Dedicated	Pin No.	General-purpose	Dedicated	Pin No.	General-purpose	Dedicated	Pin No.	General-purpose	Dedicated
2	Analog input 1		1	Analog common		27	Analog input 2		26	Analog common	
4	Analog input 3		3	Analog common		29	Analog input 4		28	Analog common	
6	Analog common		5	Analog common		31	Analog common		30	Analog common	
8	Analog common		7	Analog output 1		33	Analog common		32	Analog output 2	
10	Empty		9	Analog output 3		35	Empty		34	Analog output 4	
12	Digital input X0	FLS1 ^{*1}	11	Empty		37	Digital input X1	RLS1 ^{*1}	36	Empty	
14	Digital input X4	General-purpose	13	Digital input X2	DOG1 ^{*1}	39	Digital input X5	General-purpose	38	Digital input X3	General-purpose
16	Digital input X8	DOG2 ^{*1}	15	Digital input X6	FLS2 ^{*1}	41	Digital input X9	General-purpose	40	Digital input X7	RLS2 ^{*1}
18	Digital input common		17	Digital input XA	General-purpose	43	Digital input common		42	Digital input XB	General-purpose
20	Empty		19	Emergency stop		45	Empty		44	Emergency stop common	
22	Digital output Y2	General-purpose	21	Digital output Y0	General-purpose	47	Digital output Y3	General-purpose	46	Digital output Y1	General-purpose
24	Digital output Y6	General-purpose	23	Digital output Y4	General-purpose	49	Digital output Y7	General-purpose	48	Digital output Y5	General-purpose
			25	Digital output common					50	Digital output common	

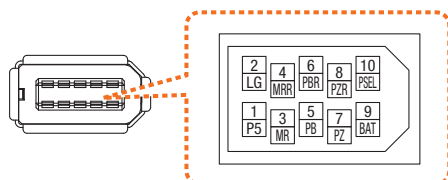
Supported connector model (commercially available)

- Soldering type connector: 10150-3000PE (manufactured by 3M Japan Limited)
- Shell kit: 10350-52F0-008 (manufactured by 3M Japan Limited)

*1: "General-purpose" and "Dedicated" can be switched according to the settings.

Encoder connector

Serial encoders and ABZ phase encoders are connected using the encoder connector. The following is the front view of the encoder connector pin arrangement.



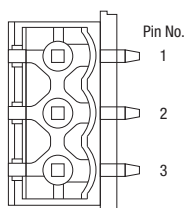
■ Encoder connector

Pin No.	Signal name	Signal name of each encoder			
		Serial encoder		ABZ phase encoder	SSI encoder
		Two-wire type	Four-wire type		
1	P5	5V	5V	5V	
2	LG	LG	LG	LG	
3	MR	MR	MR	PA	CLK+
4	MRR	MRR	MRR	PAR	CLK-
5	PB			PB	DATA+
6	PBR			PBR	DATA-
7	PZ		MX	PZ	
8	PZR		MXR	PZR	
9	BAT	BAT	BAT		
10	PSEL			PSEL	

Supported connector model (commercially available)

- Receptacle: 36210-0100PL (manufactured by 3M Japan Limited)
- Shell kit: 36310-3200-008 (manufactured by 3M Japan Limited)

Power supply connector



■ Power supply connector

Pin No.	Signal name
1	24VDC
2	24G
3	FG

Supported connector model (provided with the unit)

- DG8PW3CN

Power cable

- 0.3 to 2.5mm² (12 to 22AWG)

Network devices

Open network connection

Open network connection

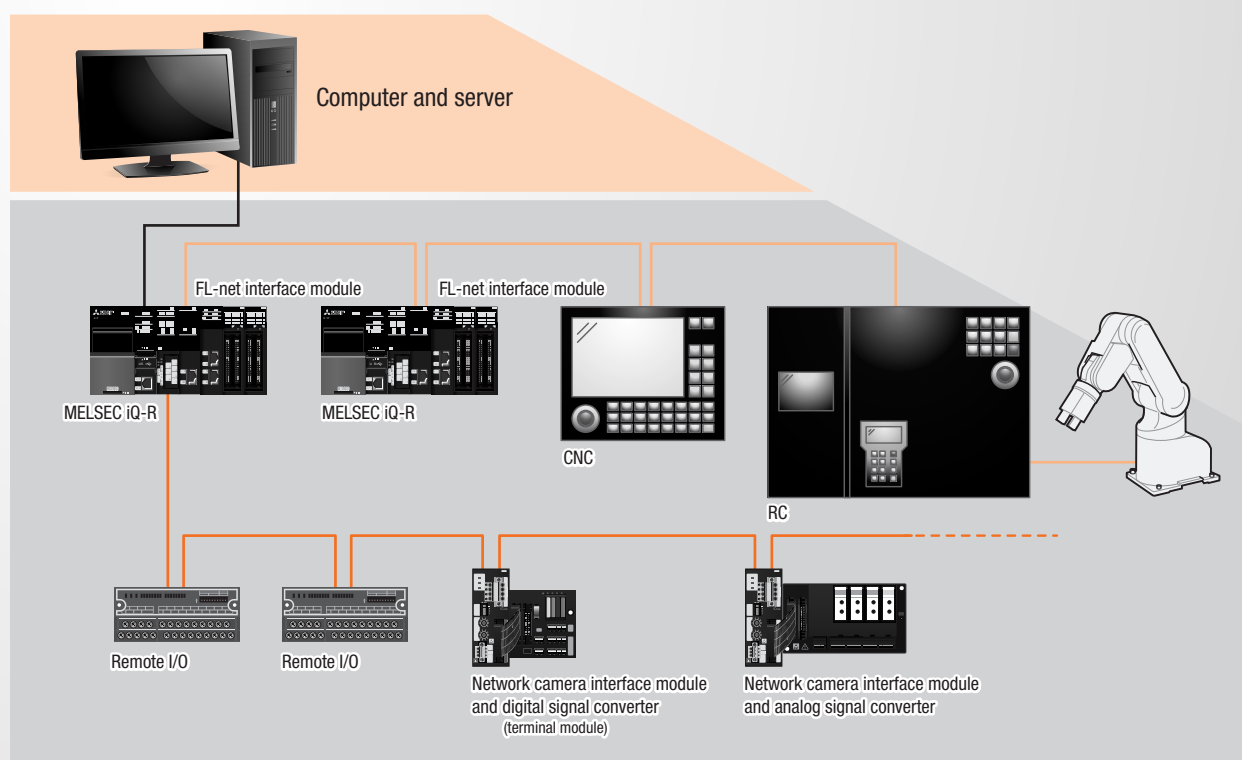
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Open network connection (FL-net interface module)	
Features	P.72
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Open network connection (FL-net interface module)

MELSEC iQ-R series programmable controllers manufactured by Mitsubishi Electronic are available for building the FL-net (OPCN-2) system. The FL-net (OPCN-2) can be interconnected to devices, such as programmable controllers, computerized numerical controllers (CNC), and personal computers which are manufactured by different manufacturers,

providing control and monitoring.



P.73

Easy system start-up

The module supports the functions of Mitsubishi Electric GX Works3, making users' programming easier.

P.74

Two communication functions to match the application

Data communications on FL-net (OPCN-2) are performed by either "cyclic transmission" or "message transmission".

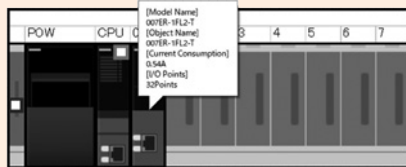
P.74

Masterless and large-scale network

Masterless method enables users to connect/disconnect each node to/from the network at any time and connect a maximum of 254 devices.

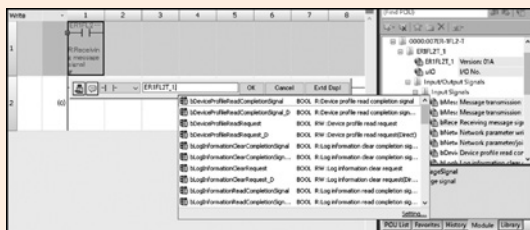
Easy system start-up

The module supports the functions of Mitsubishi Electric GX Works3, making users' programming easier.



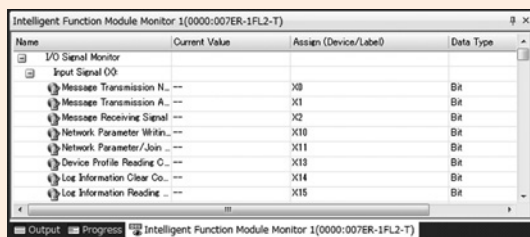
Initial setting on GUI

- Graphically configurable initial setting
- Module assignments by dragging and dropping



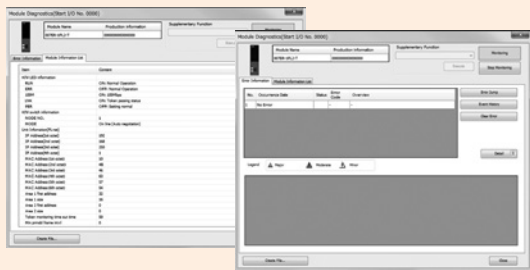
Module label

- Label programming supported
- Device and buffer memory address selection from the list
- Ladder editor input supported
- Auto-tracking of module assignments



Intelligent function module monitor

- Display of device assignment and current value
- Available for start-up and troubleshooting



Module diagnostics

- Display of module status on GX Works3
- Display of error code details
- Same operation as the Mitsubishi Electric MELSEC iQ-R series modules

FB name	Function
P+MEE-007ER-1FL2-T_Initialize_R	Sets the network parameter area of the local node.
P+MEE-007ER-1FL2-T_ByteBlockRead_R	Reads the byte block.
P+MEE-007ER-1FL2-T_ByteBlockWrite_R	Writes the byte block.
P+MEE-007ER-1FL2-T_WordBlockRead_R	Reads the word block.
P+MEE-007ER-1FL2-T_WordBlockWrite_R	Writes the word block.
P+MEE-007ER-1FL2-T_NetworkParameterRead_R	Reads the network parameter/join node information.
P+MEE-007ER-1FL2-T_NetworkParameterWrite_R	Writes the network parameter.
P+MEE-007ER-1FL2-T_OperateCommand_R	Issues the operation command.
P+MEE-007ER-1FL2-T_StopCommand_R	Issues the stop command.
P+MEE-007ER-1FL2-T_DeviceProfileRead_R	Reads the device profile.
P+MEE-007ER-1FL2-T_LogInformationRead_R	Reads the log information.
P+MEE-007ER-1FL2-T_LogInformationClear_R	Clears the log information.
P+MEE-007ER-1FL2-T_MessageReturn_R	Returns the message.
P+MEE-007ER-1FL2-T_SendTransparentMessage_R	Sends the transparent type message.
P+MEE-007ER-1FL2-T_ReceiveTransparentMessage_R	Receives the transparent message.
P+MEE-007ER-1FL2-T_RefreshCyclicDataOther_R	Refreshes the cyclic data of other nodes.
P+MEE-007ER-1FL2-T_RefreshCyclicDataLocal_R	Refreshes the cyclic data of the local node.

Module FB (function block)

- Module FBs available for basic functions (17 types)
- Easier programming
- English and Japanese supported

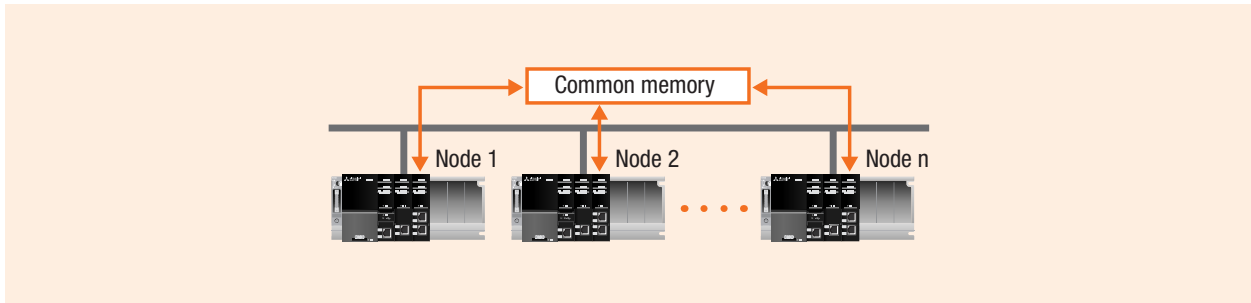
*: Module FBs and the reference manual can be download on our website.

Two types of communication functions to match the application

Data communications on FL-net (OPCN-2) are performed by either cyclic transmission or message transmission.

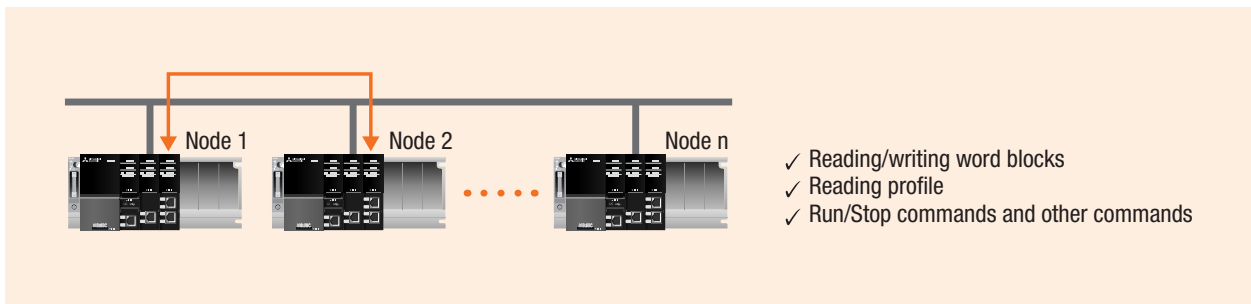
Cyclic transmission

Each node is linked to common memory and data can be shared.



Message transmission

Specific data is communicated as it is required.

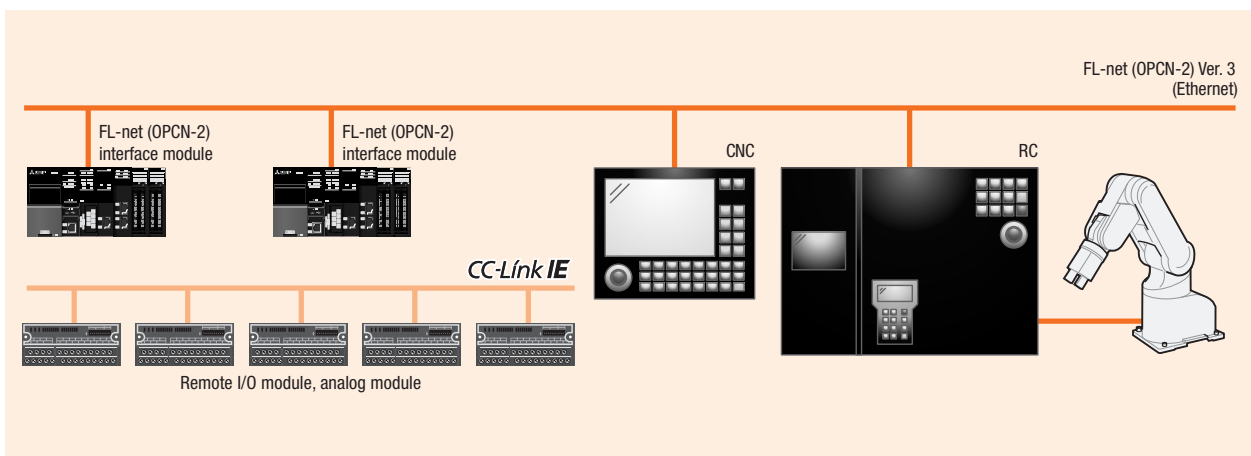


Masterless and large-scale network

Masterless method enables users to connect/disconnect each node to/from the network at any time without affecting communications of other nodes.

Users can freely power on/off any node, and perform maintenance and connect a maximum of 254 devices^{*1}.

^{*1}: 249 devices can be used as control devices. The other five devices are used for failure diagnostics.



Model list

FL-net (OPCN-2) interface module

Product	Specifications	Model
MELSEC iQ-R series-compatible FL-net (OPCN-2) interface module	<ul style="list-style-type: none"> Module User's Manual (Hardware) 	ER-1FL2-T
User's Manual (Detailed)	Japanese version	ER-1FL2-T-M1J
	English version	ER-1FL2-T-M1E

Specifications



FL-net (OPCN-2) interface module

ER-1FL2-T

- The module supports the functions of Mitsubishi Electric GX Works3, making users' programming easier.
- Data communications on FL-net (OPCN-2) are performed by either cyclic transmission or message transmission.
- Masterless method enables users to connect/disconnect each node to/from the network at any time and connect a maximum of 254 devices.

Performance specifications

Item		Specifications
Standard		Protocol specification for control network standard (JIS B 3521) FL-net (OPCN-2) Ver.3 Class 1 (Equivalent to Ver. 2)*1
Transmission specifications	Data transmission speed	10BASE-T/100BASE-TX
	Communication mode	10BASE-T Half-duplex
		100BASE-TX Full-duplex/Half-duplex
	Transmission method	Base band
	Maximum segment length	100m (length between a hub and a node)*2
	Maximum No. of nodes in system	254
	Maximum No. of cascade connections	10BASE-T: Maximum four stages*3 100BASE-TX: Maximum two stages*3
	Cyclic data volume	Maximum (8192 bits + 8192 words) per system Maximum (8192 bits + 8192 words) per node
Link data specifications	Message data volume	Maximum 1024 bytes
	Common memory area	Area 1 (bit area): 8k bits Area 2 (word area): 8k words
	Message area (Transient area)	Maximum 1024 bytes×2 (1 for each of transmit and receive)
No. of occupied I/O points		32
5VDC internal current consumption		0.54A
External dimension		106 (H) × 27.8 (W) × 110 (D)mm (Installation base unit mounting side: 98mm(H))
Weight		170g

*1: Since there is no compatibility between FL-net (OPCN-2) Ver. 3 and FL-net (OPCN-2) Ver. 1, connections and communications are not possible between these versions.

*2: The maximum segment length of the Ethernet cable is 100m. However, the length may be shorter depending on the operating environment of the cable. For details, consult the manufacturer of the cable used.

*3: This number is applied when a repeater hub is used. For the number of the cascade connections when using a switching hub, consult the manufacturer of the switching hub used.

Support message list

Message	1:1	1:n	Sever function	Client function
Byte block read	○	-	-	○*
Byte block write	○	-	-	○*
Word block read	○	-	○	○*
Word block write	○	-	○	○*
Network parameter read	○	-	○	○
Network parameter write	○	-	-	○*
Operate/stop command	○	-	-	○*
Device profile read	○	-	○	○
Log information read	○	-	○	○
Log information clear	○	○	○	○
Message return	○	-	○	○*
Transparent message transmission	○	○	○	○

Server function.....Functions that create a response frame for a received request message and send it.

Client function.....Functions that send a response message and receive a response frame.

*: Realized by the transparent message transmission.

Network devices

Common Elements

Common elements

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<Overseas standards> Check the compliance with the overseas standards of the products to be used in combination.
 ○: Compliant, Δ: Material certificate, ×: Non-compliant, -: Not applicable

Network interface module

Supported network	Specifications		Dedicated cable	Model	Overseas standard			
					UL	CE	RoHS	KC
CC-Link IE TSN CC-Link IE Field CC-Link IE Field Basic SLMP (standard Ethernet) MODBUS/TCP	For digital signal converter	Input type	Included	FA3-TH1M16XC-01C	○	○*	○	○*
		Output type (sink)		FA3-TH1M16Y-01C	○	○*	○	○*
		Output type (source)		FA3-TH1M16YE-01C	○	○*	○	○*
		Input type	Not included Use an optional cable.	FA3-TH1M16XC	○	○	○	○
		Output type (sink)		FA3-TH1M16Y	○	○	○	○
		Output type (source)		FA3-TH1M16YE	○	○	○	○
	For analog signal converter	Input type	Included	FA3-AT1M8X-01C	○	○*	○	○*
		Output type		FA3-AT1M8Y-01C	○	○*	○	○*
		Input type	Not included Use an optional cable.	FA3-AT1M8X	○	○	○	○
		Output type		FA3-AT1M8Y	○	○	○	○
		Output type		FA3-AT1M8Y	○	○	○	○
CC-Link IE TSN CC-Link IE Field CC-Link IE Field Basic SLMP (standard Ethernet)	For digital signal converter	Input type	Included	FA3-TH1T16XC-01C	○	○*	○	○*
		Output type (sink)		FA3-TH1T16Y-01C	○	○*	○	○*
		Output type (source)		FA3-TH1T16YE-01C	○	○*	○	○*
		Input type	Not included Use an optional cable.	FA3-TH1T16XC	○	○	○	○
		Output type (sink)		FA3-TH1T16Y	○	○	○	○
		Output type (source)		FA3-TH1T16YE	○	○	○	○
	For analog signal converter	Input type	Included	FA3-AT1T8X-01C	○	○*	○	○*
		Output type		FA3-AT1T8Y-01C	○	○*	○	○*
		Input type	Not included Use an optional cable.	FA3-AT1T8X	○	○	○	○
		Output type		FA3-AT1T8Y	○	○	○	○
		Output type		FA3-AT1T8Y	○	○	○	○
CC-Link	For digital signal converter	Input type	Included	FA3-TH1C16XC-01C	○	○*	○	○*
		Output type (sink)		FA3-TH1C16Y-01C	○	○*	○	○*
		Output type (source)		FA3-TH1C16YE-01C	○	○*	○	○*
		Input type	Not included Use an optional cable.	FA3-TH1C16XC	○	○	○	○
		Output type (sink)		FA3-TH1C16Y	○	○	○	○
		Output type (source)		FA3-TH1C16YE	○	○	○	○
	For analog signal converter	Input type	Included	FA3-AT1C8X-01C	○	○*	○	○*
		Output type		FA3-AT1C8Y-01C	○	○*	○	○*
		Input type	Not included Use an optional cable.	FA3-AT1C8X	○	○	○	○
		Output type		FA3-AT1C8Y	○	○	○	○
		Output type		FA3-AT1C8Y	○	○	○	○

*: Only the modules are compliant. The enclosed cables are not compliant.

Network interface module dedicated cable

Connected to	Specifications	Cable length	Model	Overseas standard			
				UL	CE	RoHS	KC
Signal converter	Extension cable for signal converter	1m	FA3-CB2L10MM1H20	Δ	-	○	-
		2m	FA3-CB2L20MM1H20	Δ	-	○	-
		3m	FA3-CB2L30MM1H20	Δ	-	○	-

CC-Link cable

Supported version	Specifications	Cable length	Model	Overseas standard			
				UL	CE	RoHS	KC
Ver.1.00	Standard cable	200m	FA-CBL200SB	Δ	-	-	-
	High-performance cable		FA-CBL200SBH	Δ	-	-	-
	Vibration-resistant cable (for movable part)		FA-CBL200SBZ	Δ	-	-	-
	Cable with a built-in 24VDC power cable	100m	FA-CBL100PWSB	Δ	-	-	-
Ver.1.10	Standard cable	200m	FA-CBL200PSBH	Δ	-	-	-
	Vibration-resistant cable (for movable part)		FA-CBL200PSBZ	Δ	-	-	-
	Cold-resistant cable		FA-CBL200LTPSBH	Δ	-	-	-
	Cable with a built-in 24VDC power cable	100m	FA-CBL100PWPSBH	Δ	-	-	-

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CC-Link terminated cable

Supported version	Specifications	Cable length	Model	Overseas standard			
				UL	CE	RoHS	KC
Ver.1.00	Round solderless terminal	0.3m	FA-CBL03CC	Δ	-	-	-
		0.5m	FA-CBL05CC	Δ	-	-	-
		1m	FA-CBL10CC	Δ	-	-	-
		2m	FA-CBL20CC	Δ	-	-	-
	Y-shaped solderless terminal	0.3m	FA-CBL03CCY	Δ	-	-	-
		0.5m	FA-CBL05CCY	Δ	-	-	-
		0.7m	FA-CBL07CCY	Δ	-	-	-
		1m	FA-CBL10CCY	Δ	-	-	-
Ver.1.10	Round solderless terminal	0.3m	FA-CBL03CCPH	Δ	-	-	-
		0.4m	FA-CBL04CCPH	Δ	-	-	-
		1m	FA-CBL10CCPH	Δ	-	-	-
		2m	FA-CBL20CCPH	Δ	-	-	-
	Cylindrical bar terminal	0.2m	FA-CBL02CCPHF	Δ	-	-	-
		0.5m	FA-CBL05CCPHF	Δ	-	-	-
		0.7m	FA-CBL07CCPHF	Δ	-	-	-
	One-touch connector	0.2m	FA-CBL02CCPHY	Δ	-	-	-
		0.2m	FA-CBL02CCPHY	Δ	-	-	-
	Y-shaped solderless terminal	0.3m	FA-CBL03CCPHY	Δ	-	-	-
		0.5m	FA-CBL05CCPHY	Δ	-	-	-
		0.7m	FA-CBL07CCPHY	Δ	-	-	-
		1m	FA-CBL10CCPHY	Δ	-	-	-
		1.5m	FA-CBL15CCPHY	Δ	-	-	-
		2m	FA-CBL20CCPHY	Δ	-	-	-

CC-Link cable terminated parts set

Specifications	Model	Overseas standard			
		UL	CE	RoHS	KC
Round solderless terminal type, Quantity: 100	FA-R100SET	Δ	-	-	-
Y-shaped solderless terminal type, Quantity: 100	FA-Y100SET	Δ	-	-	-

CC-Link simple type T-branch module

Specifications			Model	Overseas standard			
				UL	CE	RoHS	KC
Simple type	Built-in 110Ω terminating resistor (Switching between on and off)	M3 screw	FA-TK72	Δ	-	-	-

CC-Link waterproof type T-branch module

Specifications			Model	Overseas standard			
				UL	CE	RoHS	KC
Waterproof type	Dedicated to communication cables	4-pin connector	FA-TW43	Δ	-	-	-
	For cables with a built-in power cable	7-pin connector	FA-TW73	Δ	-	-	-

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CC-Link waterproof connector

Specifications			Model	Overseas standard			
				UL	CE	RoHS	KC
4-pin adapter	Female (connecting to the plug FA-204-PM*)	Packing diameter: φ6	FA-204-AdF6	Δ	-	-	-
		Packing diameter: φ8	FA-204-AdF8	Δ	-	-	-
		Packing diameter: φ10	FA-204-AdF10	Δ	-	-	-
		Packing diameter: φ12	FA-204-AdF12	Δ	-	-	-
	Male (connecting to the plug FA-204-PF*)	Packing diameter: φ6	FA-204-AdM6	Δ	-	-	-
		Packing diameter: φ8	FA-204-AdM8	Δ	-	-	-
		Packing diameter: φ10	FA-204-AdM10	Δ	-	-	-
		Packing diameter: φ12	FA-204-AdM12	Δ	-	-	-
		Packing diameter: φ6	FA-207-AdF6	Δ	-	-	-
		Packing diameter: φ8	FA-207-AdF12	Δ	-	-	-
7-pin adapter	Female (connecting to the plug, FA-207-PM*)	Packing diameter: φ6	FA-207-AdM6	Δ	-	-	-
		Packing diameter: φ8	FA-207-AdM8	Δ	-	-	-
	Male (connecting to the plug, FA-207-PF*)	Packing diameter: φ6	FA-207-AdM6	Δ	-	-	-
		Packing diameter: φ8	FA-207-AdM8	Δ	-	-	-
		Packing diameter: φ10	FA-207-AdM10	Δ	-	-	-
		Packing diameter: φ12	FA-207-AdM12	Δ	-	-	-
4-pin plug	Female	Packing diameter: φ6	FA-204-PF6	Δ	-	-	-
		Packing diameter: φ8	FA-204-PF8	Δ	-	-	-
		Packing diameter: φ10	FA-204-PF10	Δ	-	-	-
		Packing diameter: φ12	FA-204-PF12	Δ	-	-	-
	Male	Packing diameter: φ6	FA-204-PM6	Δ	-	-	-
		Packing diameter: φ8	FA-204-PM8	Δ	-	-	-
		Packing diameter: φ10	FA-204-PM10	Δ	-	-	-
		Packing diameter: φ12	FA-204-PM12	Δ	-	-	-
	Female	Packing diameter: φ6	FA-207-PF6	Δ	-	-	-
		Packing diameter: φ8	FA-207-PF8	Δ	-	-	-
		Packing diameter: φ10	FA-207-PF10	Δ	-	-	-
		Packing diameter: φ12	FA-207-PF12	Δ	-	-	-
7-pin plug	Female	Packing diameter: φ6	FA-207-PM6	Δ	-	-	-
		Packing diameter: φ8	FA-207-PM8	Δ	-	-	-
		Packing diameter: φ10	FA-207-PM10	Δ	-	-	-
		Packing diameter: φ12	FA-207-PM12	Δ	-	-	-
	Male	Packing diameter: φ6	FA-207-PM6	Δ	-	-	-
		Packing diameter: φ8	FA-207-PM8	Δ	-	-	-
4-pin receptacle	Female (connecting to the plug, FA-204-PM*)		FA-204-RF	Δ	-	-	-
	Male (connecting to the plug, FA-204-PF*)		FA-204-RM	Δ	-	-	-
7-pin receptacle	Female (connecting to the plug, FA-207-PM*)		FA-207-RF	Δ	-	-	-
	Male (connecting to the plug, FA-207-PF*)		FA-207-RM	Δ	-	-	-
Built-in 110Ω terminating resistor (4-pin)	Male		FA-CONW4P110E	Δ	-	-	-
Built-in 110Ω terminating resistor (7-pin)	Male		FA-CONW7P110E	Δ	-	-	-

Dustproof cap for CC-Link waterproof connector

Specifications			Model	Overseas standard			
				UL	CE	RoHS	KC
For adapter	Used for FA-204-AdM*/AdF*, FA-207-AdM*/AdF* (IP67 non-compliant)		FA-NRW-20-AdCa	Δ	-	-	-
For plug	Used for FA-204-PM*/PF*, FA-207-PM*/PF* (IP67 non-compliant)		FA-NRW-20-PCa1	Δ	-	-	-
For receptacle	Used for FA-204-RM/RF, FA-207-RM/RF (IP67 non-compliant)		FA-NRW-20-RCa	Δ	-	-	-

Cable with CC-Link waterproof connector

Supported version	Specifications	Cable length	Model	Overseas standard			
				UL	CE	RoHS	KC
Ver.1.10	With a female connector (FA-204-PF8) on one end	5m	FA-CBL05PSBH4F	Δ	-	-	Δ
	With a male connector (FA-204-PM8) on one end	5m	FA-CBL05PSBH4M	Δ	-	-	Δ
	With a female connector (FA-207-PF12) on one end	10m	FA-CBL10PWSB7F	Δ	-	-	Δ
Ver. 1.00, Cable with a built-in power cable	With a male connector (FA-207-PM12) on one end	10m	FA-CBL10PWSB7M	Δ	-	-	Δ
	Male connector (FA-207-PM12)	1m	FA-CBL01PWSB7MF	Δ	-	-	Δ
	With a male connector (FA-207-PF12)						

Network camera interface module

Product	Specifications	No. of devices to be registered	Model	Overseas standard			
				UL	CE	RoHS	KC
CC-Link IE Field Network-compatible network camera interface module	・Module ・CD-ROM: Configuration tool, User's Manual (Detailed) in PDF format, Function blocks (GX Works3/GX Works2), CSP+ file ・User's Manual (Hardware)	2	ECLEF-NV1G-02	○	○	○	×
		4	ECLEF-NV1G-04	○	○	○	×
		8	ECLEF-NV1G-08	○	○	○	×
		16	ECLEF-NV1G-16	○	○	○	×

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RFID interface module

Type	Specifications	No. of channel connections	Model	Overseas standard			
				UL	CE	RoHS	KC
MELSEC iQ-R series slot-in type	· Module · User's Manual (Hardware)	1	ER-1V680D1	○	○	○	○
		2	ER-1V680D2	○	○	○	○
User's Manual (Detailed)	Japanese version	-	ER-1V680D-M1J	-	-	-	-
	English version		ER-1V680D-M1E	-	-	-	-
MELSEC-Q series slot-in type	· Module · User's Manual (Hardware)	1	EQ-V680D1	○	○	○	○
		2	EQ-V680D2	○	○	○	○
User's Manual (Detailed)	Japanese version	-	EQ-V680D-MAN-JP	-	-	-	-
	English version		EQ-V680D-MAN-E	-	-	-	-
CC-Link IE Field-compatible network distributed type	· Module · User's Manual (Hardware)	2	ECLEF-V680D2	○	○	○	○
			ECLEF-V680D-M1J	-	-	-	-
User's Manual (Detailed)	Japanese version	-	ECLEF-V680D-M1E	-	-	-	-
	English version		ECLEF-V680D-M1E	-	-	-	-
CC-Link-compatible network distributed type	· Module · User's Manual (Hardware)	1	ECL2-V680D1	○	○	○	○
			ECL2-V680D1-MAN-JP	-	-	-	-
User's Manual (Detailed)	Japanese version	-	ECL2-V680D1-MAN-E	-	-	-	-
	English version		ECL2-V680D1-MAN-E	-	-	-	-

SSCNET-compatible hydraulic control unit

Product	Specifications		Model	Overseas standard			
				UL	CE	RoHS	KC
SSCNET-compatible hydraulic control unit	24VDC power supply connector provided with the unit	Analog input voltage specifications	DG2AF3N	○	○	○	×
		Analog input current specifications	DG2AF3N-P01	○	○	○	×

SSCNET-compatible hydraulic control unit

Connection cable

Specifications	Cable length	Model	Overseas standard			
			UL	CE	RoHS	KC
· A dedicated cable to connect an SSCNET-compatible hydraulic control unit and our general-purpose interface amplifier junction terminal block	0.5m	DG4AF3CB05	×	×	×	×
	1m	DG4AF3CB10	×	×	×	×

FL-net (OPCN-2) interface module

Product	Specifications	Model	Overseas standard			
			UL	CE	RoHS	KC
MELSEC iQ-R series-compatible FL-net (OPCN-2) interface module	· Module · User's Manual (Hardware)	ER-1FL2-T	○	○	○	○
User's Manual (Detailed)	Japanese version	ER-1FL2-T-M1J	-	-	-	-
	English version	ER-1FL2-T-M1E	-	-	-	-

Please confirm the following product warranty details prior to product use.

Gratis Warranty Terms and Gratis Warranty Range

If any fault or defect (hereinafter referred to as "Failure") attributable to Mitsubishi Electric Engineering should occur within the gratis warranty period, Mitsubishi Electric Engineering shall repair the product free of charge via the distributor from whom you made your purchase.

Should the repair require a business trip, a charge will be incurred for the expense required for the dispatch of an engineer (domestic support only).

Further, onsite readjustments and testing associated with failed module replacement shall be outside the scope of responsibility of Mitsubishi Electric Engineering.

■ Gratis Warranty Period

The gratis warranty period of this product shall be one (1) year from the date of purchase or delivery to the designated place.

Note that after manufacture and shipment from Mitsubishi Electric Engineering, the maximum distribution period shall be six (6) months, and the gratis warranty period after manufacturing shall be limited to eighteen (18) months. Further, the gratis warranty period for repaired products shall not exceed the gratis warranty period of the product prior to repair.

■ Gratis Warranty Range

- (1) The gratis warranty range shall be limited to normal use based on the usage conditions, methods and environment, etc., defined by the terms and precautions, etc., given in the instruction manual, user's manual, and caution labels on the product.
- (2) In the following cases, a repair fee shall be applied even if within the gratis warranty period.
 - 1) Failure resulting from inappropriate storage or handling, carelessness or negligence by the user, or Failure caused by the user's hardware or software design.
 - 2) Failure caused by unapproved modifications, etc., to the product by the user.
 - 3) Failure that could have been avoided if, when the Mitsubishi Electric Engineering product was assembled into the user's device, safeguards defined by legal regulations applicable to the user's device or functions or structures considered standard by the industry had been provided.
 - 4) Failure recognized as preventable if the consumed products specified in instruction manuals, etc., were normally maintained or replaced.
 - 5) Failure caused by external factors beyond anyone's control such as fires or abnormal voltage, and Failure caused by Force Majeure such as earthquakes, lightning, or wind and water damage.
 - 6) Failure caused by reasons unpredictable by scientific technology standards at the time of shipment from Mitsubishi Electric Engineering.
 - 7) Any other failure not attributable to Mitsubishi Electric Engineering or found by the user to not be attributable to Mitsubishi Electric Engineering.

Onerous repair term after discontinuation of production

- (1) The period in which product repair (fee applied) is available is seven (7) years after product discontinuation.

Discontinuation of production shall be reported by Mitsubishi Electric Engineering sales services.
- (2) Product supply (including spare parts) is not possible after production has been discontinued.

Overseas Services

Please consult your dealer where you purchased Mitsubishi Electric Engineering products.

Exclusion of opportunity loss and secondary loss from warranty liability

Regardless of the gratis warranty period, Mitsubishi Electric Engineering shall not be liable for compensation for damages arising from causes not attributable to Mitsubishi Electric Engineering, opportunity losses or lost profits incurred by the user due to Failures of Mitsubishi Electric Engineering products, damages or secondary damages arising from special circumstances, whether foreseen or unforeseen by Mitsubishi Electric Engineering, compensation for accidents, compensation for damages to products other than Mitsubishi Electric Engineering products, or compensation for replacement work, readjustment of onsite machinery and equipment, startup test runs or other duties carried out by the user.

Changes in product specifications

The specifications given in the catalogs, manuals, and technical documents are subject to change without notice.

Product application

- (1) This product shall be used in applications that will not lead to a major accident even in the unlikely event any failure or defect should occur in the product in which the product is incorporated, and shall be systematically provided with external backup and fail-safe functions that operate in the event of any failure or defect.
- (2) This product has been designed and manufactured as a general-purpose product for general industry applications, etc. The product shall be excluded from use in applications in which the public could be greatly affected such as the applications of the nuclear and other power plants operated by the respective power companies, and applications in which a special quality assurance system is required, such as the applications of railway companies or government or other public offices. The product shall also be excluded from use in aircraft, medical applications, incineration and fuel devices, manned transport devices, equipment for recreation and amusement, and safety devices, in which human life or assets could be greatly affected.

Notwithstanding the above, restrictions Mitsubishi Electric Engineering may in its sole discretion, authorize use of the product in one or more of the Prohibited Applications, provided that the usage of the product is limited only for the specific applications agreed to by Mitsubishi Electric Engineering and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the products are required. For details, please contact the Mitsubishi Electric Engineering representative in your region.

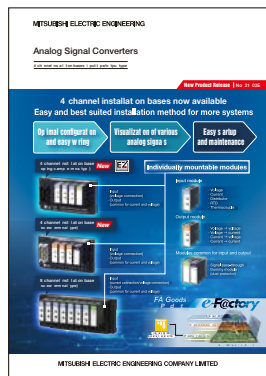
Related products

New Product Releases

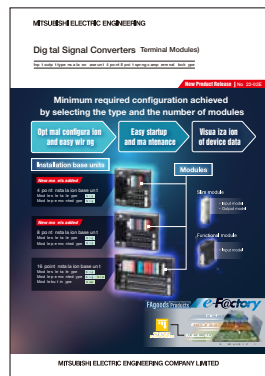
Cable with spring clamp terminal block



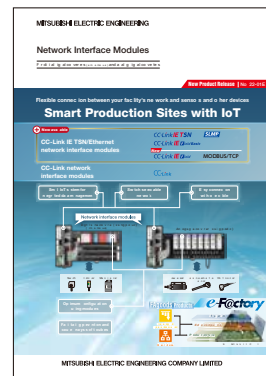
Analog signal converter



Digital signal converter (Terminal Module)



Network interface module

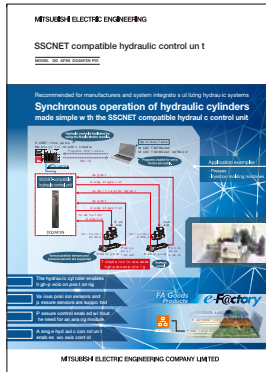


Leaflets

Spring clamp junction terminal block for Mitsubishi Electric AC servo system



SSCNET-compatible hydraulic control unit

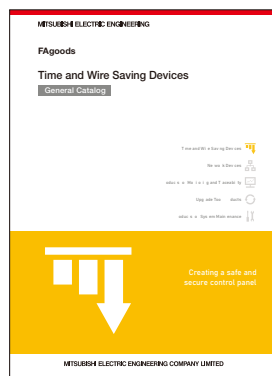


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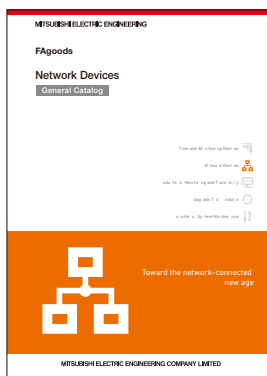
Digest edition



Time and Wire Saving Devices



Network Devices



Upgrade Tool Products



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The information is intended for the Japanese market.

For safe use

- To use the products given in this publication properly, always read the relevant manuals before beginning operation.
- The products have been manufactured as general-purpose parts for general industries, and are not designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine or passenger-carrying vehicles, consult with Mitsubishi Electric Engineering.
- The products have been manufactured under strict quality control. However, when installing the products where major accidents or losses could occur if the products fail, install appropriate backup or fail-safe functions in the system.