General Specifications

FN310
Field Wireless
Multi-Protocol Module

GS 01W03D01-01EN

■ GENERAL

This General Specification (GS) describes the specifications for Field Wireless Multi-Protocol Module. Combined with "Field Wireless Communication Module FN110", this product is connectable with a field wireless network as a field wireless device. This product acquires sensor data from a connected sensor and transmits it to a field wireless network through FN110.

Refer to General Specifications of "Field Wireless Communication Module FN110" for an overview and detailed information.

■ FEATURES

• Protocol conversion

This product can convert a wired communication protocol to the ISA100 Wireless protocol, and transmit it to a field wireless network. ISA100 Wireless is an international, industrial wireless networking standard engineered to serve the needs of process industries.

• Multi-protocol support

HART or Modbus* communication protocol can be selected. Various wired legacy device required by plant operation can be converted into a wireless device as required.

* Future release

• Installation flexibility

With built-in batteries, this product can supply power to the connected field device, eliminating the need for cables.

Cable elimination allows installing a device at locations where it was previously either inaccessible or cost-prohibitive because of cable management and cost.

• Small and lightweight housing with LCD

This product has a small and lightweight housing with a built-in LCD that displays the process data and communication status.

■ STANDARD SPECIFICATIONS

□ POWER SUPPLY SPECIFICATIONS

Battery:

Dedicated battery pack.
Rated voltage: 7.2 V
Rated capacity: 19 Ah

Battery Pack:

2x primary lithium-thionyl chloride batteries
With battery case (batteries sold separately)

□ PERFORMANCE SPECIFICATIONS

Update Period:

[Protocol code: J]
5 to 3600 s selectable
[Protocol code: M, Connection Device Type: DT2]
8 to 3600 s selectable

Battery Characteristics:

[Protocol code: J]
At one-to-one connection, the typical battery life is 4 years when BootStrapTime*1*2 of the HART device is 10 seconds or 1 year when BootStrapTime*1*2 is 60 seconds, under the following conditions*3:
• Ambient temperature: 23 ±2°C
• Device role: IO mode
• Update period: 10 minutes
• LCD display: off

*1: BootStrapTime is defined as the time from the power-on of the HART device until the reliable data is available.
*2: For BootStrapTime, please contact the manufacturer of the connected HART device.
*3: Environmental condition such as vibration and the type of connected HART device may affect the battery life.

At 4-20 mA loop connection, the typical battery life is 8 years at 10 seconds update time or 5 years at 5 seconds update time in the following conditions.*1
• Ambient temperature: 23 ±2°C
• Device role: IO mode
• LCD display: off

*1: Environmental condition such as vibration may affect the battery life.

[Protocol code: M, Connection Device Type: DT2]
The typical battery life is 8 years under the flowing conditions*1:
• SENCOM: FU20F-NPT
• Ambient temperature: 23 ±2°C
• Device role: IO mode
• Update period: 10 minutes
• LCD display: off

*1: Environmental condition such as vibration and the type of connected Modbus device may affect the battery life.

YOKOGAWA

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GS 01W03D01-01EN

1st Edition: June 2014 (KP)
9th Edition: July 2021 (KP)

□ FUNCTIONAL SPECIFICATIONS

Input:
[Protocol code: J]
This product has HART master function and enables setting primary and secondary. Communication specifications between this product and HART devices are below.
Protocol revision: HART 7*
Communication mode:
HART multidrop connection 4 mA fixed
HART point-to-point connection 4-20 mA
Number of HART devices: 1 device
Cable: Max 20 m (AWG14 to 22 with shield)

* The HART protocol ensures backward compatibility with the previous revisions.

[Protocol code: M]
Communication specifications between this product and Modbus devices are below.
Communication Mode: Half-duplex communication (RS-485 compliant)
Protocol: Modbus RTU
Communication Speed: 9600 bps
Number of Modbus devices: 1 device
Cable: Max 20 m (AWG14 to 22 with shield)

Connection Devices:
Connecting a HART device enables to acquire PV, SV, TV and QV.
Connecting a SENCOM enables to acquire pH, ORP, rH and temperature. To perform the calibration of SENCOM, use SPS24 SENCOM PC Software.

Output:
Communication specifications between this product and FN110 are below.
Communication Mode: Half-duplex communication (RS485 compliant)
Communication Speed: 9600 bps
Connector: 5-pin round connector dedicated
Cable: Max 20 m (dedicated cable)

Power Supply:
Power supply to the FN110
Supply voltage: 3.5 V
Supply current: 50 mA
[Protocol code: J]
Power supply to the HART device*1*2*3
Maximum supply voltage: 18 V (steady-state)
Maximum supply current: 12 mA (steady-state)

*1: HART devices operate at 4 mA current-fixed mode.

*2: Before using, make sure the minimum operating voltage of the HART device is 16.5V or less with 0 ohm load.

*3: Supplies power when using VOUT terminal.

[Protocol code: M]
Power supply to the Modbus device
Supply voltage: 3.5 V
Supply current: 10 mA

Integral Indicator (LCD display):
5-digit numerical and status display. Display contents and display on/off can be controlled with a magnet (not included).
The indicator displays the following information: Wireless communication status, device status, write protection status, sensor data and alarm message

Diagnosis Functions:
Power failures, inter module communication failures, sensor communication failures, memory errors, battery alarm, abnormal temperature

Software Download Function:
Software download function permits to update wireless field device software via ISA100 Wireless communication.

□ INSTALLATION ENVIRONMENT

Ambient Temperature Limits:
Operating: –40 to 85°C (altitude up to 3000 m)
–30 to 80°C (LCD visible range)
Storage: –40 to 85°C

Ambient Humidity Limits:
Operating: 0 to 100%RH (non-condensation)
Storage: 0 to 100%RH (non-condensation)

Ambient Temperature Gradient:
Operating: ±10°C/h or less
Storage: ±20°C/h or less

Vibration Resistance:
0.21 mm P-P (10 - 60 Hz), 3 G (60 - 2 kHz)

Shock Resistance:
50 G 11 ms

□ REGULATORY COMPLIANCE STATEMENTS

This product satisfies the following standards.

* Please confirm that an installation region fulfills an applicable standard. If additional regulatory information and approvals are required, contact a Yokogawa representative.

CE Conformity:
EMC Directive:
EN61326-1 Class A Table 2, EN55011 Class A
RoHS Directive:
EN IEC 63000
ATEX Directive:
See “OPTIONAL SPECIFICATIONS (For Explosion Protected Types)”
Other Normative Standards:
Safety: EN61010-1 (Indoor/Outdoor use)

Canadian Safety Standards:
CAN/CSA-C22.2 No.61010-1
CAN/CSA-C22.2 No.94.1, CAN/CSA-C22.2 No.94.2
IEC 60529

Degrees of Protection:
IP66, IP67 and Type 4X apply when the connector is properly tightened.

□ PHYSICAL SPECIFICATIONS

Connections:
Refer to “MODEL AND SUFFIX CODES”.

Housing Material:
Plastic (Polycarbonate)

Weight:
500 g (without mounting bracket, clamp, and battery)

Mounting:
Refer to “MODEL AND SUFFIX CODES”.

■ MODEL AND SUFFIX CODES

Model	Suffix Code		Descriptions
FN310	.....		Field Wireless Multi-Protocol Module
General Specification	Inter module communication	**-A1**	Digital communication for FN series
	Protocol	**-J** ..... **-M**	Digital communication (HART 7 *1) Digital communication (RS485 Modbus Protocol)
	Housing Material	**0**	Plastic (Polycarbonate)
	Electrical connection	**0**	Horizontal connection: blind plug, Vertical connection: G 1/2 female *2
		1	Horizontal connection: blind plug, Vertical connection: 1/2 NPT female *2
		2	Horizontal connection: blind plug, Vertical connection: M20 female *2
		3	Horizontal connection: G 1/2 male with clamp, Vertical connection: blind plug *3 *4
		4	Horizontal connection: 1/2 NPT male with clamp, Vertical connection: blind plug *3 *4
		5	Horizontal connection: M20 male with clamp, Vertical connection: blind plug *3 *4
		6	Horizontal connection: blind plug, Vertical connection: blind plug *5
	---	**A**	Always A
	Integral indicator	**-D**	Digital indicator
	Mounting bracket	**J**	316 SST 2-inch pipe mounting (for horizontal piping)
		K	316 SST 2-inch pipe mounting (for vertical piping)
		N	None
	---	**A**	Always A
	---	**A**	Always A
	---	**-A**	Always A
	---	**A**	Always A
Option codes			/☐ Optional specifications

*1: The HART protocol is backward-compatible with previous versions.
*2: Cable gland is not included. Prepare the cable gland with a flat gasket.
*3: Select when directly attached to the electrical connection port of HART devices.(Protocol code J only)
*4: Make sure before use that the vibration characteristics and the strength of the connection port of the HART device are fulfilled. (Protocol code J only)
*5: Select when intended to use as a routing device.

■ OPTIONAL SPECIFICATIONS (For Explosion Protected Types)

Please select appropriate equipment in accordance with the laws and regulations of the relevant country/region, when it is used in a location where explosive atmospheres may be present.

- **Protocol code: J**

Item		Description	Code
Factory Mutual (FM)	United States	FM Intrinsically safe Approval (United States) Applicable Standards: FM 3600, FM 3610, FM 3810, ANSI/UL 60079-0, ANSI/UL 60079-11, NEMA 250, ANSI/IEC 60529 Specific Ex marking: IS CL I/II/III DIV 1 GP ABCDEFG T4 CL I ZN 0 AEx ia IIC T4 Enclosure: IP66, Type 4X Amb. Temp. : –40 to 70 °C (–40 to 158 °F) Electrical Parameters: Wireless Communication (Connector) Uo = 5.88 V, Io = 613 mA, Po = 907 mW, Co = 5.82 µF, Lo = 25 µH VOUT (Terminal 1, 2) Uo = 23.1V, Io = 87 mA, Po = 450 mW, Co = 100 nF, Lo = 3 mH COMM (Terminal 3, 4) Ui = 30 V, Ii = 300 mA, Pi = 1 W (linear source), Ci = 20 nF, Li = 0 µH Dielectric Strength: 500 V a.c. r.m.s., 1 minute	**FS17**
	Canada	FM Intrinsically safe Approval (Canada) Applicable Standards: CAN/CSA-C22.2 No. 0, CAN/CSA-C22.2 No. 60079-0, CAN/CSA-C22.2 No. 60079-11, CAN/CSA-C22.2 No. 61010-1, CAN/CSA-C22.2 No. 94.1, CAN/CSA-C22.2 No. 94.2, CAN/CSA-C22.2 No. 60529 Specific Ex marking: Ex ia IIC T4 Ga IS CL I/II/III DIV 1 GP ABCDEFG T4 Enclosure: IP66, Type 4X Amb. Temp.: –40 to 70 °C (–40 to 158°F) Electrical Parameters: Wireless Communication (Connector) Uo = 5.88 V, Io = 613 mA, Po = 907 mW, Co = 5.82 µF, Lo = 25 µH VOUT (Terminal 1, 2) Uo = 23.1V, Io = 87 mA, Po = 450 mW, Co = 100 nF, Lo = 3 mH COMM (Terminal 3, 4) Ui = 30 V, Ii = 300 mA, Pi = 1 W (linear source), Ci = 20 nF, Li = 0 µH Dielectric Strength: 500 V a.c. r.m.s., 1 minute	**CS17**
ATEX		ATEX Intrinsically safe Approval Applicable Standards: EN IEC 60079-0, EN 60079-11, EN 60079-28 Certificate number: FM15ATEX0069X Specific Ex marking: II 1 G Ex ia op is IIC T4 Ga Degrees of protection: IP66 in accordance with only IEC 60529 Amb. Temp. (Tamb): –40 to 70 °C (–40 to 158 °F) Electrical Parameters: Wireless Communication (Connector) Uo = 5.88 V, Io = 613 mA, Po = 907 mW, Co = 5.82 µF, Lo = 25 µH VOUT (Terminal 1, 2) Uo = 23.1V, Io = 87 mA, Po = 450 mW, Co = 100 nF, Lo = 3 mH COMM (Terminal 3, 4) Ui = 30 V, Ii = 300 mA, Pi = 1 W (linear source), Ci = 20 nF, Li = 0 µH Dielectric Strength: 500 V a.c. r.m.s., 1 minute	**KS27**
IECEx		IECEx Intrinsically safe Approval Applicable Standards: IEC 60079-0, IEC 60079-11, IEC 60079-28 Certificate number: IECEx FMG 15.0039X Specific Ex marking: Ex ia op is IIC T4 Ga Degrees of protection: IP66 in accordance with only IEC 60529 Amb. Temp. (Tamb): –40 to 70 °C (–40 to 158 °F) Electrical Parameters: Wireless Communication (Connector) Uo = 5.88 V, Io = 613 mA, Po = 907 mW, Co = 5.82 µF, Lo = 25 µH VOUT (Terminal 1, 2) Uo = 23.1V, Io = 87 mA, Po = 450 mW, Co = 100 nF, Lo = 3 mH COMM (Terminal 3, 4) Ui = 30 V, Ii = 300 mA, Pi = 1 W (linear source), Ci = 20 nF, Li = 0 µH Dielectric Strength: 500 V a.c. r.m.s., 1 minute	**SS27**

● Protocol code: M

Item		Description	Code
Factory Mutual (FM)	United States	FM Intrinsically safe Approval (United States) Applicable Standards: FM 3600, FM 3610, FM 3810, ANSI/UL 60079-0, ANSI/UL 60079-11, NEMA 250, ANSI/IEC 60529 Specific Ex marking: IS CL I/II/III DIV1 GP CDEFG T4 CL I ZN 0 AEx ia IIB T4 For connection to CL I/II/III DIV1 GP ABCDEFG CL I ZN 0 AEx ia IIC T4 Enclosure: IP66, Type 4X Ambient temperature: −40 °C ≤ Ta ≤ +70 °C Electrical Parameters: Wireless Communication (Connector) Uo = 5.88 V, Io = 483 mA, Po = 779 mW, Co = 5.82 µF, Lo = 25 µH Sensor Input (Terminal 1 to 4) Uo = 5.88 V, Io = 145 mA, Po = 213 mW, Co = 43 µF, Lo = 1.6 mH Dielectric Strength: ≥ 500 V AC, r.m.s., 1 min	**FS17**
	Canada	FM Intrinsically safe Approval (Canada) Applicable Standards: CAN/CSA-C22.2 No.0 CAN/CSA-C22.2 No. 60079-0 CAN/CSA-C22.2 No. 60079-11 CAN/CSA-C22.2 No. 61010-1 CAN/CSA-C22.2 No. 94.1 CAN/CSA-C22.2 No. 94.2 CAN/CSA-C22.2 No. 60529 Specific Ex marking: Ex ia [ia IIC] IIB T4 Ga IS CL I/II/III DIV1 GP CDEFG T4 For connection to CL I/II/III GP DIV1 ABCDEFG Enclosure: IP66, Type 4X Ambient temperature: −40 °C ≤ Ta ≤ +70 °C Electrical Parameters: Wireless Communication (Connector) Uo = 5.88 V, Io = 483 mA, Po = 779 mW, Co = 5.82 µF, Lo = 25 µH Sensor Input (Terminal 1 to 4) Uo = 5.88 V, Io = 145 mA, Po = 213 mW, Co = 43 µF, Lo = 1.6 mH Dielectric Strength: ≥ 500 V AC, r.m.s., 1 min	**CS17**
ATEX		ATEX Intrinsically safe Approval Applicable Standards: EN IEC 60079-0, EN 60079-11, EN 60079-28 Certificate number: FM15ATEX0071X Specific Ex marking: II 1G Ex ia op is [ia IIC] IIB T4 Ga Degrees of protection: IP66 in accordance with only IEC 60529 Amb. Temp. (Tamb): –40 to 70 °C (–40 to 158 °F) Electrical Parameters: Wireless Communication (Connector) Uo= 5.88 V, Io = 483 mA, Po = 779 mW, Co= 5.82 µF, Lo = 25 µH Sensor Input (Terminal 1 to 4) Uo = 5.88 V, Io = 145 mA, Po = 213 mW, Co = 43 µF, Lo = 1.6 mH Dielectric Strength: ≥ 500 V AC, r.m.s., 1 min	**KS27**
IECEx		IECEx Intrinsically safe Approval Applicable Standards: IEC60079-0, IEC60079-11, IEC60079-28 Certificate number: IECEx FMG 15.0042X Specific Ex marking: Ex ia op is [ia IIC] IIB T4 Ga Degrees of protection: IP66 in accordance with only IEC 60529 Amb. Temp. (Tamb): –40 to 70 °C (–40 to 158 °F) Electrical Parameters: Wireless Communication (Connector) Uo = 5.88 V, Io = 483 mA, Po = 779 mW, Co = 5.82 µF, Lo = 25 µH Sensor Input (Terminal 1 to 4) Uo = 5.88 V, Io = 145 mA, Po = 213 mW, Co = 43 µF, Lo = 1.6 mH Dielectric Strength: ≥ 500 V AC, r.m.s., 1 min	**SS27**

■ OPTIONAL SPECIFICATIONS (Connection Device Types)

Item	Description	Code
Connection device type*1	SENCOM*2	**DT2**

*1: When protocol code M is selected, specify the connection device.
*2: FU20F-NPT, FU20F-FSM, FU24F-NPT, FU24F-FSM, SC25F-AGP25-120, SC25F-AGP25-225, SC25F-ALP25-120, SC25F-ALP25-225

■ OPTIONAL SPECIFICATIONS

Item	Description	Code
Protection cap*	Metal waterproof cap	**CP**
Wired tag plate	316 SST tag plate wired onto module	**N4**

*: When protection cap is not specified, dust-cap is attached.

■ OPTIONAL ACCESSORIES

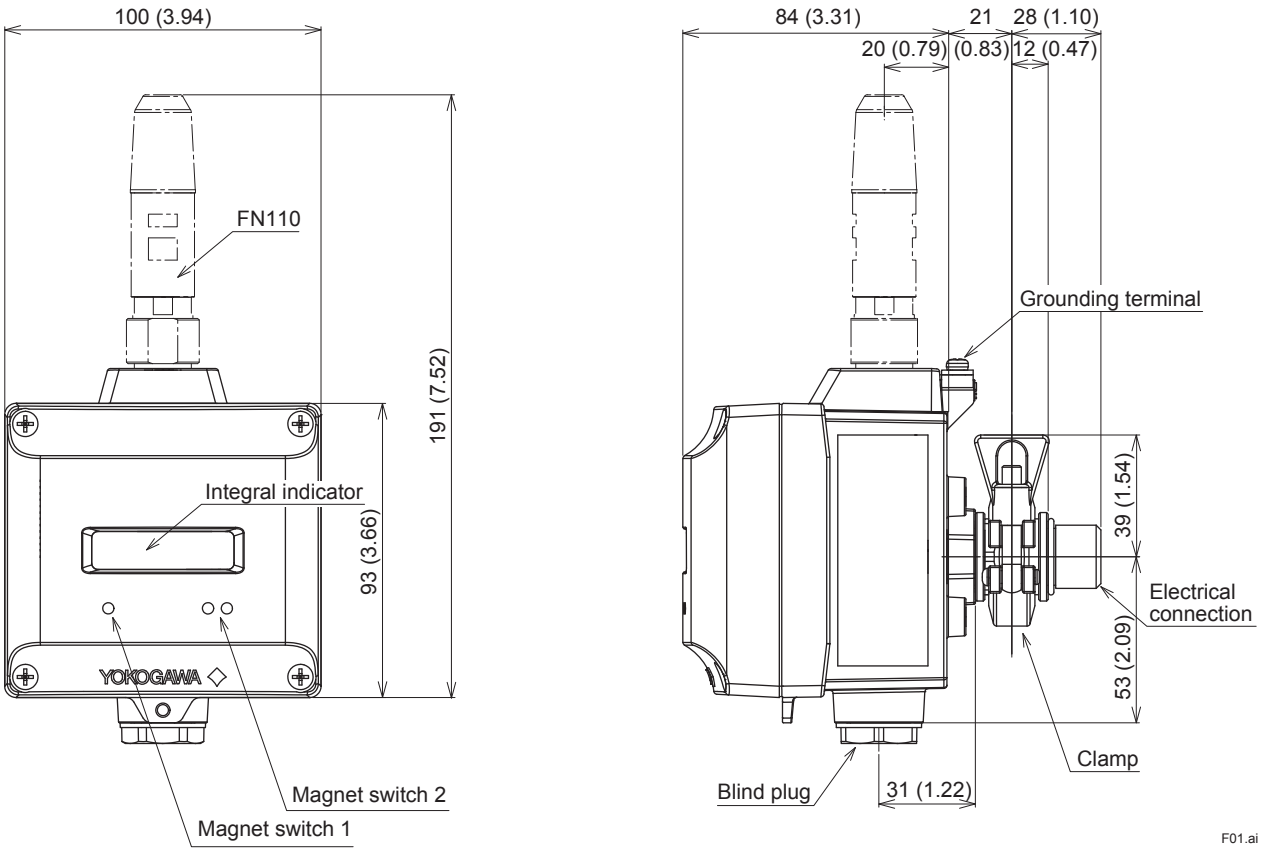
Item	Parts Number	Description
Battery pack assembly	F9090FD*1	Battery case, Lithium-thionyl chloride batteries*2 2 pieces
Batteries*3	F9915NR	Lithium-thionyl chloride batteries*2, 2 pieces
Battery case	F9090GD*4	Battery case only
Magnet	F9840PA	For magnet switch operation

*1: If you need F9090FC, please purchase F9090FD. F9090FD is a set of F9090FC and instruction manual.
*2: Tadiran TL-5930/S
*3: Alternatively, Tadiran SL-2780/S, TL-5930/S or VITZROCELL SB-D02 batteries can be purchased from your local distributor.
*4: If you need F9090GC, please purchase F9090GD. F9090GD is a set of F9090GC and instruction manual.

■ DIMENSIONS

□ Direct mounting to electrical connection port (Protocol code: J)

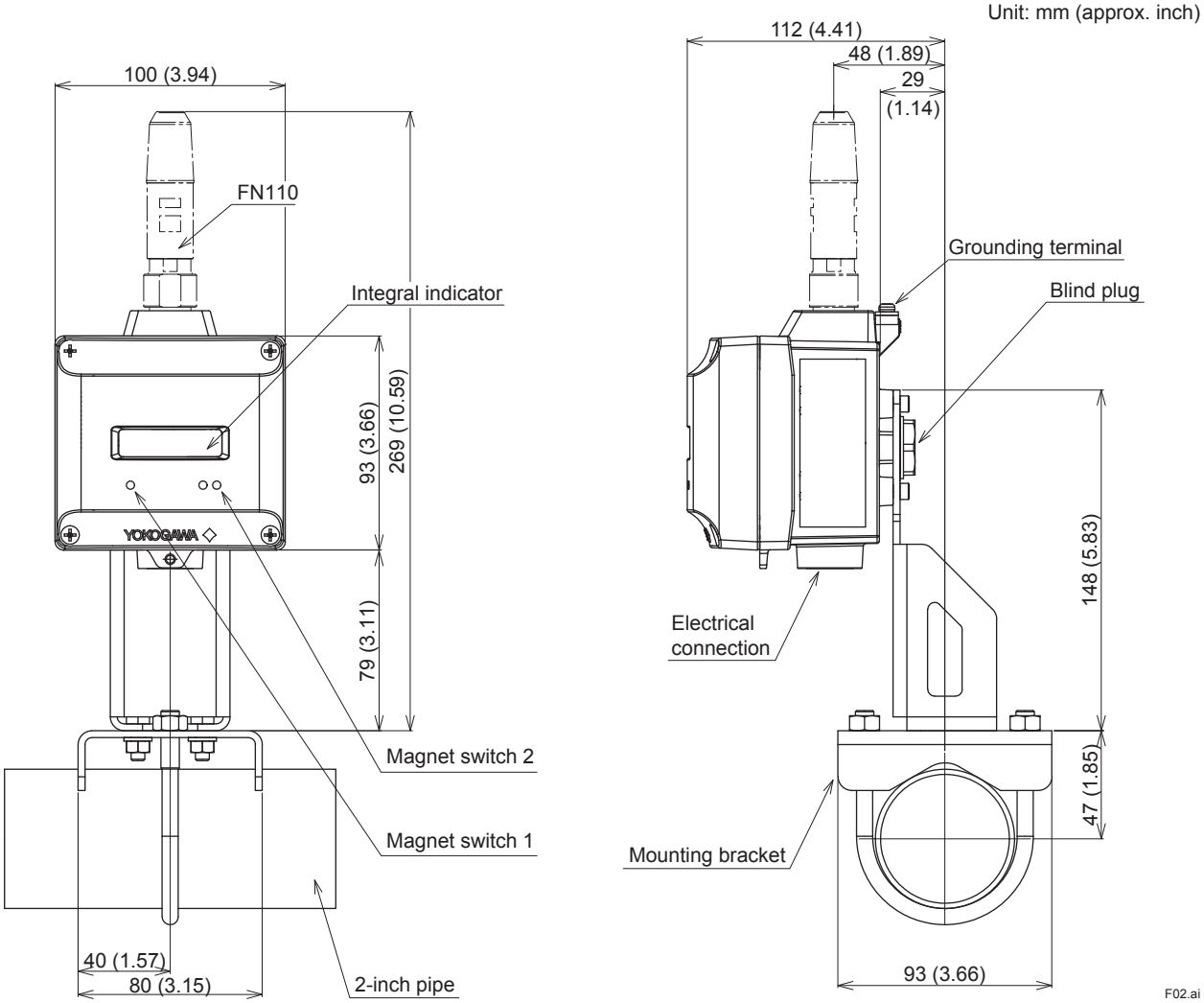
Unit: mm (approx. inch)



* The FN110 is sold separately.

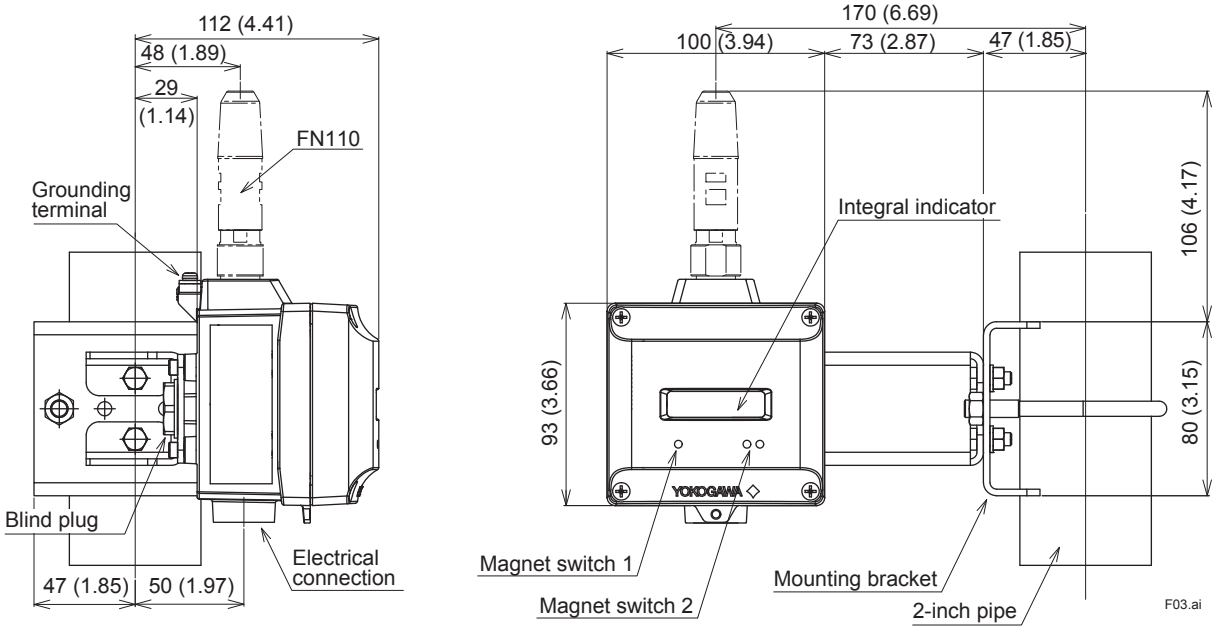
□ 2-inch pipe mounting (for horizontal piping) (Protocol code: J, M)

Unit: mm (approx. inch)

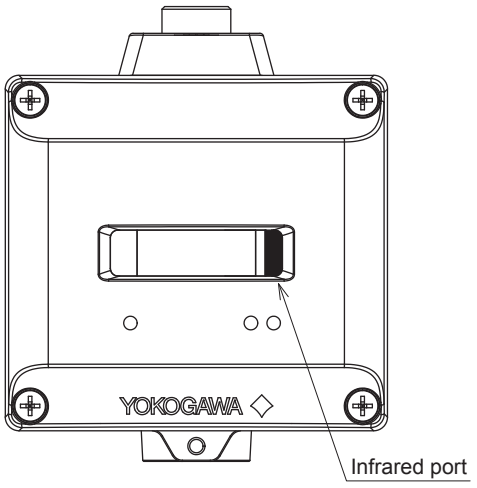


□ 2-inch pipe mounting (for vertical piping) (Protocol code: J, M)

Unit: mm (approx. inch)



• Infrared Configuration



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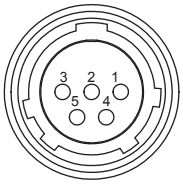
• Pin Assignment of FN110 Connection Terminal



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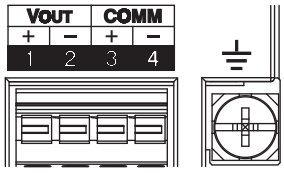
Pin	Signal
1	Frame Ground*
2	Signal Ground
3	Power Supply
4	Transmit/Receive Data positive
5	Transmit/Receive Data negative

* Wired to the grounding terminal inside the FN310 housing.

• Input Terminal Configurations

[Protocol code: J]



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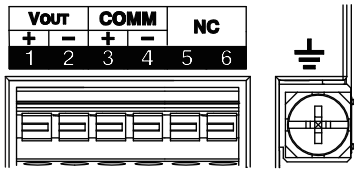
Terminal	Signal			
	One-to-one Connection			4-20 mA Loop Connection
	2-wire	4-wire (Active)	4-wire (Passive)	
1	Power Supply and Input Signal +	No Connection	Loop Power and Input Signal +	No Connection
2	Power Supply and Input Signal -	No Connection	Loop Power and Input Signal -	No Connection
3	No Connection	Input Signal +	No Connection	Input Signal +
4	No Connection	Input Signal -	No Connection	Input Signal -
⏚	Frame Ground			

[Protocol code: M]



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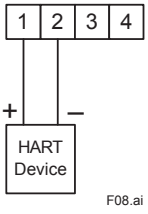
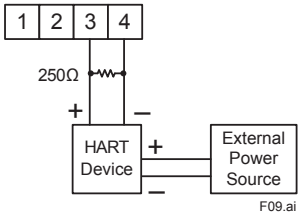
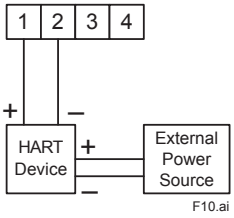
Terminal	Signal
1	Power Supply +
2	Power Supply Gnd
3	Data +
4	Data -
5	No Connection
6	No Connection
⏚	Frame Ground

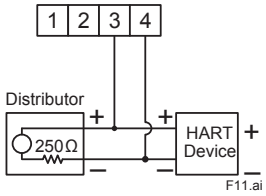
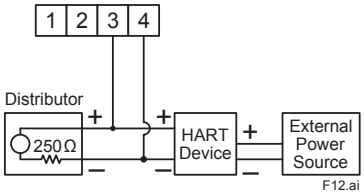
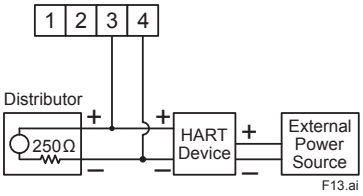
● Input Wiring

[Protocol code: J]
One-to-one Connection

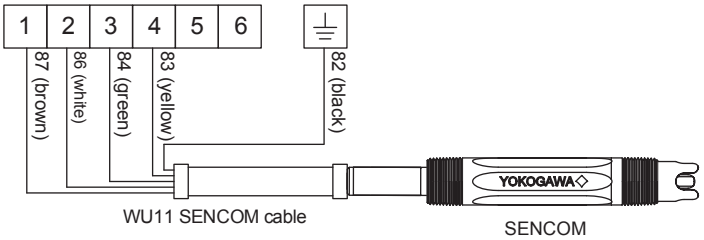
2-wire	4-wire (Active)	4-wire (Passive)
		

* Connect the FN310 and HART devices directly.

4-20 mA Loop Connection

2-wire	4-wire (Active)	4-wire (Passive)
		

[Protocol code: M]

Connection Device Type	Wiring Diagram
DT2	

< Ordering Information >

Specify the following when ordering.

1. Model, suffix codes, and option codes.
2. Tag Number (if required)
   Engraving on the tag plate can be specified by a combination of uppercase letters, lowercase letters, numbers, “- (hyphen)”, “_ (underscore)”. Factory setting is blank unless otherwise specified.

< Related Products General Specifications >

Field Wireless System Overview:
Refer to GS 01W01A01-01EN
Field Wireless Communication Module FN110:
Refer to GS 01W03B01-01EN
Field Wireless Management Station YFGW410:
Refer to GS 01W02D01-01EN
Field Wireless Access Point YFGW510:
Refer to GS 01W02E01-01EN
Field Wireless Access Point YFGW520:
Refer to GS 01W02E02-01EN
FieldMate Versatile Device Management Wizard:
Refer to GS 01R01A01-01E
Plant Resource Manager (PRM):
Refer to GS 30B05A10-01EN
SENCOM FU20F/FU24F/SC25F Digital pH/ORP-sensor:
Refer to GS 12B06J03-04E-E

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EU WEEE (Waste Electrical and Electronic Equipment) Directive is only valid in the EU.
This instrument is intended to be sold and used only as a part of equipment which is excluded from WEEE Directive, such as large-scale stationary industrial tools, a large-scale fixed installation and so on, and, therefore, subjected to the exclusion from the scope of the WEEE Directive. The instrument should be disposed of in accordance with local and national legislation/regulations.