

# General Specifications

## YTA510 Temperature Transmitter



GS 01C50E01-01EN

The YTA510 is the high performance temperature transmitter that accepts Thermocouple, RTD, ohms or DC millivolt inputs. The dual input type independently measures and calculates process values for Sensor 1 and Sensor 2. YTA510 transmit not only process variables but also the setting parameters using wireless signal. The transmitters run on internal batteries, and the installation cost can be decreased since hard-wiring is not required. The communication is compliant with ISA100.11a protocol specifications.

### ■ FEATURES

#### ● Long Life Battery Design

Ultra low current consumption design using two high capacity lithium-thionyl chloride batteries provide wireless operation for years.

#### ● Security Assured Wireless Network Joining

Infrared communication between the devices for wireless network configuration and parameter setting.

#### ● Quick Update Time

Selectable from 1 second to 60 minutes for measured process value to publish wirelessly.

### ■ STANDARD SPECIFICATIONS

#### ■ WIRELESS SPECIFICATIONS

Communication protocol: ISA100.11a protocol  
Data rate: 250 kbps  
Frequency: 2400 - 2483.5 MHz license free ISM band  
Radio security: AES 128 bit codified  
RF Transmitter power: Max. 11.6 dBm (fixed)  
Antenna: +2 dBi Omni directional monopole type  
For amplifier housing code 8 and 9, separately sold remote antenna and antenna cables can be used.

#### ■ POWER SUPPLY SPECIFICATIONS

Battery:  
Use the dedicated battery pack.  
Rated voltage: 7.2 V  
Rated capacity: 19 Ah

#### ■ PERFORMANCE SPECIFICATIONS

##### Accuracy

See Table 1.

##### Cold Junction Compensation Accuracy

For T/C only  
 $\pm 0.5^{\circ}\text{C}$  ( $\pm 0.9^{\circ}\text{F}$ )

##### Ambient Temperature Effect (per 1.0°C change)

See Table 2.



#### Battery Characteristic

Battery pack with long life lithium-thionyl chloride batteries. With the intrinsically safe type, the battery pack is replaceable in hazardous area. Typical battery life is 10 years at 30 seconds update time or 6 years at 10 seconds update time in the following conditions.\*

- Ambient temperature:  $23\pm 2^{\circ}\text{C}$
- Device role: IO mode
- LCD display: off

\* For amplifier housing code 8 and 9, typical battery life is 8 years at 5 seconds update time with power saving mode. Environmental condition such as vibration may affect the battery life.

### ■ FUNCTIONAL SPECIFICATIONS

#### Input

Single input: Amplifier housing code 7  
Dual input: Amplifier housing code 8 and 9  
Input type is selectable: Thermocouples, 2-, 3-, and 4-wire RTDs, ohms and DC millivolts. See Table 1.  
4-wire is available for Sensor 1 input.

#### Input Signal Source Resistance (for T/C, mV)

1 k $\Omega$  or lower

#### Input Lead Wire Resistance (for RTD, Ohm)

10  $\Omega$  per wire or lower

#### Output

Wireless (ISA100.11a protocol) 2.4 GHz signal.

#### Range

See Table 1.

#### Update Period

1 to 3600 s selectable.\*

\* Minimum update time is 2 s at dual input sensor use.

**Zero-gain Adjustment**

Set the amount of zero-gain point adjustment.

**Integral Indicator (LCD display)**

5-digit numerical display, unit display and bar graph. The indicator is configurable to display the following variables periodically.  
°C, K, °F, °R, mV and ohm, 0 to 100 % bar graph, and alternate display of Sensor 1 and Sensor 2 process value  
See also "Factory Setting."

**Sensor Burnout**

Select either HIGH or LOW as the configuration.

**Self Diagnostics**

Amplifier failure, sensor failure, configuration error, battery alarm, wireless communication alarm and over-range error for process variables.

**Software Download Function**

Software download function permits to update wireless field device software via ISA100.11a wireless communication.

**Battery Pack**

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

■ **NORMAL OPERATING CONDITION**

(Optional features or approval codes may affect limits.)

**Ambient Temperature Limits**

-40 to 85°C (-40 to 185°F)  
-30 to 80°C (-22 to 176°F) LCD visible range

**Ambient Humidity Limits**

0 to 100% RH

■ **REGULATORY COMPLIANCE STATEMENTS**

This device contains the wireless module which satisfies the following standards.

- \* The specific radio equipment (Approval Number:007WWCUL0480) which received the technical standard satisfied certification based on the Radio Law is used for this product.
- \* Please confirm that an installation region fulfills an applicable standard. If additional regulatory information and approvals are required, contact a Yokogawa representative.

**EMC Conformity Standards**

EN61326-1 Class A, Table 2 (For use in industrial locations), EN61326-2-3

**R&TTE Conformity Standards C €**

ETSI EN 300 328, ETSI EN 301 489-1, ETSI EN 301 489-17, EN61010-1, EN61010-2-030, EN62311

- Indoor/Outdoor use

**Safety Requirement Standards**

EN61010-1, EN61010-2-030

- Altitude of installation site:  
Max. 2,000 m above sea level
- Installation category: I  
(Anticipated transient overvoltage 330 V)
- Pollution degree: 2
- Indoor/Outdoor use

**Regulation Conformity of the Wireless Module**

- FCC Approval
- IC Approval

■ **PHYSICAL SPECIFICATIONS**

**Enclosure**

**Housing**

Low copper cast aluminum alloy with polyurethane, mint-green paint. (Munsell 5.6BG 3.3/2.9 or its equivalent)

**Degrees of Protection**

IP66/IP67, NEMA4X

**Name plate and tag**

316 SST tag plate wired onto transmitter.

**Weight**

2.8 kg (6.2 lb)

Without battery pack and mounting bracket.

**Connections**

Refer to "MODEL AND SUFFIX CODE."

< **Related Instruments** >

Field Wireless System:

Refer to GS 01W01A01-01EN

Field Wireless Integrated Gateway YFGW710:

Refer to GS 01W01F01-01EN

Field Wireless Management Station YFGW410:

GS 01W02D01-01EN

Field Wireless Access Point YFGW510:

GS 01W02E01-01EN

Field Wireless Media Converter YFGW610:

GS 01W02D02-01EN

**Table 1. Sensor type, measurement range, and accuracy**

Sensor Type		Standard	Measurement Range	Accuracy
T/C	B	IEC584	100 to 300°C ( 212 to 572°F )	± 5.0°C ( ± 9.0°F )
			300 to 400°C ( 572 to 752°F )	± 2.0°C ( ± 3.6°F )
			400 to 1820°C ( 752 to 3308°F )	± 1.5°C ( ± 2.7°F )
	E		-200 to 1000°C ( -328 to 1832°F )	± 0.4°C ( ± 0.8°F )
	J		-200 to 1200°C ( -328 to 2192°F )	± 0.5°C ( ± 0.9°F )
	K		-200 to 1372°C ( -328 to 2502°F )	± 0.6°C ( ± 1.1°F )
	N		-200 to 1300°C ( -328 to 2372°F )	± 0.6°C ( ± 1.1°F )
	R		-50 to 100°C ( -58 to 212°F )	± 1.7°C ( ± 3.1°F )
	S		100 to 1768°C ( 212 to 3214°F )	± 0.8°C ( ± 1.5°F )
			-50 to 100°C ( -58 to 212°F )	± 1.7°C ( ± 3.1°F )
T	100 to 1768°C ( 212 to 3214°F )	± 0.8°C ( ± 1.5°F )		
RTD	Pt100	IEC751	-200 to 850°C ( -328 to 1562°F )	± 0.3°C ( ± 0.6°F )
	Pt200		-200 to 850°C ( -328 to 1562°F )	± 0.6°C ( ± 1.1°F )
	Pt500		-200 to 850°C ( -328 to 1562°F )	± 0.5°C ( ± 0.9°F )
mV		-	-10 to 100 [mV] <sup>*1</sup> -10 to 220 [mV] <sup>*2</sup>	± 0.03 [mV]
Ohm		-	0 to 2000 [Ω]	± 1 [Ω]

Note: For T/C input, add Cold Junction Compensation Accuracy (± 0.5°C) to the total accuracy.  
For RTD input of the 2-wire connection, add a corrected value (± 0.1°C) to the total accuracy.

\*1 Applicable for amplifier housing code 7.

\*2 Applicable for amplifier housing code 8 and 9.

**Table 2. Effects of ambient temperature**

Sensor Type		Temperature Effects per 1.0°C Change in Ambient Temperature	Measurement Range
T/C	B	0.2°C - ( 0.066% of ( t - 100 ) )	100°C ≤ t < 300°C
		0.07°C - ( 0.0057% of ( t - 300 ) )	300°C ≤ t < 1000°C
		0.037°C	t ≥ 1000°C
	E	0.0035°C - ( 0.00492% of t )	t < 0°C
		0.0035°C + ( 0.00146% of t )	t ≥ 0°C
	J	0.0039°C - ( 0.00529% of t )	t < 0°C
		0.0039°C + ( 0.00149% of t )	t ≥ 0°C
	K	0.00521°C - ( 0.00707% of t )	t < 0°C
		0.00521°C + ( 0.00182% of t )	t ≥ 0°C
	N	0.0077°C - ( 0.00918% of t )	t < 0°C
		0.0077°C + ( 0.00136% of t )	t ≥ 0°C
	R, S	0.04°C - ( 0.057% of t )	t < 0°C
		0.04°C + ( 0.0102% of t )	0°C ≤ t < 100°C
		0.0316°C - ( 0.001% of t )	100°C ≤ t < 600°C
		0.0175°C + ( 0.00173% of t )	t ≥ 600°C
	T	0.00513°C - ( 0.00631% of t )	t < 0°C
0.00513°C + ( 0.0008% of t )		t ≥ 0°C	
RTD	Pt100	0.0048°C + ( 0.0016% of absolute value t )	Entire Sensor Input Range
	Pt200	0.0038°C + ( 0.0015% of absolute value t )	t < 650°C
		0.0028°C + ( 0.0016% of t )	t ≥ 650°C
	Pt500	0.003°C + ( 0.0014% of absolute value t )	t < 650°C
0.002°C + ( 0.0016% of t )		t ≥ 650°C	
mV		0.2μV + ( 0.0015% of reading )	Entire Sensor Input Range
Ohm		0.001Ω + ( 0.0011% of reading )	Entire Sensor Input Range

Note1: The "t" on Table 2 means the value of the reading in °C.

Note2: The "absolute value t" on Table 2 means the absolute value of the reading in °C.

[ Example of absolute value t ]

When the temperature value is 250 Kelvin, abs reading is 23.15, absolute (250 - 273.15).

**MODEL AND SUFFIX CODES**

Model	Suffix Codes	Descriptions	
<b>YTA510</b>	.....	Temperature Transmitter	
Output Signal	<b>-L</b> .....	Wireless communication (ISA100.11a)	
Amplifier Housing	<b>7</b> .....	Single input type, cast aluminum alloy with integral antenna	
	<b>8</b> .....	Dual input type, cast aluminum alloy with detachable antenna (2 dBi)* <sup>3</sup>	
	<b>9</b> .....	Dual input type, cast aluminum alloy without antenna (N connector)* <sup>2,3</sup>	
Electrical Connection	<b>0</b> .....	G 1/2 female, two electrical connections without blind plugs	
	<b>2</b> .....	1/2 NPT female, two electrical connections without blind plugs	
	<b>4</b> .....	M20 female, two electrical connections without blind plugs	
	<b>5</b> .....	G 1/2 female, two electrical connections with a blind plug	
	<b>7</b> .....	1/2 NPT female, two electrical connections with a blind plug	
	<b>9</b> .....	M20 female, two electrical connections with a blind plug	
	<b>A</b> .....	G 1/2 female, two electrical connections with a 316SST blind plug	
Integral Indicator	<b>D</b> .....	with digital indicator	
	Mounting Bracket	<b>B</b> .....	304 SST stainless steel 2-inch horizontal pipe mounting bracket * <sup>1</sup>
		<b>D</b> .....	304 SST stainless steel 2-inch vertical pipe mounting bracket * <sup>1</sup>
<b>J</b> .....		316 SST stainless steel 2-inch horizontal pipe mounting bracket * <sup>1</sup>	
<b>K</b> .....		316 SST stainless steel 2-inch vertical pipe mounting bracket * <sup>1</sup>	
	<b>N</b> .....	None	
---	<b>A</b> .....	Always A	
---	<b>A</b> .....	Always A	
Option codes	/ <input type="checkbox"/> Optional specifications		

- \*1: For flat-panel mounting, please prepare bolts and nuts.
- \*2: Order the antenna separately from accessory option.
- \*3: Remote antenna cables can be attached. Order separately from accessory option.

**OPTIONAL SPECIFICATION**

Item	Description	Code
Painting	Color change	Amplifier cover only Munsell code; N1.5, black <b>P</b> <input type="checkbox"/>
	Coating change	High anti-corrosion coating <b>X2</b>
Calibration unit	°F or °R	<b>D2</b>

## ■ OPTIONAL SPECIFICATION (For Explosion Protected type)

Item	Description	Code
Factory Mutual (FM)	FM Intrinsically safe Approval Applicable Standard: Class 3600, Class 3610, Class 3611, Class 3810, NEMA 250, ANSI/ISA-60079-0, ANSI/ISA-60079-11 Intrinsically Safe for Class I, Division 1, Groups A, B, C & D, Class II, Division 1, Groups E, F & G and Class III, Division 1, Class I, Zone 0, in Hazardous Locations, AEx ia IIC Nonincendive for Class I, Division 2, Groups A, B, C & D, Class II, Division 2, Groups F & G and Class III, Division 1, Class I, Zone 2, Group IIC, in Hazardous Locations Enclosure: "NEMA 4X", Temp. Class: T4, Amb. Temp.: -50 to 70°C (-58 to 158°F) Sensor Circuit Parameter : Voc=6.6V, Isc=66mA, Po=109mW, Ca=22uF, La=8.1mH	<b>FS17</b>
ATEX	ATEX Intrinsically safe Approval Applicable Standard: EN60079-0, EN60079-11, EN60079-26 Certificate: KEMA 10ATEX0163 X II 1 G Ex ia IIC T4 Ga Degree of protection: IP66/IP67 Amb. Temp(Tamb): -50 to 70°C (-58 to 158°F) Sensor Circuit Parameter : Uo=6.6V, Io=66mA, Po=109mW, Co=22uF, Lo=8.1mH	<b>KS27</b>
Canadian Standards Association (CSA)	CSA Intrinsically safe Approval Certificate: 2328785 Applicable standard: CAN/CSA-C22.2 No.0, CAN/CSA-C22.2 No.0.4, C22.2 No.25, CAN/CSA-C22.2 No.94,CAN/CSA-C22.2 No.157, C22.2 No.213, CAN/CSA-C22.2 No.61010-1, CAN/CSA-C22.2 No.60079-0, CAN/CSA-E60079-11, IEC60529 Ex ia IIC T4 Intrinsically Safe for Class I, Division 1, Groups A, B, C & D, Class II, Division 1, Groups E, F & G, Class III, Division 1, Nonincendive for Class I, Division 2, Groups A, B, C & D, Class II, Division 2, Groups F & G, Class III, Division 1 Enclosure: IP66/IP67 and Type 4X , Temperature Code: T4 Amb. Temp(Tamb): -50 to 70°C (-58 to 158°F) Sensor Circuit Parameter : Uo=6.6V, Io=66mA, Po=109mW, Co=22uF, Lo=8.1mH	<b>CS17</b>
IECEx	IECEx Intrinsically safe Approval Applicable Standard: IEC60079-0:2011, IEC60079-11:2011, IEC60079-26:2006 Certificate: IECEx KEM 10.0073 X Ex ia IIC T4 Ga Enclosure: IP66/IP67 Amb. Temp(Tamb): -50 to 70°C (-58 to 158°F) Sensor Circuit Parameter : Uo=6.6V, Io=66mA, Po=109mW, Co=22uF, Lo=8.1mH	<b>SS27</b>

## OPTIONAL ACCESSORIES

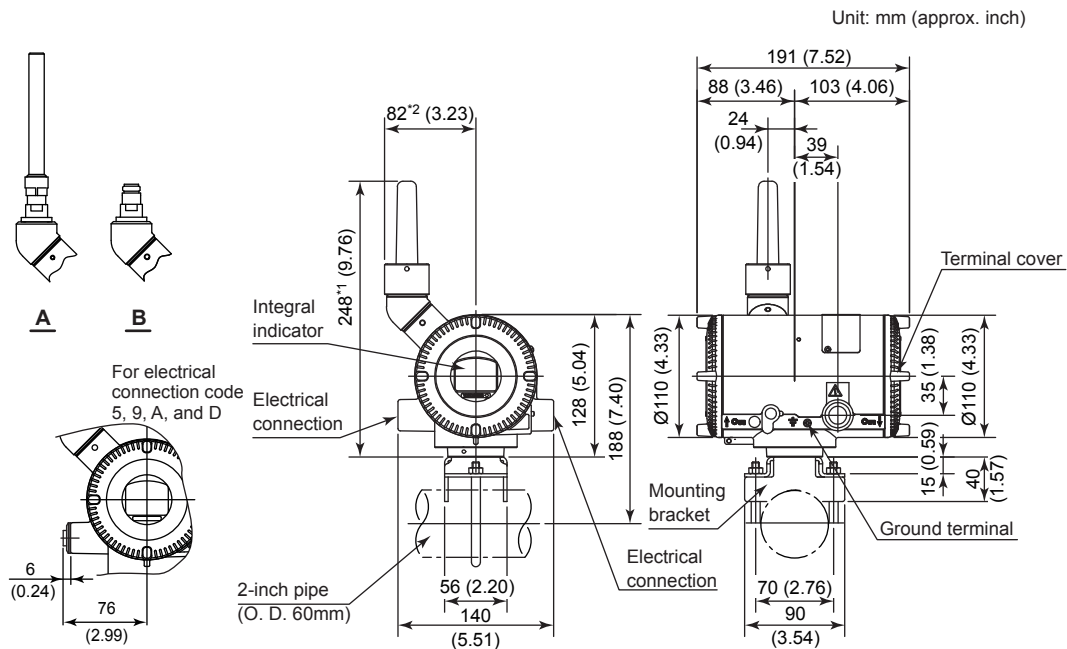
Product	Part number	Specification
Battery pack assembly	F9915NQ	Battery case, Lithium-thionyl chloride batteries 2 pieces
Batteries*1	F9915NR	Lithium-thionyl chloride batteries, 2 pieces
Battery case	F9915NK	Battery case only
Remote antenna cable	F9915KU	3 m with mounting bracket
	F9915KV	13 m (3 m+10 m), with arrester and mounting bracket
Antenna	F9915KW	2 dBi standard antenna
	F9915KX	0 dBi antenna
	F9915KY	6 dBi high gain antenna*2

\*1: Alternatively, Tadiran SL-2780/S or TL-5930/S batteries can be purchased from your local distributor.

\*2: Use of high gain antenna is limited by local regulation of radio and telecommunication law. Consult Yokogawa for details. High gain antenna must be connected to the transmitter by using remote antenna cables.

## DIMENSIONS

### 2-inch horizontal pipe mounting (Amplifier housing code 7)



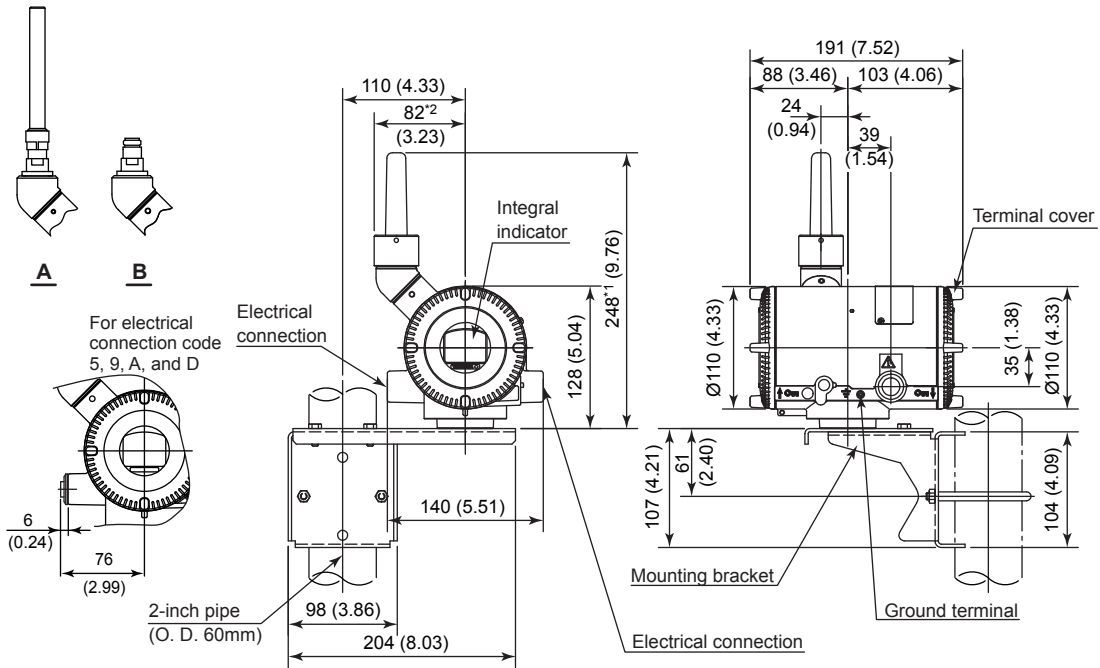
\*1: When amplifier housing code 8 is selected, the value is 307 mm (12.09 inch). When amplifier housing code 9 is selected, the value is 187 mm (7.36 inch). In both cases, the figures are shown as A or B accordingly.

\*2: When amplifier housing code 8 or 9 is selected, the value is 81 mm.

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● 2-inch vertical pipe mounting (Amplifier housing code 7)

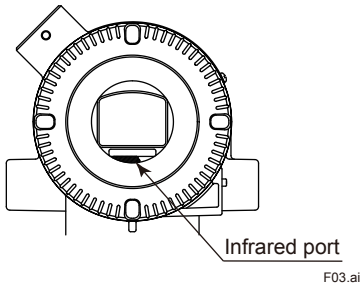
Unit: mm (approx. inch)



\*1: When amplifier housing code 8 is selected, the value is 307 mm (12.09 inch). When amplifier housing code 9 is selected, the value is 187 mm (7.36 inch). In both cases, the figures are shown as A or B accordingly.  
 \*2: When amplifier housing code 8 or 9 is selected, the value is 81 mm (3.19 inch).

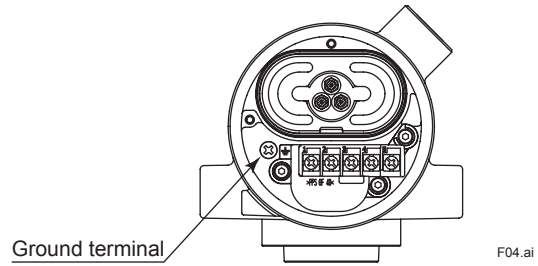
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● Infrared Configuration



F03.ai

● Terminal Configuration



F04.ai

● Antenna/Cable

Unit: mm (approx. inch)

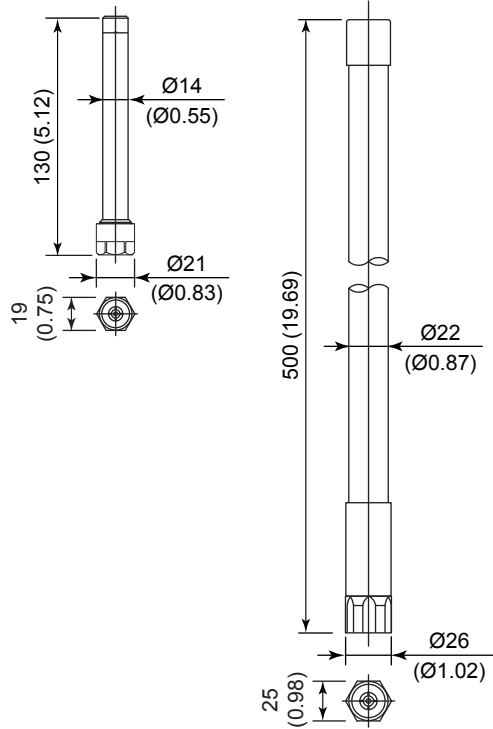
□ Non-directional antenna

• Gain: 2 dBi

Part number: F9915KW

• Gain: 6 dBi

Part number: F9915KY



□ Antenna cable

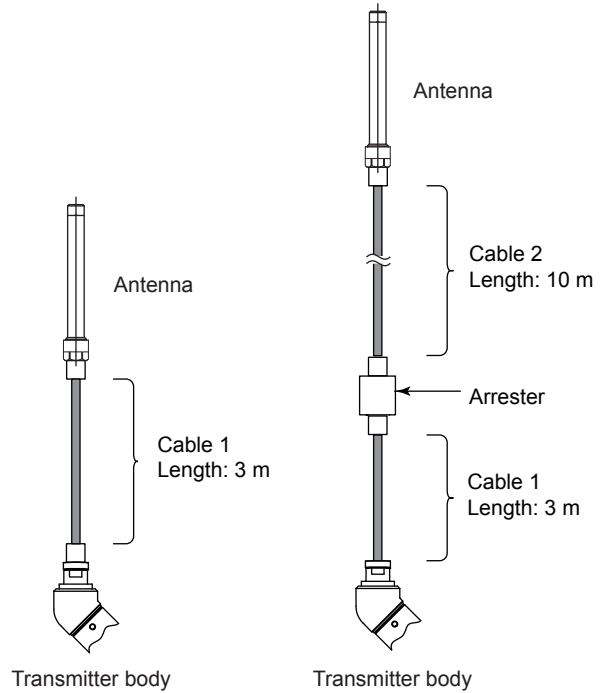
• Sheath diameter: 11.2 mm

< Without arrester >

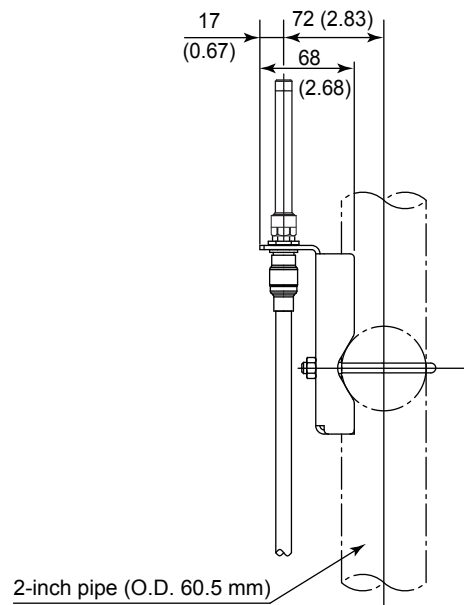
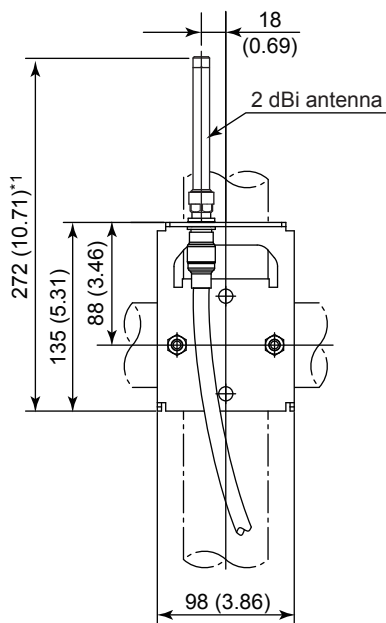
Part number: F9915KU

< With arrester >

Part number: F9915KV



● Antenna mounting bracket

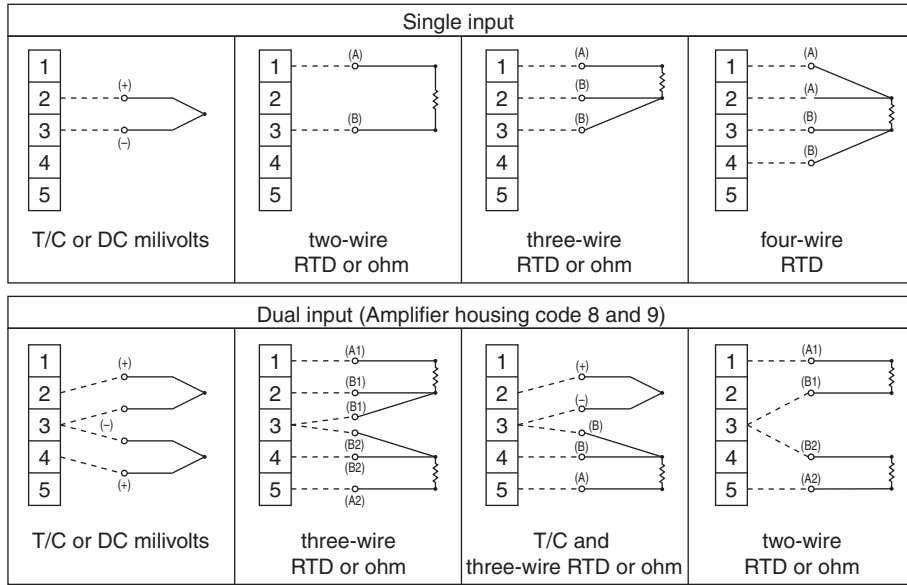


\*1: When 6 dBi antenna is selected, the value is 642 mm (25.28 inch).

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● Input Wiring



F06.ai

< Ordering Information >

Specify the following when ordering Model, suffix codes, and optional codes. The instrument is shipped with the settings shown in Table A. Specify the following when necessary.

1. Sensor type.  
For RTD and resistance input, specify the number of wire as well. (Example; Pt100 3-wire system)  
For dual input model, select sensor type for both Sensor 1 and Sensor 2. When Sensor 2 is not used, select "Not used" for Sensor 2.
2. Calibration range and unit
  - 1) Calibration range can be specified within the measurement range shown in Table 1. Also, set the upper limit is larger than the lower limit.
  - 2) Specify one range from °C, K, °F or °R for temperature input. °F and °R are available when Optional code D2 is specified. It is not necessary to specify the unit of mV and ohm inputs, for these units automatically will be mV or Ohm.
3. Tag Number (if required)  
Specify Tag number (up to 16 letters) to be engraved on the tag plate. The specified letters are written on TAG\_Name (16 letters) in the amplifier memory.

4. Software tag

Specify this software tag when tag number which is different from the tag number specified in the "TAG NUMBER" is required. The tag number specified in "SOFTWARE TAG" will be entered on "TAG" (up to 16 letters) in the amplifier memory.

< Factory Setting >

Table A. Settings upon shipment

Tag No.	"Blank" or as specified in order
Calibration range and unit	See Table 1. Measurement Range or as specified in order