

General Specifications

FCJ Autonomous Controller Hardware



GS 34P02Q11-01E

■ GENERAL

This document describes the general specifications of the FCJ autonomous controller. (FCJ is an acronym of field control junction.)

■ FEATURES

- High-performance, high-reliability, all-in-one controller with built-in I/O interface
- Memory with ECC
- Low heat dissipation eliminates the need for a fan
- A wealth of RAS features — CPU self-diagnostics, temperature monitoring, I/O diagnostics, and more
- The control network can be duplexed.
- For engineering descriptive coding, five IEC 61131-3 compliant programming languages are supported. This allows use of the language most suitable for the purpose of each application or the preference of the user, and enables efficient development of control applications such as feedback and sequence control.
- A control application can be broken down into software parts for reuse, allowing efficient and quality configuration of a system.
- Application Portfolios, into which Yokogawa's application expertise is packed, enable effortless creation of complex applications.
- Java-enabled — allowing file transfers using the FTP protocol and autonomous event notifications by e-mail. With Infowell, applications such as web browsers or e-mail communications can be utilized without programming.
- Intercommunication with other autonomous controllers or other equipment for inter-linking control actions
- Using Versatile Data Server Software (VDS) together allows a system with enriched operation and monitoring functions to be built up.
- Can link up Foundation Fieldbus-enabled field devices by functioning as link active schedulers (LASs) for low-speed voltage mode (H1) Foundation Fieldbus segments.
- An FCN/FCJ OPC server for Windows can be used for accessing the data of an autonomous controller FCN/FCJ from an OPC (OLE for Process Control) client on a PC.



■ SPECIFICATIONS

Item	Specification	
Model	NFJT100-S10□	NFJT100-H10□
Weight	1.7 kg	1.8 kg
Power supply	24 V DC±10%	
Current dissipation	800 mA	1000 mA
Dimensions (W x H x D)	213.8 x 156 x 95 mm	
AI	6	
AO	2	
DI	16	
DO	16	
Control network	Ethernet (duplexed configuration possible)	
Foundation Fieldbus	Not supported.	2 ports
Mounting	Panel- or DIN rail-mounted	

● CPU

Item	Specification	
Processor	MMX-Pentium 166 MHz	
Memory	Main	128 MB with ECC
	Static RAM	1 MB with ECC, backed up by battery
System card	1 slot	
Serial Port	2 RS-232C ports: D-sub 9 pins, male (*1)	
Communication method	Full duplex	
	Synchronization	Asynchronous
Baud rate	0.3, 1.2, 2.4, 4.8, 9.6, 14.4, 19.2, 28.8, 38.4, 57.6, or 115.2 kbps	
Network interface	2 Ethernet ports: 100/10 Mbps, 100BASE-TX or 10BASE-T, RJ45 modular jacks	
RAS features	Watchdog timer, temperature monitor, etc.	
Battery	2700 mAh lithium battery	
Display	3 LEDs for CPU status indication, 2 LEDs for LAN status indication	
Switches	Reset, shutdown	

*1: Connectors are fastened using inch screw threads (No. 4-40 UNC).

● Analog Inputs

Item	Specification	
Input points	6	
Input signals	1 to 5 V differential, non-isolated	
Maximum absolute input voltage	±7.5 V	
Input resistance	During power-on	1 MΩ or more
	During power-off	340 kΩ or more
Allowable signal source resistance	500 Ω or less	
Accuracy	±0.3% of full scale when all DI/Os are off ±0.4% of full scale when all DI/Os are on	
Maximum temperature drift	±0.01%/°C (Max)	
A/D resolution	15 bits/1-5 V	
Data refresh cycle	10 ms	
Input step response time	100 ms	
Normal mode noise rejection ratio	37 dB or more (with power supply frequency at 50/60 Hz)	
External connections	M2.5 pressure-clamp terminals	

● Analog Outputs

Item	Specification
Output points	2
Output signals	4 to 20 mA DC, non-isolated
Allowable load resistance	0 to 750 Ω
Accuracy	±0.5% of full scale when all DI/Os are off ±0.6% of full scale when all DI/Os are on
Temperature drift	±0.01%/°C
D/A resolution	11 bits/4-20 mA
Data refresh cycle	10 ms
Step response time	40 ms
Output fallback (*1)(*2)	<ul style="list-style-type: none"> HOLD (holds the current level when the fallback action is triggered). SETV (sets the output to the preset level when the fallback action is triggered).
Output ripple	50 mVp-p (with 250 Ω load)
Output open detection	Provided
External connections	M2.5 pressure-clamp terminals

*1: The fallback detection time is 4 seconds.

*2: Whether to enable output fallback actions is to be selected for each module. When enabling them, select HOLD or SETV for each channel.

● Digital Inputs

Item	Specification
Input points	16 voltage signals(*1), a shared common terminal for all points
Rated input voltage	24 V DC
Input "on" voltage	18 V to 26.4 V DC
Input "off" voltage	5.0 V DC or less
Input current	4.1 mA/point ±20% (at rated voltage input)
Instantaneous allowable maximum input voltage	30 V DC
Isolation	Input signals to system isolated. (Point-to-point non-isolated.)
Withstanding voltage	Between input signal and system: 2 kV AC
Input response time	8 ms or less (for status input)
Minimum "on" detection time	20 ms (for pushbutton [momentary] input)
Maximum on-off cycle	25 Hz (for pushbutton [momentary] input)
Functions: Status inputs Pushbutton inputs	On/off status detection Rise/fall edge counting
External connections	M2.5 pressure-clamp terminals

*1: A voltage-free contact cannot be connected directly.

● Digital Outputs

Item	Specification
Output points	16, with shared common terminal for all points
Rated load voltage	24 V DC
Rated external power supply (*1)	24 V DC, 50 mA
External power supply voltage range	20.4 to 26.4 V DC
Maximum "on" voltage	2 V DC
Maximum output-off leak current	0.1 mA
Output type	Current sink
Maximum load (*2)	100 mA/point, 26.4 V
Isolation	Output signals to system isolated. (Point-to-point non-isolated)
Withstanding voltage	Between output signals and system: 2 kV AC
Output response time	3 ms or less
Functions: Status outputs	On/off status outputs
Output fallback (*3) (*4)	HOLD: Holds the current status when the fallback action is triggered. OFF: Resets all the output channels to off when the fallback action is triggered. NO: Performs no fallback action.
External connections	M2.5 pressure-clamp terminals

- *1: Needs an external 24 V DC power supply.
- *2: Connect a spark killer diode when driving DC relay.
- *3: Fallback detection time is 4 seconds.
- *4: HOLD, OFF, or NO should be chosen for all channels commonly.

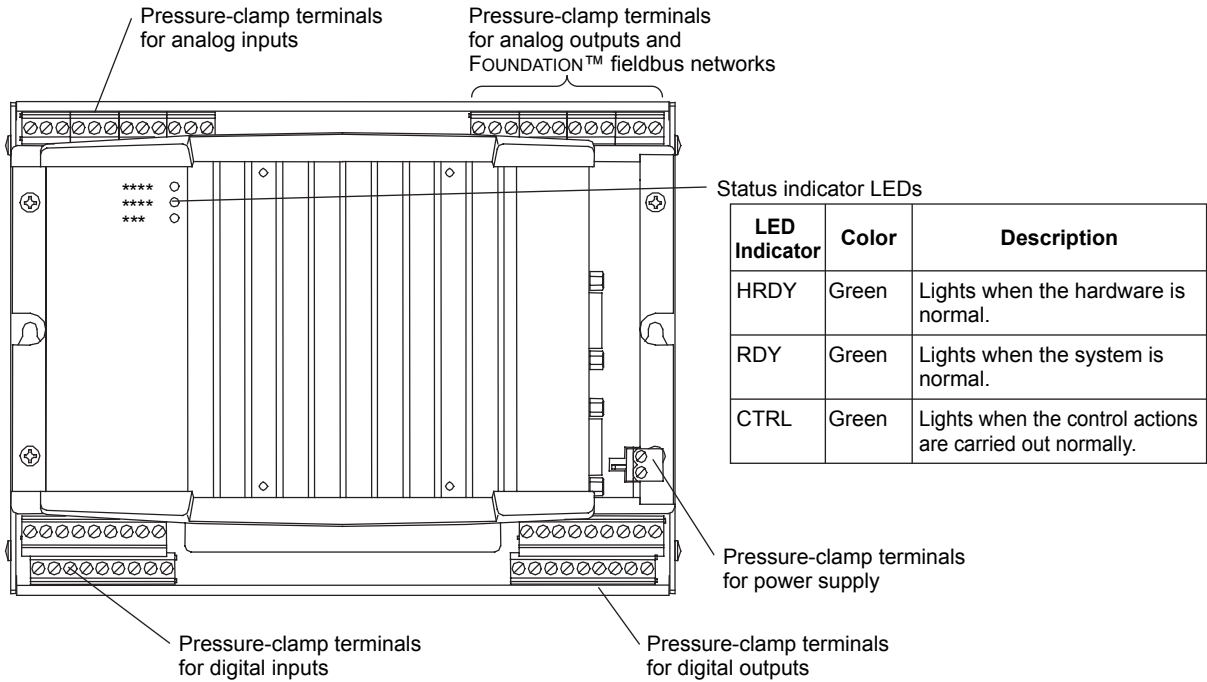
● FOUNDATION fieldbus Communication

Item	Specification
Interface	FOUNDATION fieldbus (Low speed Voltage Mode)
Number of FCJ ports	2 ports/FCJ
Number of FF BlockViews	Up to 50 blocks per FCJ (*1)
I/O points	48 points/port
Maximum number of fieldbus device	16 units/port
Transmission speed	31.25 kbps
Function	LAS(Link Active Scheduler) function
Bus connections (external connections)	Pressure-clamp terminals (*2)
LED indicator	-
Surge absorber	-
Terminator	- (*3)

- *1: The total number of Fieldbus function blocks when all ports of FCJ be used.
- *2: The power supply for the fieldbus must be prepared separately.
- *3: The terminators for both ends must be prepared separately.

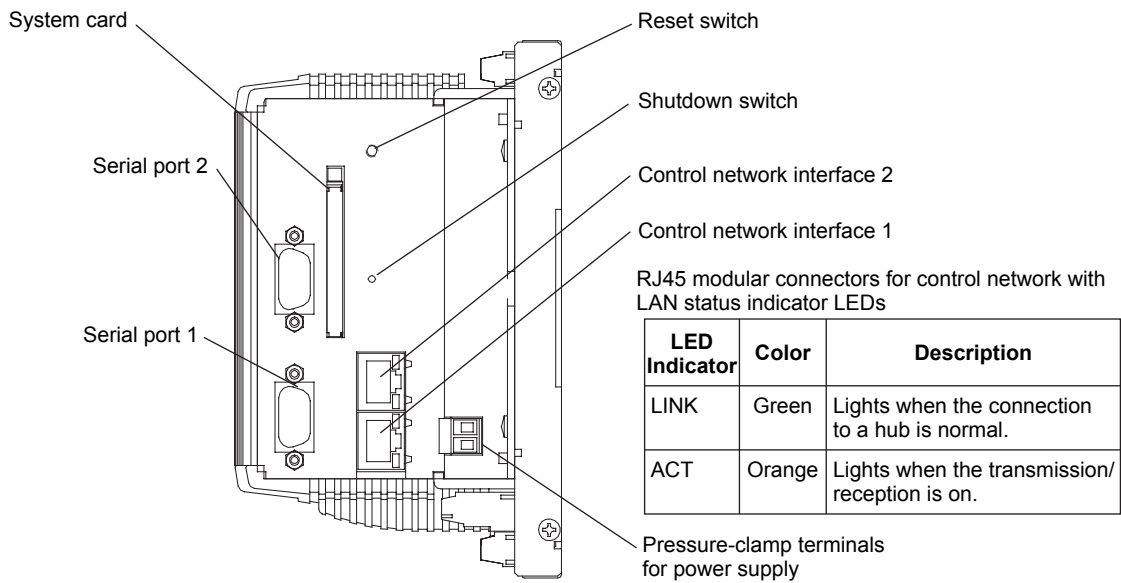
■ APPEARANCES

● Front View



F01E.ai

● Right Side View



F02E.ai

■ INSTALLATION REQUIREMENTS

Item		Specification
Ambient temperature	Operation	0° to 60°C (*1)
	Transportation/ storage	-40° to 85°C (*2)
Ambient humidity	Operation	5 to 95% RH (no condensation)
	Transportation/ storage	5 to 95% RH (no condensation)
Rate of change in temperature	Operation	Within ±10°C/h
	Transportation/ storage	Within ±20°/Ch
Dust		0.3 mg/m ³ or less
Protection class		IP20
Resistance to corrosive gases		ANSI/ISA S71.04, Class G2 (standard) (ANSI/ISA S71.04 Class G3, option)
Resistance to vibration		0.15 mm P-P (5 to 58 Hz)
		1 G (58 to 150 Hz)
Resistance to shock		15 G, 11 ms (during power-off, for sine half-waves in XYZ-directions)
Altitude		2000 m or less
Noise	Electric field	3 V/m or less (26 MHz to 1 GHz)
	Magnetic field	30 A/m (AC) or less, 400A/m (DC) or less
	Electrostatic discharge	4 kV or less contact discharge, 8 kV or less aerial discharge
Grounding		Apply the grounding system which is defined by the rules and standards of the country or the region.
Cooling		Natural air cooling

*1: When only one port is used for the control network; 0° to 55°C when both ports are used for the control network.

*2: The time may be lost if the temperature falls below -10°C.

■ COMPLIANT STANDARDS

Item		Standards
EMC standards	CE Marking	EN 55011 Class A Group 1 (emission) EN 61000-6-2 (immunity) (*1)
	C-Tick Marking	EN 55011 Class A Group 1
	KC Marking	Korea Electromagnetic Conformity Standard
Standards for Hazardous Location Equipment (*2)	FM Non-Incendive (*5)	Class I Division 2, Groups A, B, C, D T4 Class 3600: 1998 Class 3611: 2004 Class 3810: 2005
	CENELEC ATEX Type "n" (*3) (*4)	Ⓔ II 3 G Ex nA II C T4 Gc X EN 60079-15:2010 EN 60079-0:2009 EN 60079-0:2012
	CSA Non-Incendive (*5)	Class I Division 2, Groups A, B, C, D T4 CAN/CSA-C22.2 No.0-M91 CAN/CSA-C22.2 No.0.4-04 CAN/CSA-C22.2 No. 157-92 C22.2 No. 213-M1987 TN-078

Note: According to the New Approach Directive, the manufacturer and the representative office in EU are indicated below:

Manufacturer: YOKOGAWA Electric Corporation (2-9-32 Nakacho, Musashino-shi, Tokyo 180-8750, Japan).

Representative office in EU Community: Yokogawa Europe B.V. (Euroweg 2, 3825 HD Amersfoort, The Netherlands).

*1: For lightning surge immunity, a device such as a lightning arrester needs to be installed externally.

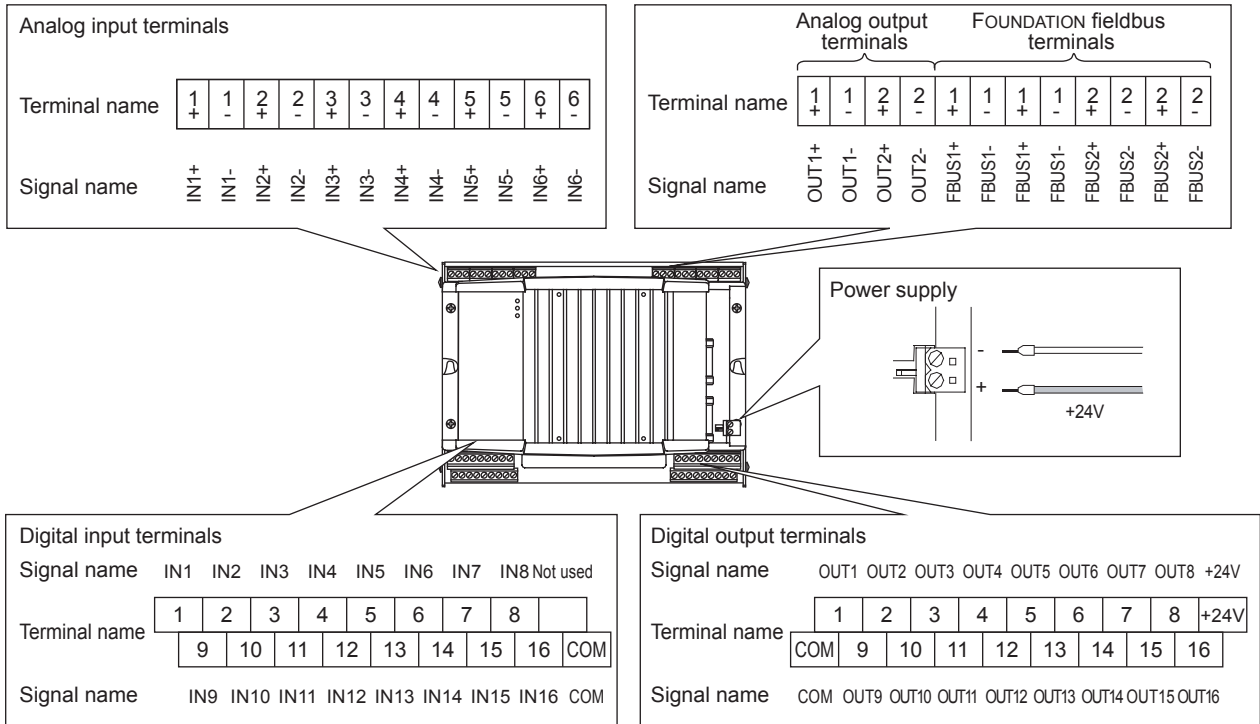
*2: Refer to TI 34P02Q91-01E for the products meeting NI.

*3: When FCJ is used under the CENELEC ATEX Type "n" environment, the Instruction Manual, "Explosion Protection of FCN/FCJ Products" (IM 34P02Q11-02E) is required for safer installation and wiring.

*4: To be compliant with these standards, the FCJ hardware needs to be installed in a lockable metal cabinet of IP54 or higher protection rating.

*5: To be compliant with these standards, the FCJ hardware needs to be installed in a lockable metal cabinet.

■ TERMINAL ARRANGEMENT



F03E.ai

■ EXTERNAL WIRING DIAGRAMS FOR DIGITAL I/O

● Digital Input Wiring

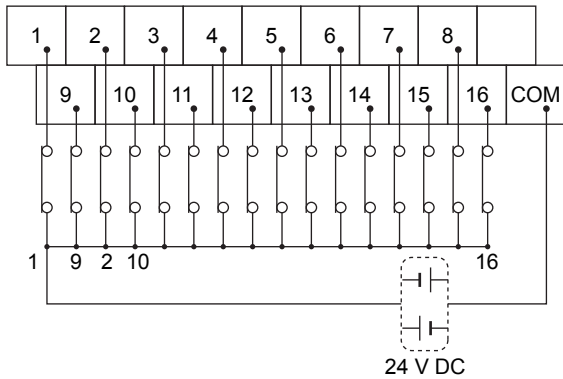


Figure External Wiring Diagram for Digital Inputs of FCJ

F05E.ai

● Digital Output Wiring

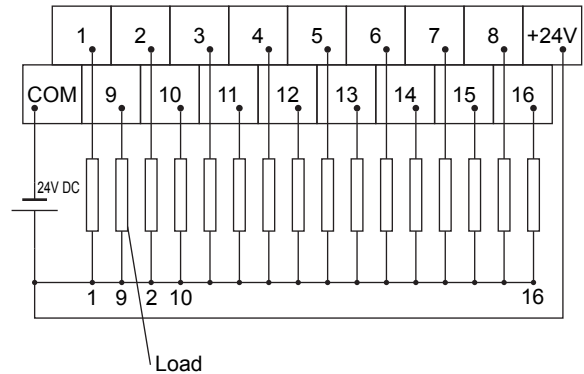


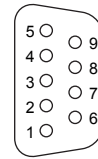
Figure External Wiring Diagram for Digital Outputs of FCJ

F06E.ai

PIN ASSIGNMENTS OF FCJ'S SERIAL PORT

Table Connector Pin Assignment
(D-sub 9-pin, male) (*1)

Pin No	Signal name	Function
1	CD	Data channel receiving carrier detection
2	RD	Receiving data
3	SD	Transmission data
4	ER	Data terminal ready
5	SG	Signal ground
6	DR	Data set ready
7	RS	Transmission request
8	CS	Transmission enabled
9	—	Not used

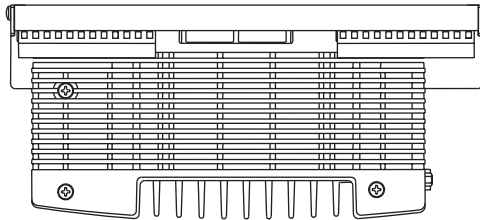


F12E.ai

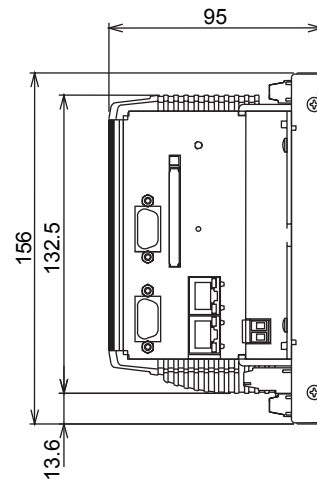
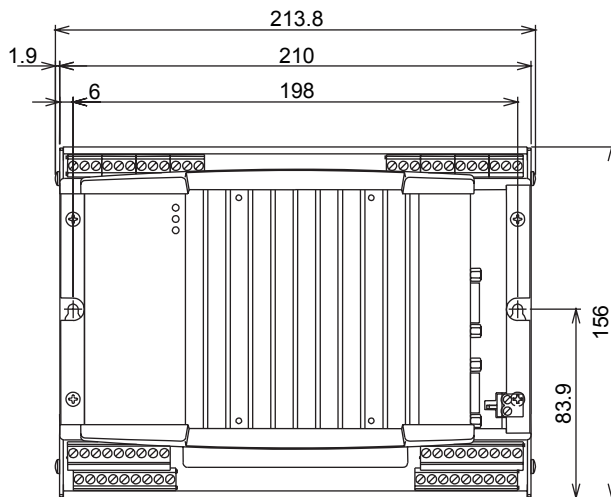
Figure Pin Position (Front View)

*1: Connectors are fastened using inch screw threads (No. 4-40 UNC).

DIMENSIONS



Unit: mm



F04E.ai

■ CABLE SPECIFICATIONS

The following describes the specifications required for the power, grounding, and field signal wiring cables used.

● Applicable Cables

Insulated cables for industrial equipment such as:

- 600 V polyvinyl chloride insulated wires (IV); JIS C3307
- Polyvinyl chloride insulated wires for electrical apparatus (KIV); JIS C3316
- 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV); JIS C3317
- Heatproof vinyl insulated wires VW-1 (UL1015/UL1007)
- Control cables (vinyl insulated vinyl sheath cable) (CVV); JIS C3401

● Recommended Sizes

Power cable

Without sleeve: AWG18 to 14 (0.75 to 2 mm²)
 With sleeve: AWG18 to 16 (0.75 to 1.5 mm²)

Grounding cable

AWG14 to 13 (2 to 2.6 mm²) with M3 ring tongue terminal (Use an insulated ring tongue terminal.)

Signal cables

Without sleeve: AWG20 to 14 (0.5 to 2 mm²)
 With sleeve: AWG20 to 16 (0.5 to 1.5 mm²)

■ RESTRICTIONS AND PRECAUTIONS ON INSTALLATION

See Installation Guide for “STARDOM FCN/FCJ Installation Guide” (TI 34P02Q91-01).

■ For Type “n”

When FCJ is used under the Type “n” environment, the Instruction Manual, “Explosion Protection of FCN/FCJ Products” (IM 34P02Q11-02E) below is required for safer installation and wiring.

Document No.	Name
IM 34P02Q11-02E	Explosion Protection of FCN/FCJ Products

■ MODEL AND SUFFIX CODES

		Description
Model	NFJT100	FCJ autonomous controller
	-S	Without field network interface
	-H	With FOUNDATION fieldbus interface: 2 ports
	1	With AI/O (AI:6, AO:2), DI/O (DI:16, DO:16)
Suffix Codes	0	Always 0
	5	Basic type with no explosion protection
	6	With ISA Standard G3 option and no explosion protection
	E	Basic type with explosion protection
	F	With ISA Standard G3 option and explosion protection

■ ORDERING INFORMATION

Specify the model and suffix codes.

For selecting the right products for explosion protection, please refer to “STARDOM FCN/FCJ Installation Guide” (TI 34P02Q91-01) without fail.

■ TRADEMARKS

- STARDOM is a trademark of Yokogawa Electric Corporation.
- “FOUNDATION” of “FOUNDATION fieldbus” is a registered trademark of the Fieldbus Foundation.
- Ethernet is a registered trademark of Xerox Corporation, the United States.
- Other company and product names appearing in this document are trademarks or registered trademarks of their respective holders.