Instruction Manual

EXA SC

SC200 Intelligent Two-wire Conductivity Transmitter System

SC200□ Intelligent Conductivity Transmitter

SC21□G Conductivity Detector

IM 12D8B1 - 01E

YOKOGAWA
Yokogawa Electric Corporation

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1st Edition

INTRODUCTION

The conductivity of the water solution containing electrolytic substance changes depending on the concentration of the component and temperature of the solution, and if the temperature is constant, the conductivity of the solution and concentration indicate a relationship peculiar to the solution.
In particular, when a very small amount of electrolytic substance is dissolved in pure water, conductivity increases in proportion to the concentration of the solution; therefore, the purity of water can be known by measuring the conductivity. Thus, a conductivity meter is an indispensable gauge for water quality control.
Additionally, the conductivity meter plays an important role in the quality control of manufacturing process solutions for chemical, foods and pharmaceutical industries as well as water quality control.

The EXAsc series, SC200 intelligent two-wire conductivity transmitter system is a solution conductivity meter for processing, whose measuring function has been heightened and maintenance simplified with the introduction of a micro-processor.
The SC200 system consists of a SC200□ intelligent conductivity transmitter, SC21□G conductivity detector and distributor. Transmitters are largely classified as "nonexplosion-proof" types which are used under ordinary environmental conditions and "intrinsically safe explosion-proof" types which can be utilized even under environments where explosive gas may be generated.
The detector basically has three types of electrodes which are selected and used depending on the conductivity of the measuring solution. They are classified as either types which are connected directly to a process pipe, etc. or types which introduce the measuring solution through a connected sampling pipe.
Thus, the SC200 system provides the best choice of devices to fit the conditions of the measuring solution and installation environment, so that an optimum measuring system for individual applications can be established to ensure highly reliable conductivity measurement.

FD No. 10072-K

Contents of This Manual

This instruction manual describes the whole range of handling including installation, operation, inspection and maintenance of the SC200□ intelligent conductivity transmitter and SC21□G conductivity detector, of which the intelligent two-wire conductivity transmitter system consists.

For handling of the distributor and safety barrier, refer to the instruction manuals mentioned below.

Instruction Manual	Manual No.	Object Machine
PH201G distributor	IM 19B1E4-01E	PH201G distributor
SDBT/SDBS distributor	IM 1B4T1-01E	SDBT/SDBS distributor
Installation of rack gauges	IM 1B4F2-01E	SDBT/SDBS installation procedure
BARD safety barrier	IM 1B4S1-01E	BARD400 safety barrier

CONTENTS

1. GENERAL

This chapter outlines the EXAsc series, SC200 intelligent two-wire conductivity transmitter system and the SC200□ intelligent conductivity transmitter and SC21□G conductivity detector of which the system consists.

1.1 System Configuration

The SC200 intelligent two-wire conductivity transmitter system is divided into a "nonexplosion-proof system" and "explosion-proof (intrinsically safe explosion-proof) system".

1.1.1 Nonexplosion-proof System

Figure 1.1 shows the appliances to be chosen when configuring the nonexplosion-proof system.

The intelligent conductivity transmitter used is the SC200G. The conductivity detector must be selected considering the characteristics of the measuring solution and installation environment. Any distributor can be used if it satisfies the given specifications. However, when HOLD or ABNORMAL contact output is specified, use the PH201G distributor.

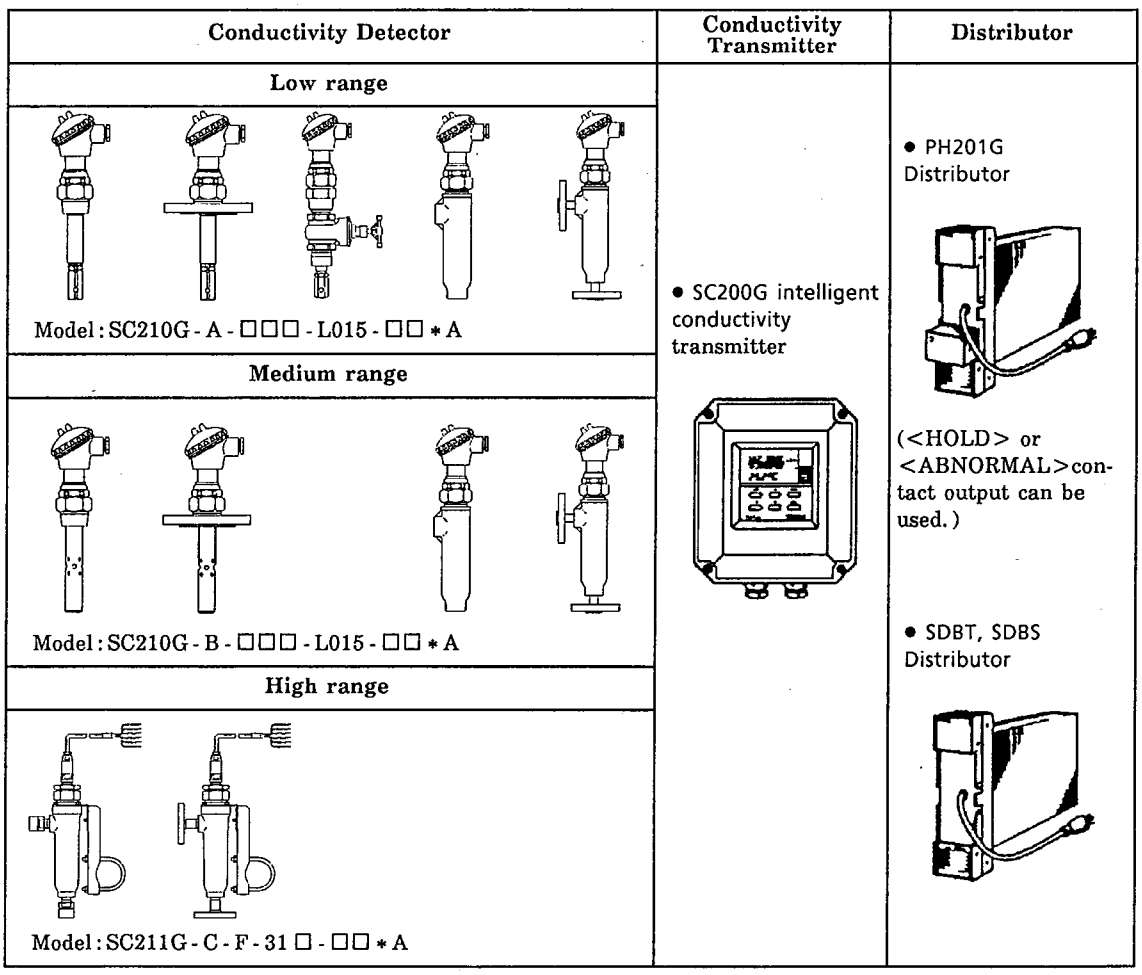


Figure 1.1 Units Which Can Be Used to Configure the Non-explosion-proof System

1.1.2 Explosion-proof System

Figure 1.2 shows the appliances to be chosen when configuring the explosion-proof system.

In case of the explosion-proof system, add the BARD400 safety barrier. The intelligent conductivity transmitter used is the SC200S. The conductivity detector must be selected considering the characteristics of the measuring solution and installation environment. The conductivity detector is the same as that used for " nonexplosion-proof systems ". For the distributor, the SDBT or PH201G is selected. When using HOLD or ABNORMAL contact output, select the PH201G distributor.

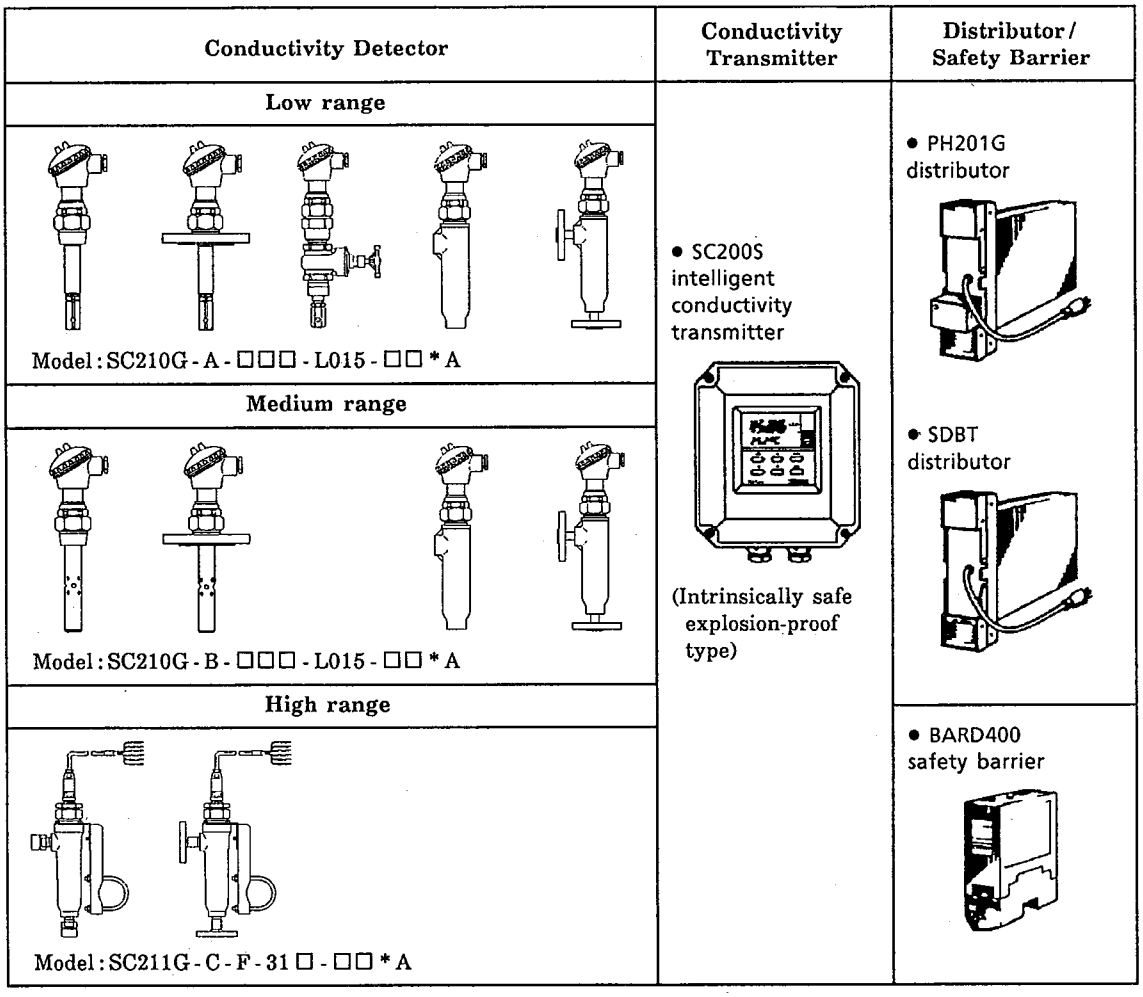


Figure 1.2 Units Which Can Be Selected to Configure the Explosion-proof System

1.2 System Components

1.2.1 Conductivity Detector

The conductivity detector can be classified into the following three types in terms of application and cell constant.

SC210G-A conductivity detector for low range	(cell constant: 0.05 cm^{-1})
SC210G-B conductivity detector for medium range	(cell constant: 5 cm^{-1})
SC211G-C conductivity detector for high range	(cell constant: 10 cm^{-1})

These conductivity detectors are structured (flow-through structure) to introduce a measuring solution to themselves through a connected sampling pipe (nominal diameter: 15A).
The SC210G-A and SC210G-B have a type which is connected directly to a process pipe (direct insertion type).

(1) SC210G-A conductivity detector for low range (cell constant: 0.05 cm^{-1})

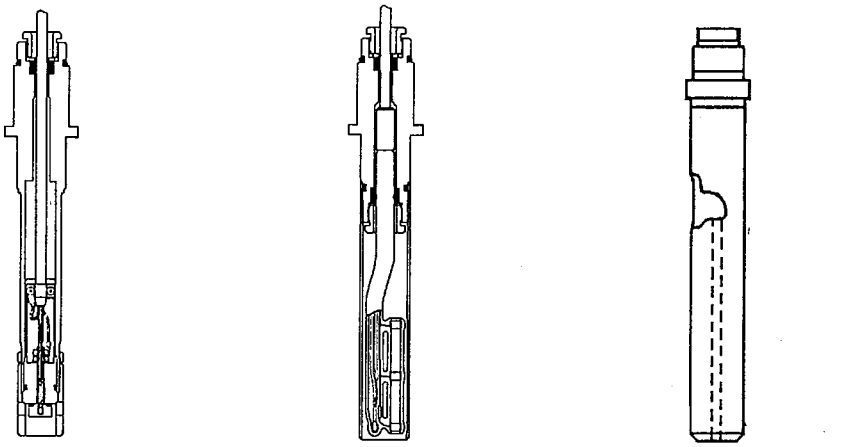
This detector's electrode is a stainless steel (SUS316) 2-electrode coaxial type and is used to measure a solution whose conductivity is 0 to 200 µS/cm.

(2) SC210G-B conductivity detector for medium range (cell constant: 5 cm^{-1})

This detector's electrode is a 2-electrode type having three ringed platinum electrodes arranged at an equal distance in its glass tube bore (of the three platinum electrodes, two on the sides are short-circuited internally and serve as a pair with the middle electrode). It is used to measure a solution whose conductivity is 200 µS/cm to 20 mS/cm.

(3) SC211G-C conductivity detector for high range (cell constant: 10 cm^{-1})

This detector is used to measure a solution whose conductivity is 1 mS/cm to 1 S/cm. The electrode is a 4-electrode type with four platinum electrodes inside its cylindrical body.One of the characteristics of the 4-electrode type is that it is difficult for a measured value to be affected by contamination, if any.



SC210G-A
cell constant: 0.05 cm^{-1}

SC210G-B
cell constant: 5 cm^{-1}

SC211G-C
cell constant: 10 cm^{-1}

Figure 1.3 Electrode Construction of the Conductivity Detectors

1.2.2 Intelligent Conductivity Transmitter

With square wave AC voltage with a specified frequency and voltage applied to the electrode of the conductivity detector, the SC200G (or SC200S) intelligent conductivity transmitter receives a current signal proportional to the conductivity of the measuring solution and temperature signal for temperature compensation. Then, it converts these signals to a "conductivity" value and displays them in digitally on the display unit. 4 to 20 mA DC analog signals corresponding to the measuring range are transmitted to the distributor. Additionally, the signals for ABNORMAL and HOLD contact outputs are superimposed on the analog signal.

The SC200G (or SC200S) conductivity transmitter incorporates a variety of functions to operate the system under the optimum conditions and simplify maintenance.

1.2.3 Distributor / Safety Barrier

The distributor supplies operating power to the conductivity transmitter and receives 4 to 20 mA DC analog transmission signals in return. Transmission and reception are performed directly by the distributor and conductivity transmitter in case of the nonexplosion-proof system; however, they are performed via the safety barrier in case of the explosion-proof system.

The distributor converts 4 to 20 mA DC analog signals from the conductivity transmitter to 1 to 5 V DC output signals and outputs them to a receiving device such as a recorder.

When the conductivity transmitter detects an "abnormality" with a FAIL indication or holds a transmission signal, signals superimposed on transmission signals are also transmitted from the conductivity transmitter to the distributor. (can be stopped). However, this signal cannot be used except with the PH201G distributor.

When the PH201G distributor receives such a signal, the appropriator ABNORMAL or HOLD contact signal is output separately.

The safety barrier is the device used to build a intrinsically safe explosion-proof system. The SC200 intelligent two-wire conductivity transmitter system utilizes the BARD400 safety barrier.

2. SPECIFICATIONS

This chapter describes the specifications of the SC21□G conductivity detector and SC200 intelligent conductivity transmitter, of which the EXAsc series, SC200 intelligent two-wire conductivity transmitter system consists.
For the specifications of other devices (for example, the PH201G distributor), refer to their respective instruction manuals.

2.1 Conductivity Detector

2.1.1 Standard Specifications

Measurement Objective : Solution conductivity

Measurement Principle : Electrode system
(SC210G : 2-electrode system, SC211G : 4-electrode system)

Construction :

SC210G : Direct insertion type
(screw connection, flange connection)
Flow-through type

SC211G : Flow-through type
(pipe connection, screw connection, flange connection)

Watertight Structure :

SC210G : JIS C0920 watertight structure (NEMA 4 or equivalent)

SC211G : JIS C0920 rainproof structure

Wetted Part Materials :

SC210G-A : [sensor] SUS316, polytrifluorochloroethylene resin, fluoro-rubber
[flow-through-type holder] SCS14 or polypropylene resin (PP)

SC210G-B : [sensor] platinum, glass, SUS316, fluoro-rubber
[flow-through-type holder] SUS14 or polypropylene resin (PP)

SC211G : [sensor] platinum, glass, polydifluorochrovinylidene resin,
[flow-through-type holder] polypropylene resin (PP), fluoro-rubber

Measuring Range :

SC210G-A : 0 to 200 µS/cm

SC210G-B : 200 µS/cm to 20 mS/cm

SC211G : 1 mS/cm to 1 S/cm

Measuring Solution Temperature :

SC210G : 0 to 105°C (0 to 100°C when a PP-made flow-through-type holder is used)

SC211G : 0 to 80°C

Measuring Solution Pressure :

SC210G : 10 kgf/cm^2 max. (5 kgf/cm^2 max. when a PP-made flow-through-type holder is used)

SC211G : 2 kgf/cm^2 max.

Cell Constant :

SC210G-A : 0.05 cm^{-1}
SC210G-B : 5 cm^{-1}
SC211G : 10 cm^{-1}

Resistance Temperature Detector (RTD) :

SC210G : Thermister
SC211G : Pt 1000Ω

2.1.2 Models and Suffix Codes

(1) SC210-A Conductivity Detector for Low Range
SC210-B Conductivity Detector for Medium Range

Model	Suffix Code	Option Code	Description
SC210G	·····	·····	Conductivity detector
Sensor type	-A	·····	Low range: cell constant: 0.05 cm^{-1}
	-B	·····	Medium range: cell constant: 5 cm^{-1}
Construction: Direct insertion type, screw-in type	-100	·····	R 1-1/2 (PT 1-1/2 male)
	-103	·····	1-1/2 NPT male
Construction: Direct insertion type, flange type	-206	·····	JIS 10K-50-RF flange
	-207	·····	ANSI CLASS 150-2-RF flange
	-208	·····	JPI CLASS 150-2-RF flange
Construction: Flow-through type (screw-in type piping system)	-302	·····	SCS14 holder, Rc 1/2 screw
	-312	·····	Polypropylene resin (PP) holder, Rc 1/2 screw
	-303	·····	SCS14 holder, 1/2 NPT female
	-313	·····	PP holder, 1/2 NPT female
Construction: Flow-through type (flange type piping system)	-304	·····	SCS14 holder, JIS 10K-15-RF flange
	-314	·····	PP holder, JIS 10K-15-FF flange
	-305	·····	SCS14 holder, ANSI CLASS 150-1/2-RF flange
	-315	·····	PP holder, ANSI CLASS 150-1/2-FF flange
Construction: Direct insertion type with gate valve (Note)	-402	·····	Mounting screw: R 1-1/4 (PT 1-1/4 male)
	-403	·····	Mounting screw: 1-1/4 NPT male
Sensor insertion distance	-L015	·····	Always L015
Length of the Dedicated cable provided	-03	·····	3 m
	-05	·····	5 m
	-10	·····	10 m
Style code	*A	·····	Style A
Option		/SCT	Stainless tag plug, for ANSI wire tube with an adapter (1/2 NPT female)
		/ANSI	

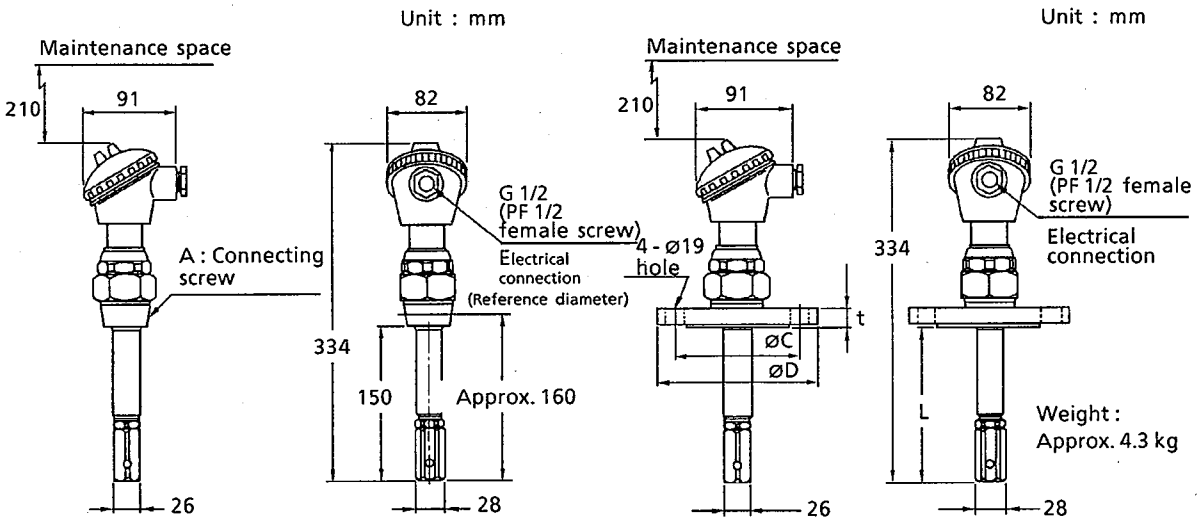
Note: The direct insertion-type detector with gate valve is applied for only the SC210G-A.

(2) SC211G-C Conductivity Detector for High Range

Model	Suffix Code	Option Code	Description
SC211G	.....	.....	Conductivity detector
Sensor type	-C	.....	High range: cell constant: 10 cm^{-1}
Electrode type	-F	.....	4-electrode type
Flow-through type (screw/flange connection piping system)	-312	.....	Polypropylene resin (PP) holder, Rc 1/2 screw
	-313	.....	PP holder, 1/2 NPT female screw
	-314	.....	PP holder, JIS 10K-15-FF flange
	-315	.....	PP holder, ANSI CLASS 150-1/2-FF flange
Length of the dedicated cable provided	-05	.....	5.5 m
	-10	.....	10 m
Style code	*A	.....	Style A

2.1.3 External Dimensions

(1) Direct Insertion-Type Detector (SC210G-A Conductivity Detector for Low Range)



Weight : Approx. 2.1 kg

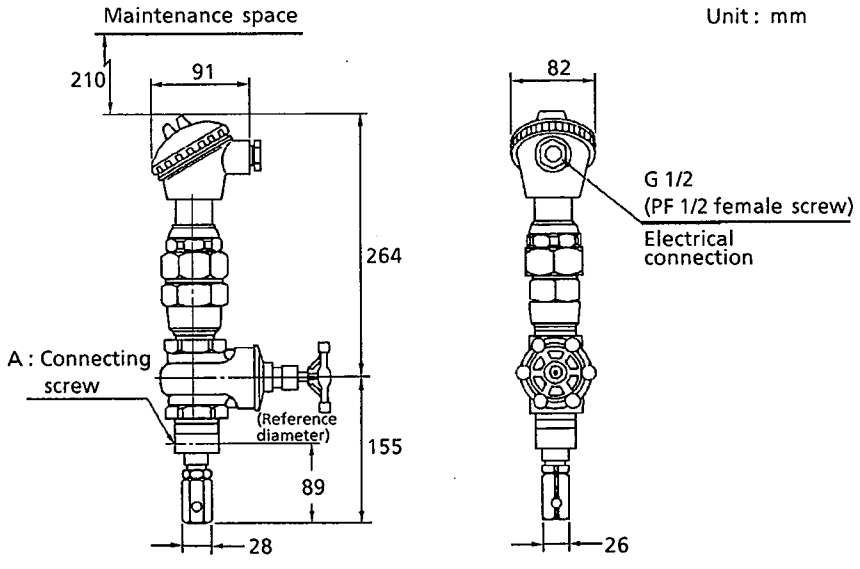
Model	Screw A
SC210G-A-100	R 1-1/2 (PT 1-1/2)
SC210G-A-103	1-1/2 NPT

Figure 2.1 Screw-in Type

Model	Flange rating	øC	øD	t	L
SC210G-A-206	JIS 10K-50-RF	120	155	16	146
SC210G-A-207	ANSI CLASS150-2-RF	120.7	152.4	19.1	143
SC210G-A-208	JPI CLASS150-2-RF	120.6	152	19.5	143

Note : The connecting surface of the ANSI flange is serrated.

Figure 2.2 Flange Type

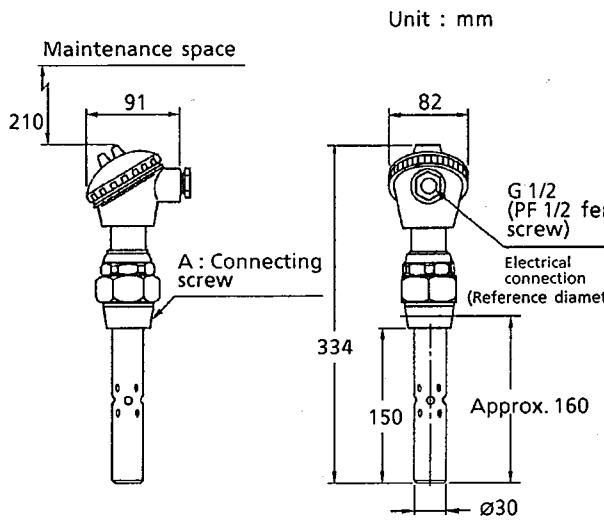


Model	Screw A
SC210G-A-402	R 1-1/4 (PT 1-1/4)
SC210G-A-403	1-1/4 NPT

Weight : Approx. 3.9 kg

Figure 2.3 Screw-in Type with Gate Valve

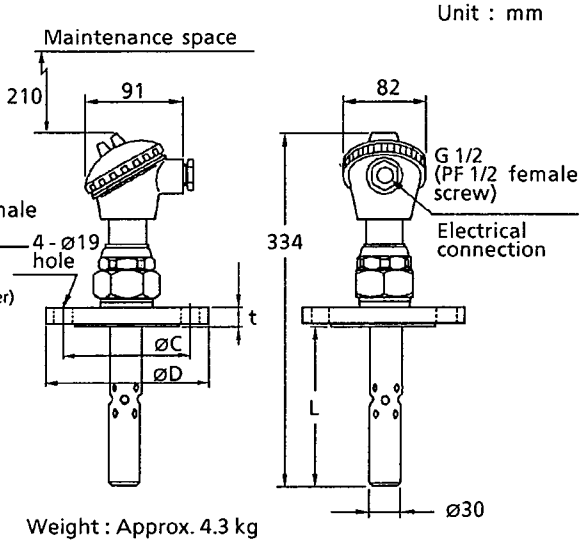
(2) Direct Insertion-type Detector (SC210G-B Conductivity Detector for Medium Range)



Weight : Approx. 2,1 kg

Model	Screw A
SC210G-B-100	R 1-1/2 (PT 1-1/2)
SC210G-B-103	1-1/2 NPT

Figure 2.4 Screw-in Type



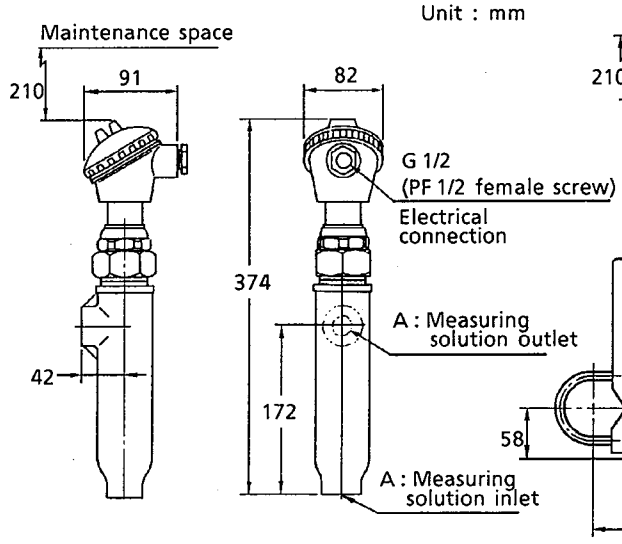
Weight : Approx. 4.3 kg

Model	Flange rating	øC	øD	t	L
SC210G-B-206	JIS 10K-50-RF	120	155	16	146
SC210G-B-207	ANSI CLASS150-2-RF	120.7	152.4	19.1	143
SC210G-B-208	JPI CLASS150-2-RF	120.6	152	19.5	143

Note : The connecting surface of the ANSI flange is serrated.

Figure 2.5 Flange Type

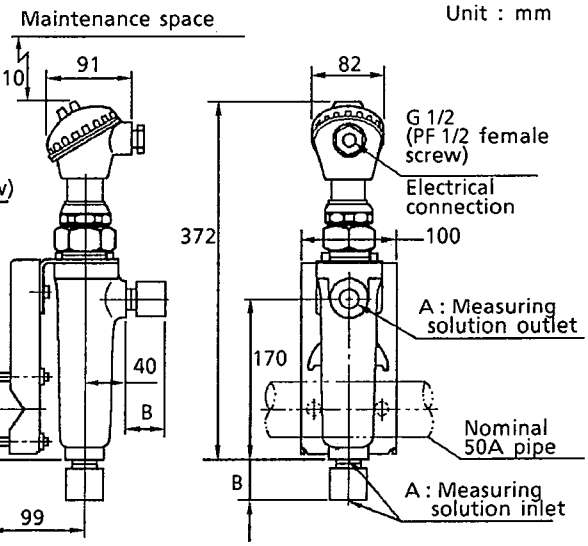
(3) Flow-through-type Detector for Screw-in Type Piping Connecting (SC210G-A Conductivity Detector for Low Range) (SC210G-B Conductivity Detector for Medium Range)



Weight : Approx. 3.7 kg

Model	Screw A
SC210G-☐-302	Rc 1/2 (PT 1/2)
SC210G-☐-303	1/2 NPT

Figure 2.6 Holder Material: Stainless Steel (SCS14)

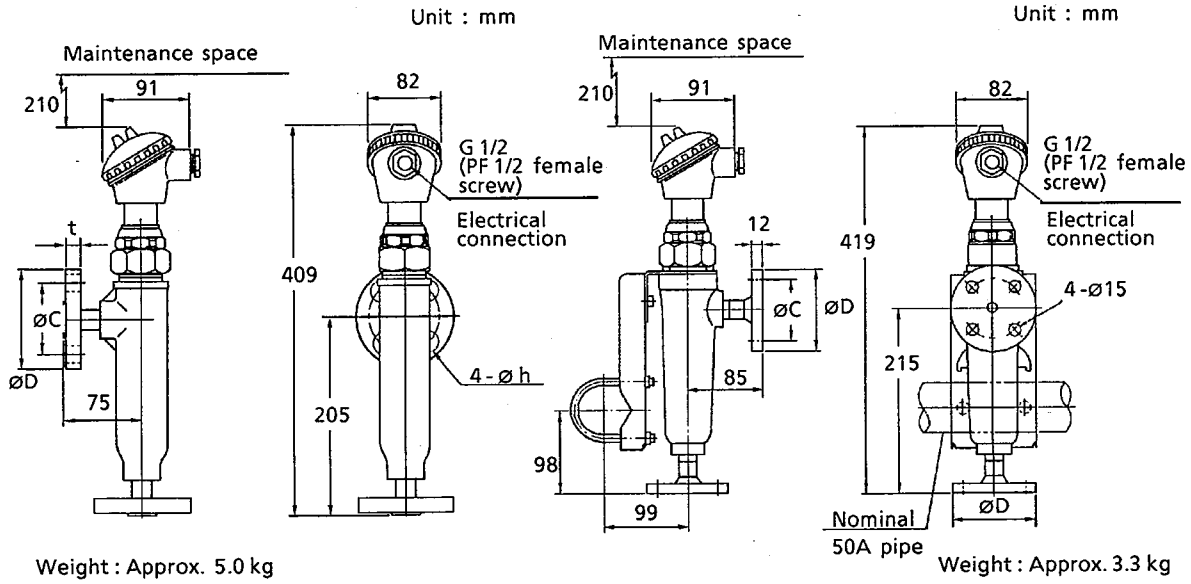


Weight : Approx. 3.1 kg

Model	Screw A	B
SC210G-☐-312	Rc 1/2 (PT 1/2)	–
SC210G-☐-313	1/2 NPT	47

Figure 2.7 Holder Material: Polypropylene

(4) Flow-Through-Type detector for flange type piping connecting (SC210G-A conductivity detector for low range) (SC210G-B conductivity detector for medium range)



Weight : Approx. 5.0 kg

Weight : Approx. 3.3 kg

Model	Flange rating	øC	øD	t	øh
SC210G-☐-304	JIS 10K-15-RF	70	95	12	15
SC210G-☐-305	ANSI CLASS150-1/2-RF	60.5	88.9	11.2	15.7

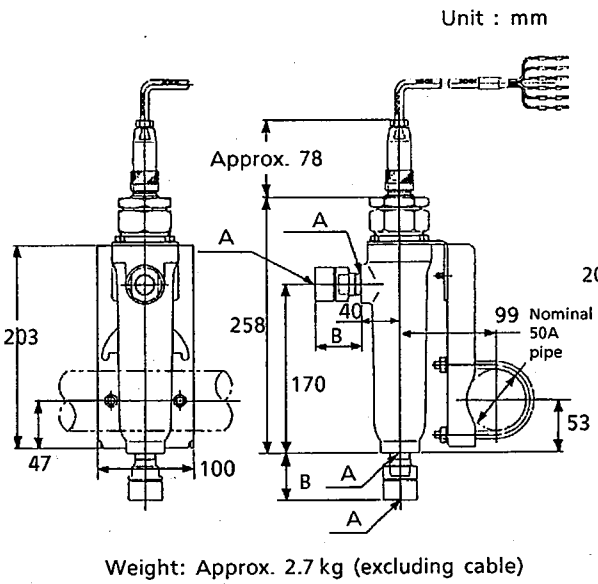
Model	Flange rating	øC	øD
SC210G-☐-314	JIS 10K-15-FF	70	95
SC210G-☐-315	ANSI CLASS150-1/2-FF	60.5	88.9

Note : The surface of the ANSI flange is processed in serration.

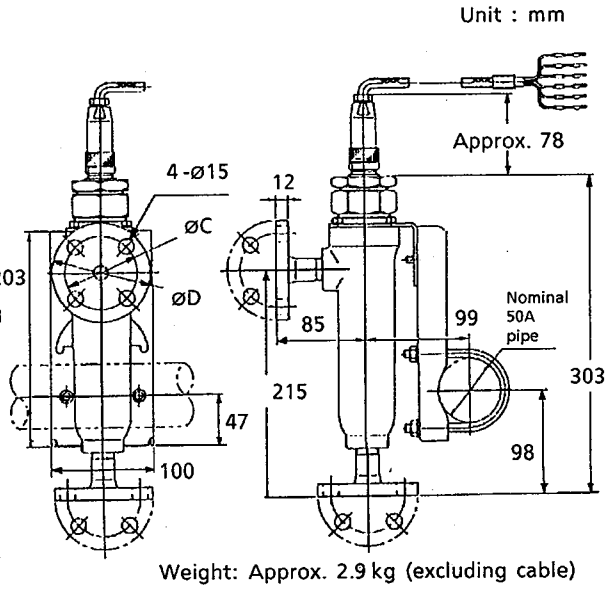
Figure 2.8 Holder Material: Stainless Steel (SCS14)

Figure 2.9 Holder Material: Polypropylene Resin

(5) Flow-through-type Detector (SC211G-C Conductivity Detector for High Range)



Weight: Approx. 2.7 kg (excluding cable)



Weight: Approx. 2.9 kg (excluding cable)

Model	Screw A	B
SC211G-C-F-312	Rc 1/2 (PT 1/2)	–
SC211G-C-F-313	1/2 NPT	47

Model	Flange rating	øC	øD
SC211G-C-F-314	JIS 10K-15-FF	70	95
SC211G-C-F-315	ANSI CLASS150-1/2-FF	60.5	88.9

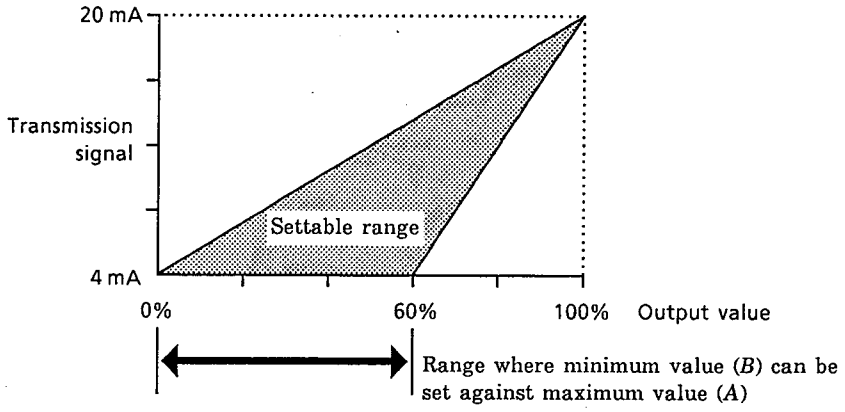
Figure 2.10 Screw-in Type Piping Connection

Figure 2.11 Flange Type Piping Connection

2.2 Intelligent Conductivity Transmitter

2.2.1 Standard Specifications

Watertight Structure	:	JIS C0920 watertight structure (equivalent to NEMA 4 water-proof structure)
Explosion-proof Structure	:	Nonexplosion-proof type (for SC200G) or intrinsically safe explosion-proof type (for SC200S)
Material	:	Case : Cast aluminum alloy Window : Polycarbonate
Finish	:	Baked polyurethane resin paint
Color	:	Cover : Deep sea moss green, Munsell 0.6GY3.1/2.0 or equivalent Case : Frosty white, Munsell 2.5Y8.4/1.2 or equivalent
Weight	:	Transmitter body : Approx. 2.4 kg Mounting bracket : Approx. 0.7 kg
Mounting	:	50A pipe mounting, wall mounting or panel mounting
Ambient Temperature	:	−10 through 55°C
Storage Temperature	:	−30 through 70°C
Signal Cable Inlet	:	JIS A15 or equivalent plastic waterproof gland (cable outer diameter : 9 to 12 mm)
Measuring Range	:	0 to 2 S/cm
Display Method	:	Digital (LCD) display
Display Range	:	0 to 1.999 S/cm
Transmission Signal	:	4 — 20 mA DC insulated transmission output
Transmission Signal Range	:	Any range can be set between the minimum range 0 — 0.5 μS/cm and the maximum range 0 — 2 S/cm. A value other than "0" can be set as the minimum value (where the minimum (A) and maximum (B) values must satisfy "$B/(B-A) \leqq 2.5$").



Transmission Signal Output Characteristics :

Linear output
Line-segment approximation output
(Input is 20 steps by 5%)
Reversed output

Allowable Length of Transmission Signal Cable :

2000 m max. (for nonexplosion-proof system)

Temperature Compensation :

Reference temperature : Can be set arbitrarily between 0 to 100°C

Temperature compensation coefficient :

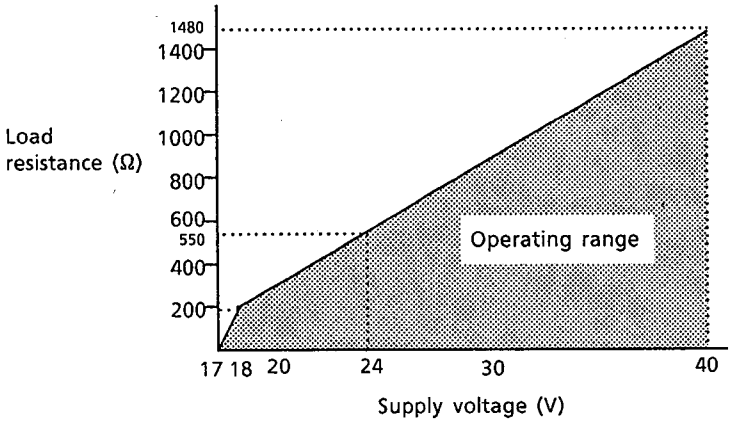
Can be set arbitrarily between −10 to +10 %/°C and can be automatically calculated by the temperature coefficient of sodium chloride (NaCl) solution.

Input temperature signal : Temperature signal for detector RTD (thermister for SC210G, and Pt 1000Ω for SC211G)

Power Supply Voltage : 17 through 40 V DC (supplied from the distributor)

Note: When building up a intrinsically safe explosion-proof system, use the distributor SDBT or PH201G.

Load characteristics (relationship between the supply voltage and load resistance)



Nonexplosion-proof System

Display Function :

Display : 3-1/2 digit numerals (data display), 6-digit numerals and alphabetical letters (message, auxiliary data)

Content of display : conductivity, temperature, mA output, cell constant, reference temperature, temperature compensation coefficient, error indication (when an error occurs), holding indication (when holding occurs), interactive message, key operation request

Setting / Execution Instruction Functions :

Functions available on "operation level" :

Instruction of calibration execute, selection of content displayed on the "message display unit", instruction of signal holding set / release

Functions available on "setting level" :

Setting of output range, setting of hold parameters, selection of signal hold set / release, selection of hold preceding value / preset value, setting of preset value, input of conductivity for temperature coefficient calculation

Functions available on "service level" :

Selection of °C / °F, setting of reference temperature, selection of a RTD, setting of output characteristics, setting of cell constant, selection of auto-return function ON / OFF, selection of electrode type (2-electrode type / 4-electrode type), one-point temperature calibration (*), selection of burn-up ON / OFF, setting of temperature compensation coefficient

* : One-point temperature calibration is enabled only when "Pt 1000Ω" or "Ni 100Ω" is entered as the type of the RTD to be specified on "service level".

Self-diagnostic Functions : Temperature range failure, conductivity range failure, electrode contamination detection, temperature compensation coefficient error, automatically calibrated value error, electric circuit failure, setting input failure

<Reference Performance> (Performance of Single Transmitter Unit)

[In the range of 1 µS/cm to 2 S/cm]

Repeatability : 0.5% of span

Accuracy : ±1% of span

[In the range of 0 to 1 µS/cm]

Accuracy : ±0.02 µS/cm and ±0.02 mA

2.2.2 Models and Suffix Codes

(1) SC200G Intelligent Conductivity Transmitter

Model	Suffix Code	Option Code	Description
SC200G	·····	·····	Intelligent conductivity transmitter
Explosion-proof	-N	·····	Nonexplosion-proof construction (always -N for SC200G)
Language used for cautions	-J	·····	Japanese
	-E	·····	English
Style code	*A	·····	Style A
Optional specifications • Mounting bracket		/PI	With pipe mounting bracket
		/W	With wall mounting bracket
		/PA	With panel mounting bracket
• Hood		/H	With a Awning hood
• Tag plate		/SCT	Stainless steel tag plate
• Option conduit adapter		/AFTG	G 1/2 (PF 1/2 female) machined

(2) SC200S Intelligent Conductivity Transmitter

Model	Suffix Code	Option Code	Description
SC200S	·····	·····	Intelligent conductivity transmitter
Explosion-proof	-J	·····	Intrinsically safe explosion-proof construction
Language used for cautions	-J	·····	Japanese
	-E	·····	English
Style code	*A	·····	Style A
Optional specifications • Mounting bracket		/PI	With pipe mounting bracket
		/W	With wall mounting bracket
		/PA	With panel mounting bracket
• Hood		/H	With a Awning hood
• Tag plate		/SCT	Stainless steel tag plate
• Option conduit adapter		/AFTG	G 1/2 (PF 1/2 female) machined

2.2.3 External Dimensions

(1) Mounting On Pipe

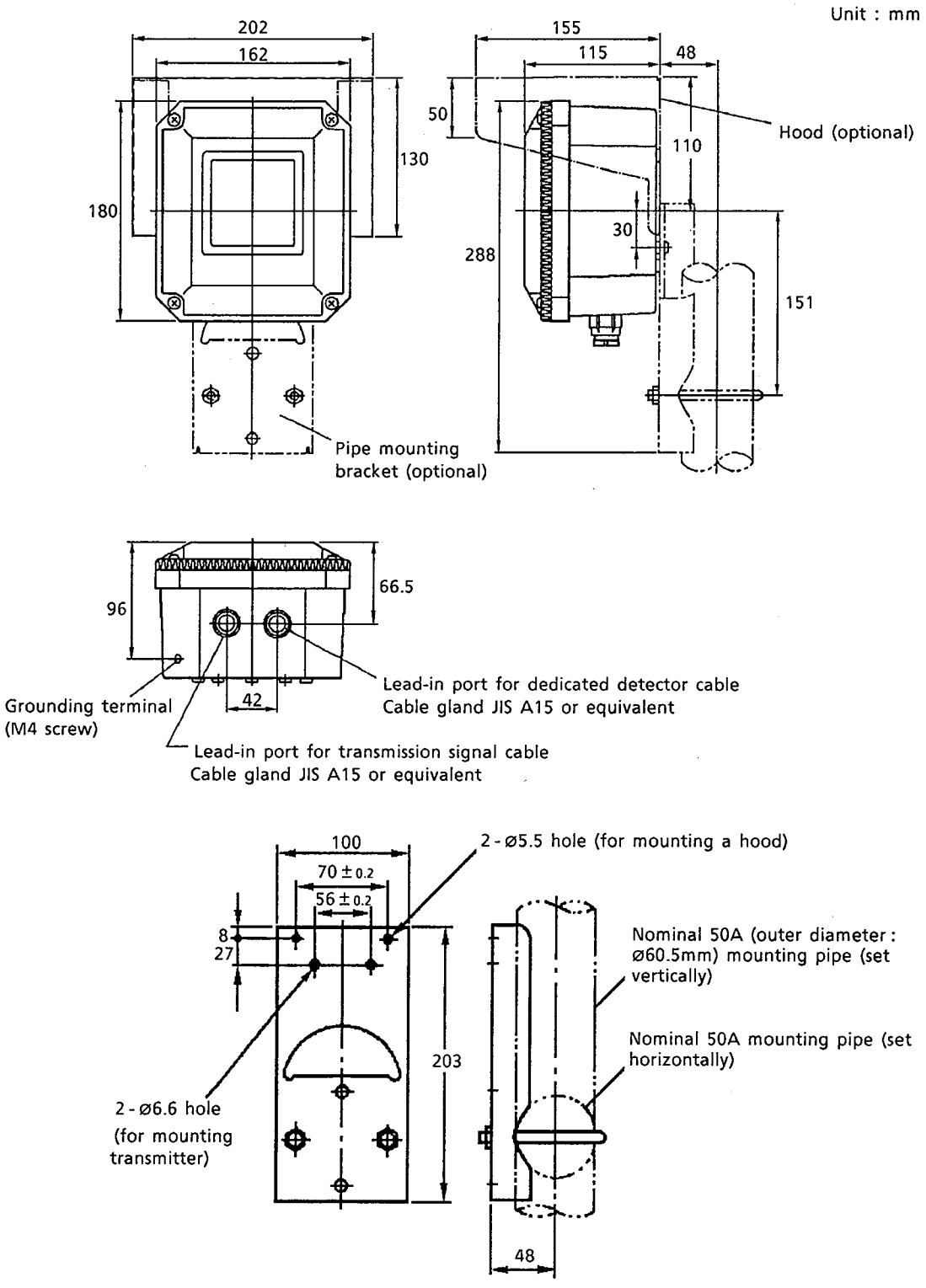


Figure 2.12 External Dimensions of Intelligent Conductivity Transmitter (mounted on pipe)

(2) Mounting on Panel or Wall

Unit : mm

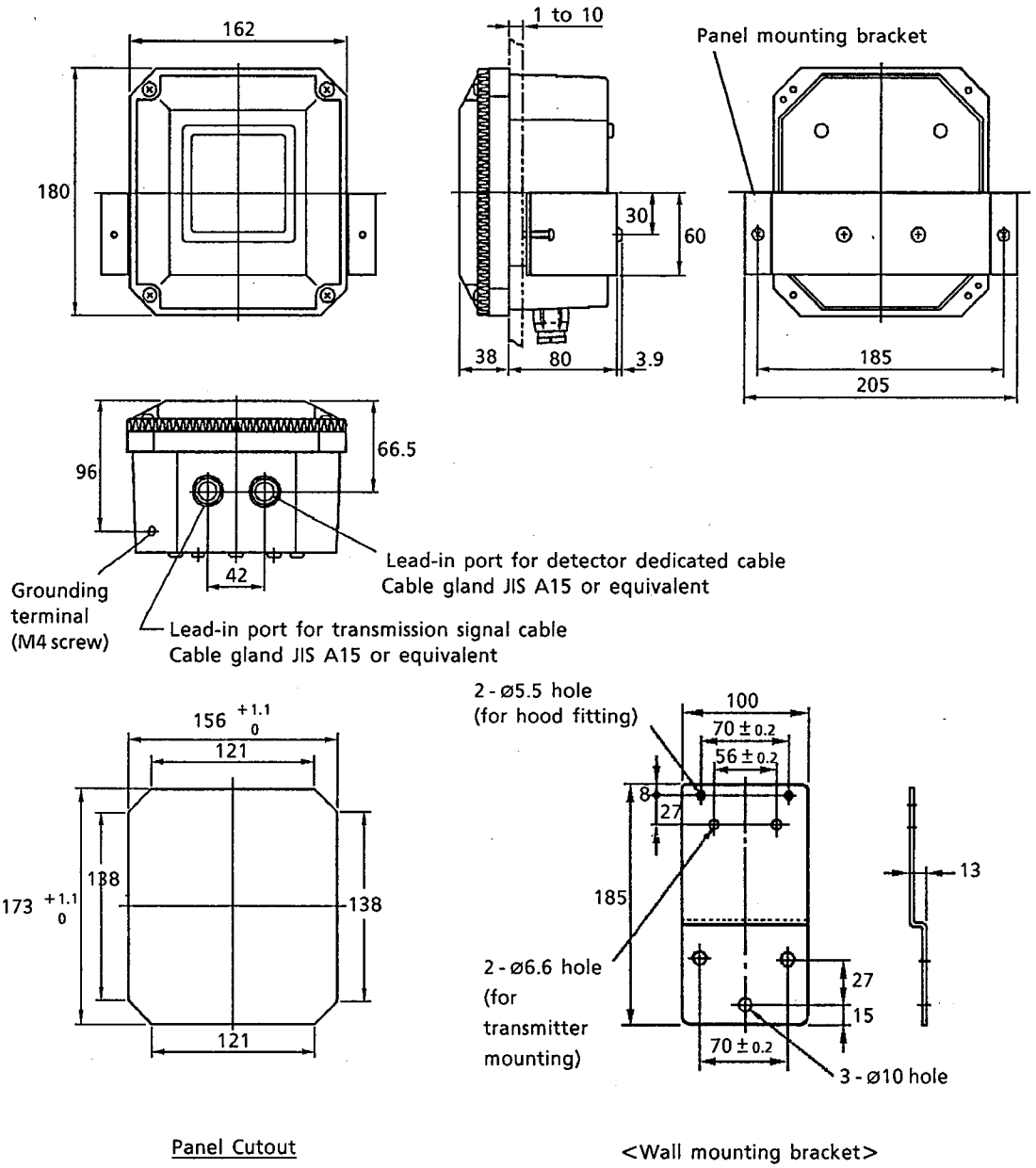


Figure 2.13 External Dimensions of Intelligent Conductivity Transmitter (for mounting on panel or wall)

2.3 Handling of the Intrinsically safe Explosion-proof Conductivity Transmitter

The SC200S intelligent conductivity transmitter is an instrument whose explosion-proof characteristics have been verified by examination based on the Labor Safety and Hygiene Law.
Thus this instrument can be installed in a places where explosive gas may be generated. However, because the environmental conditions and handling are restricted, be sure to follow the precautions mentioned on the product and in the instruction manual.

2.3.1 Explosion-proof Specifications for SC200S Intelligent Conductivity Transmitter

The SC200S intelligent conductivity transmitter has a intrinsically safe explosion-proof construction.

2.3.2 Explosion-proof Specifications

Look at the conductivity transmitter you are going to use. The intrinsically safe explosion-proof type conductivity transmitter indicates its name, examination pass No., explosion-proof structure and object gas, and ambient temperature. Additionally precautions on use are also mentioned.

2.3.3 Restriction on Installation Place

The intrinsically safe explosion-proof type conductivity transmitter can be installed in a place where the explosive characteristics of an object gas was verified for this instrument may be generated. However, avoid installation in a class 0 plocation.

2.3.4 Environmental Conditions of Installation Site

As the environmental conditions for this instrument, the humidity and altitude are as follows. If a temperature is indicated, use it under that condition.

Humidity : 45 to 85 % RH
Altitude : Up to 1000 m

2.3.5 Outside Wiring Work

The wiring cable to be connected to the intrinsically safe explosion-proof structure (safety barrier / conductivity transmitter) must not be so long as to exceed the specified inductance and electrostatic capacity, and the terminal connection must be terminated in a specified manner. During wiring, take care in prevent contact between the intrinsically safe circuit and nonintrinsically safe circuit as well as damage to cables.

2.3.6 Maintenance

Upon replacing a part or repairing the intrinsically safe explosion-proof construction, the instrument must be restored to its original condition electrically and mechanically as a rule. Thus, never change the specifications or make modification.
Further, repair is limited to the extent which requires no use of a soldering iron. Also, before repair work, be sure to move the instrument to a safe place.

3. CONDUCTIVITY DETECTOR INSTALLATION AND PIPING

This chapter explains the installation and piping procedure for the SC21□G conductivity detector.
For installation of the SC200□ intelligent conductivity transmitter and wiring, refer to Chapter 4.

3.1 Unpacking

After close inspection at the plant, the SC21□G conductivity detector is packed carefully so as not to be damaged during shipment. When unpacking, handle carefully to avoid any violent shock.

After unpacking is completed, inspect the appearance visually and confirm that there is no damage. For confirmation, look at the model code shown on the name plate and verify that the product is the ordered one. Additionally, confirm the length of the dedicated cable provided for the detector.

3.2 Installation

3.2.1 Site Selection

Install the conductivity detector in a place where:

- Facilitates inspection and maintenance
- The temperature and pressure of the measuring solution satisfy their usable conditions
- The measuring solution contains no bubbles affecting the measured value
- There is no change in the level of the measuring solution

3.2.2 Preparation

Conductivity detectors are divided into direct insertion types, which are attached directly to the electrode insertion hole provided on a process pipe, etc., and flow-through types which are connected to a sampling pipe.
When using the direct insertion type conductivity detector, provide it with an electrode insertion hole of an appropriate screw size or flange size.

When using a flow-through type conductivity detector whose holder is made of polypropylene resin, provide with a nominal 50A pipe (outer diameter: 60.5 mm) for mounting the detector. The mounting pipe for mounting can be set vertically or horizontally.

Note: When the holder is made of polypropylene resin, be sure to fix the detector on pipes or other structure to prevent the pipe joint from breakage.
When the holder material is stainless steel (SCS14), support the detector by conduit pipe. Thus it is not necessary to install special mounting pipe.

<Electrode Insertion Hole Handling Procedure>

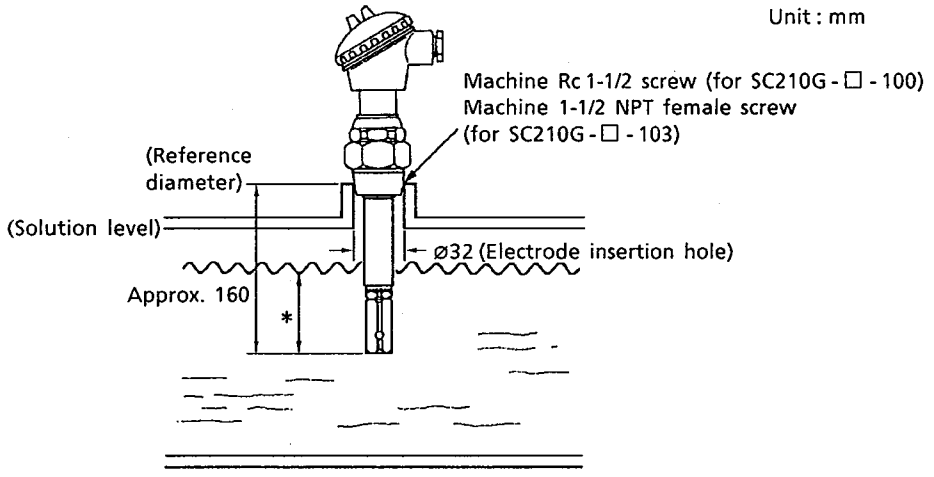
When handling the electrode insertion hole, consider the following points:

- Does the measuring solution overflow through the electrode insertion hole when the conductivity detector is removed for maintenance?
- Can the conductivity detector be removed for maintenance even if the process solution cannot be stopped arbitrarily?

In addition, the mounting direction of the detector is not especially limited.

(1) Screw-in Type

Figure 3.1 shows the procedure for electrode insertion hole processing in case of the screw-in type.



*: Always keep the electrode dipped more than 60 mm.

Figure 3.1 Procedure for Electrode Insertion Hole Processing for the Screw-in Direct Insertion Type Detector.

Figure 3.2 shows the procedure for the direct insertion type with a gate valve.

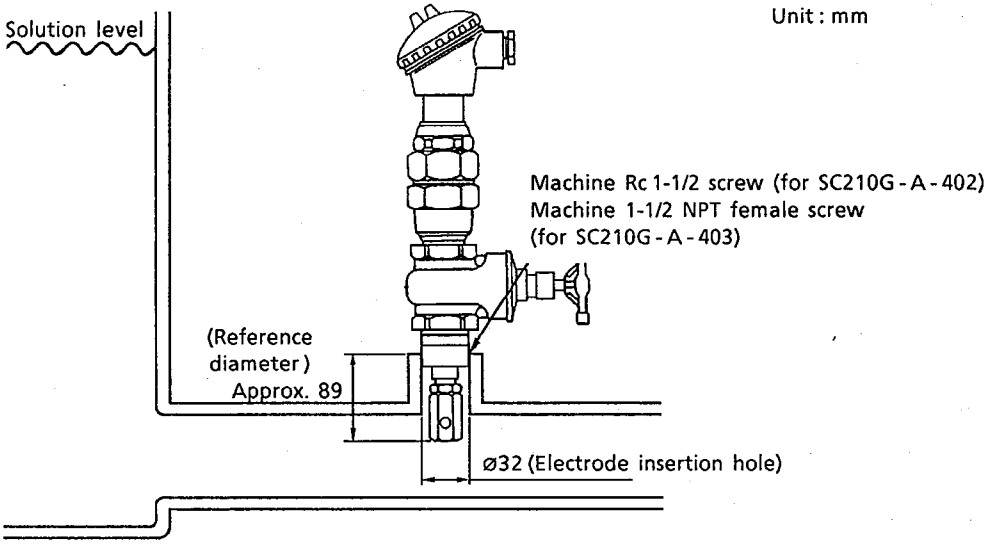
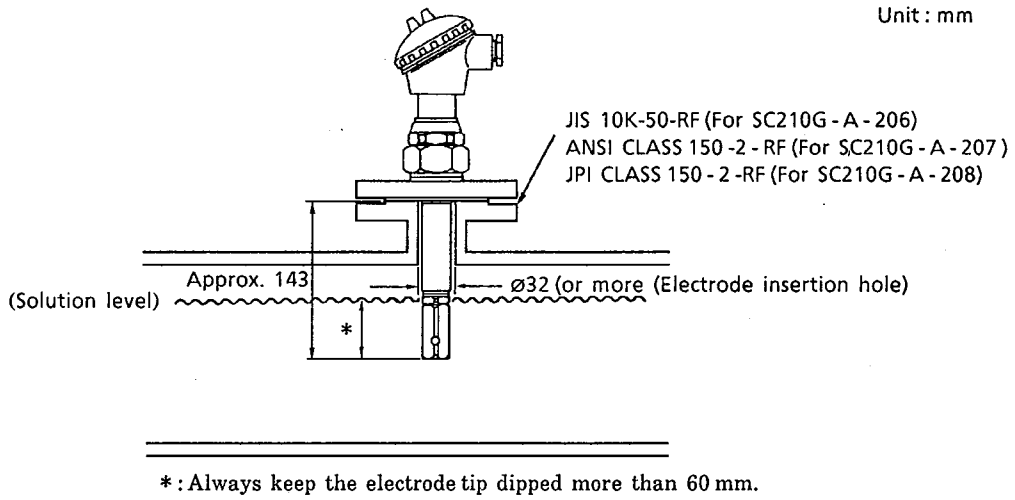


Figure 3.2 Procedure for Electrode Insertion Hole Processing for the Direct Insertion Type Detector with Gate Valve

(2) Flange Type

Figure 3.3 shows the procedure for electrode insertion hole processing for the flange type.



*: Always keep the electrode tip dipped more than 60 mm.

Figure 3.3 Procedure for Electrod Insertion Hole Processing for the Flange Type Direct Insertion Type Detector

<Procedure for the Installation of Flow-through-type Detector Mounting Pipe>

This procedure is only applicable for the polypropylene resin holder.

Install a 50A pipe of nominal size (outer diameter : 60.5 mm) with sufficient strength vertically or horizontally. When the mounting pipe is installed vertically, the conduit pipe is free to install vertically. When the mounting pipe is installed vertically, the conduit pipe is free to install horizontally.

The detector holder is structured to permit changing the direction of the measuring solution outlet backwards / forwards and right / left.

Cable lead-in port can also be changed in any direction horizontally. The detector can be fixed on a wall by removing the pipe mounting bracket.

When mounting the detector in this manner, process holes as shown in Figure 3.4.

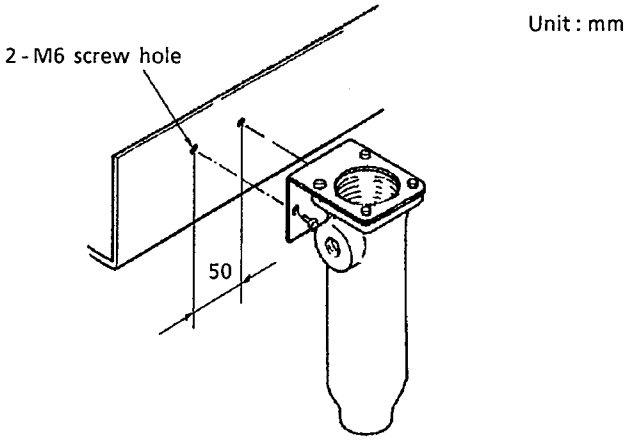


Figure 3.4 Processing of Holes for Mounting on the Wall

3.2.3 Installation of the Detector

When the installation preparations mentioned in section 3.2.2 are completed, install the detector.

In case of the screw-in direct insertion type detector, wind seal tape on the thread part and drive it fully into the electrode insertion hole.

In case of the flange type direct insertion detector, put a gasket between the detector's flange surfaces and electrode insertion hole and tighten the four bolts with equal force.

In case of the flow-through-type detector, fix the detector at the specified position of the mounting pipe.

When using the SC210G conductivity detector, after installing it, adjust the direction of the terminal wiring port so as to facilitate wiring. Loosening the union nut allows the terminal box to turn freely.

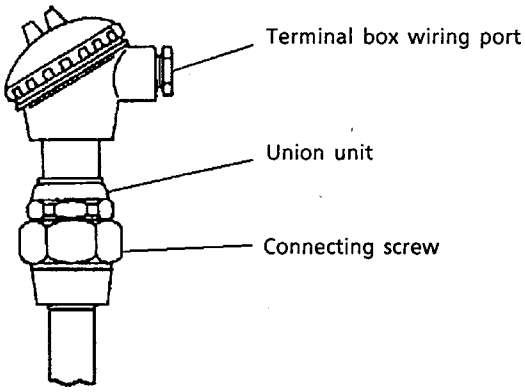


Figure 3.5 Direction Adjustment Union Nut

3.3 Piping

When using the flow-through-type conductivity detector, if the detector is not connected directly to a process pipe, install a sampling pipe to introduce the measuring solution to the detector.

The procedure for installation of the sampling pipe is explained here.

3.3.1 Joint Position

Pipe joint holes are provided on the bottom and side of the holder, and the bottom pipe joint hole faces the measuring solution inlet and side pipe joint hole, the measuring solution outlet.

In case of the stainless steel (SCS14) holder, the side pipe joint hole can be set in any horizontal direction.

The polypropylene resin holder is assembled so that the pipe joint hole faces right when the fixing bracket is at the rear, as a rule. By changing the installation direction of the bracket, the pipe joint hole can be made to face to the left or front. (See Figure 3.6)

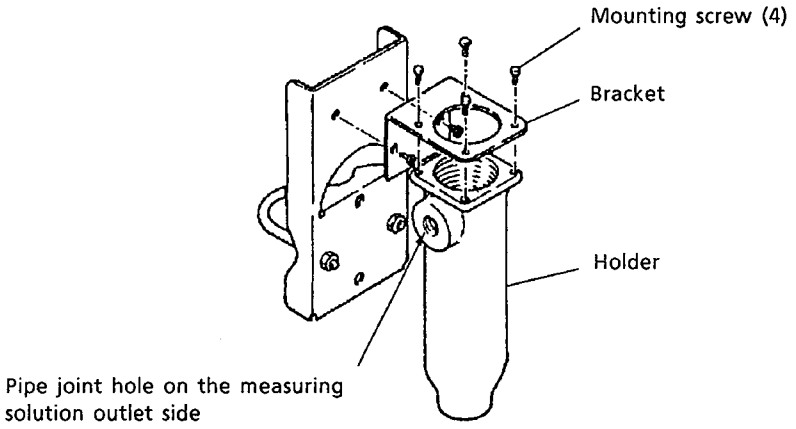


Figure 3.6 Bracket for Fixing the Polypropylene Resin Holder

3.3.2 Material

When connecting a pipe to the detector, use one of the following:

(1) For the Polypropylene Resin (PP) Holder

- Hard vinyl chloride tube (JIS K9741) : nominal size: 16
- Polypropylene resin tube : nominal size: 16
- Wired soft vinyl chloride tube : nominal size: 15

(2) For the stainless steel (SCS14) holder

- Stainless steel pipe (JIS G3459) for piping SUS304 or SUS316 : nominal size : 15

3.3.3 Notes

(1) Pressure of Measuring Solution

For the SC210G-A and SC210G-B conductivity detector, when the holder is made of stainless steel, the allowable maximum pressure is 10 kgf/cm^2 G in terms of the strength. For the polypropylene resin holder, the allowable maximum pressure is 5 kgf/cm^2 G.

The usable pressure of the SC211G-C conductivity detector is limited depending on the holder material and electrode, and the allowable maximum pressure is 2 kgf/cm^2 G.

(2) Temperature of Measuring Solution

For the SC210G-A and SC210G-B conductivity detector, the allowable maximum temperature is 105°C when the material of the holder is stainless steel, and 100°C when it is polypropylene resin.

In the SC211G-C conductivity detector, the allowable maximum temperature of the measuring solution is 80°C.

Meanwhile, conductivity differs in even the same solution depending on the temperature. In the SC200 intelligent two-wire conductivity transmitter system, conductivity compensated by the temperature is obtained by setting a reference temperature and temperature compensation coefficient. Thus, the less the temperature of the measuring solution varies from the reference temperature, the more excellent the measuring accuracy becomes.

(3) Flow rate of Measuring Solution

Because the flow rate does not affect measuring accuracy, it is not especially necessary to control the flow rate. However, when slurry is contained in the measuring solution, if it passes through the detector at a large flow rate, the electrode and holder may be worn or damaged.

Except when a large flow rate is needed, it is recommended to keep it below 20 l/min.

(4) Bubbles in Measuring Solution

If a large amount of bubbles exist in the measuring solution, the measured value deflects, disturbing proper measurement.

When bubbles exist in the measuring solution in a process pipe, take appropriate measures; for example, by providing an overflow tank as shown in Figure 3.7.

(5) Safety at Maintenance Time

When removing the electrode for inspection and maintenance, mount a stop valve to the pipe to prevent measuring solution from spouting from the holder.

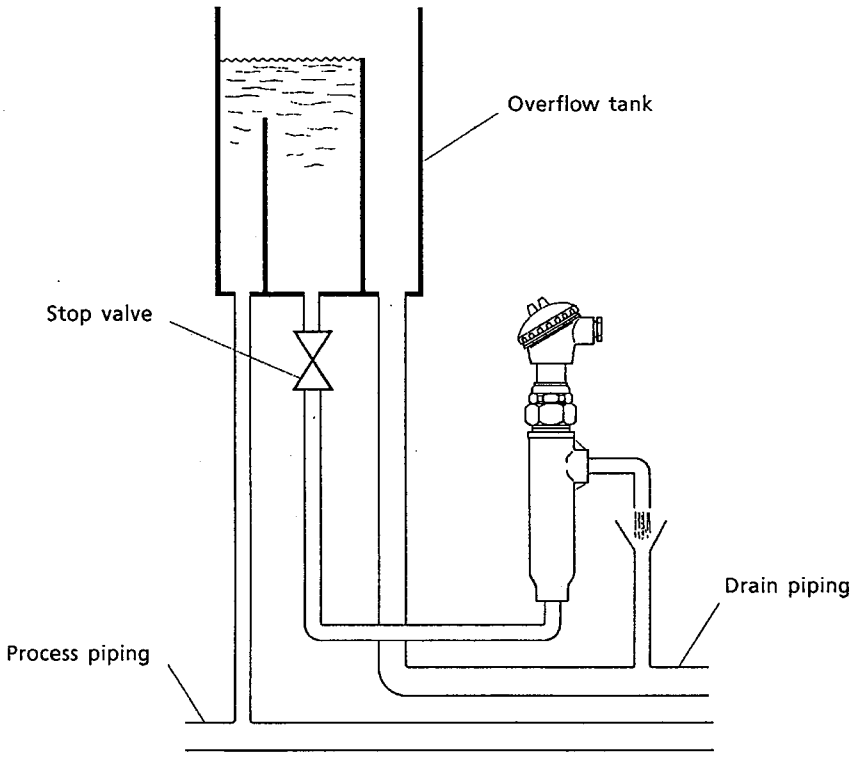


Figure 3.7 Example of Sampling Piping with Bubble Removal Function

4. CONDUCTIVITY TRANSMITTER INSTALLATION AND WIRING

This chapter explains the installation procedure for the intelligent conductivity transmitter and the wiring procedure for the SC200 intelligent two-wire conductivity transmitter system.

4.1 Unpacking

After close inspection at the plant, the intelligent conductivity transmitter is packed carefully so as not to be damaged during shipment. When unpacking, handle it carefully not avoid any violent shock.

After unpacking is completed, inspect the appearance visually and confirm that there is no damage. Additionally, for confirmation, check the name plate to confirm that the product is the ordered one.

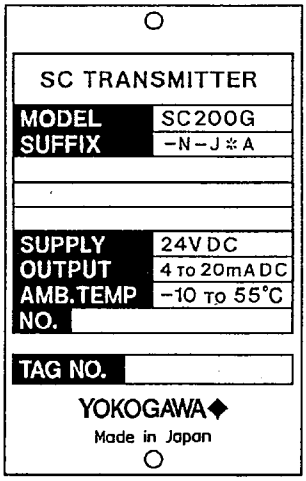


Figure 4.1 Example of Name Plate Indication

4.2 Installation

4.2.1 Site

The intelligent conductivity transmitter is waterproof structured. However, it is recommended to install it in a place free of water. Additionally, select a place where:

- Little corrosive gas
- Little mechanical vibration
- Little ambient temperature changes and near normal temperature (The allowable ambient temperature of this unit is −10 to +55°C.)
- Humidity can be kept at 45 to 85% (This unit can be utilized in an environment of 10 to 100 % RH as long as no condensation occurs. However, it is recommended to install it in a place free of high or low humidity.)

If there is any fear that the inside temperature exceed the unit's use limits due to direct sunshine, provide it with a awning hood (optional).

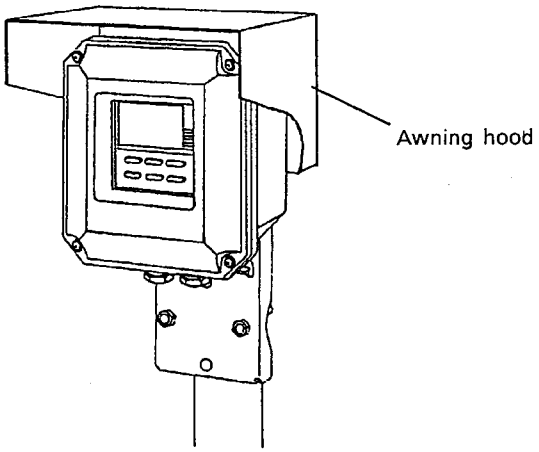


Figure 4.2 Installed Awning Hood

4.2.2 Method

The intelligent conductivity transmitter can be mounted on a panel, the wall or pipe (nominal diameter 50A : outer diameter 60.5 mm). For the mounting, a special mounting bracket is needed in each case. A designated mounting bracket is attached to the conductivity transmitter.

(1) Panel Mounting

Figure 4.3 shows the panel mounting bracket and mounting procedure.

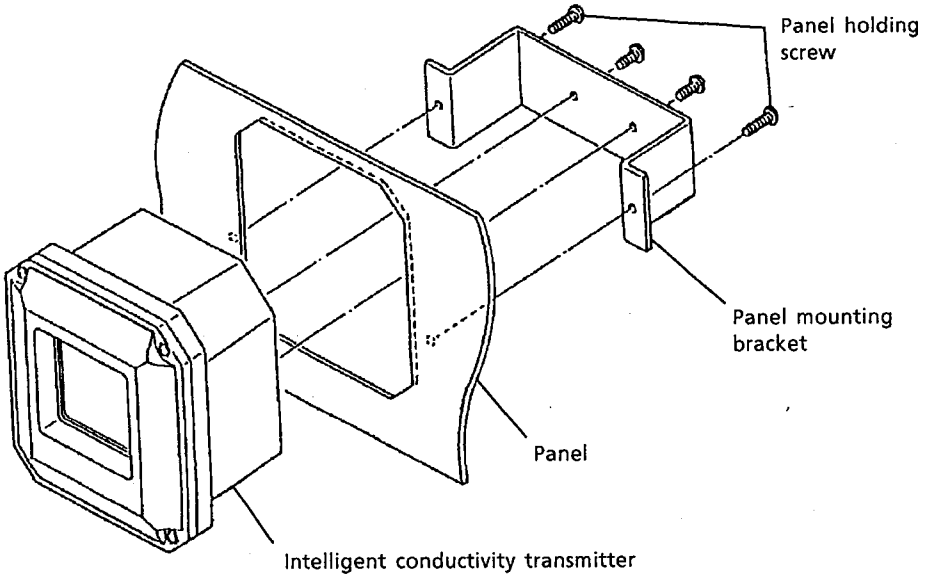


Figure 4.3 Panel Mounting Bracket and Mounting Procedure

When mounting on a panel, cut the panel as shown in Figure 4.4.

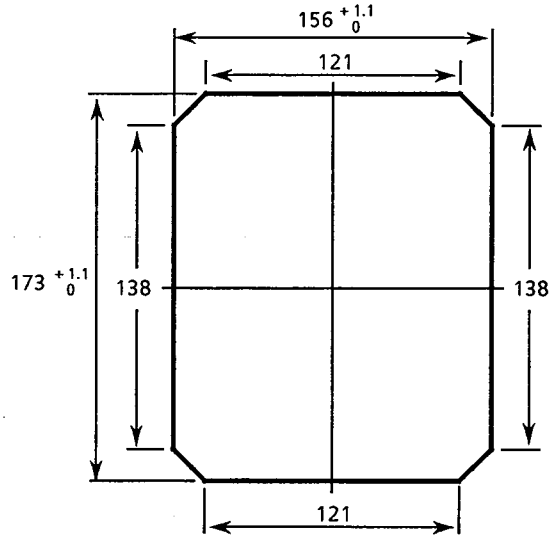


Figure 4 Panel Cut Dimensions

(2) Pipe Mounting

When mounting on a pipe, place the rigid mounting pipe in a vertical or horizontal direction.

Figure 4.5 shows the pipe mounting.

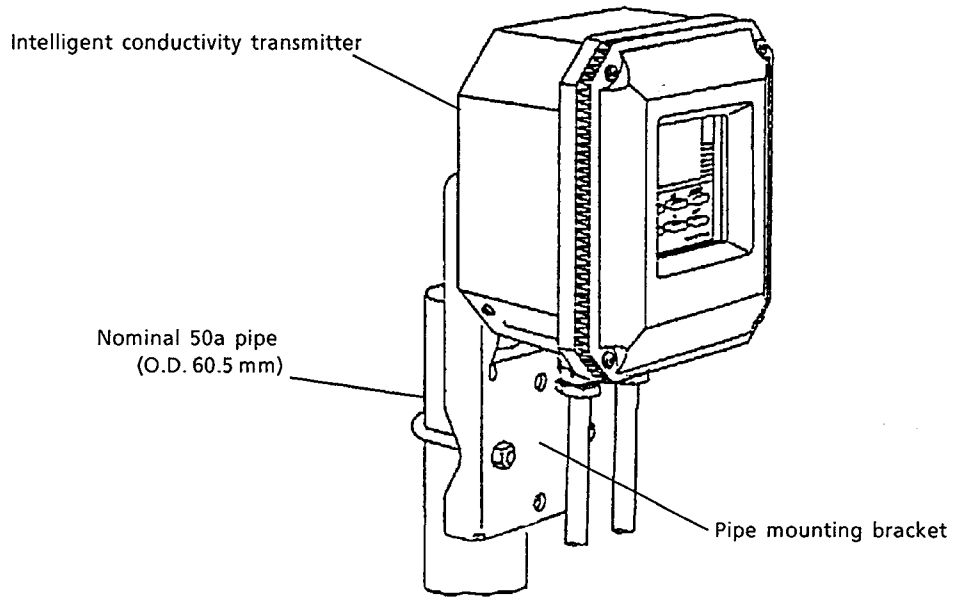


Figure 4.5 Pipe Mounting

(3) Wall Mounting

Figure 4.6 shows the mounting bracket and procedure for mounting on the wall. When mounting, machine screw holes (M8 screw (3)) as shown in the figure.

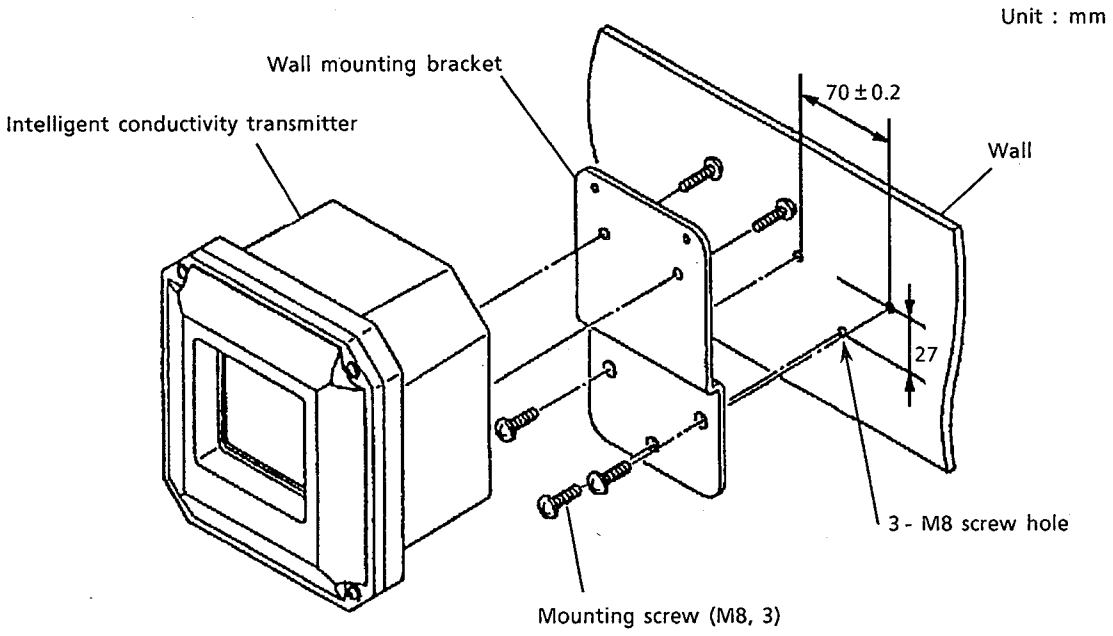


Figure 4.6 Wall Mounting Bracket and Procedure

4.3 Wiring

This section describes the SC200 intelligent two-wire conductivity transmitter system. For details on wiring for the distributor and safety barrier (intrinsically safe explosion-proof system), refer to their respective instruction manuals. Note that wiring to the conductivity transmitter is not included.

4.3.1 Outline

The wiring systems for the SC200 intelligent two-wire conductivity transmitter system are shown in Figure 4.7 (nonexplosion-proof system) and Figure 4.8 (intrinsically safe explosion-proof system).

(1) Wiring of the Nonexplosion-proof System

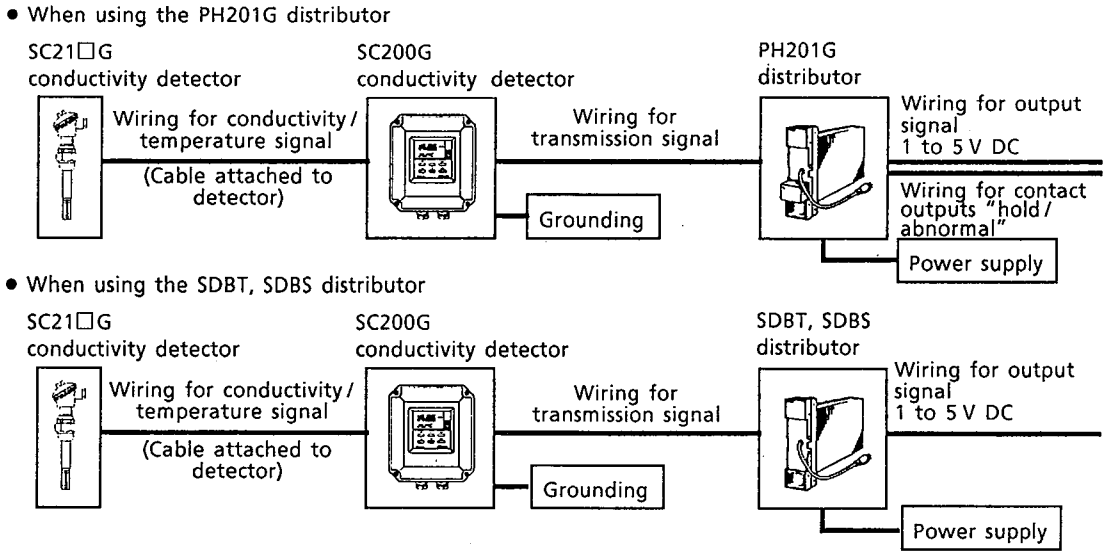


Figure 4.7 Wiring of the Nonexplosion-proof System

(2) Wiring of the Intrinsically Safe Explosion-proof System

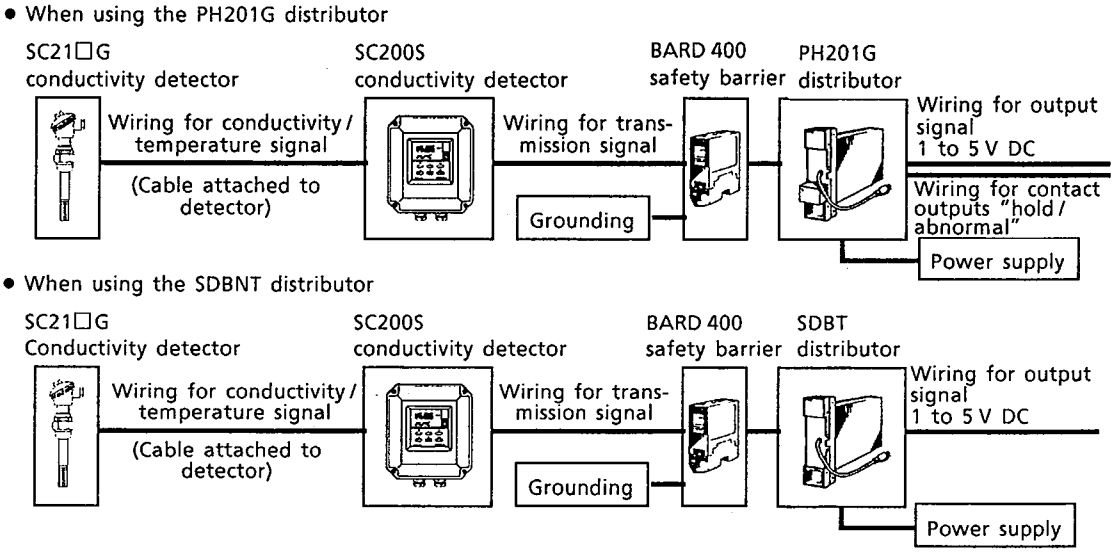


Figure 4.8 Wiring of the for Intrinsically Safe Explosion-proof System

4.3.2 Detector's Dedicated Cable Connection

The conductivity detector is provided with a dedicated cable for receiving square wave AC voltage with a specified frequency and voltage and the transmitter is provided with a dedicated cable for transmitting a current signal proportional to the conductivity of the measuring solution and a temperature signal for temperature compensation.
The detector's dedicated cable differs in structure between the SC210G conductivity detector (2-electrode type) and SC211G conductivity detector (4-electrode type). The cable length is specified.

Figure 4.9 shows the connection diagram for the detector's dedicated cable.

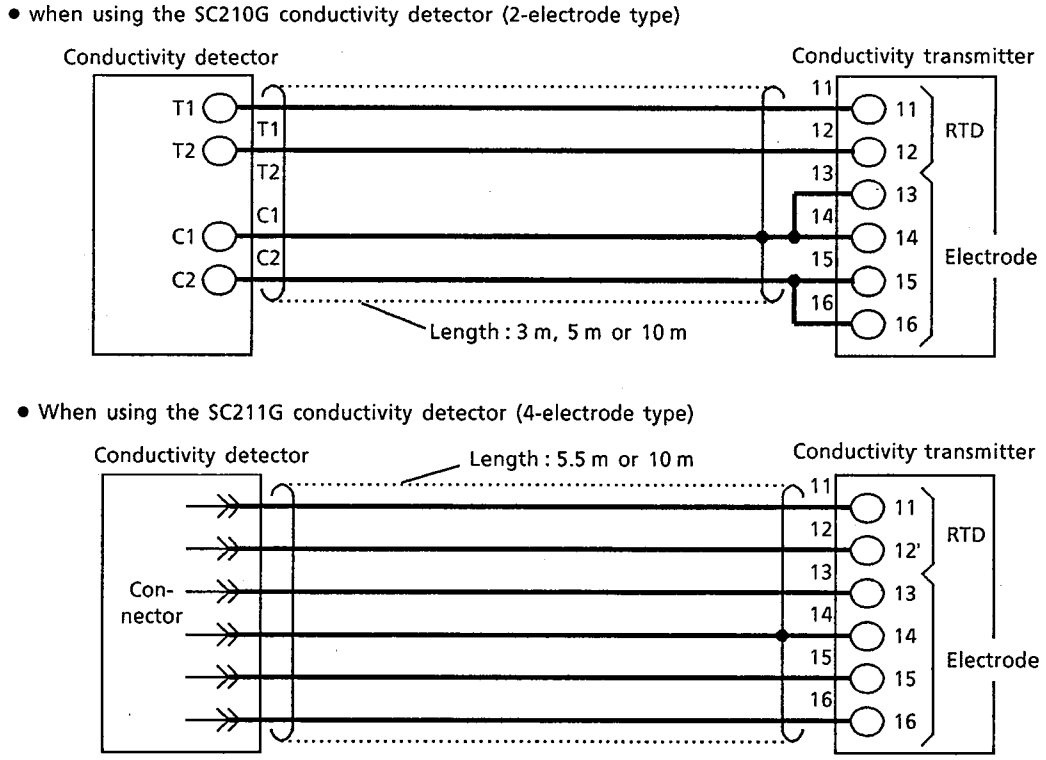
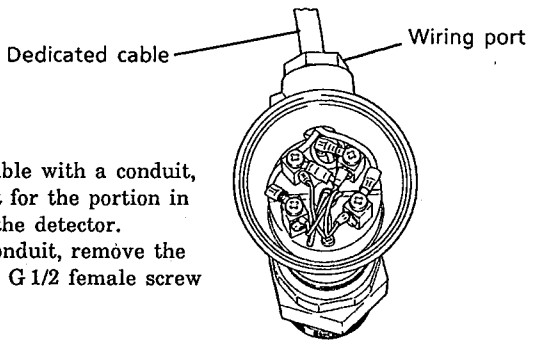


Figure 4.9 Connection of the Detector's Dedicated Cable

[Connection to the Conductivity Detector]

(1) SC210G Conductivity Detector (2-electrode type)

Run the cable through the wire port and connect each conductor to an appropriate terminal. Figure 4.10 shows the completed cable connection.



Note: When protecting a cable with a conduit, use a flexible conduit for the portion in the neighborhood of the detector. When coupling the conduit, remove the cable gland. (Use the G 1/2 female screw for the wire port.)

Figure 4.10 Connection of the Dedicated Cable in the Detector's Terminal Box

(2) SC211G conductivity detector (4-electrode type)

The terminal end of the detector for the SC211G dedicated cable is a connector. Insert the cable connector into the detector connector and firmly fix the nut.

[Connection to the Conductivity Transmitter]

Connection to the conductivity transmitter is the same for the SC210G and SC211G dedicated cables. Connect each cable in the following manner.

(1) Loosen the four screws on the front side of the intelligent conductivity transmitter and remove the case cover.

Note: In the SC200S intelligent conductivity transmitter, the terminal cover is attached to the terminal board; thus, remove it also.

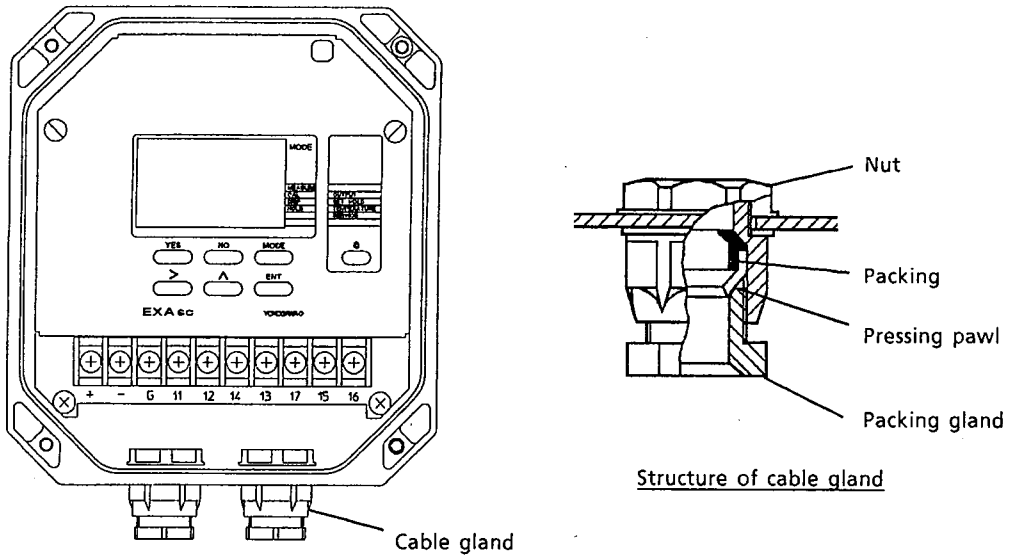


Figure 4.11 Conductivity Transmitter Wire Terminal and Cable Gland

(2) Connecting the dedicated cable to the terminal

First, remove the packing gland, pressing pawl and packing from the cable gland, and install them on the cable. Introduce the cable inside through the wire port on the right front, check the symbol (number) of each conductor, and finally connect each conductor to an appropriate terminal.

(3) Drive the packing gland attached to the cable into the gland itself and seal the wire port.

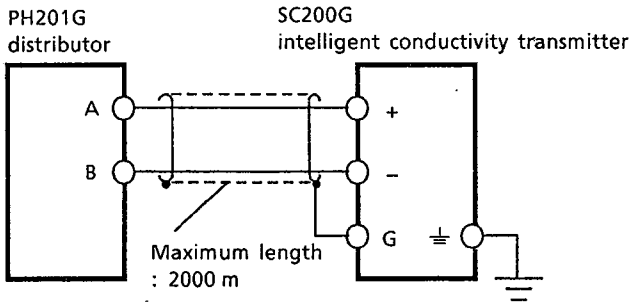
Fit the packing gland firmly to prevent moisture from entering. (Caution: if the packing gland is tightened too much, the cable may be damaged by the pressing pawl.)

Note: When protecting the cable with a conduit, follow the procedure mentioned in section 4.3.3.
When the SC211G high range conductivity detector is used, the cable on the detector side is connected through a connector. Therefore, the conduit cannot be connected directly to the detector.

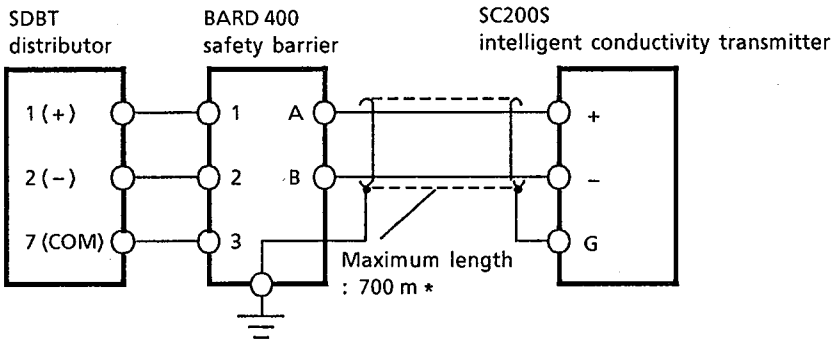
4.3.3 Transmission Signal Cable Connection

The transmission cable connects between the intelligent conductivity transmitter and distributor (for nonexplosion-proof system) or safety barrier (for intrinsically safe explosion-proof system).

- **Example of Nonexplosion-proof System**



- **Example of Intrinsically Safe Explosion-proof System**



*: This example shows the wiring of the intrinsically safe circuit. The cable length mentioned in the figure refers to CEV-S cable. When wiring, be careful that the inductance is 2.2 mH or less and the capacitance is less than 35 nF.

Figure 4.12 Example of Transmission Signal Cable Connection

For this wiring, use a 2-core shielding cable Ø9 to Ø12 mm in finishes outer diameter.

For the nonexplosion-proof system, the cable length must be less than 2000 m (so as to ensure the minimum operating voltage of the conductivity transmitter).

For the intrinsically safe explosion-proof system, the cable length must be less than 700 m (*1). Further, for the intrinsically safe explosion-proof system, the inductance and capacitance of the wiring must be less than 2.2 mH and 35 nF respectively. Then, when connecting the cable to the safety barrier, connect the shielding of the cable to the grounding terminal of the safety barrier temporarily and ground according to the JIS class 1 grounding procedure (grounding resistance: less than 10Ω) dedicated for the intrinsically safe circuit (as distinguished from ordinary circuits).

*1: This is the case for the CEV-S cable. For the CVV-S cable, the maximum length is 350 m.

To connect the cable to the intelligent conductivity transmitter, proceed as follows:

(1) Terminal Treatment of the Cable
Tear off cable's insulating shield about 40mm from the end. Cut the exposed shield at the root and solder the grounding lead wire to this part. Protect the soldered part by winding it with insulating tape.
Then, adjust the length of the lead wire so as to be almost the same as that of the conductor and install a crimp terminal (see note) fitting to the M4 screw on the ends of this lead wire and each conductor.

Note: In case of the intrinsically safe explosion-proof system, use a fork-shaped or round crimp terminal.

(2) Connecting the cable to the terminal
First, remove the packing gland, pressing pawl and packing from the cable gland, and fit them to the cable. Introduce the cable inside through the wire port on the front left and connect each conductor to an appropriate terminal.

(3) Drive the packing gland attached to the cable into the gland itself and seal the wire port.
Fit the packing gland firmly to prevent moisture from entering. (Caution: If it is tightened too much, the cable may be damaged.)

Note: When using the intrinsically safe explosion-proof type intelligent conductivity transmitter, after the connection is completed, always install a terminal cover.

When protecting the cable with a conduit, replace the packing gland of the cable gland with an adapter for the conduit.

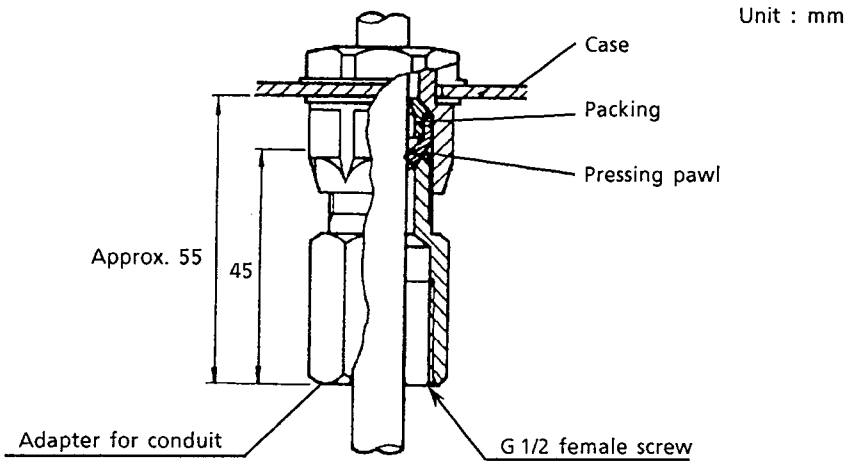


Figure 4.13 Adapter for Connecting the Conduit

(4) After wiring is completed, install the cover of the intelligent conductivity transmitter. Be sure to install it firmly to prevent moisture from entering.

4.3.4 Grounding Wire Connection

This is done for the nonexplosion-proof system.

Using a thick enough conductor (nominal sectional area: more than 2 mm^2), ground the grounding terminal on the bottom of the intelligent conductivity transmitter case according to the specified grounding procedure (JIS class 3 grounding procedure, grounding resistance: less than 100Ω).

In the grounding terminal, install the conductor just as if it were nipped between the screw head and washer.

Note: Ground the intrinsically safe explosion-proof system on the BARD400 safety barrier. Thus, do not ground the conductivity transmitter.

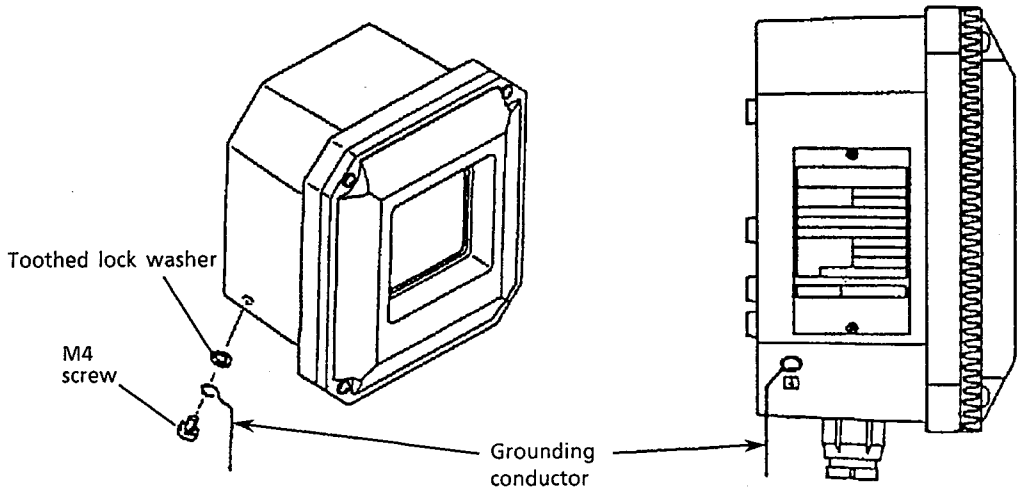


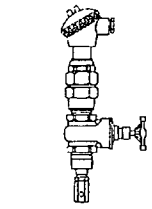
Figure 4.14 Grounding Conductor Connection Procedure

5. NAME AND FUNCTION OF EACH PART

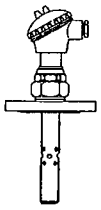
This chapter explains the name and function of each part of the SC21□G conductivity detector and SC200□ conductivity transmitter.

5.1 Conductivity Detector

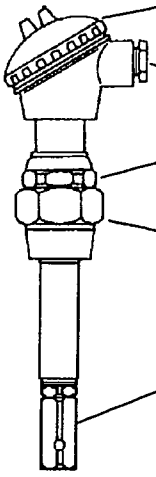
- Direct insertion type conductivity detector



Screw-in type with gate valve



Flange type



Screw-in type

Terminal box:
Which incorporates a wire terminal for connecting a dedicated cable

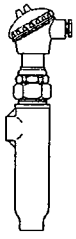
Wire port

Lock nut:
Loosening it enables changing the direction of the terminal box.

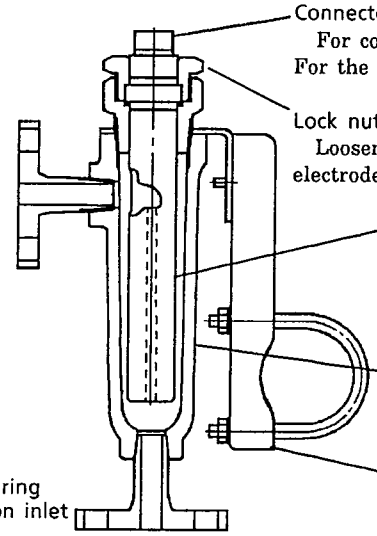
Connecting screw:
For mounting the detector on the electrode insertion hole. A flange type is also available.

Electrode:
Low-range (cell constant: 0.05 cm^{-1}) and medium-range (cell constant: 5 cm^{-1}) types are available. They are different in shape. A RTD (thermister) is also incorporated.

- Flow-through type conductivity detector



Low-range type, medium-range type (screw connection piping type)



High-range type (flange connection piping type)

Connector (for high-range electrode):
For connecting a dedicated cable.
For the low and medium ranges, this part is a terminal box.

Lock nut:
Loosening this enables changing the direction of the electrode.

Measuring solution outlet

Electrode:
Low-range, medium-range and high-range (cell constant: 10 cm^{-1}) types are selectable. They are different in shape.
A RTD (Pt 1000Ω for high renge) is incorporated

Holder:
Choice of polypropylene resin and stainless steel types.

Mounting metal:
For mounting the poly-propylene resin holder on a nominal size 50A pipe

Measuring solution inlet

Figure 5.1 Conductivity Detector

5.2 Conductivity Transmitter

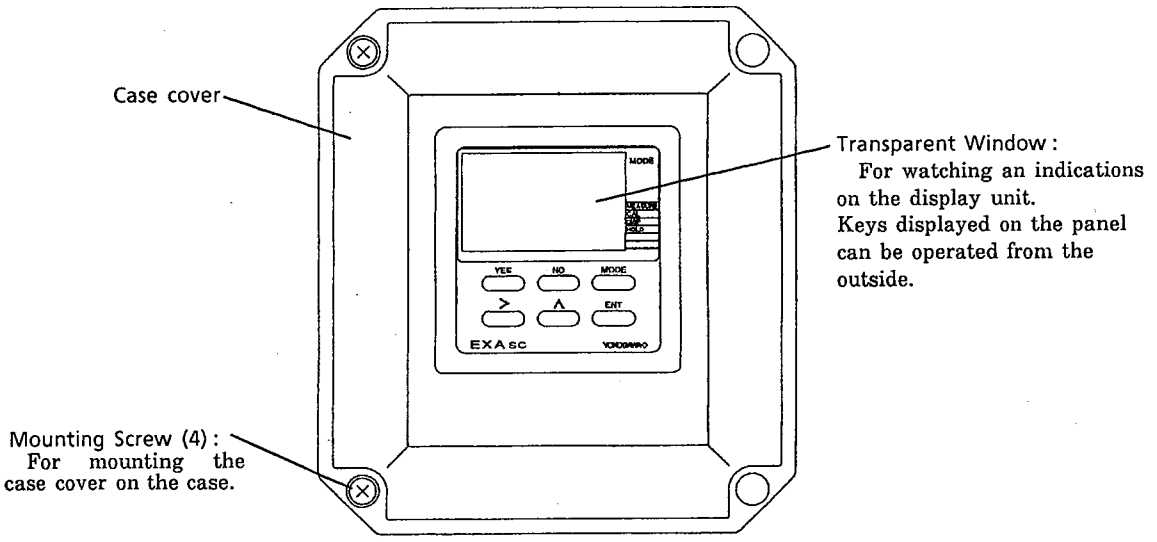


Figure 5.2 Intelligent Conductivity Transmitter (with case cover installed)

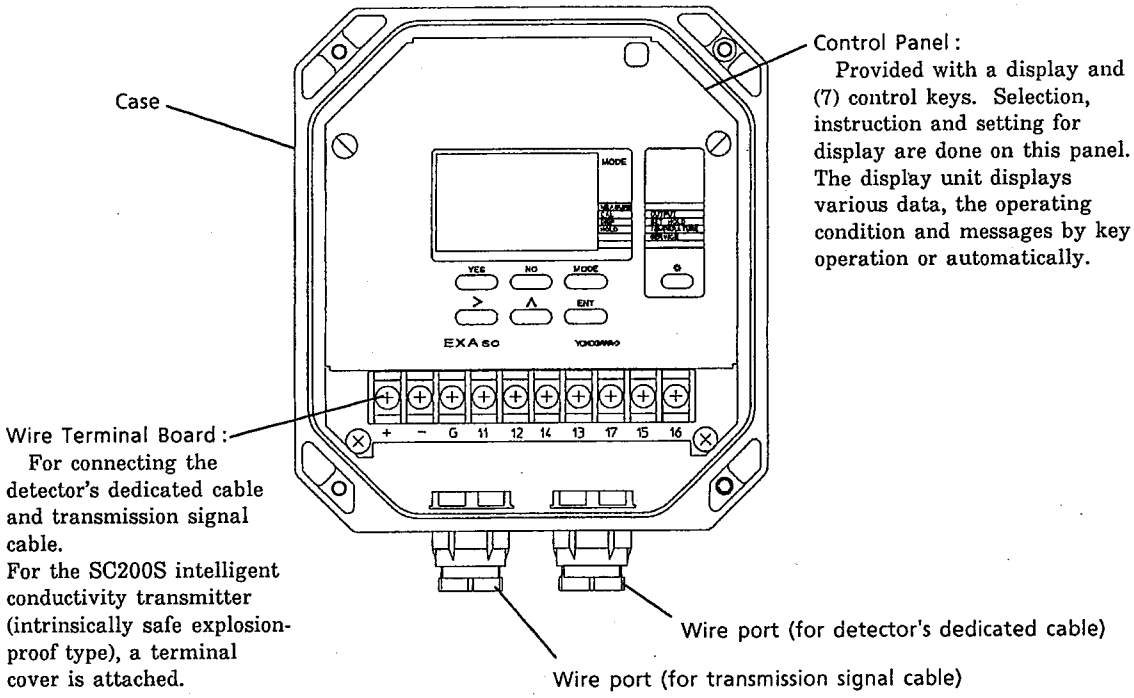


Figure 5.3 Intelligent Conductivity Transmitter (with cover removed)

[Control panel]

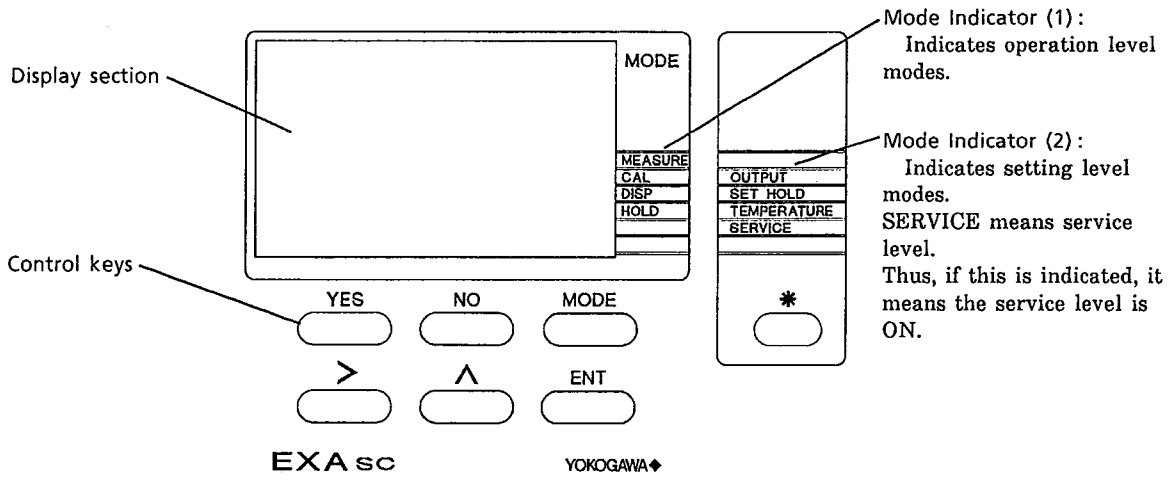


Figure 5.4 Control Panel

(1) Display Section Composition

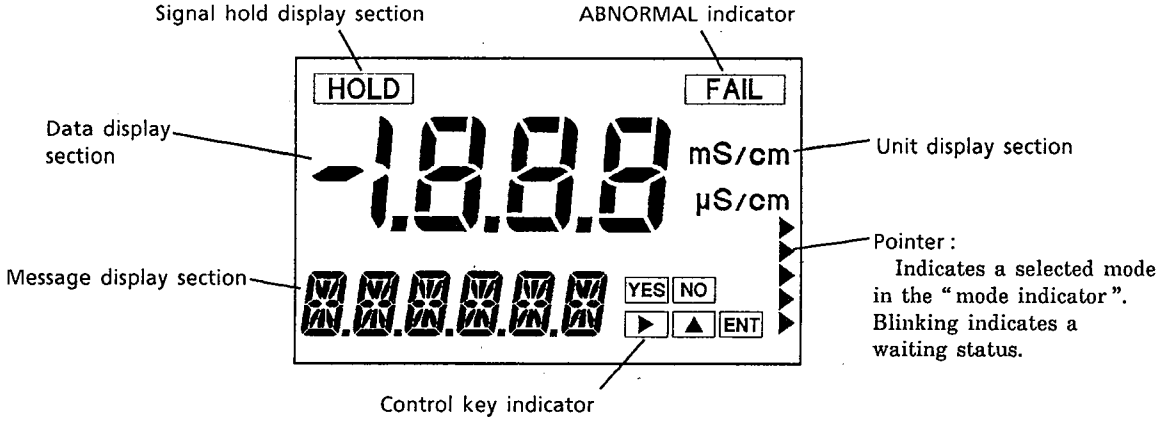


Figure 5.5 Display Unit

(2) Type and Function of the Control Key

Control Key	Name	Application / Function
YES	Conversational key (Yes)	Used to acknowledge an inquired message.
NO	Conversational key (No)	Used to deny an inquired message.
MODE	Mode key	Used to switch modes. This is also used to change from the setting level to operation level.
>	Cursor key	Used to select the numeric character to be changed or registered.
∧	Numeric up key	Used to increase a selected number.
ENT	Entry key	Used to register data.
*	Setting level selection key	Used to change from the measuring mode to setting level.

5.3 Intelligent Conductivity Transmitter

Operation of the intelligent conductivity transmitter is determined at the following three levels:

(1) Operation level

The operation level enables daily inspection and maintenance.

Note: The keys to be used at the operation level can be operated from outside with the case cover mounted.

Ordinary measuring operations are done at this level.

(2) Setting level

This level permits setting operation parameters to adjust operation of the conductivity transmitter to fit to individual operating conditions.

(3) Service level

This level permits setting of data and selecting functions conforming to the specifications of a combined conductivity detector.

Usually, the service level setting operation is done once only at startup.

Each level has operation modes classified according to the functions, and an operation instructions and data setting are performed by designating one of those operation modes.

The types of operation modes on each level are shown below:

Control Level	Operation Mode
Operation level	Measuring mode, calibration mode, display content (message display section) selection mode, signal hold "set/release" selection mode
Setting level	Output range setting mode, signal hold parameter setting mode, temperature compensation parameter setting mode
Service level	CODE 01 Select temperature compensating RTD and temperature unit CODE 02 Set reference temperature value CODE 03 Select output characteristic "linear/polygonal" CODE 04 Set polygonal output parameter CODE 05 Set cell constant CODE 06 Select auto-return function ON/OFF CODE 07 Select electrode type (2-electrode/4-electrode type) CODE 08 One-point temperature calibration CODE 09 Select burn-up function ON/OFF CODE 10 Select conductivity indicating value decimal point. MOVE/FIX CODE 11 Select MAINTENANCE, ABNORMAL output function "set/release" CODE 12 Select polarization check function ON/OFF CODE 13 Indicate soft release No. CODE 14 Set temperature coefficient for reference temperature conversion

6. OPERATION

This chapter describes the startup for regular operation of the SC200 intelligent two-wire conductivity transmitter system and the operating method required for regular operation.

At startup, a key operation to set an operation parameter is necessary. For this procedure and the related display, refer to Chapter 7.

6.1 Startup

Startup is performed in the following steps:

(1) Detector installation and piping inspection
See Section 6.1.1.

(2) Wiring inspection
See Section 6.1.2.

(3) Intelligent conductivity transmitter setup
See Section 6.1.3.

(4) Setting of operating parameters
See Section 6.1.4.

(5) Measuring solution circulation
See Section 6.1.5.

(6) Operation check
See Section 6.1.6

6.1.1 Detector Installation and Piping Inspection

When using direct insertion type conductivity detector, check that the detector electrode is dipped in the measuring solution.

When using flow-through-type conductivity detector, check that the measuring solution intake and outlet pipes are not reversely connected. If the pipes are placed so that the measuring solution flows in from the bottom of the holder, the setup is normal.

6.1.2 Wiring Inspection

Inspect the overall system to confirm that all the wires are placed and connected properly. (See Figures 4.7, 4.8, 4.9 and 4.12)

For the wiring to the distributor and safety barrier, refer to each's respective instruction manual.

6.1.3 Intelligent Conductivity Transmitter Setup

The intelligent conductivity transmitter is activated by supplying power to the distributor.

Supply power conforming to the distributor specifications.

6.1.4 Setting Operating Parameters

To prepare the proper operating environment suitable to measuring the conductivity of each process, set the appropriate operational level on the setting level and service level.

Select the content of the display indicated for regular operation and set data on the operation level.

The types of settings on each operation level, content of settings (data setting range and selection item) and setting status upon shipment are shown in Tables 6.1, 6.2 and 6.3.

Additionally, the procedure for setting each item is explained.

(1) Setting Level

<Expansion of the setting level operational mode>

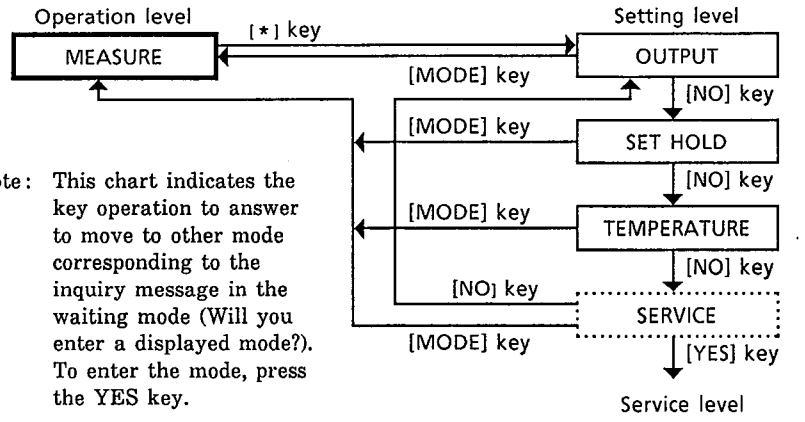


Table 6.1 Setting Items and Content on the Setting Level

Item	Content	Initial Value (upon shipment)
Output range setting mode (pointer indication: OUTPUT)	Message display:	*OUTPU
• Conductivity setting corresponding to transmission output 4 mA	0 to 1999 (mS/cm)	20.0 (μS/cm)
• Conductivity setting corresponding to transmission output 20 mA	0 to 1999 (mS/cm)	1.000 (mS/cm)
Hold parameter setting mode (pointer indication: SET HOLD)	Message display:	*SET.HD
• Signal hold value ON/OFF selection	* HLD.ON (execute), * HLD.OF (release)	* HLD.ON
• Hold value "preceding value/fixed value" selection	* HD.LST (preceding value), * HD.FIX (fixed value)	* HD.LST
• Fixed value setting (*HLD. mA)	04.0 to 20.5 (mA)	12.0 (mA)
Temperature compensation parameter setting mode (pointer indication: TEMPERATURE)	Message display:	*TEMP
• Selection of Temperature coefficient "NaCl characteristic/measuring solution characteristic" selection	* NaCl (NaCl), * % (measuring solution)	* NaCl
• Temperature coefficient calculation data for manual temperature compensation	Conductivity maintaining the temperature coefficient at −10.00 to 10.00	.0.00 (%/°C)

(2) Service Level

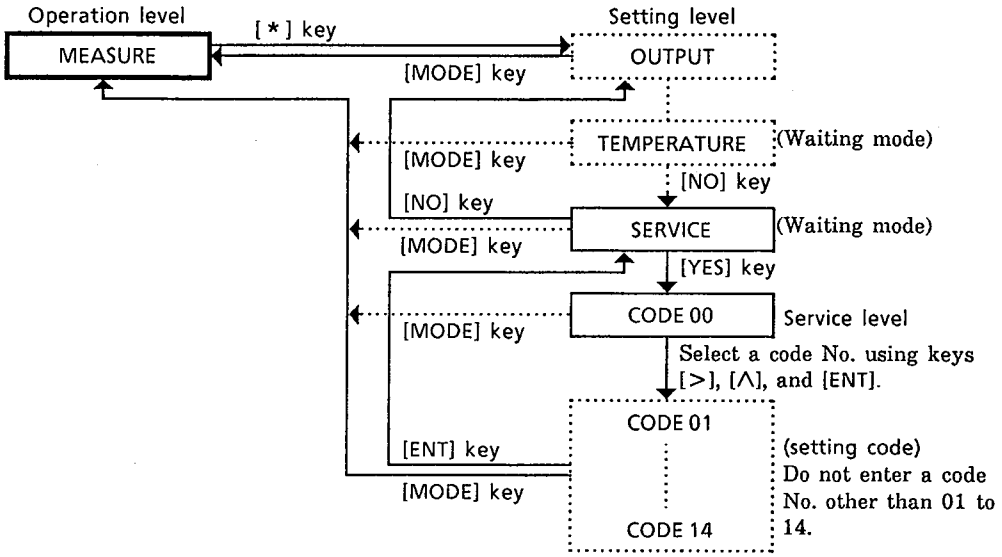


Table 6.2 Setting Items and Content on the Service Level

Item		Content	Initial Value (upon shipment)
CODE 01	Temperature compensating temperature element and temperature unit parameter	Message display: *T.CODE	
• Temperature compensating temperature element selection		0 (Pt 1000Ω), 1 (Ni 100Ω), 2 (NTC)	2
• Temperature unit selection		0 (°C), 1 (°F)	0
CODE 02	Reference temperature	Message display: *TR. °C *TR. °F	
• Reference temperature value setting		00.0 to 100.0 (°C) 032 to 212 (°F)	25.0 (°C)
CODE 03	Output characteristic	Message display: *TABLE	
• Output characteristic linear / polygonal selection		0 (linear), 1 (polygonal)	0
CODE 04	Polygonal output 20-step table	Message display example: * 00.0 *100.0	
• Conductivity corresponding to the transmission signal value (%)		Transmission signal conductivity in 5% increments between 0%(4 mA) and 100% (20 mA) (21 points)	Linear output of 20 to 1000 µS/cm output range
CODE 05	Cell constant	Message display example: *CELL.C	
• Cell constant setting		.010 to 50.0 (cm^{-1})	.050 (cm^{-1})
• Cell constant fine adjustment value input		−19.99 to 19.99 (%)	0.00 (%)
CODE 06	Auto-return	Message display: *RET.	
• Auto-return ON / OFF selection		0 (OFF), 1 (ON)	1
CODE 07	Electrode type	Message display: *ELEC.	
• 2-electrode / 4-electrode type selection		2 (2-electrode type), 4 (4-electrode type)	2
CODE 08	One-point temperature calibration (for Pt 1000Ω and Ni 100Ω)	Message display: *TPADJ	
• Measured temperature input		−10.0 to 200 (°C) 014 to 392 (°F)	—
CODE 09	Burn-up	Message display: *BURN	
• Burn-up function ON / OFF selection		0 (OFF), 1 (ON)	0

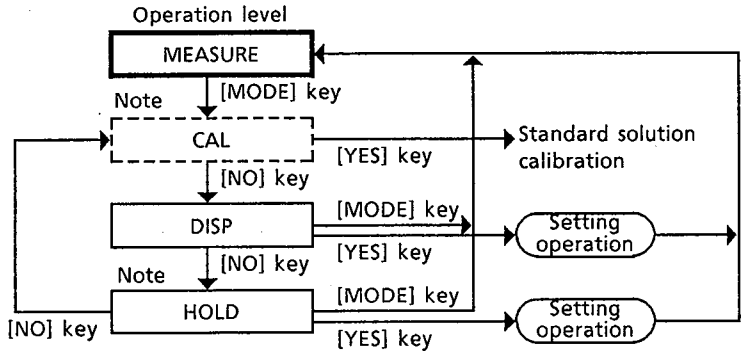
Note : Does not need to be executed on startup.

Table 6.2 (2) Setting Items and Content on the Service Level

Item		Content	Initial Value (upon shipment)
CODE 10	Conductivity display value decimal point position	Message display :	✱SC.DSP
• Decimal point position FIX/MOVE selection		0 (move), 1 (X.XXX µS/cm) 2 (XX.XX µS/cm) 3 (XXX.X µS/cm) 4 (X.XXX mS/cm) 5 (XX.XX mS/cm) 6 (XXX.X mS/cm) 7 (XXXX mS/cm)	0
CODE 11	HOLD, <ABNORMAL> output	Message display :	✱COMM
• HOLD, <ABNORMAL> output provided /not provided selection		0 (not provided), 1 (provided)	0
CODE 12	Polarization check	Message display :	✱POLCK
• Polarization check function ON/OFF selection			0
CODE 13	Soft release No. display	Message display example :	REL 12
CODE 14	Temperature coefficient for reference temperature conversion	Message display :	✱T.COEF
• Temperature coefficient setting		−10.00 to 10.00 (%/°C) (%/°F)	.000 (%/°C)

(3) Operation Level

<Expansion of operation level operational mode>



Note : The CAL mode is used to execute calibration and is not used upon startup.

You cannot enter the HOLD mode unless ✱HLD.ON is set by the hold parameter setting mode on the setting level.

Table 6.3 Setting Items and Content on the Operation Level

Item	Content	Initial Value (upon shipment)
Display selection mode (pointer indication: DISP)	Message display :	DISP
• Selection of the content displayed on the display unit	Temperature (XXX.X °C) (XXX.X °F) Output value (XX.X mA) Cell constant (C.C. X.XXX) Reference temperature (T.R.XX °C) (T.R.XX °F) Temperature compensation(NaCl/T.C. XX.XX)	Temperature
Signal hold provided/not provided selection mode (pointer indication : HOLD)	Message display :	HOLD
• Signal hold ON/OFF selection	[YES] key (provided), [NO] key (not provided)	—

(4) Setting Procedure for Each Operational Mode

The setting procedure for each operational mode is explained below.

Description 1 : For Setting Level

(1-1) : Output range setting mode (OUTPUT)
(1-2) : Signal hold parameter setting mode (SET HOLD)
(1-3) : Temperature compensation parameter setting mode (TEMPERATURE)

Description 2 : For Service Level

(2-1) : CODE 01 Temperature compensating temperature element and temperature unit parameter
(2-2) : CODE 02 Reference temperature
(2-3) : CODE 03 Output characteristic
(2-4) : CODE 04 Polygonal output 20-step table
(2-5) : CODE 05 Cell constant
(2-6) : CODE 06 Auto-return
(2-7) : CODE 07 Electrode type
(2-8) : CODE 08 One-point temperature calibration (execution)
(2-9) : CODE 09 Burn-up
(2-10) : CODE 10 Conductivity display decimal point position value
(2-11) : CODE 11 HOLD, <ABNORMAL> output
(2-12) : CODE 12 Polarization check
(2-13) : CODE 13 Soft release No. (indication)
(2-14) : CODE 14 Temperature coefficient for reference temperature conversion

Description 3 : For Operation Level

(3-1) : Display selection mode (DISP)
(3-2) : Signal hold provided / not provided

Description 1 : Setting Level Operational Modes

1-1. Output Range Setting Mode (OUTPUT) (waiting mode message: *OUTPUT)

Note: When <1 (polygonal output)> is selected by CODE 03 of the service level, the output range setting mode is skipped. That is the output range set at this stage is invalidated if <1 (polygonal)> is selected by service level CODE 03.

Set the output range (conductivity) corresponding to a transmission output of 4 to 20 mA DC.

Set conductivity (minimum value or maximum value of the output range) corresponding to 4 mA or 20 mA.

(1) Conductivity corresponding to 4 mA (* 4 mA)

The value corresponding to 4 mA can be changed to an other value other than 0. However, this value must be less than 60% of the conductivity corresponding to 20 mA. The value which can be set must be less than 1999 (mS/cm).

(2) Conductivity corresponding to 20 mA (* 20 mA)

Keeping in mind the set value of the conductivity corresponding to 4 mA, set a desired value less than 1999 (mS/cm).

If conductivity corresponding to 4 mA is set beyond 60% of the conductivity corresponding to 20 mA, Err.17 is output. Similarly, in case of reverse output (*1), if conductivity corresponding to 20 mA is set beyond 60% of the conductivity corresponding to 4 mA, Err.17 is likewise output.

When Err.17 is output, re-enter a value satisfying the existing condition.

(*1) : Reverse output refers to an output with the maximum value of the output range set as conductivity corresponding to 4 mA, and the minimum value of the output range set as conductivity corresponding to 20 mA.

1-2. Signal Hold Parameter Setting Mode (SET HOLD) (waiting mode message: *SET.HD)

Designates whether or not a transmission signal is to be held upon calibration or operation on the setting level / service level. When holding the signal, set a hold output value.

(1) Signal hold function ON / OFF (*HLD.ON / HLD.OF)

To stop the signal hold function, select <*HLD.OF>. To execute this function, select <*HLD.ON>.

When <*HLD.ON> is selected, HOLD ON / OFF can be designated using the signal hold ON / OFF selection mode (HOLD) of the "operation" level.

Note: When <*HLD.OF> is selected at this stage, you cannot enter the operation level HOLD mode.

(2) Hold output value (*HD.LST / *HD.FIX)

When <*HLD.ON> is designated, you are asked to select which preceding value is to be held or a fixed current value (preset value) is set.

When changing a hold output value to a value just before holding, select <*HD.LST>.

To set a fixed current value, select <*HD.FIX>.

(3) Fixed current value (*HLD.mA)

When designating <*HD.FIX>, you are asked to set a fixed current value. In this case, set a value in the range between 4 and 20 mA.
Upon shipment, this value is set to 12 mA.

1-3. Temperature Compensation Parameter Setting Mode (TEMPERATURE) (waiting mode message: *TEMP)

Designates which temperature compensation is to be performed according to the characteristics of the sodium chloride (NaCl) solution or the temperature coefficient of the measuring solution. When executing this according to the measuring solution's temperature coefficient, enter a conductivity value for temperature coefficient calculation.

(1) Temperature compensation NaCl characteristic / measuring solution characteristic (*NaCl / *%)

The SC200□ conductivity transmitter memory contains the characteristic of the NaCl solution. When temperature compensation is enabled according to this, select <*NaCl>. If temperature compensation based on the temperature coefficient of the measuring solution is needed, select <*%>.

(2) Entry of a conductivity value for temperature coefficient calculation (*T.C0.00)

When <*%> is designated, entry of a conductivity value is requested. In this case, enter the correct conductivity value for the reference temperature. Proceed as explained below to enter the value.
And prior to entry, this device must be actuated. Additionally, other requirements for entry are that the reference temperature has been set and that the conductivity of the measuring solution at that reference temperature is clear.

Note: Setting of the reference temperature is performed by <CODE 02> of the service level. The conductivity of a measuring solution at the reference temperature can be found by reading the conductivity displayed value when the measuring solution is adjusted to the reference temperature.

(a) Actuate the device and measure the conductivity of the measuring solution. The measured conductivity is displayed on the conductivity transmitter data display unit.

(b) Convert the conductivity of the measuring solution displayed on the data display to the correct conductivity for the reference temperature.
Use the [>] key and [*] key for this conversion.

(c) Press the [ENT] key to enter the converted conductivity in (b) above.
The temperature coefficient calculated according to this conductivity is displayed on the message display unit.
The range of a calculated temperature coefficient is +10.00 [(%/°C) or (%/°F)].
If a calculated value exceeds this range, Err.2 is output so that the temperature coefficient is not updated. Usually, if a proper value (conductivity value) is entered, "Err.2" is not output. If Err.2 is output, re-enter a conductivity value.
If the temperature coefficient of the measuring solution is known in advance, this temperature coefficient can be entered in <CODE 14> of the service level.

Note: A temperature coefficient after entering becomes valid. Thus, when executing a measurement operation according to the temperature coefficient entered here, do not select <CODE 14> of the service level. When the [ENT] key is pressed with <CODE 14> of the service level selected, the set temperature coefficient becomes valid.

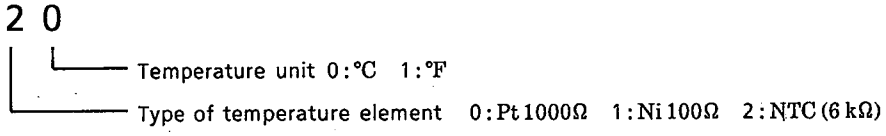
Description 2 : For Service Level Codes

2-1. CODE 01 Temperature compensating temperature element and temperature unit parameter

The intelligent two-wire conductivity transmitter system utilizes SC210G and SC211G conductivity detectors. Because a temperature element for temperature compensation is incorporated in these detectors, enter the type of temperature element. In addition, designate the measuring temperature unit.

(1) Selection of a temperature element for temperature compensation and temperature unit (*T.CODE)

The temperature element of the SC210G conductivity detector is a thermister. The temperature element of the SC211G conductivity detector is Pt 1000Ω.
When using the SC210G, change the left digit of the two-digit number to <2 (NTC)>, and when using the SC211G, change it to <0 (Pt 1000Ω)> and then enter the type of temperature element.
Designation of the temperature unit is performed by the right digit of the two-digit number. When using °C, enter <0> and when using °F, enter <1>.



2-2. CODE 02 Reference Temperature

Because the conductivity of solution differs depending on the temperature, usually convert a measured conductivity to the conductivity at a certain temperature (reference temperature). Set the reference temperature here.

(1) Setting the reference temperature value (*T.R. °C/*T.R. °F)

The setting range is 00.0 to 100.0°C or 032 to 212°F. If a value over this range is set, Err.19 is output. If Err.19 is output, set the value again.

2-3. CODE 03 Output Characteristic

The SC200□ conductivity transmitter is provided with a function to output non-linear transmission signal (polygonal) against the conductivity.

Select linear or polygonal output at this stage.

(1) Selection of the output characteristic "linear/polygonal" (*TABLE)

For linear output, select <0> and for polygonal output, select <1>.
If <1> is selected, the output range set in the output range setting mode (OUTPUT) of the setting level becomes invalid.

2-4. CODE 04 Polygonal Output 20-step Table

When polygonal output is designated by CODE 03, enter "20-step table" data to obtain a desired polygonal output.

Note : When <0 (linear output)> is selected by CODE 03 (linear output), CODE 04 is skipped.

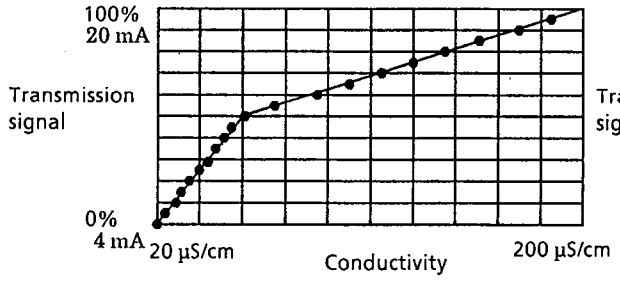
(1) Setting a conductivity corresponding to the transmission signal value (%) (*0% *100%)

Enter conductivity values corresponding to the 21 points in 5% increments, of the transmission signal values; i.e., 0% (4 mA), 5% (4.8 mA), etc. to 100% (20 mA).
The conductivity value is set so that it increases (decreases) gradually corresponding to the transmission signal value. The set values at plant shipment and polygonal output are shown as an example below.

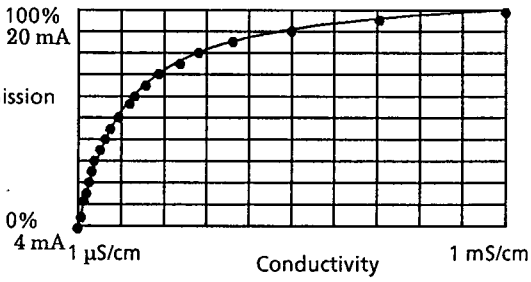
Set Values at Plant Shipment

Transmission Signal Value	Set Conductivity Value	Transmission Signal Value	Set Conductivity Value
0%(4 mA)	20.0 µS/cm	55%(12.8 mA)	559 µS/cm
5%(4.8 mA)	69.0 µS/cm	60%(13.6 mA)	608 µS/cm
10%(5.6 mA)	118.0 µS/cm	65%(14.4 mA)	657 µS/cm
15%(6.4 mA)	167.0 µS/cm	70%(15.2 mA)	706 µS/cm
20%(7.2 mA)	216 µS/cm	75%(16 mA)	755 µS/cm
25%(8 mA)	265 µS/cm	80%(16.8 mA)	804 µS/cm
30%(8.8 mA)	314 µS/cm	85%(17.6 mA)	853 µS/cm
35%(9.6 mA)	363 µS/cm	90%(18.4 mA)	902 µS/cm
40%(10.4 mA)	412 µS/cm	95%(19.2 mA)	951 µS/cm
45%(11.2 mA)	461 µS/cm	100%(20 mA)	1.000 mS/cm
50%(12 mA)	510 µS/cm		

Setting example (1)



Setting example (2)



When the number of set points as break points is small as shown in the setting example (1), setting points on a line can be omitted. That is, in the example, only conductivities 20 µS/cm, 60 µS/cm, and 220 µS/cm corresponding to transmission signals 0%, 50% and 100% must be set. In this case, if a previously set conductivity value is left at a set point to be omitted, there is no problem.
The value on an omitted point is automatically corrected so as to become a value on a line connecting set points.

- Be sure to set the value at the set point as a break point including 0% and 100% (even if it is the same as a previously set value, press the [ENT] key.)

Note: When changing only part of a previous setting, the operating procedure after the final given set point can be omitted. For example, when changing only the value corresponding to transmission output 50% in setting example (2), set the values on the set points from 0% to 50% by pressing the [ENT] key. (For 50%, press the [ENT] key after entering a set value.)
Then, develop set points after 55% by pressing the [NO] key.
If only the 50% setting is set and those from 0% to 45% are omitted, the set value 0% becomes 0 µS/cm and individual values from 5% to 45% are set on a line connecting 0% and 50%.

2-5. CODE 05 Cell Constant

Enter the cell constant of your conductivity detector.

(1) Setting the cell constant (*CELL.C)

The nominal cell constant of the SC210G - A conductivity detector is 0.05 cm^{-1}, that of the SC210G - B conductivity detector is 5 cm^{-1}, and that of the SC211G conductivity detector is 10 cm^{-1}. However, the cell constant usually differs slightly from one to another even in the same type detector.

If a cell constant is not mentioned on a detector, set the nominal cell constant. If the difference from the nominal cell constant is indicated in percentage, set a nominal cell constant according to this menu, and then obtain a difference from the nominal cell constant in percentage, according to the next displayed menu for " entry of cell constant's fine adjustment value ", and enter it.

(2) Entry of cell constant's fine adjustment value (*CC.ADJ)

When a cell constant is set, the display changes to the screen for " entry of cell constant's fine adjustment value ".

If the difference from the nominal cell constant is indicated in percentage, enter that value. The range which can be input is from −19.99 to 19.99%.
Entering such a value corrects the cell constant set in (1). The corrected cell constant can be displayed by the operation level DISP mode.

2-6. CODE 06 Auto-return

If no key is operated for a specified interval of time (approx. 60 minutes), excluding an instructed operation on the setting level or service level, the operation level's MEASURE mode (HOLD mode if hold ON is selected in the setting level SET HOLD mode) automatically changes to HOLD mode. Here, select ON / OFF.

(1) Selection of the auto-return function " ON / OFF " (*REF.)

When stopping the auto-return function, select <0>, and when executing the function, select <1>.

2-7. CODE 07 Electrode Type

The conductivity detectors used in the intelligent two-wire conductivity transmitter system are divided to 2-electrode and 4-electrode types.
Enter the correct type of your conductivity detector at this stage.

(1) Selection of the 2-electrode type / 4-electrode type (*ELEC.)

When using a 2-electrode type SC210G conductivity detector, select <2>, and when using a 4-electrode type SC211G conductivity detector, select <4>.

2-8 CODE 08 One-point Temperature Calibration

This function is applicable to a conductivity detector incorporating a Pt 1000Ω or Ni 100Ω temperature element. In the intelligent two-wire conductivity transmitter system, this function is available only when the SC211G conductivity detector is used.

Note: Because the resistance change of the temperature element (NTC 6 kΩ) incorporated in the SC210G conductivity detector against temperature change is large, one-point temperature calibration is not performed. Thus when <2 (NTC)> is entered in CODE 01, CODE 08 is skipped.

The procedure for executing one-point temperature calibration is explained below. Note, however, that usually one-point temperature calibration is not necessary at startup.

The conductivity transmitter calculates a temperature signal received from the Pt 1000Ω temperature element incorporated in the electrode of the SC211G conductivity detector as a temperature value. To make the temperature value more accurate, this value is calibrated by providing data (real temperature value).

Before performing one-point temperature calibration, dip the electrode in a solution whose temperature is stabilized. Additionally, a thermometer is necessary to measure the temperature of the solution accurately.

(1) Input of a measured temperature (*TP.ADJ)

Convert the temperature value indicated on the conductivity transmitter to a temperature value taken by the thermometer and enter it. Values which can be entered lie in the range from −10.0 to 200°C or 014 to 392°F. If a value out side this range is entered, Err.19 is output.

For the key operation to execute calibration, refer to Section 8.3.2.

2-9. CODE 09 Burn-up

If <ABNORMAL> is detected by the self-diagnostic function, the analog transmission output is fixed at 22.0 mA.

Note: <ABNORMAL> is divided into such case where only an error code is displayed (for example, data input error) and such where <ABNORMAL> indication (FAIL) is made together with an error code. The burn-up function handles the latter <ABNORMAL> state. For further details, refer to Section 9.1.

Here, select the burn-up function "ON / OFF" (*BURN).

(1) Selection of the burn-up function "ON / OFF" (*BURN)

To stop the burn-up function, select <0>, and to execute this function, select <1>.

2-10. CODE 10 Conductivity Indication Value Decimal Point

A conductivity indication value decimal point position can be made to change automatically depending on the value or be fixed at a certain point. Designate the desired position of the decimal point here.

(1) Selection of the decimal point position FIX / MOVE (*BURN)

To allow the decimal point position to change automatically, select <0> ; to fix it, select an appropriate number from <1> and <7> depending on the position.

Move 0
Fix 1 : X.XXX µS/cm
2 : XX.XX µS/cm
3 : XXX.X µS/cm
4 : X.XXX mS/cm
5 : XX.XX mS/cm
6 : XXX.X mS/cm
7 : XXXX mS/cm

2-11. CODE 11 <HOLD>, <ABNORMAL> Output

When the transmission output is held or the conductivity transmitter detects an abnormality by means of the self-diagnostic function, a contact output signal is multiplexed on an analog transmission signal and transmitted to the distributor. At this stage, this function designates whether or not the HOLD, <ABNORMAL> signal output is provided.

(1) Selection of <HOLD>, <ABNORMAL> output provided / not provided (*COMM)
<HOLD> and <ABNORMAL> signals are available only when the PH201G distributor is used. When a distributor other than the PH201G is used or no contact output is utilized even when the PH201G is used, enter <0 (not provided)>.
If a contact output is used, designate <1 (provided)>.

2-12. CODE 12 Polarization Check

Abrasion, corrosion and contamination of the electrode induces polarization, affecting measurement performance. The SC200□ conductivity transmitter checks the polarization of an electrode during measurement as one of the self-diagnostic functions. If such polarization exceeds its limit, Err.1 is output.
The polarization check function ON / OFF is designated here.

(1) Selection of the polarization check function ON / OFF (*POL.CK)
To stop the polarization check function, select <0> ; to execute this function, select <1>.

2-13. CODE 13 Soft Release No.

This code is set to provide a user with our service. Thus, no operation is needed according to this code.

2-14. CODE 14 Temperature Coefficient for Reference Temperature Conversion

A temperature coefficient for obtaining conductivity converted to a reference temperature can also be entered by the temperature compensation parameter setting mode (TEMPERATURE) operation of the setting level. However, when the measuring solution temperature coefficient is known, this entry is more simple and convenient.

(1) Setting the temperature coefficient (*T.COFF)

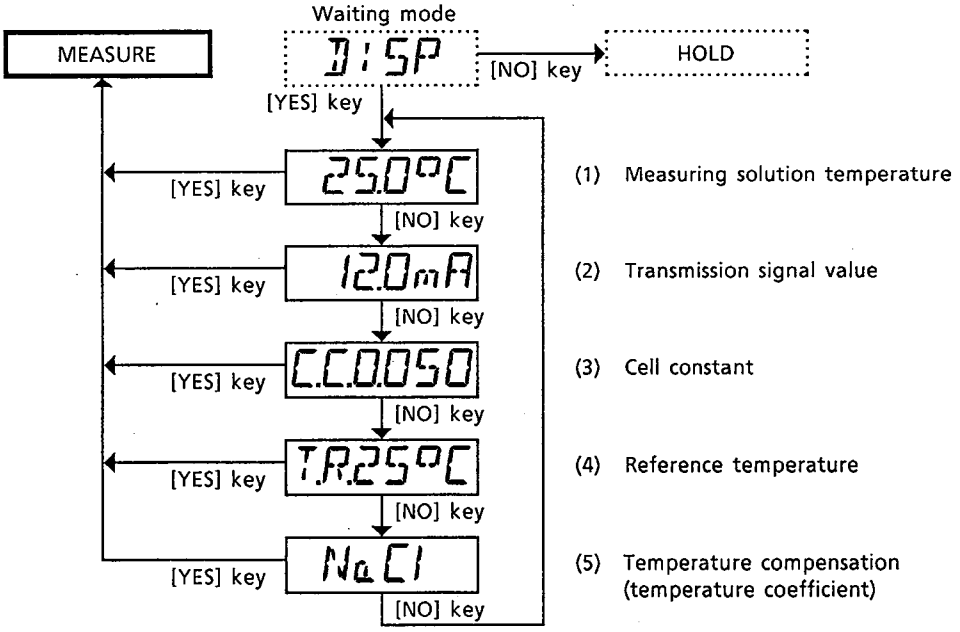
The temperature coefficient at shipment is set to .000 (%/°C). Change this value to the temperature of the measuring solution and enter it.
The temperature coefficient which can be set is in the range of −10.00 to 10.00 (%/°C) or −10.00 to 10.00 (%/°F). Arithmetic operation based on an entered temperature coefficient is performed in the temperature unit designated by <CODE 01>.
The temperature coefficient entered here is valid when "temperature compensation <measuring solution (*%) >" is selected by the temperature compensation parameter setting mode (TEMPERATURE) of the setting level. However, if after a temperature coefficient is entered, the conductivity value for temperature coefficient calculation is entered by the temperature compensation parameter setting mode (TEMPERATURE) of the setting level, the temperature coefficient calculated there becomes valid.

Description 3 : For Operation Level Modes

3-1. Message Display Content [waiting mode message: DISP]

The measuring mode (MEASURE) message display can display the current temperature of the measuring solution, current transmission signal value, updated cell constant, entered reference temperature or temperature compensation AUTO (NaCl) / MANUAL (T.C).

Designate the desired display content using the [YES] key.
The key operation procedure for designating display content is shown below.



3-2. Signal Hold "provided / not provided" [waiting mode message: HOLD]

When hold function ON is selected by the hold parameter setting mode (SET HOLD) of the setting level, this mode enables hold execute or release.

Note: When hold function OFF is selected by the hold parameter setting mode (SET HOLD) of the setting level, this operational mode is skipped.

(1) Hold ON / OFF (HOLD.ON)

To release hold corresponding to the HOLD.ON message, press the [ON] key. To execute hold, press the [YES] key. When a signal is held, HOLD is displayed on the display unit.

6.1.5 Measuring Solution Circulation

When using a flow-through-type conductivity detector, make sure that measuring solution flows smoothly to a sampling pipe. Check that measurement will not be disturbed by such as bubble mixture, etc.

6.1.6 Operation

After completing preparations for operation, check, observe the running condition for a while and verify that no disturbances exist to regular operation.

If such a disturbance exists, check the settings of the operation parameters.

6.2 Regular Operation

During regular operation, the intelligent two-wire conductivity transmitter system continues to run properly without any control. However, if necessary, for example, when measuring a solution which contaminates the electrode, perform daily maintenance as described in Chapter 8 to maintain a good operating condition.

If an <ABNORMAL> signal for a contact output occurs due some abnormality, search for the cause as instructed in chapter 9 "Troubleshooting", and employ an immediate countermeasure.

Key operations are available while steady operation is maintained.

6.3 Operation Stop and Restart

Data set in the conductivity transmitter is maintained even if the power is turned off. Timing for turning off the power is not restricted in any manner.

To stop operation, turn off the power to the distributor.

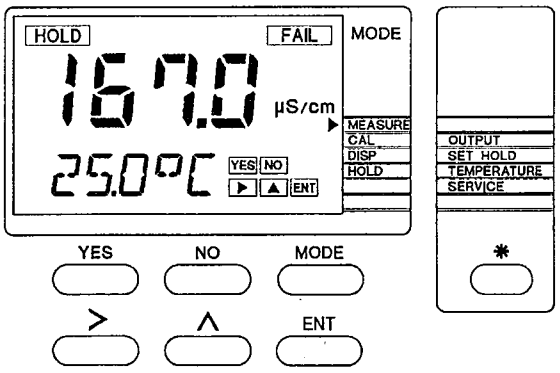
7. CONTROL PANEL OPERATION

This chapter explains the control keys and display section of the intelligent conductivity transmitter's control panel.

When going through this chapter, try to operate the product accordingly.

The SC200□ intelligent conductivity transmitter is actuated by DC power of a specified voltage supplied from the distributor.

When starting the device prior to installation, be very careful not to accidentally, supply 100 V AC power to the intelligent conductivity transmitter.



Note: The display unit shown to the left displays a measuring mode and is given here as an example only.

For the name and function of each part of the display unit, refer to Section 5.2.

Figure 7.1 Control Panel

7.1 Control Keys

7.1.1 Operation

The control keys are operated as follows:

(1) Operation level and mode selection

Note: For further details, refer to see Section 5.3.

(2) Calibration instruction
(standard solution calibration, one-point temperature calibration)

(3) Message display content selection

(4) Operation function (ON / OFF) selection

(5) Operating parameter settings (data value entry, specifications)

7.1.2 Function and Application of Each Control Key

The seven control keys are selected and used depending on the following function and application purpose.

(1) Switching control levels and expansion of the operational mode (✱ MODE)
(2) Inquiry message response (YES NO)
(3) Display data digit selection (>)
(4) Changing a display data numeral (^)
(5) Display data (or specification) entry (ENT)

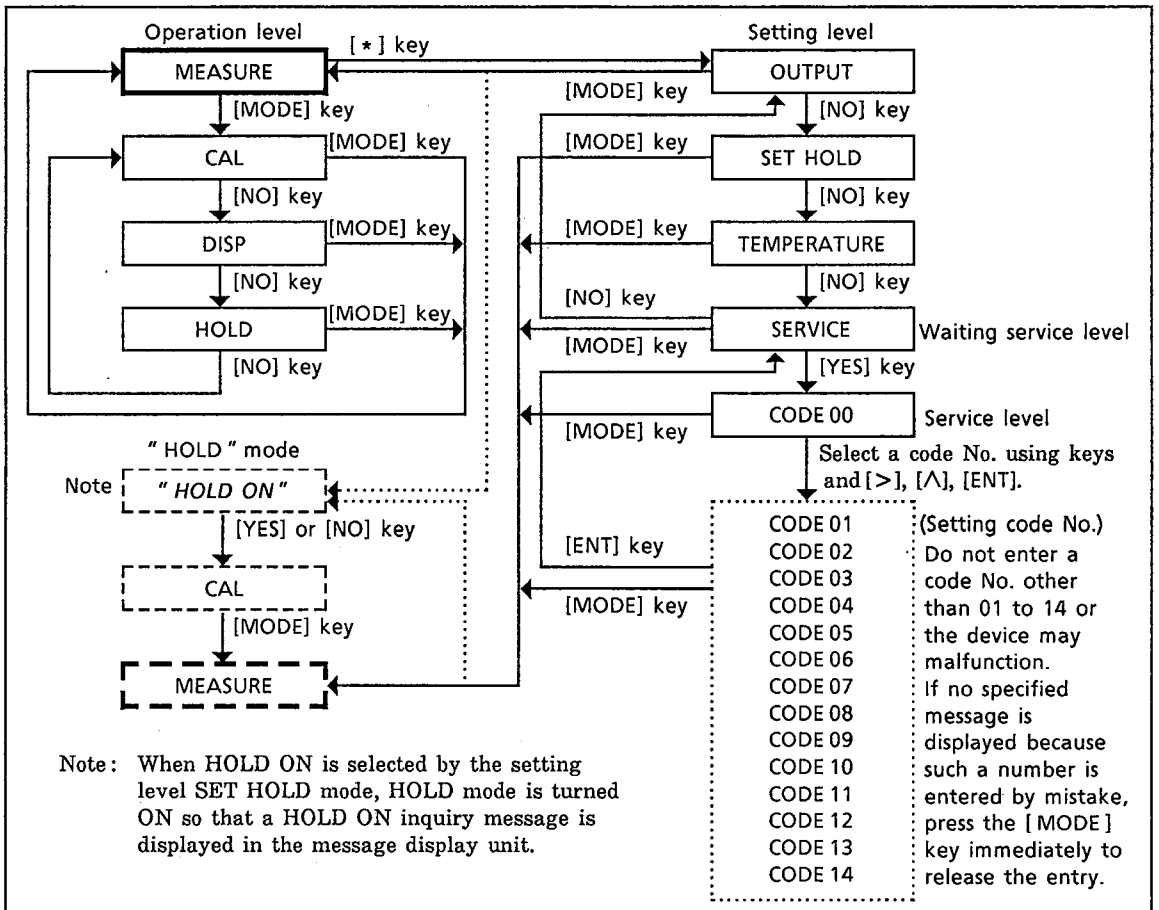
The key operation for each function and application will be explained using an example.

(1) Switching Operation Levels and Expansion of the Operational Mode

Figure 7.2 shows the types of operational modes (or codes) on each control level (operation level, setting level and service level) and the control key to be used for expansion.

To enter each operational mode actually executing an instruction such as data entry, pass through each waiting mode (see the explanation in the figure).

Figure 7.2 shows how to expand the operational modes under this waiting mode as a rule.



This figure indicates the key operation under the waiting mode (i.e., means " Are you going to enter the displayed mode? ") which makes the pointer blink as well as for switching the control level and operational mode. To enter the mode, press the [YES] key.

Switching from the setting level waiting mode or service level to the operation level can be performed using the [*] key also.

Figure 7.2 Types of Operational Modes on Each Control Level and Key Operation Procedures

(2) Inquiry Message Response (YES, NO)

Blinking of the pointer, data display unit or control key indicator represents an inquiry message.

The inquiry message is displayed in the following cases:

(a) Waiting mode status

The pointer indicating an operational mode blinks. Also, the control key indicator blinks to indicate the control key for the inquiry message response.

The "*" symbol displayed on the far left of the message display indicates that the control mode is on the setting or service level.

(b) Data input request

The left-most digit of the data display unit blinks. The control key indicator also blinks to indicate the control key to be used for data entry.

(c) Specification selection request

A specification selection message is output in the following three patterns. However, because the type of control key to be used for the answer is indicated, use the appropriate control key.

- Requesting entry designated number entry
  (Example : CODE 01 of the service level)
- Requesting a YES or NO response to a displayed message
  (Example : HOLD mode of the operation level)
- Requesting a menu selection
  (Example : SET HOLD of the setting level)

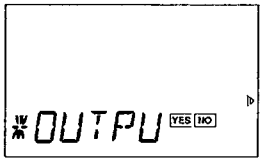
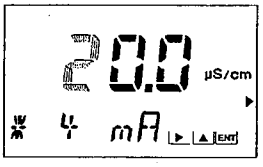
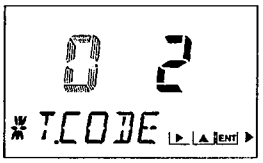
Display example		
Waiting mode status	Data input request	Specification selection request
		
Key operation		
To enter an specified operational mode, press the [YES] key. To move to another operational mode, press the [NO] key.	Select the digit to be changed using the [>] key and change if using [∧] key to the desired value. To enter an input value, use the [ENT] key.	One or two numeric characters are displayed. Two characters indicate the selection of two specifications. The key operation is the same as that for data input.

Figure 7.3 Inquiry Message Key Operation

(3) Display Data Digit Selection

To enter a data value, change the numeric characters of the data displayed on the data display section by digit to the desired value one by one.

When selecting the digit to be changed, use the [>] key. A blinking digit is the selected one. Each time the [>] key is pressed, the selected digit moves to the right; after it reaches the right-most side, it returns to the left.

(4) Changing a Display Data Numeral

Change the numeral of a selected digit using the [∧] key. Each time the [∧] key is pressed, the numeral increases. Numerals change in the following three patterns:

(a) Repetitive numeral change from 0 to 9 (ordinary pattern)

(b) Repetitive display of a specified number (when selecting a specification)

(c) Change of the left-most digit when 4-digit data with a negative sign exists (for example, temperature coefficient)

Figure 7.4 shows an example of pattern (c).

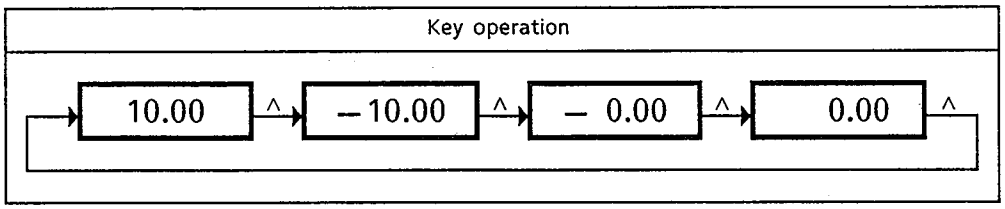


Figure 7.4 Change Pattern of 4-digit Data with a Negative Sign

A special example of the [∧] key operation is the setting of a conductivity value using the setting level OUTPUT mode. In this case, after a numeral is entered for each digit, each time the [∧] key is pressed, the decimal point position moves; then, once the decimal point has completed a single circuit in the same unit, the unit changes. (See Figure 7.5.)

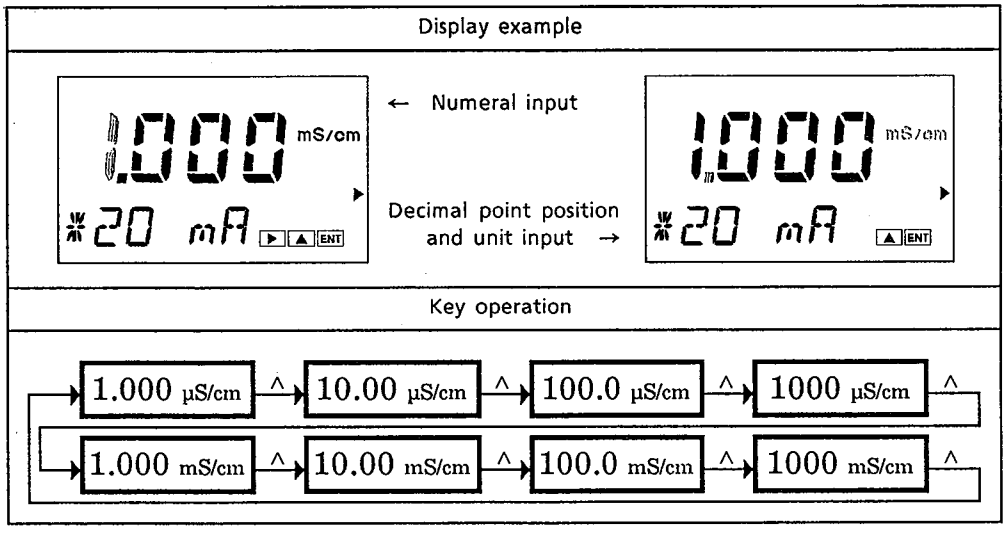


Figure 7.5 Special Example of the [∧] Key Operation (selection of the decimal point position/ unit when entering a conductivity value)

(5) Display data (or specification) entry

To enter data, press the [ENT] key. In some cases, data can be entered when the [YES] key or [NO] key is pressed to select a specification.

7.2 Display Unit

7.2.1 Display Items

The seven display sections output the following indications.
Some indications are output by operating a control key, and some indications are automatically output regardless of the key operation.

(1) Data (conductivity measuring value, setting data)
(2) Conductivity value unit (μS/cm or mS/cm)
(3) Message (operational mode content, auxiliary data, error code)
(4) Control key instruction
(5) Operational mode instruction pointer
(6) HOLD display (displayed when a transmission output is held)
(7) FAIL display (when the transmitter detects an <ABNORMAL> state in the contact output signal)

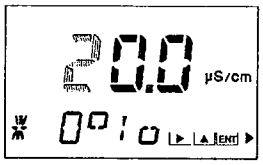
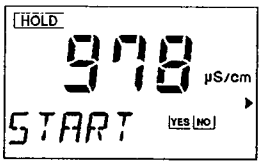
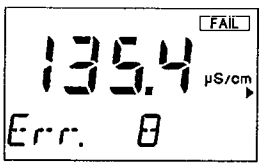
Display example		
Massage indication	HOLD indication	FAIL indication
		
Example of the 20-step table data input request message to be set by CODE 04 of the service level. This requests input of a conductivity value corresponding to the transmission signal 0%.	Example of the display on executing standard solution calibration when *HLD.ON is selected in the setting level's SET HOLD mode. HOLD is displayed in the top left.	Indicates that an abnormal temperature (LOW) has been detected during operation in measuring mode (MEASURE). The corresponding error code is also displayed.

Figure 7.6 Indication Examples

7.2.2 Key Operation Requests

Keys other than the [MODE] key and [*] key can be operated interactively with a display indication.

Key operation request messages are thus displayed in the following display sections of the seven sections.

(1) Data Display Section

The far left number blinks to request a key operation for data entry or selection of a specification.

(2) Message Display Section

A message is displayed requesting selection of an operation function / specification or data input.

(3) Pointer

The pointer blinks to ask whether you are going to enter a mode from the waiting status (waiting mode) or move to another operation mode.

The selected operation mode is indicated by the mode item in the operation mode indicating area pointed out by the operation mode indicating pointer.

Whether the mode is an operation level operation mode (the operation mode indicated by operation mode indicator 1) or a setting level / service level operation mode (the operation mode indicated by operation mode indicator 2) is shown by a "*" symbol on the left-hand side of the message display.

When a setting level / service level operational mode is selected, the "*" symbol is displayed together with a message.

8. INSPECTION AND MAINTENANCE

The SC200 intelligent two-wire conductivity transmitter system can be operated continuously without daily inspection or maintenance if a normal operation condition is insured.
If an electrode-contaminating component is found in the measuring solution, clean the electrode depending on the condition.

8.1 Conductivity Detector Maintenance

8.1.1 Cleaning the Electrode

(1) Cleaning Frequency

If the measuring solution contains any adhesive component, the electrode will be contaminated by that component. Depending on the nature of the contaminant adhering to the electrode, the same phenomenon as when an electrode with a different cell constant is used occurs so as to increase measurement error; thus, the electrode must be cleaned in specified cycles.

Observe the contaminant adhering to the electrode, determine a cleaning cycle and clean the electrode according to that cycle. Note, however, that electrodes (cell constant: 0.05 cm^{-1}) used for measurement of a solution less than 200 µS/cm hardly need to be cleaned, because not much foreign matter is contained in the measuring solution.
Generally, an electrode (cell constant: 5 cm^{-1} or 10 cm^{-1}) used for measurement of a solution over 200 µS/cm does not need to be cleaned at short intervals.

Note: The SC200□ conductivity transmitter has a function to check electrode polarization caused partly by contamination and output an <ABNORMAL> signal (error code Err.1) when it exceeds the allowable limit.
If Err.1 is detected by this function, clean the electrode and confirm that it is restored to normal condition. (For details, see Section 9.1.2.)

(2) Cleaning Procedure

<Removing the Conductivity Detector>

When removing the conductivity detector to inspect for contamination and for cleaning, loosen the union nut. Use two wrenches and grip the fixing screw using one, while turning the union nut with the other wrench counterclockwise.

If any pressure exists in the measuring solution, except when a direct insertion type detector with gate valve is used, stop the measuring solution flow and remove it.

When using a direct insertion type detector with gate valve, remove the union nut, pull the probe of the electrode until it comes into contact with the stopper, and close the gate valve. This operation prevents the measuring solution from leaking.
Then, loosen the stopper screw and remove the electrode. (To reinstall, reverse this procedure.)

<Cleaning an Electrode with a Cell Constant of 0.05 cm^{-1}>

Remove contaminant adhering to the inner and outer electrodes. For contamination of the outer electrode, even removing contamination adhering to the bore only attains is purpose. (For the structure of the electrode, see Section 1.2.1 and Figure 1.3.)

This electrode is structured so as to allow its outer electrode to be removed by loosening the lock nut. However, the cell constant may change depending on the condition after reassembly; thus, do not disassemble it as a rule.

<Cleaning an Electrode with a Cell Constant of 5 cm^{-1}>

This electrode uses glass. To prevent breakage, keep the protective tube fit when cleaning.

The section from which contaminant needs to be removed is the inner side of the glass tube incorporating a platinum electrode. Using a fine rod on which absorbent cotton is wound, rub the surface gently to remove the contaminant.

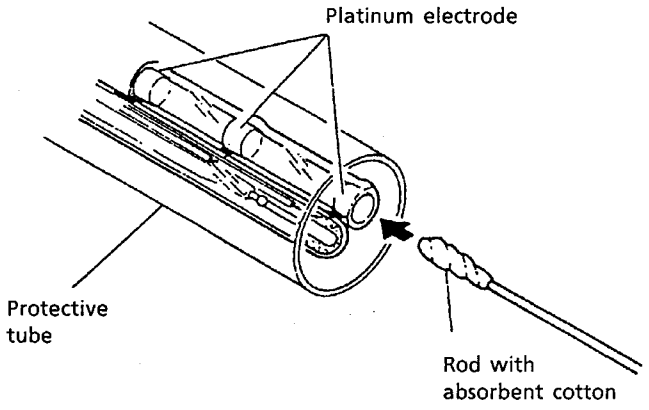


Figure 8.1 Cleaning an Electrode with a 5 cm^{-1} Cell Constant

<Cleaning an Electrode with a Cell Constant of 10 cm^{-1}>

Because the electrode is contained inside the probe, it is impossible to observe the contamination inside visually. Consider the contaminant component and adherence condition to be the same as the outer surface of the probe and wash as follows:

- Ordinary contamination :
  Wash with hot water in which detergent is dissolved.
- Chemical contamination by lime, hydroxide, etc. :
  Remove using 5 to 10% dilute hydrochloric acid. Be careful when doing this not to splash the chloric acid solution over the body and clothes.
- Contamination by algae, microbe or mold :
  Remove using chlorine solution (bleach).

Note 1: Do not use chloric acid and bleach at the same time. This may generate chlorine gas.

Note 2: Do not polish the electrode using a hard brush or it may be damaged.

8.1.2 Replacing the Sealing O-ring

If the sealing O-ring is defective and a pressure exists in the measuring solution, the solution will overflow. Accordingly, inspect the fixing screw O-ring for any defect.
In particular, when measuring a high temperature solution, pay attentions to deterioration and, if necessary, replace it periodically.

The sealing O-ring is fit in the position shown in Figure 8.2. Except for the direct insertion type conductivity detector with gate valve, the sealing O-ring can be inspected and replaced by loosening the union nut and removing the electrode.

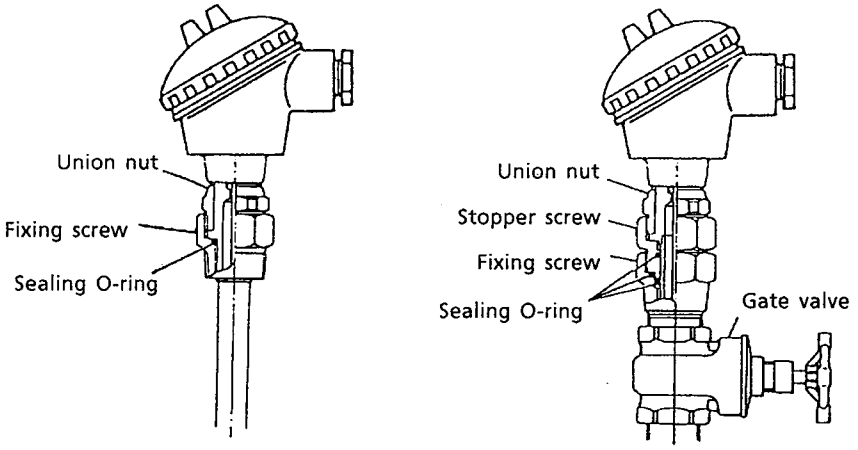


Figure 8.2 Sealing O-ring

For the direct insertion type conductivity detector with gate valve, proceed as follows for inspection and replacement.

Replacing the O-ring for the Direct Insertion Type Conductivity Detector with Gate Valve

(1) Remove the outer electrode and lock nut

First, remove the spring tip from the outer electrode. Then turn the lock nut clockwise (the direction indicated by arrow 1 in Figure 8.3) using a wrench to loosen it and turn the outer electrode counterclockwise (the direction indicated by arrow 2 in Figure 8.3).

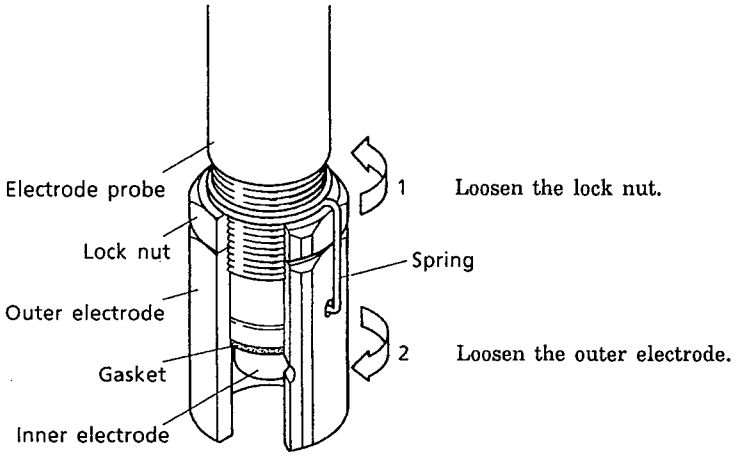


Figure 8.3 Removing the Outer Electrode and Lock Nut

(2) Pull the stopper screw from the electrode probe and replace the O-ring. Replace two at the same time as a rule.
(3) Replace the stopper screw in the electrode probe. Then replace the spring. Fully tighten the lock nut.
(4) Replace the outer electrode. (Note that the cell constant changes depending on the installation condition.) Replace the outer electrode and fix to the allowable limit.
(5) Fasten the spring. First turn the lock nut counterclockwise until it firmly contacts the outer electrode. Then insert both ends of the spring into the holes of the outer electrode.
(6) The procedure up to (5) completes replacement of the O-ring.
The cell constant may change depending on reassembly after the replacement. As a rule, calibrate with standard solution. (See Section 8.3.1.)

8.2 Conductivity Transmitter Inspection and Maintenance

8.2.1 Transparent Window

If the transparent window (polycarbonate resin weather resistant processing sheet) of the intelligent conductivity transmitter is contaminated, wipe it clean using a soft material such as a tissue.

Against serious contamination, you can use a neutral detergent. However, do not use organic solvent.

If key operation or the display is hard to see due to contamination or scratching, replace the transparent window.

8.3 Calibration

Calibration of the SC200 intelligent two-wire conductivity transmitter system is divided to standard solution calibration and one-point temperature calibration.

Standard solution calibration is performed when the electrode is deformed seriously due to corrosion or abrasion or an adhering contaminant cannot be removed.

One-point temperature calibration of the SC200□ intelligent conductivity transmitter can be used when a conductivity detector incorporating a Pt 1000Ω temperature element or Ni 100Ω temperature element is used.

In the SC200 intelligent two-wire conductivity transmitter system, only the SC211G high-range conductivity detector utilizing the Pt 1000Ω belongs to this type. However, also this conductivity detector, no one-point temperature calibration is generally needed partly because the resistance of a cable is not a problem for a standard product using a specified cable.

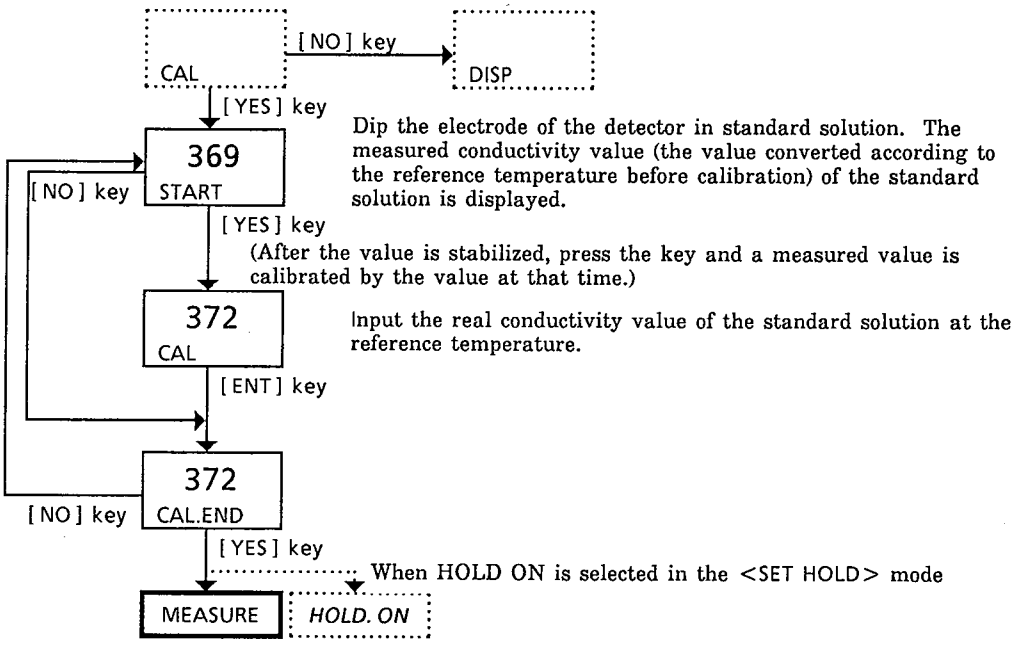
8.3.1 Standard Solution Calibration

Standard solution calibration is a means of correcting a currently used cell constant so as to obtain a proper conductivity value.

Standard solution calibration is performed using a sodium chloride (NaCl) solution whose temperature is not far from the reference temperature (usually 25°C). The NaCl solution to be used is assumed to have a concentration more than 50% the maximum value of a set output range. However, an NaCl solution having a concentration near the maximum value of the output range is the optimum. Meanwhile, the conductivity of that solution at the reference temperature must be known.

Upon standard solution calibration, select the NaCl characteristic (*NaCl) in selecting the temperature compensation "NaCl characteristic / measuring solution characteristic" in the setting level's temperature compensation parameter setting mode.

The key operation for standard solution calibration instruction is shown below.



8.3.2 One-Point Temperature Calibration

When one-point temperature calibration is necessary, proceed as follows. One-point temperature calibration is performed with the service level code set to <CODE 08>.
Dip the electrode of the detector in a solution at a temperature not far from that of the usually used measuring solution. (Take care not to allow the temperature of the solution to change easily.)

(1) After <CODE 08> is displayed, press the [ENT] key.
The message display changes to " *TP. ADJ " and a measured temperature is displayed on the data display unit.

(2) After the temperature displayed value is stabilized, measure the temperature of the measuring solution using an accurate thermometer and display this temperature value on the data display unit. To change the temperature value, use the [>] key and [*] key.

(3) Press the [ENT] key and one-point temperature is executed so that the same temperature signal value as when the [ENT] key is pressed is corrected to show the temperature value input in (2).

9. TROUBLESHOOTING

This chapter explains the various countermeasures to be taken when the SC200 intelligent two-wire conductivity transmitter system experiences trouble.

The most likely causes for disturbing proper the measurement are measuring solution and process unit. If there is any problem with the system, check that these are not the cause.

9.1 Countermeasures

9.1.1 Type and Content of Problem

The SC200□ conductivity transmitter detects various <ABNORMAL> states by means of its self-diagnostic function. Table 9.1 shows the <ABNORMAL> error codes and the content of detection. In some <ABNORMAL> cases, only an error code is displayed on the message display; in other <ABNORMAL>, "FAIL" (FAIL FAIL lights) is displayed.
For <ABNORMAL> with FAIL FAIL lit, a contact output signal (Note 1) is output; the transmission signal is over shot (22.0 mA) (Note 2).

Note 1: A contact output signal is output when "1 (output provided)" is selected in <CODE 11> of the service level. This signal is available only when the PH201G distributor is used.

Note 2: The transmission signal is fixed to 22.0 mA only when "1(burn-up function ON)" is selected in <CODE 09> of the service level.

Table 9.1 Error Code and Content

Error Code	Content	FAIL Display
Err.1	Conductivity detector trouble (electrode polarization, contamination)	Provided
Err.2	Temperature coefficient abnormal upon manual temperature compensation	Not provided
Err.3	Standard solution calibration error	Not provided
Err.5	Measured value abnormal (high)	Provided
Err.7	Temperature abnormal (high)	Provided
Err.8	Temperature abnormal (low)	Provided
Err.10	EEPROM error	Provided
Err.15	One-point temperature calibration error	Provided
Err.17	Output range setting error	Not provided
Err.18	Polygonal output 20-step table setting error	Not provided
Err.19	Input data set range exceeded	Not provided
Err.20	Initial adjustment value error	Provided

9.1.2 Countermeasures

If <ABNORMAL> condition occurs, cope with followings depending on the indicated error code.

(1) "Err.1" (conductivity detector abnormal)

Electrode polarization electrode is caused due to contamination, abrasion or corrosion. The SC200□ intelligent conductivity transmitter checks for polarization as one of its self-diagnostic functions during the measuring operation. If it detects that polarization has exceeded its limit, error code "Err.1" is displayed and an <ABNORMAL> signal is sent.

Because polarization of processing conductivity meter electrode is caused by contamination in most cases, if "Err.1" is output, remove the contaminant adhering to the electrode (see Figure 8.1.1). If an error code is still displayed even after the electrode is cleaned, the electrode is likely defective. In this case, replace it.

(2) "Err.2" (temperature coefficient abnormal)

Error code "Err.2" is output when a conductivity value for calculating a temperature coefficient is not properly input in the setting level's temperature compensation parameter setting mode (TEMPERATURE). (See item 1-3, page 6-7 of "Description 1 : Setting level operation modes". When this <ABNORMAL> state occurs, only error code "Err.2" is displayed.

The range of the temperature coefficient to be calculated is −10.00 to 10.00 (%/°C) or −10.00 to 10.00 (%/°F). When this error code appears, re-enter the correct conductivity value.

(3) "Err.3" (standard solution calibration abnormal)

Error code "Err.3" is output if the cell constant obtained in the current standard solution calibration differs by ±20% from the cell constant entered in "CODE 05" of the service level when standard solution calibration is performed in the operation level calibration mode (CAL). When this <ABNORMAL> state occurs, only error code "Err.3" is displayed.

Note: The cell constant shown on the message display by the operation level "DISP" mode changes to the value obtained by standard solution calibration. However, the cell constant obtained in that standard solution calibration is invalidated.

If an <ABNORMAL> cause is detected, check the conductivity value of the standard solution to be set and execute standard solution calibration again. If <ABNORMAL> is detected in a repeated standard solution calibration, check that the cell constant entered in "CODE 05" is not incorrect. If the entered cell constant is right, the electrode is likely defective and should be replaced.

(4) "Err.5" (measured conductivity value abnormal, high)

The SC200□ conductivity transmitter functions to perform optimum operation for the range of measuring conductivity determined on the basis of the cell constant entered in "CODE 05" of the service level and checks if the measuring operation is satisfied for the conductivity of that measuring solution.
Error code "Err.5" is output when abnormally high conductivity is detected by this function. If <ABNORMAL> is output, check if there is any abnormality in the process. If an <ABNORMAL> state is detected in the range of conductivity usually used, an inappropriate conductivity detector has been selected. Reselect an appropriate detector for the conductivity of the measuring solution referring to the measuring range shown in Section 2.1.1. Additionally, set the related operation data again.

(5) "Err.7" (temperature abnormal, high)

Error code "Err.7" is output when the temperature of the measuring solution is abnormally high (Note 1) or an error exists in the temperature measurement circuit.

Note 1: "Err.7" is displayed if the temperature exceeds 120°C when a low/medium-range conductivity detector (type SC210G) is connected, and 200°C when a high-range conductivity detector (type SC211G) is connected.

If an <ABNORMAL> state is detected, check the temperature of the measuring solution; it is at high temperature, leave it so that the temperature drops below the allowable maximum temperature appropriate for the detector.
If "Err.7" is displayed when the temperature of the measuring solution is within the specified range, the temperature measurement circuit is abnormal. To make sure, inspect the detector dedicated cable connection. If no abnormality is found in the cable connection, the temperature element incorporated in the electrode is likely defective, and the electrode should be replaced.

(6) "Err.8" (temperature abnormal, low)

Error code "Err.8" is output when the temperature of the measuring solution is below −10°C or an error has occurred in the temperature measurement circuit.
If an <ABNORMAL> cause is detected, check the temperature of the measuring solution. If the temperature is too low, take measures so that the temperature is kept above 0°C.
If "Err.8" is displayed even though the temperature of the measuring solution is within the specified range, the temperature measurement circuit is abnormal. To make sure, inspect the detector dedicated cable connection. If no abnormality is found in the cable, connection, the temperature element incorporated in the electrode is likely defective, and the electrode should be replaced.

(7) "Err.10" (EEPROM abnormal)

Error code "Err.10" is output when the intelligent conductivity transmitter does not operate properly. To check, stop the supply of power to the distributor temporarily and then turn on the power again. If <ABNORMAL> appears in this case also, the intelligent conductivity transmitter is malfunctioning. Contact your nearest dealer.

(8) "Err.15" (one-point temperature calibration abnormal)

The SC211G high-range conductivity detector using the Pt 1000Ω temperature element can perform one-point temperature calibration. Error code "Err.15" is output when the difference between the measured resistance of the temperature element and the theoretical resistance at that temperature is large in one-point temperature calibration. When this <ABNORMAL> state occurs, only the error code is displayed. When "Err.15" is displayed, check that the actual temperature of the calibration solution does not different from the set temperature, and perform one-point temperature calibration again. If "Err.15" appears again, the possible cause is a detector dedicated cable connection failure or a faulty of conductivity detector temperature element.

(9) "Err.17" (output range setting error)

Data entered in the output range setting mode (OUTPUT) of the setting level is checked to see if it is appropriate.
Error code "Err.17" is output when, upon setting an output range (conductivity) corresponding to a transmission output of 4 to 20 mA DC, the set value does not satisfy the condition. When <ABNORMAL> is output, only the error code is displayed.
If "Err.17" is output, reset the setting condition and re-enter data fitting the condition. To reset, refer to item 1-1 (page 6-6) under "Description 1: Setting level operational modes" in Section 6.1.4.

(10) "Err.18" (abnormal setting of polygonal output 20-step table)

Error code "Err.18" is output when the setting of the polygonal output 20-step table in CODE 04 of the service level is not appropriate. When this <ABNORMAL> state is indicated, only the error code is displayed.

(11) "Err.19" (input data set range exceeded)

Error code "Err.19" is output when the data value set on the setting level or service level is not within the allowable set range. When this <ABNORMAL> occurs also, only the error code is displayed.
When "Err.19" is output, re-enter the correct data value.

(12) "Err.20" (initial adjustment value abnormal)

Error code "Err.20" is output when the basic data set in the intelligent conductivity transmitter at the plant adjustment stage is incorrect.
If this <ABNORMAL> state is output, contact your nearest dealer.

9.2 Other Abnormalities

Even when no <ABNORMAL> indication occurs, operation is sometimes disturbed so that a proper measured value cannot be obtained. In this case, take the following measures.

9.2.1 Noise Mixed Into a Measured Value

Investigate the cause, checking whether the transmission output wire is located in the neighborhood of a noise source such as a power line and remedy the problem.

9.2.2 Abnormal Measured Value Indicated

Check that the DC power of the specified voltage is supplied from the distributor and if the cause is the supplied power, eliminate it.

9.3 Replacement of a Faulty Electrode

If the electrode is judged to be defective, replace the electrode assembly as follows:

(1) Stop the supply of power to the distributor. Loosen the union nut of the conductivity detector (stopper screw for the direct insertion type detector with gate valve) and remove the electrode fixed to the connecting screw.

(2) Disconnecting the electrode assembly from the dedicated cable
The electrode assembly of the SC211G high-range conductivity detector is provided with a connector, which is connected to the dedicated cable. If the SC211G detector is used, remove the connector.
The electrode assembly of the SC210G low / medium-range conductivity detector is provided with a lead wire, which is connected to the dedicated cable through the terminal box. If the SC210G detector is used, remove the lead wires (4) of the electrode assembly connected to the terminal box. Separate the terminal box from the electrode assembly. The electrode assembly is fixed into the terminal box. Insert a hexagonal head wrench into the two holes (Ø3.2 mm) on the collar in the neighborhood of the union nut and turn it counterclockwise to remove it (see Figure 9.1).

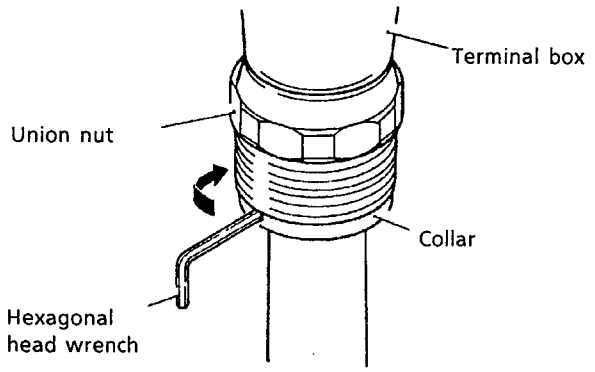


Figure 9.1 How to Remove Electrode Assembly

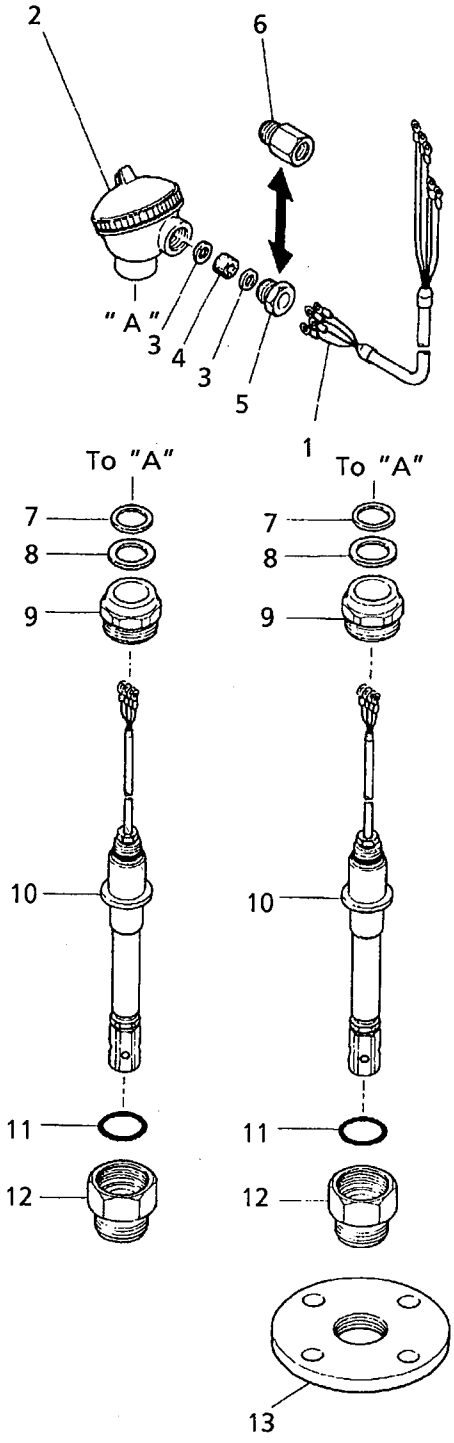
(3) Installing a substitute electrode assembly and reconnecting the wires
For the high-range electrode assembly, replace the union nut on the electrode assembly and fasten it with the holder mounting screws. Then, connect dedicated cable connector.
For the low / medium-range electrode assembly, replace dissembled parts on the electrode assembly, connect it to the terminal box and fasten with mounting screws. Then, connect each lead wire of the electrode assembly to the specified terminal. Connect the green lead wire to terminal C1, the yellow lead wire to terminal C2, and the red and black lead wires to terminals T1 and T2.

(4) Enter the cell constant of the installed electrode assembly.

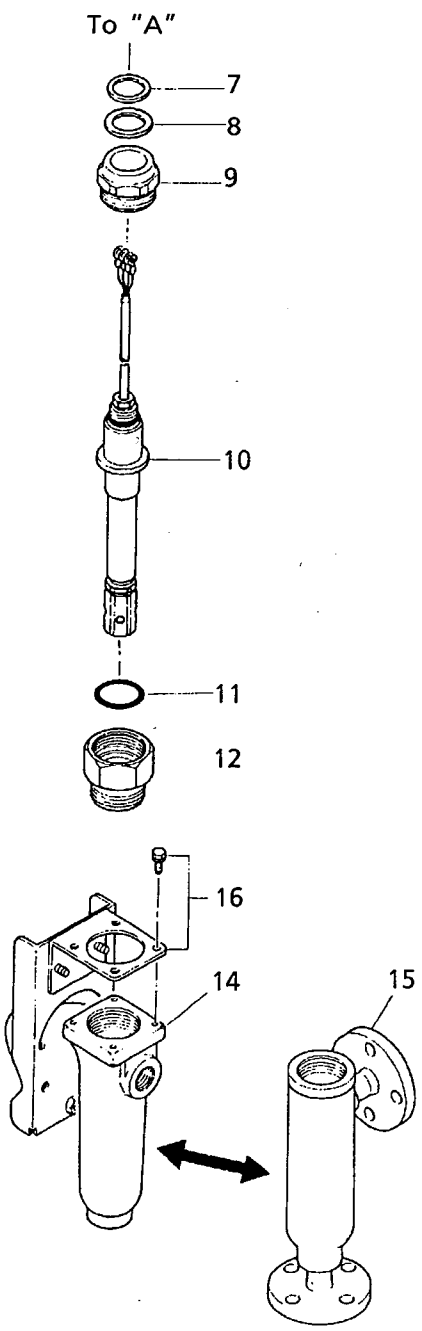
Customer Maintenance Parts List

SC210G
Conductivity Detector

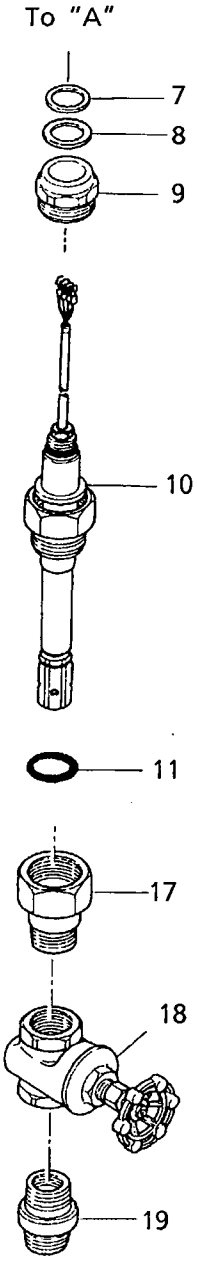
EXA SC



In-Situ Type



Flow Through Type



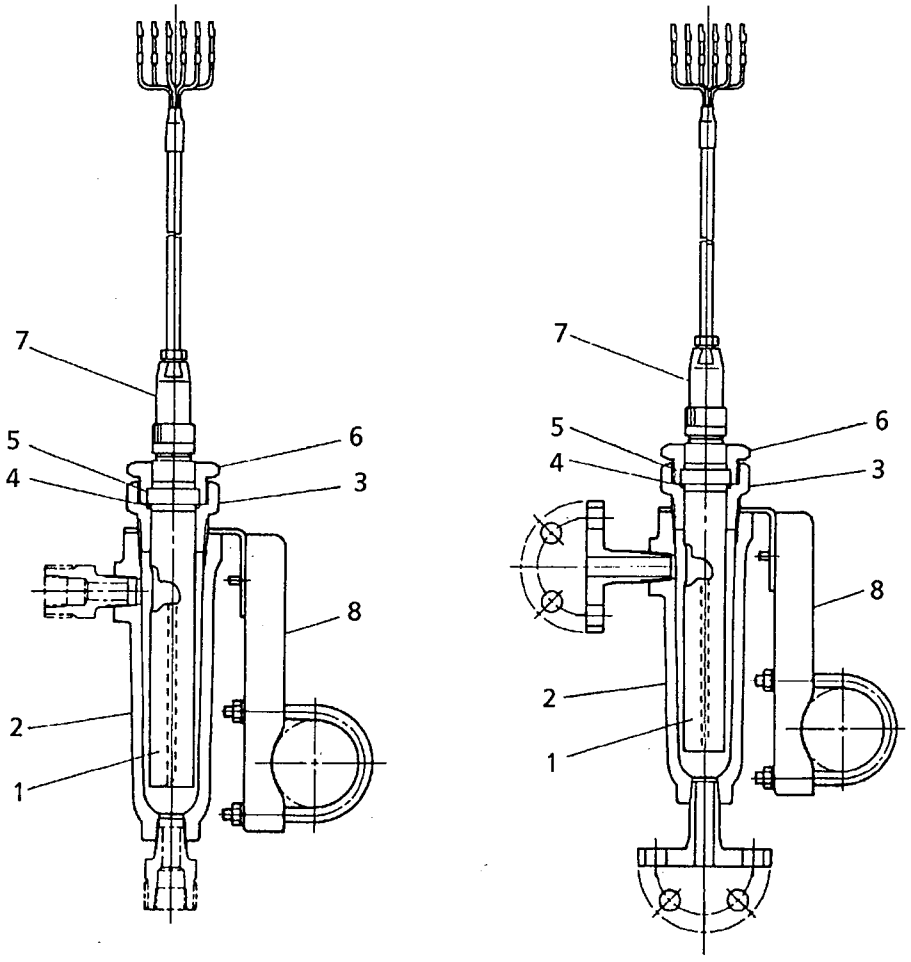
In-Situ Type
(with Gate Valve)

Item	Part No.	Qty	Description
1	—	1	Cable Assembly
	K9315QA		L = 3 m
	K9315QB		L = 5 m
	K9315QC		L = 10 m
2	—	1	Cup Assembly
3	G9600DE	2	Washer
4	G9600FD	1	Gasket
5	L9811GG	1	Nut
6	K9149SD	1	Connector (with ANSI connection)
7	K9208TG	1	Washer
8	K9208TH	1	Washer
9	K9050AP	1	Screw
10	—	1	Electorode Assembly
	K9208EA		For SC210G - A - □ (□ = 1, 2, 3)
	K9208KA		For SC210G - A - 4
	K9208JA		For SC210G - B
11	K9050AT	1	O - Ring
12	—	1	Screw
	K9050AN		Rating : R 1-1/2
	K9050AU		Rating : 1-1/2 NPT male
13	—	1	Flange
	L9840EA		Rating : JIS 10K - 50 - RF
	L9840QA		Rating : JANSI CLASS 150 - 2 - RF
	L9840KA		Rating : JPI CLASS 150 - 2 - RF
14	—	1	Holder Assembly
	K9053LD		Rating : Rc 1/2 female, SCS14
	K9053JN		Rating : Rc 1/2 female, Polypropylene
	K9053LK		Rating : 1/2 NPT emale, SCS14
	K9053JV		Rating : 1/2 NPT female, Polypropylene
15	—	1	Holder Assembly
	K9053MD		Rating : JIS 10K - 15 -RF flange, SCS14
	K9053KG		Rating : JIS 10K - 15 -FF flange, Polypropylene
	K9053PB		Rating : ANSI CLASS 150 - 1/2 - RF flange, SCS14
	K9053KN		Rating : ANSI CLASS 150 - 1/2 - FF flange, Polypropylene
16	K9053JW	1	Bracket Assembly (Holder assembly : Polypropylene)
17	K9050TP	1	Screw
18	L9852AE	1	Valve
19	—	1	Nipple
	L9832BG		Rating : R 1-1/4
	L9832BH		Rating : 1-1/4 NPT male

Customer Maintenance Parts List

SC211G
Conductivity Detector

EXA SC



Item	Part No.	Qty	Description
1	K9208BD	1	Electrode Assembly (Cell Constant : $10cm^{-1}$)
2	—	1	Holder Assembly
	K9053JN		Rc 1/2 (for SC211G-C-F-312)
	K9053JV		1/2 NPT Female (for SC211G-C-F-313)
	K9053KG		JIS 10K-15-FF (for SC211G-C-F-314)
	K9053KN		ANSI CLASS 150-1/2-FF (for SC211G-C-F-315)
3	K9315PA	1	Screw
4	G9303EB	1	O-Ring
5	K9208BL	1	Washer
6	K9315PB	1	Screw
7	—	1	Cable Assembly
	K9315QD		L=5.5m
	K9315QE		L=10m
8	K9053JW	1	Bracket Assembly

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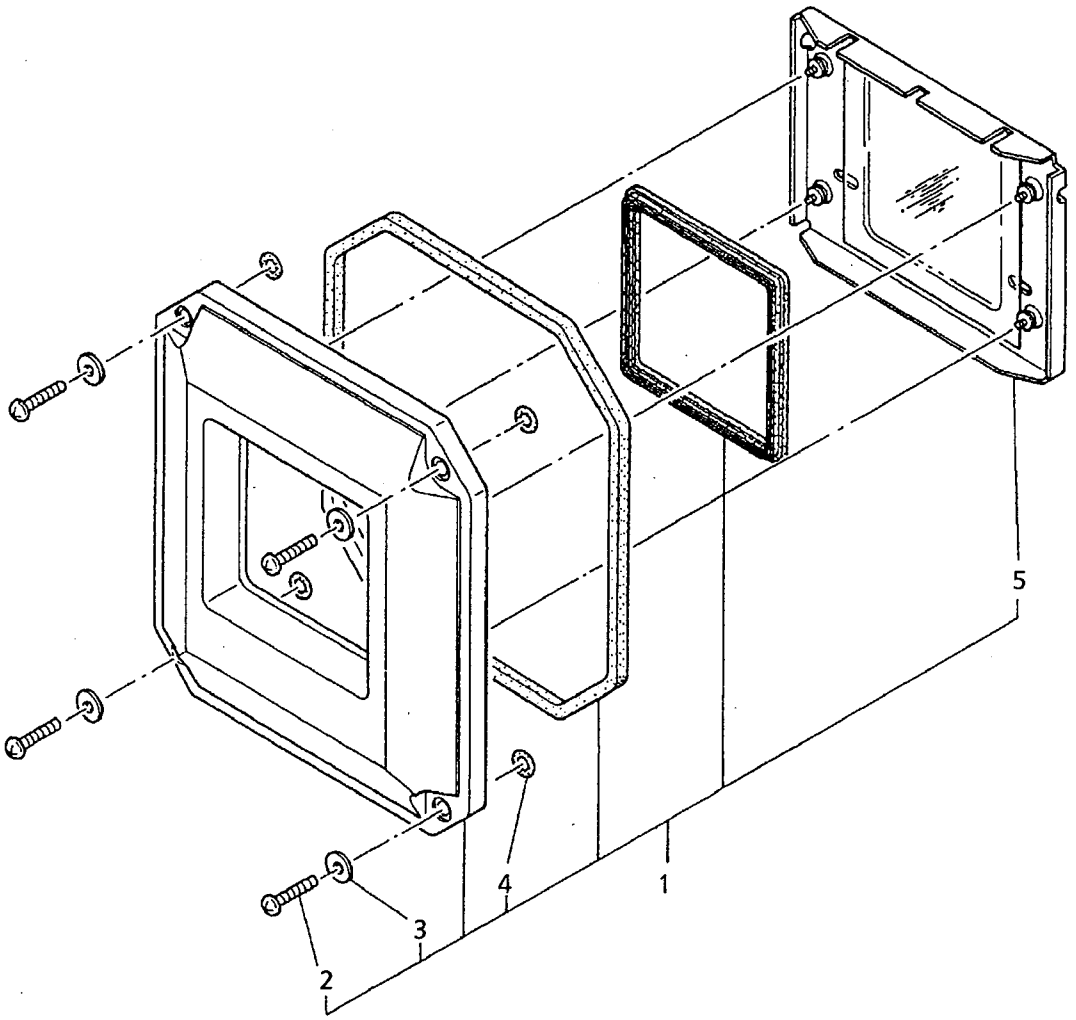
Yokogawa Electric Corporation

CMPL 12D8G1-01E

Customer Maintenance Parts List

SC200G
Intelligent Conductivity Transmitter

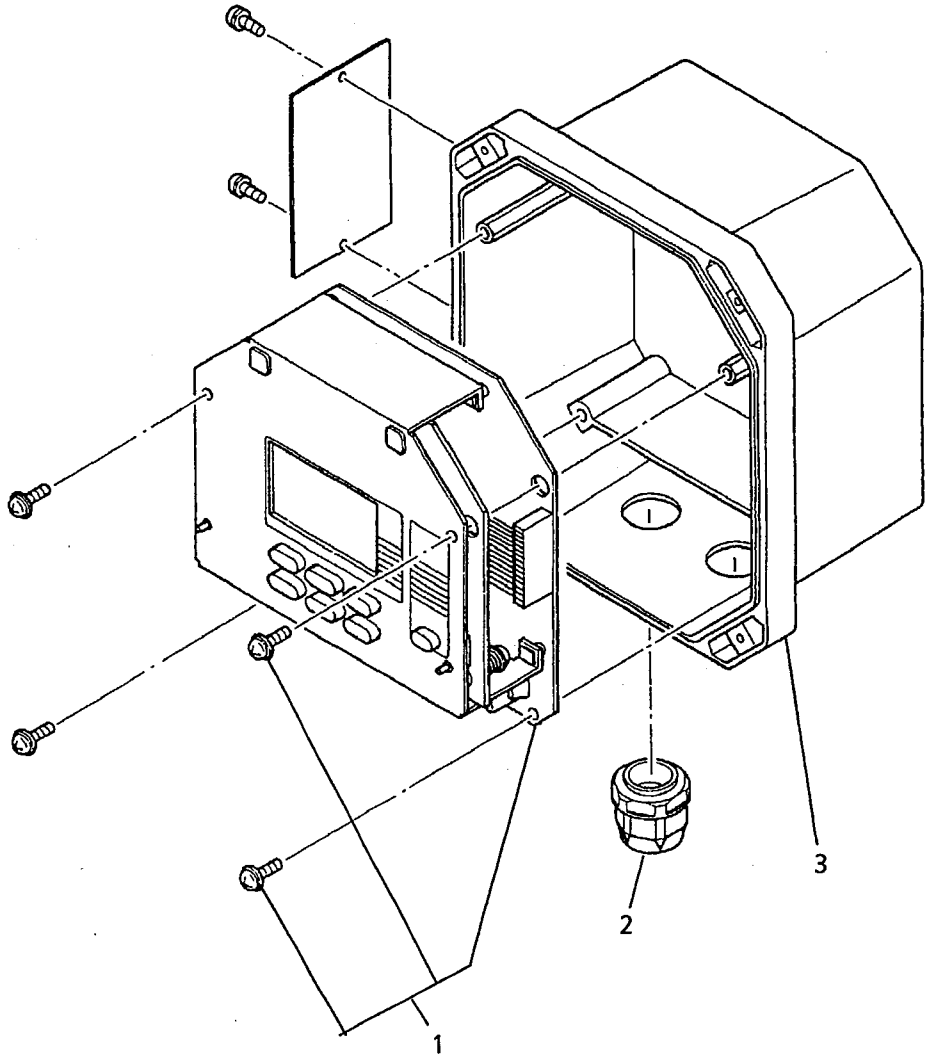
EXA SC



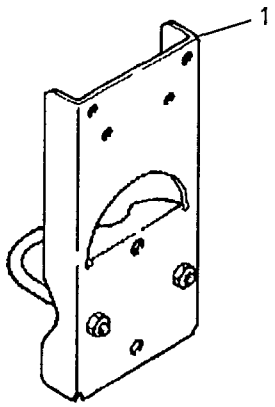
Item	Part No.	Qty	Description
1	K9315CA	1	Cover Assembly
2	Y9520JU	4	Pan H. Screw, M5 × 20
3	Y9500WU	4	Washer
4	Y9102XA	4	O-Ring
5	K9311JN	1	Window Assembly

YOKOGAWA ◆
Yokogawa Electric Corporation

CMPL 12D8M1-01E



Item	Part No.	Qty	Description
1	K9315BD	1	Amplifire Assembly
2	L9811CV	2	Cable Grand
3	K9315CB	1	Case Assembly



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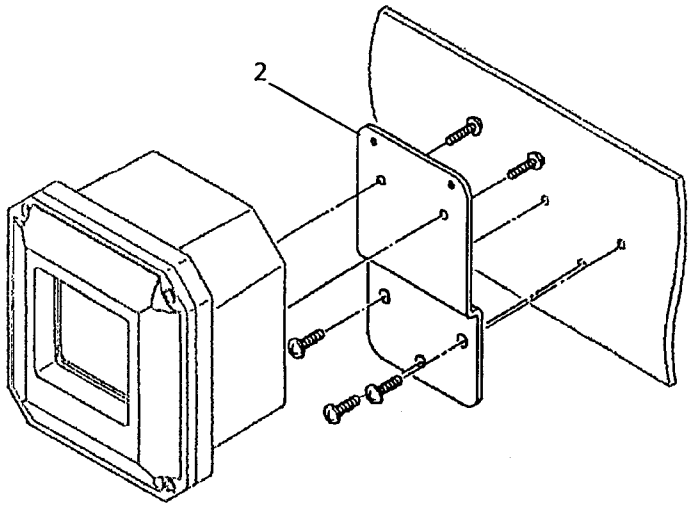

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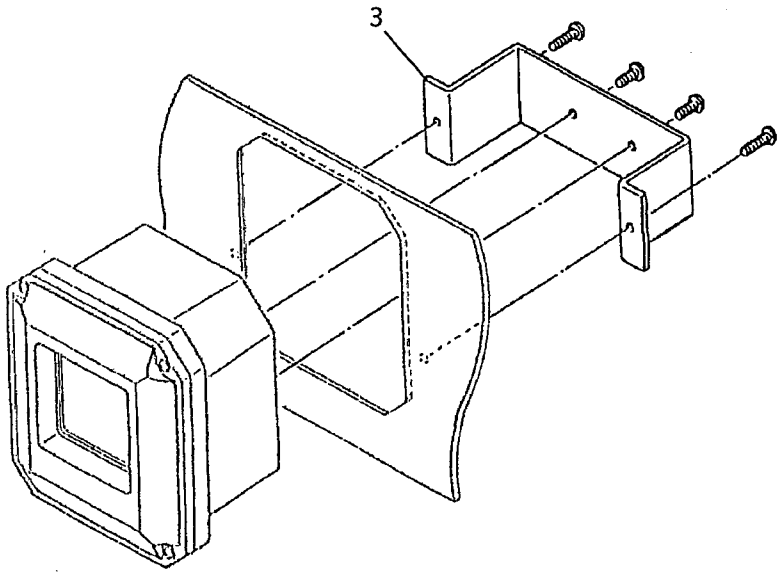

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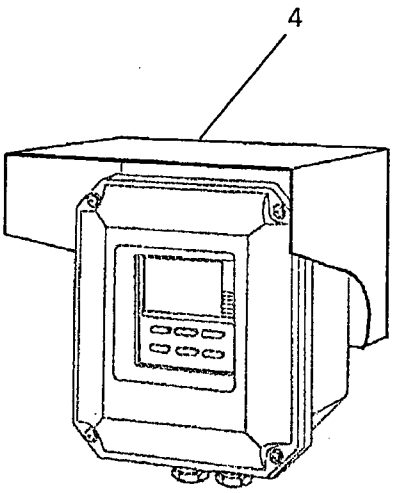

Option Code : / H

Item	Part No.	Qty	Description
1	K9149SA	1	Pipe Mounting Bracket
2	K9149SB	1	Wall Mounting Bracket
3	K9311KA	1	Panel Mounting Bracket
4	K9311KG	1	Awning Hood