

Model SC202SJ [Style : S2]
2-wire Conductivity or Resistivity
Transmitter

IM 12D08B02-11E

vigilantplant®



Preface

In order to understand the functions of the SC202SJ 2-wire conductivity transmitter available HART communication, be sure to read this manual thoroughly before using it.

Refer to the IM 12D08B02-01E for details of setting operation conditions and how to operate the SC202SJ.

* The specifications and looks of this product are subject to change without notice, for the purpose of improving it.

* This manual may not be copied without permission.

For information about instruments related to the SC202SJ, refer to the following Instruction Manuals.

Manual Name	IM No.	Instruments mentioned
Conductivity Transmitter	IM 12D08B02-01E	SC202
Conductivity Sensor	IM 12D08F03-02E	SC4AJ
Conductivity Sensor	IM 12D08G02-01E	SC8SG
Conductivity Sensor	IM 12D08G03-01E	SC210G
PH201G distributor (Style B)	IM 19B01E04-02E	PH201G (Style B) Distributor
SDBT distributor	IM 01B04T02-01E	SDBT Distributor
SDBS distributor	IM 01B04T02-02E	SDBS Distributor
Attachment rack instrument	IM 1B4F2-01E	Instruments for rack attachment
BARD Safety Barrier	IM 01B04S10-01E	Model BARD Safety Barrier

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Feasible combinations of the SC202SJ conductivity transmitter with different styles of the PH201G distributor are listed in the table below. The distributor has the usual distributor functions (supply power to transmitter, receive current output from transmitter, and provide analog output) as well as contact output functions (maintenance, wash and fail status signals). Since the two transmitters provide different digital signals to control the distributor contact outputs, two distributor styles are provided for compatibility. The "Reference" column of the table indicates whether the transmitter meets JIS intrinsic safety standards (which requires passing TIIS tests): the SC202G is not intrinsically safe (explosionproof), so never install it in a hazardous area.

Conductivity transmitter SC202SJ	Use of Distributor PH201G		Reference
	No use of contact output	Use of contact output	
	Style A & Style B possible	Only Style B possible	Intrinsically safe type

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WARNING

Electrostatic Discharge

The SC202SJ transmitter contains devices that can be damaged by electrostatic discharge. When servicing this equipment, please observe proper procedures to prevent such damage. Replacement components should be shipped in conductive packaging. Repair work should be done at grounded workstations using grounded soldering irons and wrist straps to avoid electrostatic discharge.

Do not modify the SC202SJ transmitter.

Before replacing parts inside a transmitter case, move it to a non-hazardous area.

Installation and wiring

The EXA analyser should only be used with equipment that meets the relevant IEC, American or Canadian standards. Yokogawa accepts no responsibility for the misuse of this unit.



CAUTION

The Instrument is packed carefully with shock absorbing materials, nevertheless, the instrument may be damaged or broken if subjected to strong shock, such as if the instrument is dropped. Handle with care. Although the instrument has a weatherproof construction, the transmitter can be harmed if it becomes submerged in water or becomes excessively wet. Do not use an abrasive or solvent in cleaning the instrument.

Contents of this manual are subject to change without notice. Yokogawa is not responsible for damage to the instrument, poor performance of the instrument or losses resulting from such, if the problems are caused by:

- Improper operation by the user.
- Use of the instrument in improper applications
- Use of the instrument in an improper environment or improper utility program
- Repair or modification of the related instrument by an engineer not authorized by Yokogawa.

The following safety symbols are used in the product as well as in this manual.



DANGER

This symbol indicates that the operator must follow the instructions laid out in this manual in order to avoid the risk of personnel injury, electric shock, or fatalities. The manual describes what special care the operator must exercise to avoid such risks.



WARNING

This symbol indicates that the operator must refer to the instructions in this manual in order to prevent the instrument (hardware) or software from being damaged, or a system failure from occurring.



CAUTION

This symbol draws attention to information essential for understanding the operation and functions.



NOTE

This symbol indicates information that complements the present topic.



SEE ALSO

This symbol identifies a source to which to refer.



Protective Ground Terminal. Be sure to ground equipment before use.



Function Ground Terminal (Do not use this terminal as the protective ground terminal.). Be sure to ground equipment before use.



Alternating current

Warranty and service

Yokogawa products and parts are guaranteed free from defects in workmanship and material under normal use and service for a period of (typically) 12 months from the date of shipment from the manufacturer. Individual sales organizations can deviate from the typical warranty period, and the conditions of sale relating to the original purchase order should be consulted. Damage caused by wear and tear, inadequate maintenance, corrosion, or by the effects of chemical processes are excluded from this warranty coverage.

In the event of warranty claim, the defective goods should be sent (freight paid) to the service department of the relevant sales organization for repair or replacement (at Yokogawa discretion). The following information must be included in the letter accompanying the returned goods:

- Part number, model code and serial number
- Original purchase order and date
- Length of time in service and a description of the process
- Description of the fault, and the circumstances of failure
- Process/environmental conditions that may be related to the installation failure of the device
- A statement whether warranty or non-warranty service is requested
- Complete shipping and billing instructions for return of material, plus the name and phone number of a contact person who can be reached for further information.

Returned goods that have been in contact with process fluids must be decontaminated/disinfected before shipment. Goods should carry a certificate to this effect, for the health and safety of our employees. Material safety data sheets should also be included for all components of the processes to which the equipment has been exposed.

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1. Introduction and General Description

The Yokogawa EXA 202 is a 2-wire transmitter designed for industrial process monitoring, measurement and control applications. This instruction manual contains the information needed to install, set up, operate and maintain the unit correctly. This manual also includes a basic troubleshooting guide to answer typical user questions.

Yokogawa can not be responsible for the performance of the EXA analyzer if these instructions are not followed.

1-1. Instrument check

Upon delivery, unpack the instrument carefully and inspect it to ensure that it was not damaged during shipment. If damage is found, retain the original packing materials (including the outer box) and then immediately notify the carrier and the relevant Yokogawa sales office.

Make sure the model number on the textplate affixed to the side of the instrument agrees with your order. An example of a textplate is shown below.

Safety Barrier BARD-800		Safety Barrier BARD-400	
$V_m \leq 31.5V$		$V_m \leq 31.5V$	
$I_m \leq 29.2mA$		$I_m \leq 35mA$	
$P_m \leq 0.92W$		$P_m \leq 1.1W$	
⊕			
SC TRANSMITTER			
MODEL	SC202SJ		
SUFFIX			
SUPPLY	DC 24V		
OUTPUT	DC 4 TO 20mA		
AMB. TEMP	-10 TO 55°C		
EX SYSTEM	SC202S		
EX PROOF	i3aG4		
STYLE			
No.			
YOKOGAWA ◆			
Made in Japan			
○			

Figure 1-1. Textplate



NOTE

The textplate will also contain the serial number and any relevant certification marks.

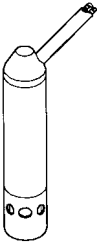
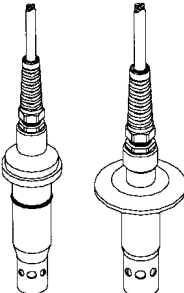


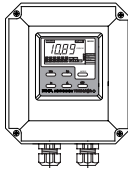

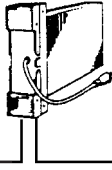

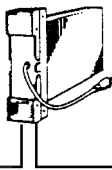
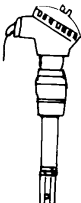
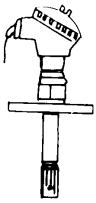
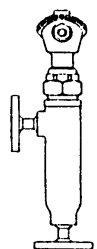
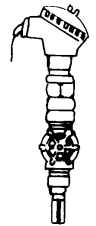
Be sure to apply correct power to the unit.

1. Introduction and General Description

Check that all the parts are present, including mounting hardware, as specified in the option codes at the end of the model number. For a description of the model codes, refer to Chapter 2 of this manual under General Specifications.

Basic Parts List: Transmitter SC202
Instruction Manual English
Optional mounting hardware when specified (See model code)

1-2. System configuration

IConductivity Detector				Conductivity Transmitter	Safety Barrier & Distributor
<div><div><div>SC4AJ</div><div>Adapter Mounting Type</div></div><div><div>SC8SG</div><div>Welding Socket Type</div></div><div><div></div><div>Screw-in Type</div></div><div><div></div><div>Flow-through Type</div></div></div>				<div>SC202SJ</div> 	<div><div>• Safety Barrier (BARD800)</div><div>• Distributor PH201G</div><div>• Safety Barrier (BARD800)</div><div>• General Purpose Type Distributor SDBT, SDBS</div></div> <div>Analog output 1-5 VDC Fail contact output Maintenance contact output</div> <div>Analog output 1-5 VDC</div>
<div><div><div>SC210G</div><div>Screw-in Type</div></div><div><div></div><div>Flange Type</div></div><div><div></div><div>Flow-through Type</div></div><div><div></div><div>Screw-in Type with Gate Valve</div></div></div>					

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2. General Specifications

2-1. Specification

A. Input specifications

- : Two or four electrodes measurement with square wave excitation.
Cell constant from 0.008 to 50.0 cm⁻¹

B. Detection method

- : Frequency, read-pulse position and reference voltage are dynamically optimized.

C. Input ranges

- Conductivity
 - Minimum : 0 μS / cm
 - Maximum : 200 mS x (Cell constant) (overrange 1999 mS / cm).
- Resistivity
 - Minimum : 0.005 kΩ / (Cell constant)
 - Maximum : 999 MΩ x cm
- Temperature
 - Pt1000 : -20 to +250 °C (0 - 500 °F)
 - Pt100 and Ni100 : -20 to +200 °C (0 - 400 °F)
 - 8.55kΩ NTC : -10 to +120 °C (10 - 250 °F)
 - PB36 NTC : -20 to +120 °C (0 - 250 °F)

D. Output Span

- Conductivity
 - : - min. 0.01 μS/cm,
 - max. 1999 mS/cm. (max 90% zero suppression)
- Resistivity
 - : - min. 0.001 kΩ·cm
 - max. 999 MΩ·cm. (max 90% zero suppression)

E. Transmission Signals

- : Isolated output of 4-20 mA DC.
For the SC202SJ
175Ω or less with the PH201G
25Ω or less with the SDBT
Burn up (21 mA) or Burn down (3.6 mA when HART or distributor comm. is non-used, 3.9 mA HART or distributor comm. is used) or pulse of 22 mA to signal failure.

F. Temperature compensation

- : Automatic, for temperature ranges mentioned under C (inputs).
- Reference temp. : programmable from 0 to 100 °C or 30 - 210 °F (default 25 °C).

G. Compensation algorithm

- NaCl : According IEC 60746-3 NaCl tables (default).
- T.C. : Two independent user programmable temperature coefficients, from 0% to 3.5% per °C (°F) by adjustment or calibration.
- Matrix : Conductivity function of concentration and temperature. Choice out of 5 preprogrammed matrixes and a 25-point user-programmable matrix.

H. Logbook

- : Software record of important events and diagnostic data. Available through HART link, with diagnostic information available in the display.

I. Display

- : Custom liquid crystal display, with a main display of 3 1/2 digits 12.5 mm high. Message display of 6 alpha-numeric characters, 7 mm high. Warning flags and units (mS/cm, kΩ·cm, μS/cm and MΩ·cm) as appropriate.

J. Power supply

- : Nominal 24 volt DC loop powered system.

For SC202SJ allowable load resistance should be determined by the following equation.

When used with BARD-800:

$$\text{Allowable load resistance } (\Omega) = \frac{V-18.5}{0.022} - R$$

When used with BARD-400:

$$\text{Allowable load resistance } (\Omega) = \frac{V-19}{0.022} - R$$

V: Minimum output voltage of power supply (distributor)
R: Internal resistance of power supply (distributor)

Note: Maximum load resistance depending on distributor used should be as follows.

(SDBT) + (BARD-800): 25 Ω
(PH201G) + (BARD-800): 175 Ω

K. Input isolation

- : 1000 VDC

L. Weight

- Body weight : approx. 1.6 kg
- Mounting brackets weight : approx. 0.7 kg

2-2. Operating specifications

A. Performance (under reference conditions with sensor simulation)

- Transmitter output tolerance: $\pm 0.125\%$ of output span
- Conductivity ($2 \mu\text{S} \times \text{K cm}^{-1}$ to $200 \text{ mS} \times \text{K cm}^{-1}$)
 - Linearity : $\pm 0.5\%$ F.S.
 - Repeatability : $\pm 0.5\%$ F.S.
- Conductivity ($1 \mu\text{S} \times \text{K cm}^{-1}$ to $2 \mu\text{S} \times \text{K cm}^{-1}$)
 - Linearity : $\pm 1\%$ F.S.
 - Repeatability : $\pm 1\%$ F.S.
- Resistivity ($0.005 \text{ k}\Omega / \text{K cm}^{-1}$ to $0.5 \text{ M}\Omega / \text{K cm}^{-1}$)
 - Linearity : $\pm 0.5\%$ F.S.
 - Repeatability : $\pm 0.5\%$ F.S.
- Resistivity ($0.5 \text{ M}\Omega / \text{K cm}^{-1}$ to $1 \text{ M}\Omega / \text{K cm}^{-1}$)
 - Linearity : $\pm 1\%$ F.S.
 - Repeatability : $\pm 1\%$ F.S.
- Temperature (Pt1000, PB36 NTC, Ni100)
 - Linearity : $\pm 0.3^\circ\text{C}$ (190°C or more with Pt1000; $\pm 1^\circ\text{C}$)
 - Repeatability : $\pm 0.3^\circ\text{C}$ (190°C or more with Pt1000; $\pm 1^\circ\text{C}$)
 - Accuracy : $\pm 0.3^\circ\text{C}$ (190°C or more with Pt1000; $\pm 1^\circ\text{C}$)
- Temperature (Pt100, 8.55k Ω NTC)
 - Linearity : $\pm 0.4^\circ\text{C}$
 - Repeatability : $\pm 0.4^\circ\text{C}$
 - Accuracy : $\pm 0.4^\circ\text{C}$
- Temperature compensation
 - NaCl table : $\pm 1\%$
 - Matrix : $\pm 3\%$

Note: "F.S." means maximum setting value of transmitter output. "K" means cell constant. YOKOGAWA provides conductivity sensors which cell constant are 0.1 to 10 cm^{-1} .

The following tolerance is added to above performance.

mA output tolerance: $\pm 0.02 \text{ mA}$ of "4 - 20 mA"

- Step response : 90 % (< 2 decades) in 7 seconds

B. Ambient operating temperature

: -10 to $+55^\circ\text{C}$ (10 to 130°F)

Storage temperature

: -30 to $+70^\circ\text{C}$ (-20 to 160°F)

C. Humidity

: 10 to 90% RH non-condensing

D. Housing

: Cast aluminium case with chemically resistant coating, cover with flexible polycarbonate window. Case color is Frosty-white (Equivalent to Munsell 2.5Y8.4/1.2) and cover is Deepsea Moss green (Equivalent to Munsell 0.6GY3.1/2.0). Cable entry is via two PG13.5 nylon glands. Weather resistant to IP65 and NEMA 4X standards. Pipe wall or panel mounting, using optional hardware.

E. Cable and terminals :

The glands will form a tight seal on cables with an outside diameter in the range of 6 to 12 mm.

F. Data protection : EEPROM for configuration

G. Automatic safeguard

: Return to measuring mode when no keystroke is made for 10 min.

H. Operation protection

: 3-digit programmable password.

I. SC202SJ Intrinsically Safe Version

Electrical:

Safety Barrier Used	Construction, Explosion /Ignition Groups	Safety Barrier Rating
BARD-800	i3aG4	Vm=DC 31.5 V Im=DC 29.2 mA Pm=0.92 W
BARD-400	i3aG4	Vm=DC 31.5 V Im=DC 35 mA Pm=1.1 W

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Environmental:

Altitude: 1000 m max.

Ambient temperature: -10 to $+55^\circ\text{C}$ for sensor and transmitter

Humidity: 45 to 85% RH

Location: Zones 0, 1 and 2 hazardous locations, with safety barrier.

Wiring between SC202SJ and safety barrier:

Safety Barrier	Maximum Allowable Inductance	Maximum Allowable Capacitance
BARD-800	2.2 mH	35 nF
BARD-400	2.2 mH	35 nF

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Connection is required between common terminal (3) of safety barrier and common terminal of distributor (power supply). Failure to connect may cause errors on 4-20 mA DC signal due to characteristics of safety barrier. When BARD-800/400 safety barrier is used, be sure to prevent large current from flowing into the safety barrier in order to avoid possible fuse blowing.

Yokogawa's distributors, Models PH201G and SDBT, have a current limiter function and are best suited for use with the SC202SJ.

2-3. HART communications

Input	: Two-wire system, 4-20 mA DC
Power supply	: SC202SJ: up to 31.5 volts Note: The transmitter contains a switched power supply, drawing its energy from the 0-4 mA section of the signal. Consequently the 17 volt limit is applied at 4 mA. The characteristic of the unit is such that above about 7 mA on the output, the terminal voltage can drop to 14.5 volts without problem.
Transmission	: Isolated output of 4 to 20 mA DC.
Signal	: Maximum load 425Ω at 24 VDC Burn to signal failure acc. NAMUR Recommendation NE43 (18.01.1994)
Operating range	: 3.9 to 21 mA
Communication	: HART®, 1200 Baud, FSK modulated on 4 to 20 mA signal
Configuration	: Local with 6 keys
Software	: Firmware based on Yokogawa stack.
Hardware	: Yokogawa HART Modem F9197UB
Other Control systems	: Yokogawa PRM, Rosemount AMS, Siemens PDM
Hand Terminal	: Rosemount HHT 275/375
Output span	: - Conductivity : min 0.01 μS/cm, max.1999 mS/cm. (max 90% zero suppression) - Resistivity : min 0.001kΩ·cm, max.999 MΩ·cm. (max 90% zero suppression) The instrument is user programmable for linear or non-linear conductivity ranges.
Cable specification	: 0.5 mm diameter or 24 AWG over maximum length of 1500 m
DD specification	: The SC202 Device Description is available enabling communications with the Handheld communicator and compatible devices.

2. General Specifications

2-4. Model and suffix codes

1. 2-wire Conductivity transmitter (Explosionproof type)

[Style : S2]

Model	Suffix Code	Option Code	Description
SC202SJ	.....	.....	Intrinsically safe type conductivity transmitter
Type	-1	.....	TIIS Certification (*1)
Language	-J	.....	Japanese
	-E	.....	English
Option	Mounting Hardware	/U	Pipe, wall mounting bracket (Stainless steel)
		/PM	Panel Mounting bracket (Stainless steel)
	Hood	/H	Hood for sun protection (Carbon steel)
		/H2	Hood for sun protection (Stainless steel)
	Tag Plate	/SCT	Stainless steel tag plate
	Conduit Adapter	/AFTG	G1/2
		/ANSI	1/2NPT
		/TB	Screw terminal
		/SPS	With screws for salt protection (*2)
		/X1	Epoxy baked finish (*3)

SC202SJ is available only for Japan, South Korea , Taiwan, China, and Russia.

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(*1) "TIIS Certification" as a certified explosion approval from the Technology Institution of Industrial Safety.

(*2) The SUS screws with teflon coating are used at the four corners of the cover.

(*3) The housing is coated with epoxy resin.

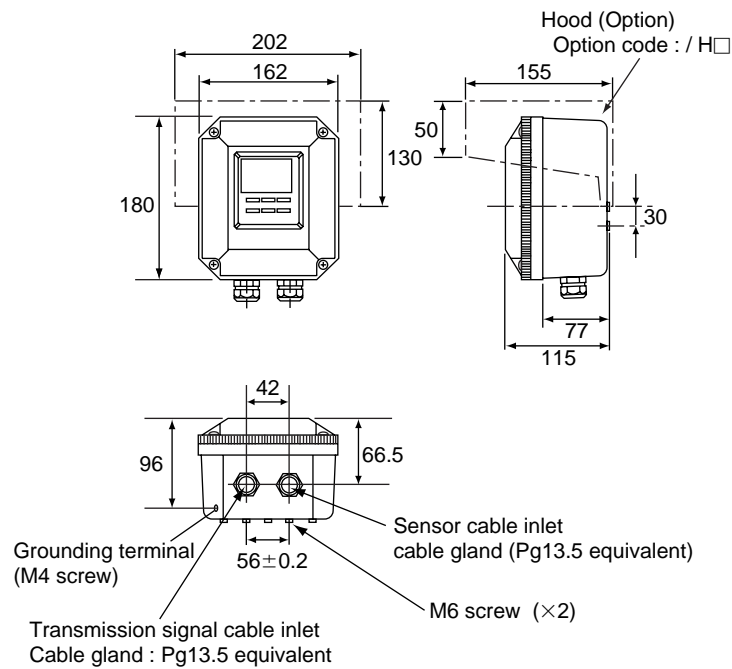
2. Dedicated distributor

Model	Suffix Code	Option Code	Description
PH201G	.....	.....	Distributor
Power Supply	-A1	100V AC
	-A2	220V AC
—	*B	Style B
Option		/TB	Terminal for Power connection

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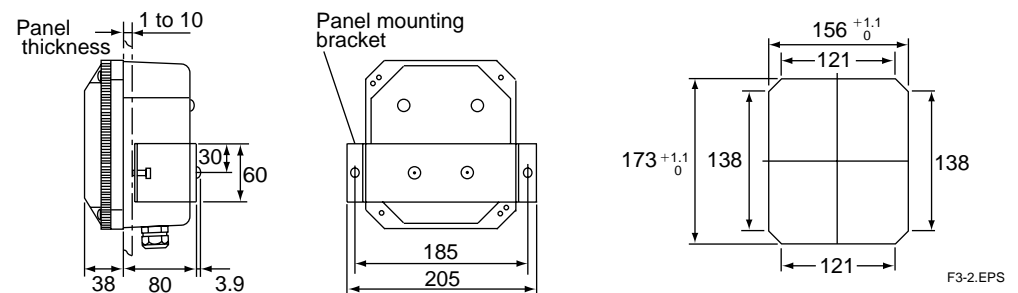
2-5. External dimensions

Unit : mm



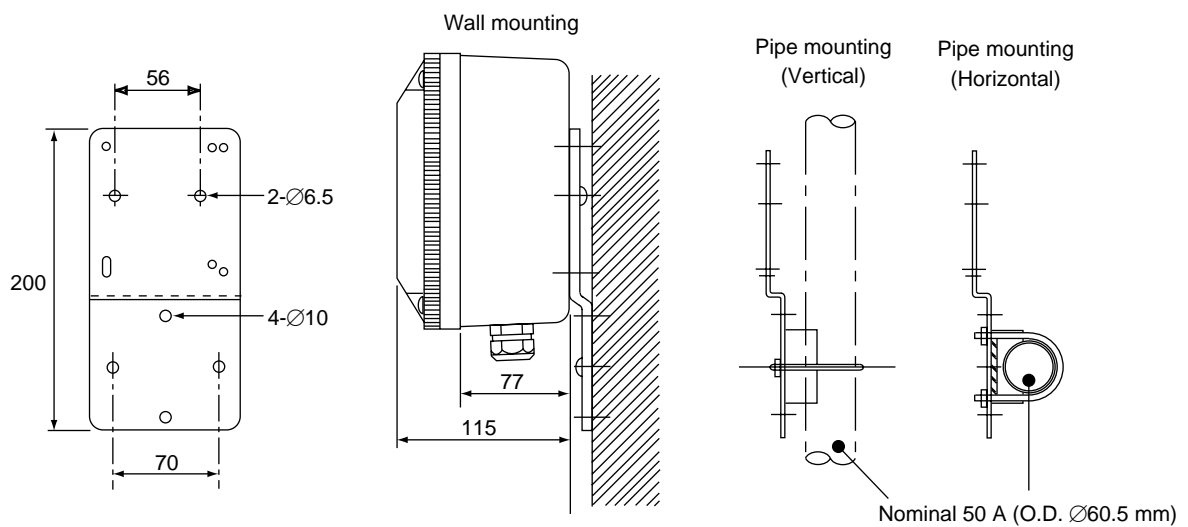
F3-1.EPS

Fig. 2-1. Housing dimensions and layout of glands



F3-2.EPS

Fig. 2-2. Panel mounting (Option code: /PM)



F3-3.EPS

Figure 2-3. Wall and pipe mounting (Option code: /U)

2. General Specifications

3. Installation and Wiring

3-1. Installation and dimensions

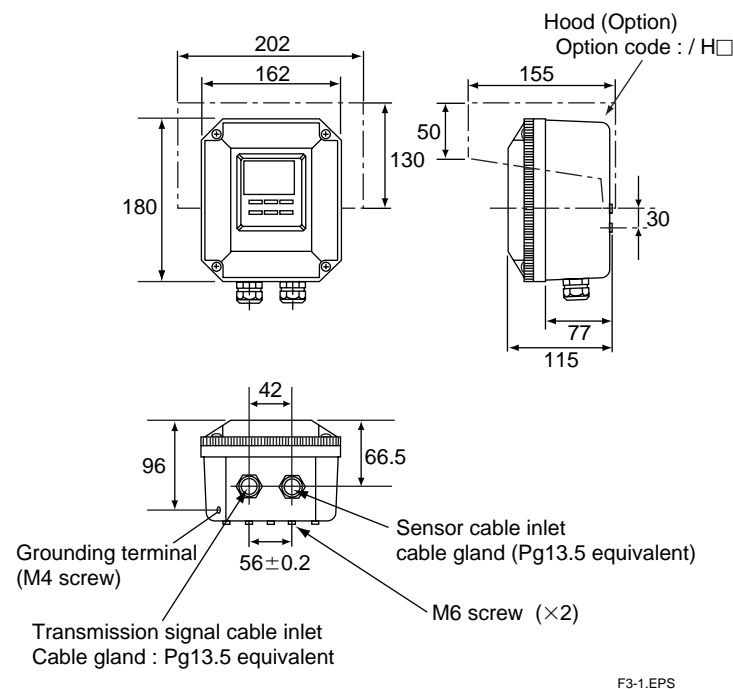
3-1-1. Installation site

The EXA converter is weatherproof and can be installed inside or outside. It should, however, be installed as close as possible to the sensor to avoid long cable runs between the sensor and the converter. In any case, the cable length should not exceed 20 meters (65 feet). Select an installation site where:

- Mechanical vibrations and shocks are negligible
- No relay/power switches are in the direct environment
- Access is possible to the cable glands (see Fig. 3-1)
- The transmitter is not mounted in direct sunlight or severe weather conditions
- Maintenance procedures are possible (avoiding corrosive environments)

The ambient temperature and humidity of the installation environment must be within the limits of the instrument specifications. (See chapter 2).

Unit : mm



F3-1.EPS

Figure 3-1. Housing dimensions and layout of glands

3-1-2. Mounting methods

Refer to Fig. 3-2 and 3-5. Note that the EXA converter has universal mounting capabilities:

- * Panel mounting using two (2) self-tapping screws (Option code /PM)
- * Surface mounting on a plate (using bolts from the back)
- * Wall mounting on a bracket (for example, on a solid wall) (Option code /U)
- * Pipe mounting using a bracket on a horizontal or vertical pipe (nominal pipe diameter 50 A) (Option code /U)

3. Installation and Wiring

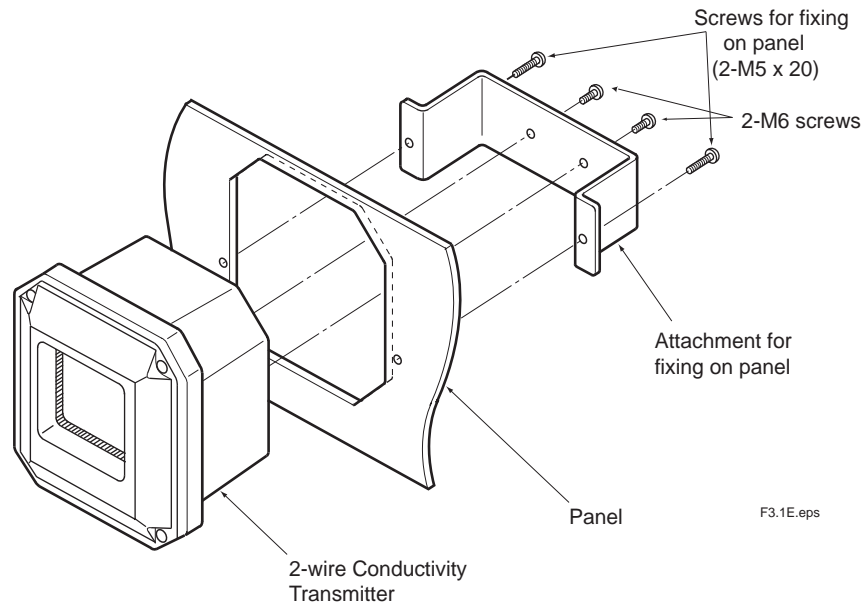


Fig. 3-2. Panel mounting hardware and overview diagram

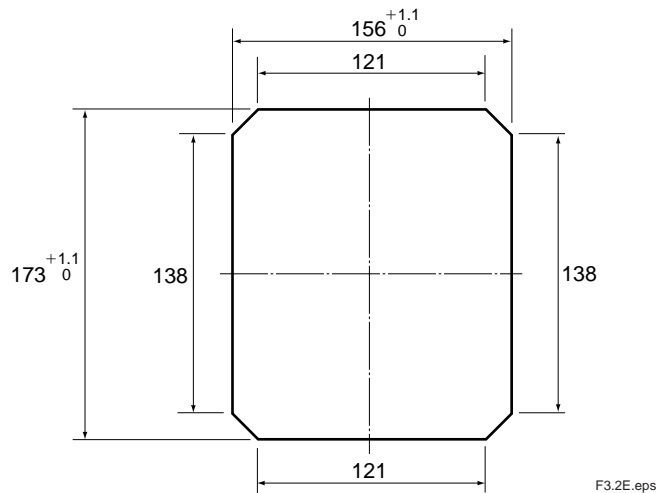


Figure 3-3. Panel cut-out dimensions

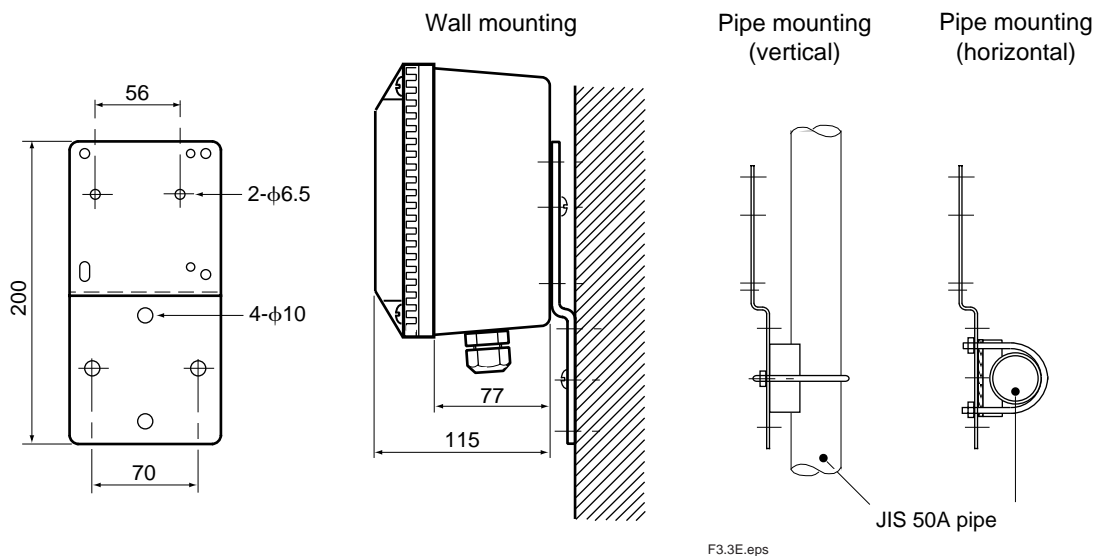


Figure 3-4. Wall and pipe mounting diagram

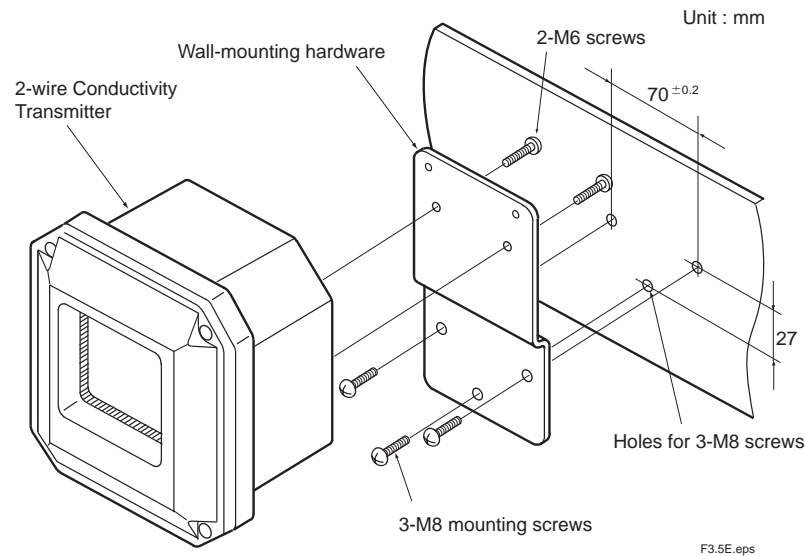


Figure 3-5. Hardware and overview diagram for wall mounting

3-2. Preparation

Refer to Fig. 3-9 to 3-12. The power/output connections and the sensor connections should be made in accordance with these figures.

Wiring Procedure:

1. Loosen the four screws holding the case cover, and remove it.
2. The terminal board is visible
3. Connect the power cable. Use the gland in the lower left part of the case.
4. Pass the sensor cable through the rightmost gland (see Fig. 3-6)
5. Check the power supply, then turn on the SC202. Set its parameters to match your environment, or use the initial parameter settings.
6. Before inserting the electrodes in the solution to be measured, enter service level, and perform AIR CAL (Service Code 04). You can compensate for the effect of electrode cable length, but first the electrodes must be completely dried or you will get an error when you attempt AIR CAL. Wash the electrodes thoroughly in pure water, then use an air gun or the like to blow away excess water, then -- after allowing the electrodes to dry completely -- perform AIR CAL.
7. Replace the cover, and securely tighten the four cover screws.
8. Don't forget to ground the external ground terminal.

3-2-1. Cables, terminals and glands

The SC202 is equipped with terminals suitable for the connection of finished cables in the size range: 0.13 to 2.5 mm (26 to 14 AWG). The glands will form a tight seal on cables with an outside diameter in the range of 6 to 12 mm.

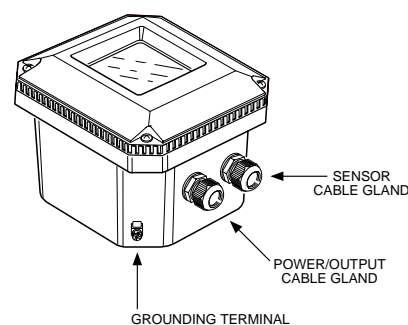


Figure 3-6. Glands to be used for cabling

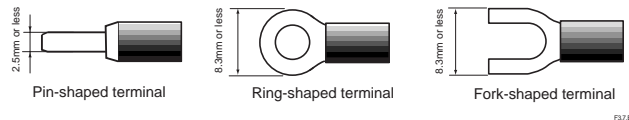
3. Installation and Wiring

Requirement of connecting with external instruments

	Terminal for pin cable terminal	Screw terminal (option /TB)
Crimp contact for cable	Pin-shaped crimp contact with sleeve insulator	Ring-shaped or fork-shaped crimp contact
Usable contact	max. 2.5 mm	Crimp contact shown as the figures under this table, which meets M3 screw
Torque for fixing	0.5 N·m or less	1.35 N·m (recommended)
Example of crimp contact*	Weidmuller Co., Ltd. made: H0.34/10, H0.5/12, H1/12, H1.5/12S	JST, Mfg. Co., Ltd. made: VD1.25-3(Ring shape), VD1.25-S3A(Fork shape)

*Note: Other crimp contact may be required, depending on core-cable diameter.

T3.2E.eps



Connection terminal shown below when /TB option specified.

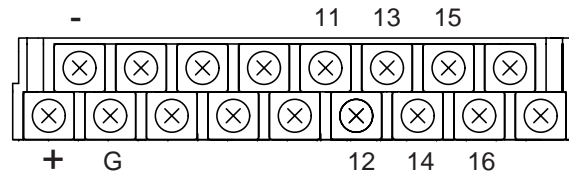


Figure 3-7. Screw Terminal Diagram

3-3. Wiring of sensors

3-3-1. General precautions

Generally, transmission of signals from SC sensors is at a low voltage and current level. Thus a lot of care must be taken to avoid interference. Before connecting sensor cables to the transmitter, make sure that following conditions are met:

- the sensor cables are not mounted in racks together with high voltage and or power switching cables
- only standard sensor cables or extension cable are used
- the transmitter is mounted within the length of the sensor cables (max. 20 m).
- the setup is kept flexible for easy insertion and retraction of the sensors in the fitting.

Excess Sensor Cable Handling for SC202SJ:

Since the allowable inductance of the sensor cable must be considered when the SC202SJ 2-wire type transmitter (intrinsically safe version) is used, observe the following instructions.

- Do not loop excess length of sensor cable.
- Fold it so length of turns is as long as possible, and tie up in a bundle.

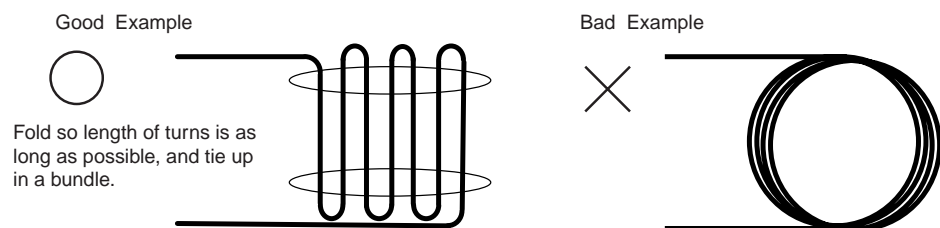


Figure 3-8. Excess Sensor Cable Handling

3-3-2. Sensor wiring

Refer to figure 3-9, which includes drawings that outline sensor wiring.

The EXA SC202 can be used with a wide range of commercially available sensor types if provided with shielded cables, both from Yokogawa and other manufacturers. The sensor systems from Yokogawa fall into two categories, the ones that use fixed cables and the ones with separate cables.

To connect sensors with fixed cables, simply match the terminal numbers in the instrument with the identification numbers on the cable ends. For details, refer to corresponding IMs.

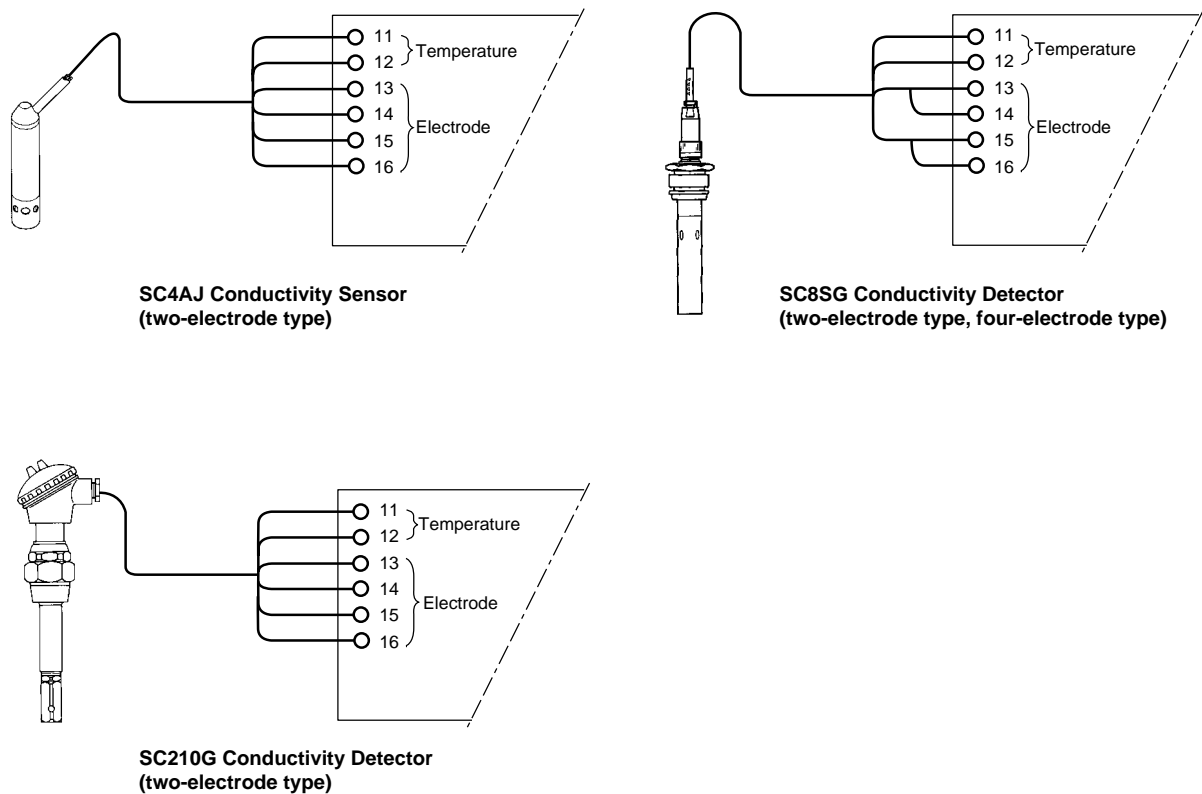


Figure 3-9. Sensor wiring diagrams

3-3-3. Other sensor systems

To connect other sensor systems, follow the general pattern of the terminal connections as listed below:

- 11 and 12 : Always used for temperature compensation resistor input.
- 13 and 14 : Normally used for the outer electrode
- 15 and 16 : Used for inner electrode

In case a 4-electrode measuring system will be used, 14 and 16 should be used for the current electrodes.

Please ensure that shielded cabling will be used.

In figure 3-10 this is shown in a schematic way.

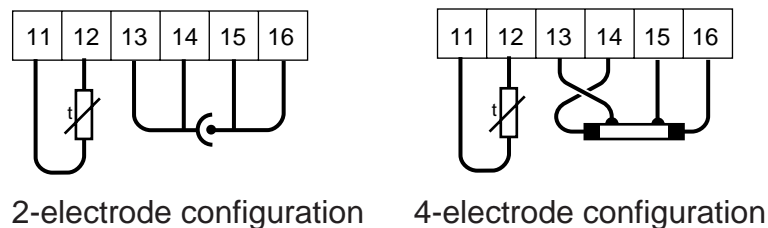


Figure 3-10. Connection diagram for other sensors

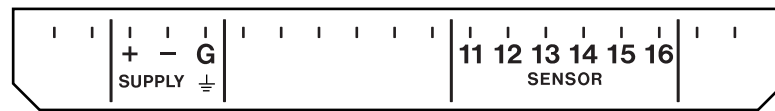


Figure 3-11. Pin-shaped Terminal identification label

3-4. Wiring of power supply

3-4-1. General precautions

Do not activate the power supply yet. First make sure that the DC-power supply is according to the specifications given.



WARNING

Use an appropriate DC power supply (such as from the PH201G distributor) for the SC202SJ transmitters. Under no circumstances should you connect AC power such as 100V AC or similar AC power supply line. To measure conductivity in hazardous locations, use the SC202SJ with BARD-800 or BARD-400 (for replacement) intrinsic safety barriers.

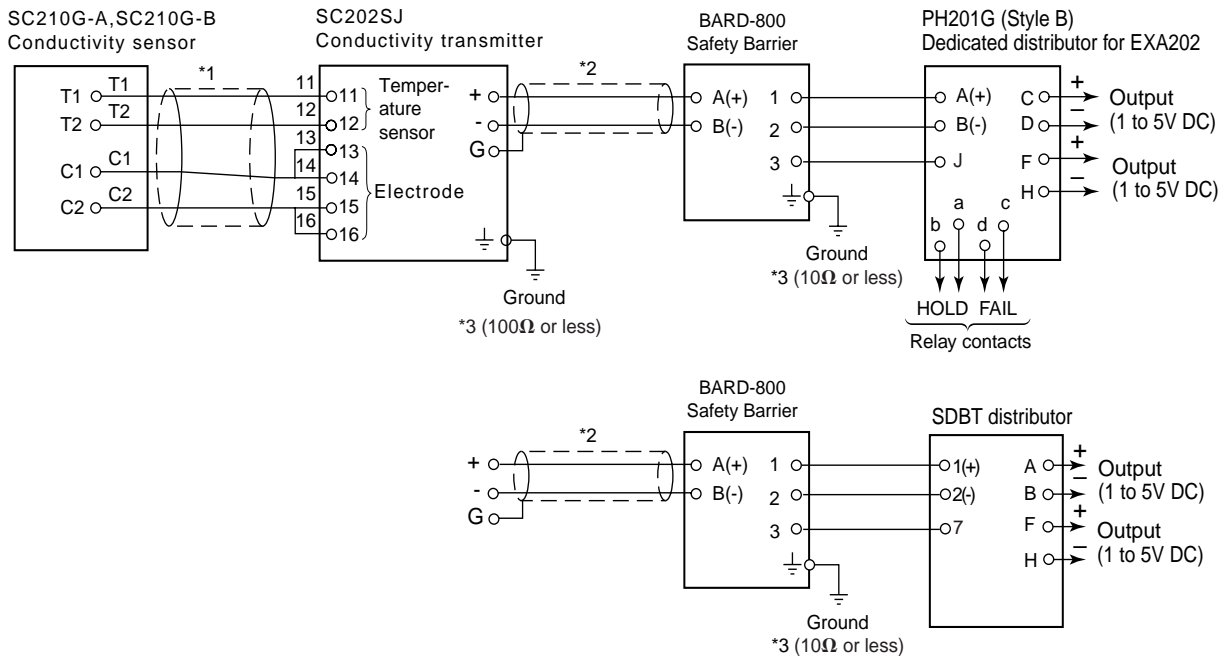
The cable leading to the distributor (power supply) or safety barrier transports power to and output signal from the transmitter. Use a two conductor shielded cable with a size of at least 1.25 mm² and an outside diameter of 6 to 12 mm. The cable gland supplied with the instrument accepts these diameters.

Grounding:

- If the transmitter is mounted on a grounded surface (e.g. a metal frame fixed in the soil) the shield of the 2-wire cable may NOT be connected to ground at the distributor.

- If the transmitter is mounted on a non-conducting surface (e.g. a brick wall) it is recommended to ground the shield of the 2-wire cable at the distributor end.

1. Example of Intrinsically Safe Explosionproof System (a) SC210G-A or SC210G-B



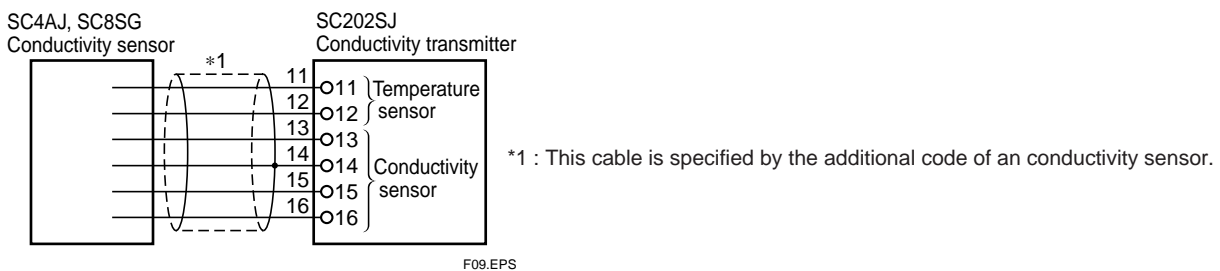
- *1: This cable is specified by the additional code of an conductivity sensor.
 *2: Use a 2-conductor shielded cable with an outside diameter of 6 to 12 mm. Shield must be connected to internal terminal G of transmitter and left unconnected at the other side.
 *3: Transmitter must be grounded using external terminal: for intrinsically safe version ground resistance of SC202SJ should be 100Ω or less (Japanese Class D grounding). For safety barrier ground resistance should not exceed 10Ω (Japanese Class A grounding).

F08s.EPS

CAUTION

Grounding wire connection for SC202SJ is different from that for SC200S. When installing SC202SJ as a replacement for SC200S, grounding wire must be reconnected as above.

(b) SC4AJ, SC8SG



F09.EPS

Figure 3-12. Wiring diagram for explosionproof type

3-4-2. Connection of the power supply

The terminal strip is accessed as was described in §3-2-1. Use the left-hand gland to insert the supply/output cable to the transmitter. Connect the supply to the terminals marked +, - and G as is indicated in figures 3-11.

3-4-3. Switching the instrument on

After all connections are made and checked, the power can be switched on from the distributor. Observe the correct activation of the instrument at the display. If for any reason the display does not indicate a value, consult the troubleshooting section.

3. Installation and Wiring

4. Maintenance

4-1. Periodic maintenance for the EXA 202 transmitter

The EXA transmitter requires very little periodic maintenance. The housing is sealed to IP65 (NEMA 4X) standards, and remains closed in normal operation. Users are required only to make sure the front window is kept clean in order to permit a clear view of the display and allow proper operation of the pushbuttons. If the window becomes soiled, clean it using a soft damp cloth or soft tissue. To deal with more stubborn stains, a neutral detergent may be used.

NOTE

Never use harsh chemicals or solvents. In the event that the window becomes heavily stained or scratched, refer to the Customer Maintenance Parts List for replacement part numbers.

When you must open the front cover and/or glands, make sure that the seals are clean and correctly fitted when the unit is reassembled in order to maintain the housing's weatherproof integrity against water and water vapour. The measurement otherwise may be prone to problems caused by exposure of the circuitry to condensation.

WARNING

For the SC202SJ, to prevent the risk of explosion due to electrostatic discharge in hazardous areas, do not rub the transparent plastic window of the SC202SJ transmitter's cover with a dry cloth and the like. When cleaning the window, care must be taken to avoid electrostatic charges. Normal key operation does not generate electrostatic charges.

4-2. Periodic maintenance of the sensor

NOTE

Maintenance advice listed here is intentionally general in nature. Sensor maintenance is highly application specific.

In general conductivity/resistivity measurements do not need much periodic maintenance. If the EXA indicates an error in the measurement or in the calibration, some action may be needed. In case the sensor has become fouled, an insulating layer may be formed on the surface of the electrodes and consequently, an apparent increase in cell constant may occur, giving a measuring error. This error is:

$$2 \times (R_v / R_{cel}) \times 100 \%$$

where:

R_v = the resistance of the fouling layer

R_{cel} = the cell resistance

NOTE

Resistance due to fouling or to polarization does not effect the accuracy and operation of a 4-electrode conductivity measuring system. If an apparent increase in cell constant occurs cleaning the cell will restore accurate measurement.

Cleaning methods

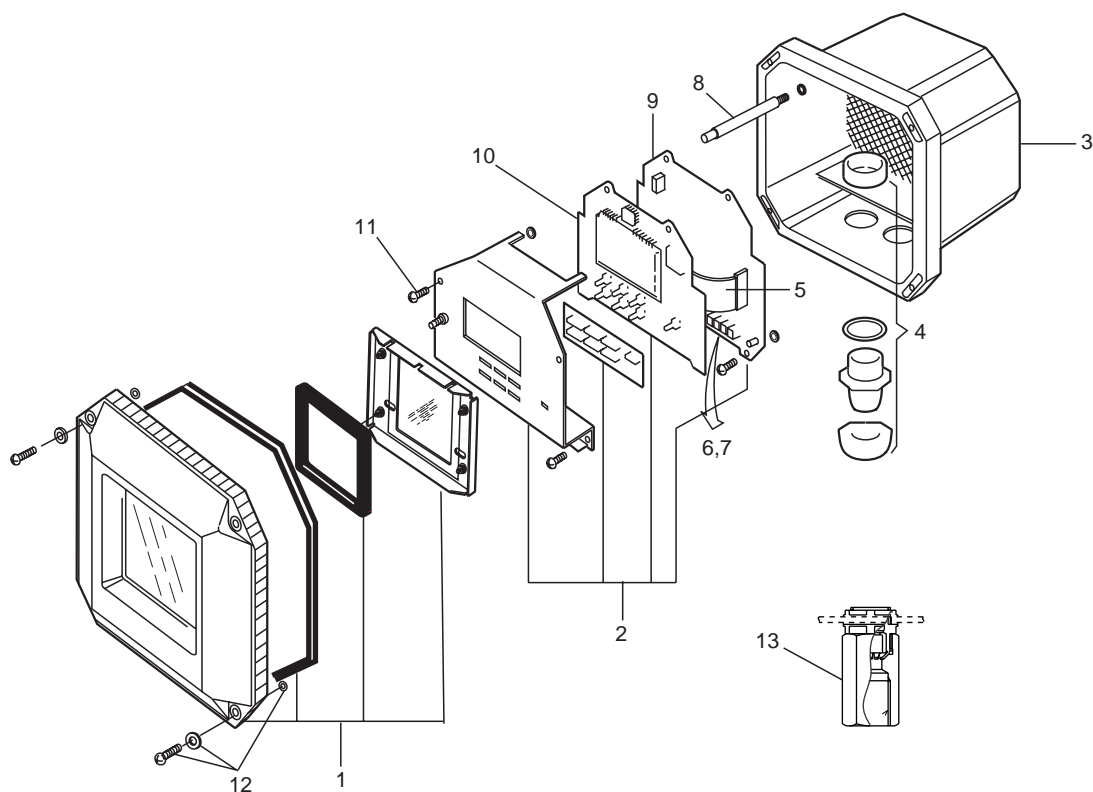
1. For normal applications hot water with domestic washing-up liquid added will be effective.
2. For lime, hydroxides, etc., a 5 ...10% solution of hydrochloric acid is recommended.
3. Organic fouling (oils, fats, etc.) can be easily removed with acetone.
4. For algae bacteria or moulds, use a solution of domestic bleach (hypochlorite).

WARNING

Never use hydrochloric acid and bleaching liquid simultaneously. The very poisonous chlorine gas will result.

Customer Maintenance Parts List

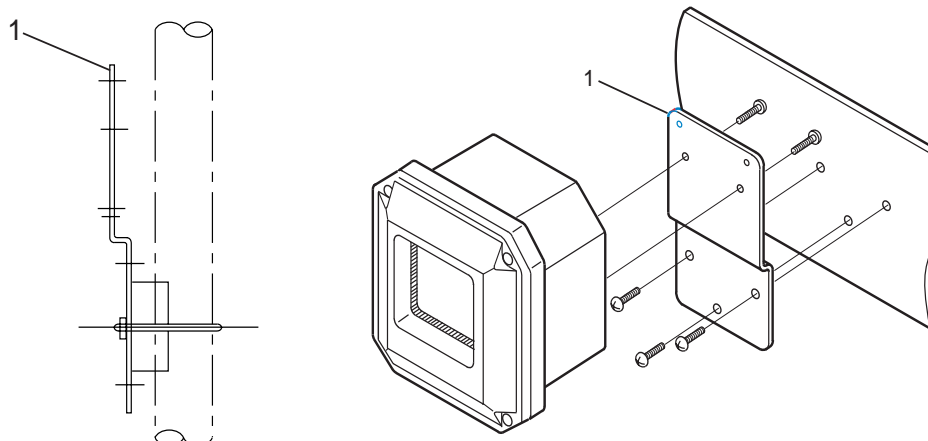
Model SC202SJ [Style : S2] Conductivity and Resistivity Transmitter



Item	Part No.	Qty	Description
1	—	—	Cover Assembly
	K9315CA	1	Polyurethane Coating
	K9315CN	1	Epoxy-polyester Coating
2	K9660YD	1	Internal Works Assembly with amplifier assembly
3	—	—	Housing Assembly
	K9315BK	1	Polyurethane Coating
	K9315BV	1	Epoxy-polyester Coating
4	K9660YU	1	Cable Gland Assembly 2 units
5	K9660BQ	1	Flat Cable
6	A1726JD	1	Pin Terminal Unit 3 terminals type
7	K9184AA	1	Screw Terminal Unit when /TB specified
8	K9660YR	1	Stud Assembly
*9	K9660SB	1	SC202SJ Analogue Assembly
*10	K9660DV	1	Digital/Display Board
11	K9660YQ	1	Screw Assembly to fix amplifier
12	—	—	Screw Assembly to fix cover
	K9660YP	1	Stainless steel screw
	K9660YS	1	Stainless steel screw with Teflon coated when /SPS specified
13	—	—	Adapter Assembly
	K9414DH	1	For G1/2 screw when /AFTG specified
	K9414DJ	1	For 1/2NPT screw when /ANSI specified

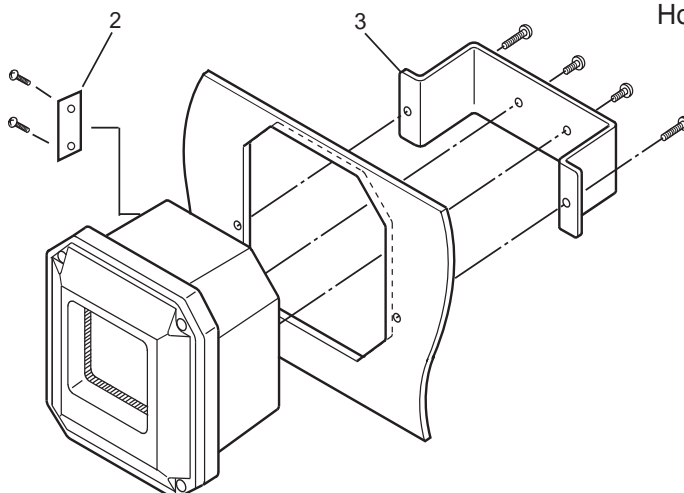
* Do not exchange these parts. Call serviceman.

Pipe/Wall Mounting Hardware (Option Code : /U)



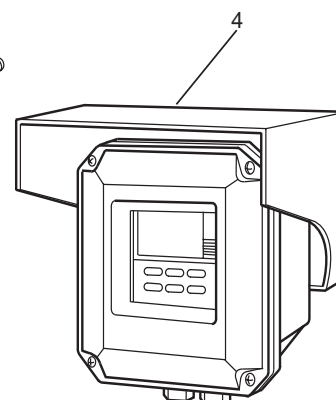
Panel Mounting Hardware

(Option Code : /SCT)



(Option Code : /PM)

Hood to sun protection (Option Code : /H /H2)



Item	Parts No.	Qty	Description
1	K9171SS	1	Universal Mount Set (/U)
2	K9311BT	1	Tag Plate (/SCT)
3	K9311KA	1	Fitting Assembly (/PM)
4	K9311KG	1	Hood Assembly (/H)
	K9660JA	1	Hood Assembly (/H2)

Revision Record

Manual Title : Model SC202SJ [Style : S2] 2-wire Conductivity or Resistivity Transmitter

Manual Number : IM 12D08B02-11E

Edition	Date	Remark (s)
1st	Mar. 2007	Newly published (separated from IM 12D08B02-01E, style changed to S2)

User's Manual

Model SC202SJ [Style : S2]
2-wire Conductivity or Resistivity
Transmitter

Supplement

Thank you for selecting our Model SC202SJ [Style : S2] 2-wire Conductivity or Resistivity Transmitter.

The User's Manual IM 12D08B02-11E 1st edition supplied with this product has been revised as follows.
Please make a note in your copy.

Addition/Correction

- Page 3-1, Figure 3.1, some dimensions modified.
- CMPL 12D08B02-12E has been revised to 2nd edition, because some parts number deleted.

3. Installation and Wiring

3-1. Installation and dimensions

3-1-1. Installation site

The EXA converter is weatherproof and can be installed inside or outside. It should, however, be installed as close as possible to the sensor to avoid long cable runs between the sensor and the converter. In any case, the cable length should not exceed 20 meters (65 feet). Select an installation site where:

- Mechanical vibrations and shocks are negligible
- No relay/power switches are in the direct environment
- Access is possible to the cable glands (see Fig. 3-1)
- The transmitter is not mounted in direct sunlight or severe weather conditions
- Maintenance procedures are possible (avoiding corrosive environments)

The ambient temperature and humidity of the installation environment must be within the limits of the instrument specifications. (See chapter 2).

Unit : mm

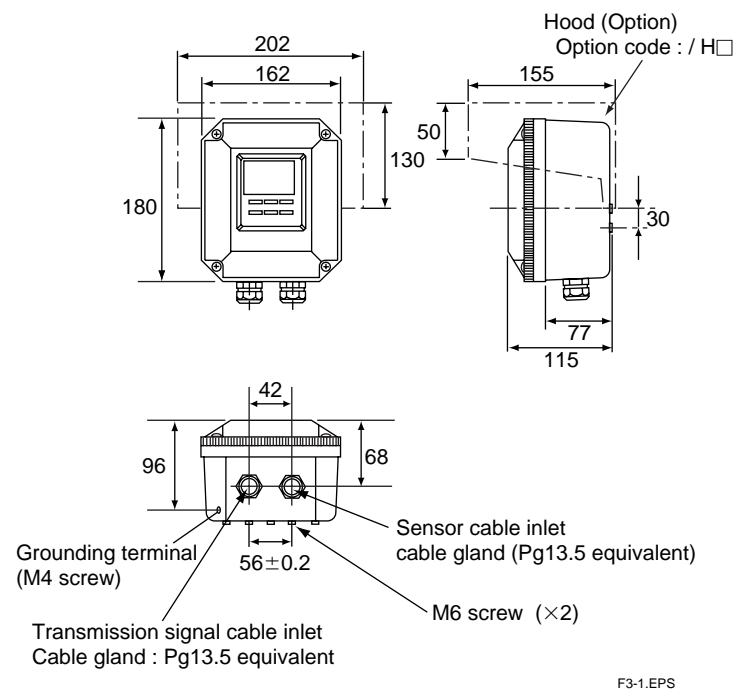


Figure 3-1. Housing dimensions and layout of glands

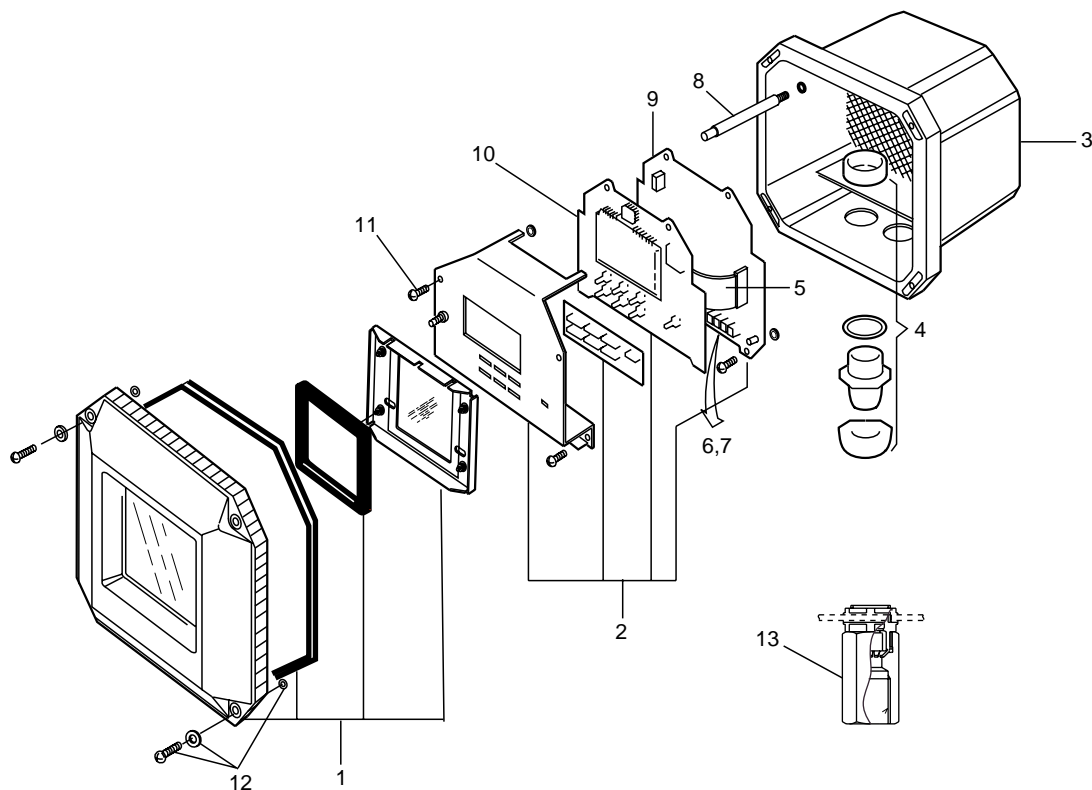
3-1-2. Mounting methods

Refer to Fig. 3-2 and 3-5. Note that the EXA converter has universal mounting capabilities:

- * Panel mounting using two (2) self-tapping screws (Option code /PM)
- * Surface mounting on a plate (using bolts from the back)
- * Wall mounting on a bracket (for example, on a solid wall) (Option code /U)
- * Pipe mounting using a bracket on a horizontal or vertical pipe (nominal pipe diameter 50 A) (Option code /U)

Customer Maintenance Parts List

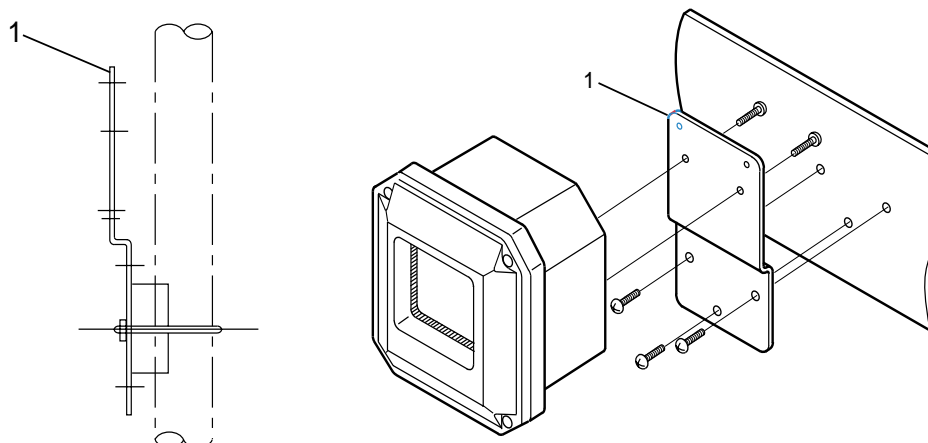
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	K9414DJ	1	For 1/2NPT screw when /ANSI specified

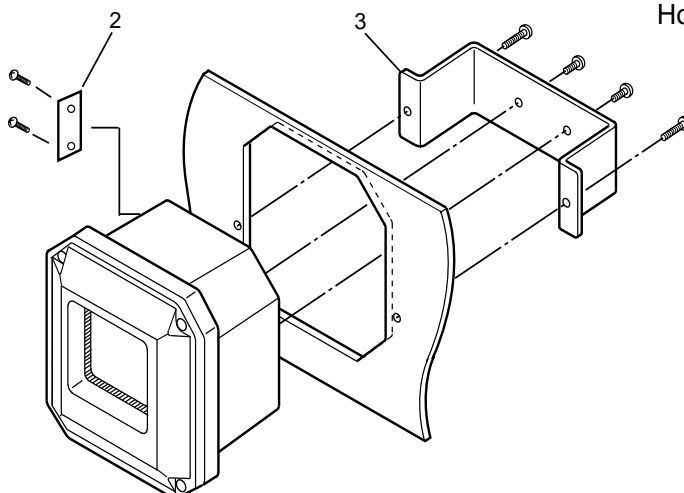
* Do not exchange these parts. Call serviceman.

Pipe/Wall Mounting Hardware (Option Code : /U)



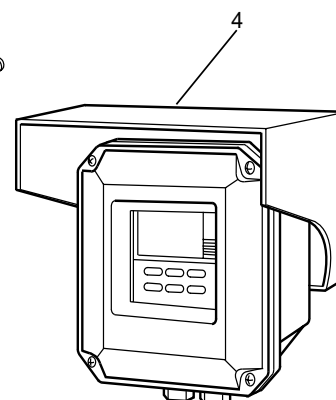
Panel Mounting Hardware

(Option Code : /SCT)



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Hood to sun protection (Option Code : /H /H2)



Item	Parts No.	Qty	Description
1	K9171SS	1	Universal Mount Set (/U)
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