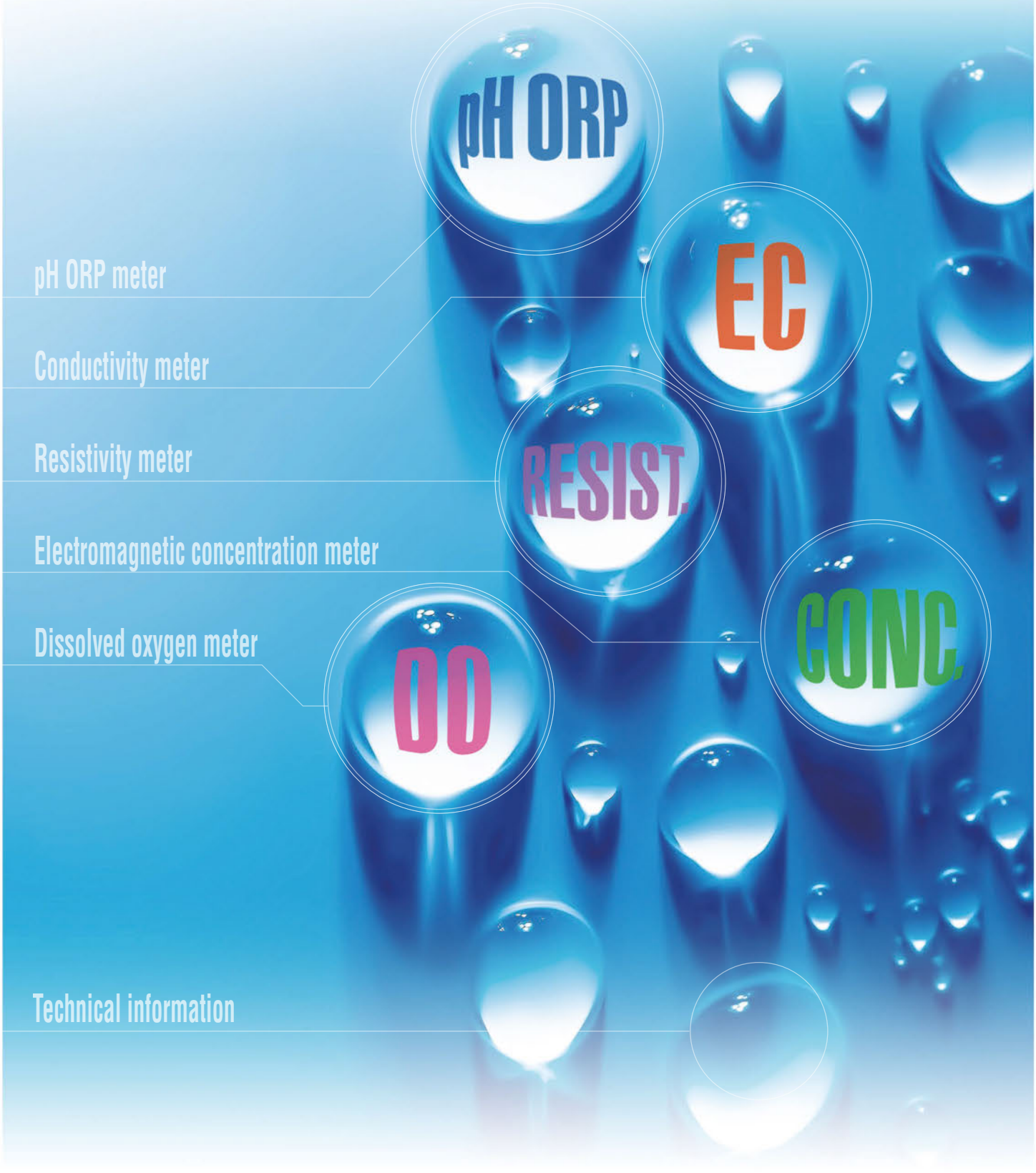
Process Instrument System Guide



pH ORP meter

Conductivity meter

Resistivity meter

Electromagnetic concentration meter

Dissolved oxygen meter

Technical information

DKK-TOA CORPORATION

This catalog is a system guide for selecting the appropriate model of our process (industrial) pH/ORP meters, conductivity meters, resistivity meters, electromagnetic meters, and dissolved oxygen (DO) meters according to the field conditions.
Refer to the catalog while planning and designing instrumentation and equipment in order to select the optimal model.
For detailed specifications, terminal diagrams, flowsheets, and product codes for the selected model, please check the respective specification sheet.

Field Installation Type Ultrasonic Cleaner pH/ORP Meter
pH: pH 0 to pH 14
ORP: -700 mV to +700 mV

pH/ORP Meter Representative System

Panel Type Conductivity Meter

Electrode Type
From 0 to 10 μS/cm
to 0 to 20 mS/cm

Electromagnetic Induction Type
From 0 to 0.5 mS/cm
to 0 to 2000 mS/cm

Conductivity Meter Representative System

Panel Type Resistivity Meter (2-channel)
0 to 20.00 MΩ· cm

Resistivity Meter Representative System

STEM GUIDE

Field Installation Type Electromagnetic Concentration Meter

Concentrations of $HCl/H_2SO_4/NaCl/NaOH$, etc. (%)

Electromagnetic Concentration Meter Representative System

Field Installation Type DO Meter with Pulse Air Jet Cleaner

0 to 10 mg/L

Dissolved Oxygen (DO) Meter Representative System

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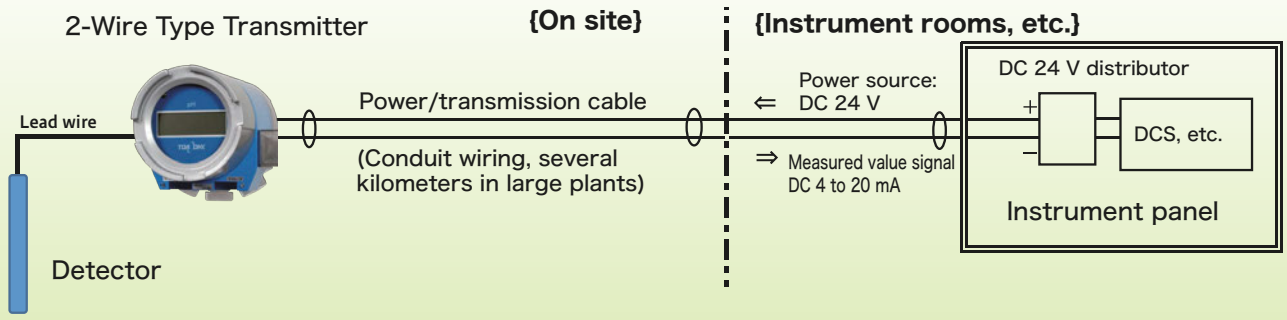
2-wire (DC Power Supply) Instrumentation System

Build a system from the transmitter installed on site to the instrument room with two wires (one cable)

Large-scale, low-cost instrumentation



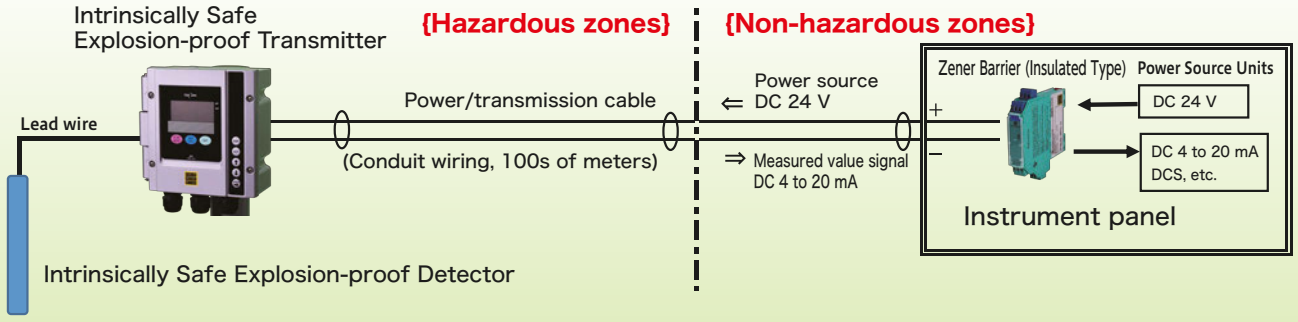
System Configuration and Typical Models for Various Instruments

System	pH/ORP Meter Model Name	Conductivity Meter		Electromagnetic Concentration Meter Model Name	Dissolved Oxygen (DO) Meter Model Name
		Electrode Type Model Name	Electromagnetic Induction Type Model Name		
Transmitter	HDM-135A/137A	WDM-135A	MDM-135A	MDM-137A	ODM-135A
Detector	Electrode: GSS/PSS-314B Holder: HC-G70	Screw-in type A6-11□	Screw-in type ME-11□	Flow-through type ME-61T	Electrode: 7533L Holder: OC-711
	Electrode: 5600/2600 Holder: HC-703C	Flange type A6-12□	Flange type ME-12□	Immersion type ME-71T	
Auxiliary Device	Holder Mounting Bracket: ZC-2	Dedicated Cable: EC-10	–	–	Electrode Lead Wire: ELW-32 Holder Mounting Bracket: ZC-2

Intrinsically Safe Explosion-Proof (2-wire DC Power Supply) Instrumentation System

Build a system from the transmitter installed in a hazardous zone to the instrument room in a non-hazardous zone with two wires (one cable)

Keeping instrumentation safe from explosions



System Configuration and Typical Models for Various Instruments

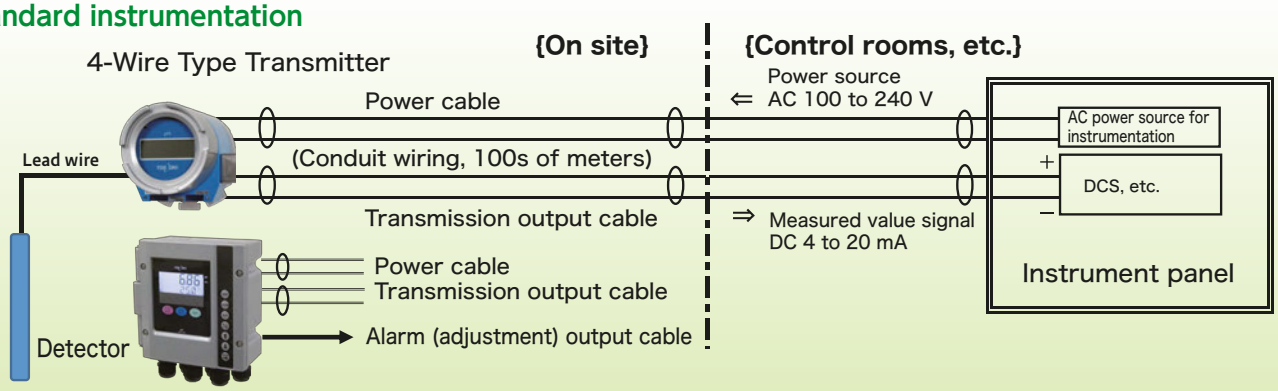
System	pH/ORP Meter Model Name	Conductivity Meter Model Name
Transmitter	SHBM-161/163	SWBM-161
Zener Barrier	Insulated Type KFD2-STC4-Ex1	
Detector	Electrode: 5600/2600 Holder: SHC-703	Screw-in Type SA6-11□
Auxiliary Device	Holder Mounting Bracket: ZC-2	Dedicated Cable: EC-10

4-wire (AC Power Supply) Instrumentation System

Field Installation Type

Build a system from the transmitter on site (non-hazardous zone) to the control room with four wires (two cables)

Standard instrumentation



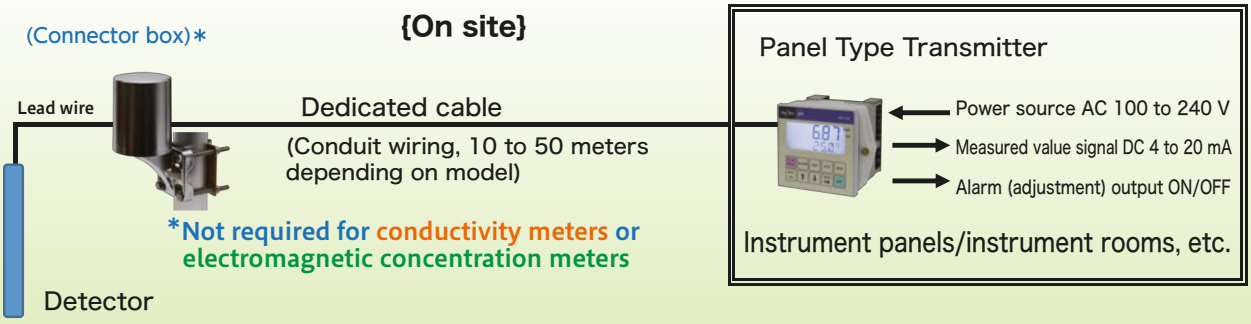
System Configuration and Typical Models for Various Instruments

System	pH/ORP Meter Model Name	Conductivity Meter		Electromagnetic Concentration Meter Model Name	Dissolved Oxygen (DO) Meter	
		Electrode Type Model Name	Electromagnetic Induction Type Model Name		Model Names for Effluent/Sewage	Low Concentration Model Name
Transmitter	HDM-136A/138A	WDM-136A	–	–	ODM-136A	ODM-110A
	HBM-160B/162B (with alarm output)	WBM-160 (with alarm output)	MBM-160 (with alarm output)	MBM-162 (with alarm output)	OBM-162A (with alarm output)	OBM-300 (Alarm/automatic range switching)
Detector	Electrode: GSS/PSS-314B Holder: HC-G70	Screw-in type A6-11□	Screw-in type ME-11□	Flow-through type ME-61T	Electrode: 7533L Holder: OC-711	Electrode: 7561L Fine Amount Holder: OC-64
	Electrode: 5600/2600 Holder: HC-703C	Flange type A6-12□	Flange type ME-12□	Immersion type ME-71T		
Auxiliary Device	Holder Mounting Bracket: ZC-2	Dedicated Cable: EC-10	–	–	Electrode Lead Wire: ELW-32 Holder Mounting Bracket: ZC-2	Electrode Lead Wire: ELW-32

Panel Type

Build a system from the instrument panel on site (non-hazardous zone) or the instrument room

Simple instrumentation



System Configuration and Typical Models for Various Instruments

System	pH/ORP Meter Model Name	Conductivity Meter		Electromagnetic Concentration Meter Model Name	Dissolved Oxygen (DO) Meter	
		Electrode Type Model Name	Electromagnetic Induction Type Model Name		Model Names for Effluent/Sewage	Low Concentration Model Name
Transmitter	HBM-100B/102B	WBM-100	MBM-100A	MBM-102A	OBM-102A	OBM-100H
Detector	Electrode: GSS/PSS-314B Holder: HC-G70	Screw-in type A6-11□	Screw-in type ME-11□	Flow-through type ME-61T	Electrode: 7533L Holder: OC-711	Electrode: 7561L Fine Amount Holder: OC-64
	Electrode: 5600/2600 Holder: HC-703C	Flange type A6-12□	Flange type ME-12□	Immersion type ME-71T		
Auxiliary Device	Holder Mounting Bracket: ZC-2 Dedicated Cable: EC-10 Connector Box: FC-4	Dedicated Cable: EC-10	–	–	Electrode Lead Wire: ELW-32 Holder Mounting Bracket: ZC-2	Electrode Lead Wire: ELW-32

1 Model Selection of pH/ORP Meters

pH Meter / ORP Meter Requested Specification Check

1. Facilities (Plant) to be Used•••
☐ Production line ☐ Quality control ☐ Effluent treatment ☐ Desulfurization equipment ☐ Boilers / pure water
☐ River, lake, pond (environment) ☐ Other

2. Location to be Installed•••••••
☐ Indoor ☐ Outdoor ☐ With direct sunlight ☐ With salt damage ☐ With dust / corrosive atmosphere
☐ With noise source ☐ High place ☐ High temperature place
☐ Non-hazardous area (non-explosion-proof specification) ☐ Hazardous area (explosion-proof specification)

3. Purpose of Continuous Measurement
☐ Display and recording only ☐ Monitoring / alarm ☐ General control (effluent, etc.)
☐ High-precision control ☐ Other

4. Sample Water•••••••••••••••••
Temperature:_____°C Pressure:_____KPa Electric conductivity:_____S/cm
Flow velocity:_____m/sec pH/ORP (control) value:_____

5. Transmitter Type••••••••••••••
☐ Field installation type 2-wire type ☐ Field installation type 4-wire type ☐ Panel type ☐ Explosion-proof type
☐ Alarm (adjustment) output required

6. Detector Type•••••••••••••••••
☐ Immersion type ☐ Throw-in / drop-in type ☐ Flow-through type ☐ Explosion-proof type
☐ Cleaner required:_____ method

7. Auxiliary Device / Spare Parts
☐ Pole stand required ☐ Detector mounting device required ☐ Arrester required
☐ Calibration kit required ☐ Other

8. Field Utilities••••••••••••••••••
☐ With power supply for instrumentation _____ V ☐ With commercial power supply _____ V
☐ With instrumentation air ☐ With industrial water

Two Representative System Examples: Transmitter + Detector (Electrode and Holder) + Auxiliary Device

Outdoor Installation 2-wire Type

Outdoor Field

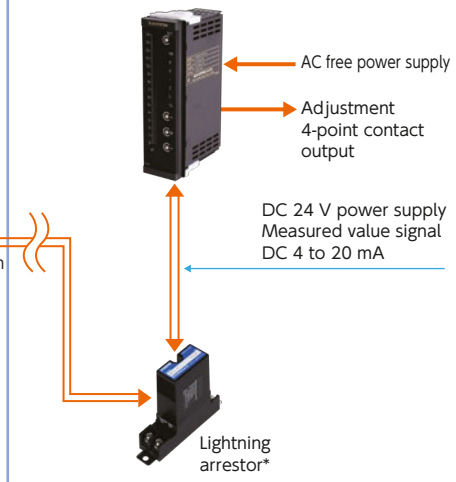
■Detector with pulse air jet cleaner
PHCG-7D/
GSS-314B

■Pole stand
ZB-1

■Transmitter HDM-135A

Instrument Room / Instrument Panel

■Bar graph display controller with DC power supply*
130D002



*Other company's products.

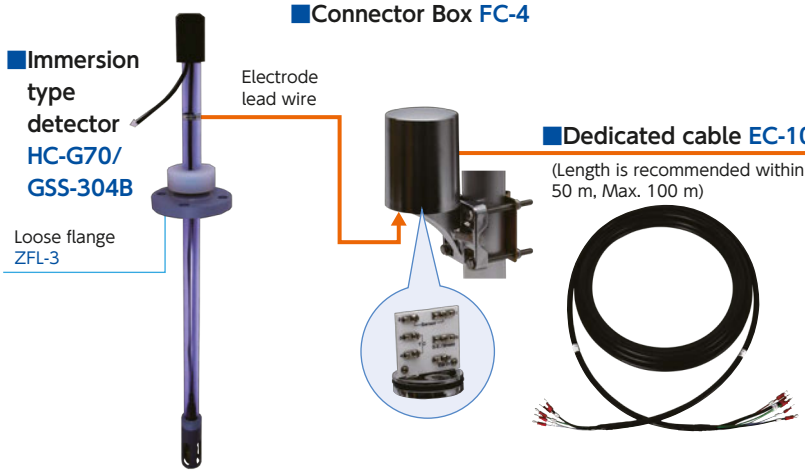
Indoor Installation Panel Mounting Type

Installation Plan

■Immersion type detector
HC-G70/
GSS-304B

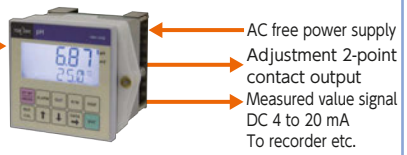
Loose flange
ZFL-3

■Connector Box FC-4



Instrument Room / Instrument Panel

■Panel mounting type transmitter
HBM-100B



*In case of AC 100 V or higher, it is possible to deal with voltage converter unit ZP-30.

Field Installation Type

Type of Transmitter

■2-wire pH meter: HDM-135A
■2-wire ORP meter: HDM-137A

■4-wire pH meter: HDM-136A
■4-wire ORP meter: HDM-138A

Main Specifications and Functions

◉Power supply: DC 24 V

◉Power supply: AC 100 to 120 V 50/60 Hz
or AC 200 to 240 V 50/60 Hz

◉Transmission output: DC 4 to 20 mA Load resistance 650 Ω or lower
◉Meas. range: pH meter pH -1.00 to pH 14.00
(Arbitrary setting with a width of pH 2 or higher)
ORP meter -2000 to +2000 mV (Arbitrary setting with a width of 400 mV or higher)
Water temperature 0 to 100°C
◉Structure and mounting: Outdoor installation IP55 50A pole mounting
◉Ambient temperature and humidity: -20 to 55°C 99% RH or lower
◉Mass: Approx. 3 kg
◉Dimensions: ϕ120 × 180 (D) mm
◉Options: Hood, heavy-duty coating, arrestor (simple type)

Field Installation Type / Multi-functional Type

■4-wire pH meter: HBM-160B
■4-wire ORP meter: HBM-162B

◉pH/ORP and water temperature:
two measurement value signals
◉Two-point alarm (adjustment) output signal
◉Display with backlight
◉Cleaner control signal (optional)

◉Power supply: AC 100 to 240 V 50/60 Hz
◉Transmission output: DC 4 to 20 mA Load resistance 650 Ω or lower
pH or ORP and water temperature: 2 circuits
◉Meas. range: pH meter pH -1.00 to pH 15.00
(Arbitrary setting with a width of pH 2 or higher)
ORP meter -2000 to +2000 mV
(Arbitrary setting with a width of 400 mV or higher)
Water temperature -5.0°C to 100.0°C
(Arbitrary setting with a width of 10°C or higher)
◉Alarm (adjustment) output: Two circuits, c contact, with adjustable sensitivity
Three circuits, A contact One circuit, C contact (optional)
◉Structure and mounting: Outdoor installation IP65 50A pole or wall mounting
◉Ambient temperature and humidity: -20 to 55°C 90% RH or lower
◉Mass: Approx. 2 kg
◉Dimensions: 181 (W) × 180 (H) × 95 (D) mm
◉Options: Output for cleaner, RS485 output, arrestor (simple type),
hood, heavy-duty coating

Panel Mounting Type

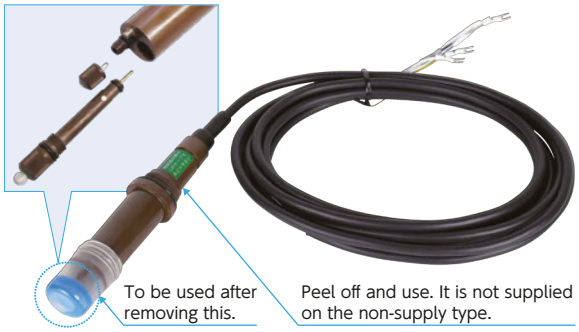
■pH meter: HBM-100B
■ORP meter: HBM-102B

◉Two-point alarm (adjustment) output signal
◉Display with backlight
◉Cleaner control signal (optional)

◉Power supply: AC 100 to 240 V 50/60 Hz
◉Transmission output: DC 4 to 20 mA Load resistance 650 Ω or lower
◉Meas. range: pH meter pH -1.00 to pH 15.00
(Arbitrary setting with a width of pH 2 or higher)
ORP meter -2000 to +2000 mV
(Arbitrary setting with a width of 400 mV or higher)
Water temperature -5.0 to 100.0°C
◉Alarm (adjustment) output: Two circuits, a contact, with adjustable sensitivity
Four circuits, A contact, or Two circuits, C contact (optional)
◉Structure and panel cut size: Indoor installation (IP20) 92 mm × 92 mm
◉Ambient temperature and humidity: -10 to 50°C 90% RH or lower
◉Mass: Approx. 0.6 kg
◉Dimensions: 96 (W) × 96 (H) × 90 (D) mm
◉Options: Output for cleaner, RS485 output

Replaceable Tip Type GSS Series Electrode

Common Specifications



Supply Type

For Process Online

- **For pH standard:** GSS-314BI(Q)
- **For pH high alkaline:** GSS-314AI(Q)
- **For pH hydrofluoric acid-resistant:** GSS-314FI(Q)
- **For ORP (Pt) standard:** PSS-314BI(Q)
- **ORP (Au):** ASS-314BI(Q)

Non-Supply Type

For Effluent Treatment

- **For pH effluent:** GSS-304BI(Q)
- **For pH high-alkaline effluent:** GSS-304AI(Q)
- **For pH hydrofluoric acid-resistant effluent:** GSS-304FI(Q)
- **For ORP (Pt) effluent:** PSS-304BI(Q)
- **For ORP (Au) effluent:** ASS-304BI(Q)

*I is lead length 5 m and Q is lead length 10 m

Main Specifications and Functions

- Body material: PPS resin Outer diameter: ϕ28
- Lead wire Outer diameter: ϕ7.5 Length: 5 m (I) or 10 m (Q)

Common Features

- The electrode tip can be replaced without removing the electrode lead wire from the transmitter.
- The glass electrode and the liquid junction tip are inexpensive and can be replaced easily due to the screw-in structure, reducing running costs
- The body and lead wire are robust and have a long life.

- Inner solution used: 3.3M KCl
- Sample water temperature: Max. 100°C, max. 50°C for hydrofluoric acid-resistant
  Pressure: Max. 0.3 MPa
  Electric conductivity: 100 μS/cm (10 mS/m) or higher

Features

- The heat resistance is high and the electric conductivity lower limit is low.

- Inner solution used: Saturated KCl gel
- Sample water temperature: Max. 80°C, max. 50°C for hydrofluoric acid-resistant
  Pressure: Max. 0.5 MPa
  Electric conductivity: 1000 μS/cm (100 mS/m) or higher

Features

- Periodic replenishment of the inner solution is not necessary.
- The pressure resistance is as high as 0.5 MPa and flow-through pressurization is not required.
- Replacement of the inner solution KCl gel is possible.

Replaceable Tip Type GSS Series Electrode, Installation Holder (Detector)

Immersion Type Holder

- **Resin** HC-G70
  For transparent PVC, the sample water temperature shall be 60°C or lower. It has weather resistance.
  For translucent PP, the sample water temperature shall be 80°C or lower. Indoor installation is recommended.
- **Stainless steel (SUS316)** HC-G72
  Compatible with non-supply electrode only
- **Throw-in type PVC** HC-G95
  Compatible with non-supply electrode only

With the electrode assembled

HC-G95 + GSS-304BI

With electrode assembled on a 1 m length holder

HC-G70 + GSS-314BI

- The protection pipe for drop-in is optional.
  Material: SUS or PVC (50A)
  Length: 2.0/3.0/4.0/5.0/6.0 m

- Length: 0.5/1.0/1.5/2.0/2.5/3.0 m
  Immersion type common

Replaceable Tip Type GSS Series Electrode, Installation Holder (Detector)

Immersion Type Holder with Cleaner

■With ultrasonic cleaner:

UHC-7C

- Power supply: AC 100 V
- Material: SUS316 and PVC

- Length: 0.5/1.0/1.5/2.0/2.5/3.0 m
  Immersion type common

■With pulse air jet cleaner:

PHCG-7D

PHCG-95D

For deep tank/drop-in type
Compatible with non-supply electrode only

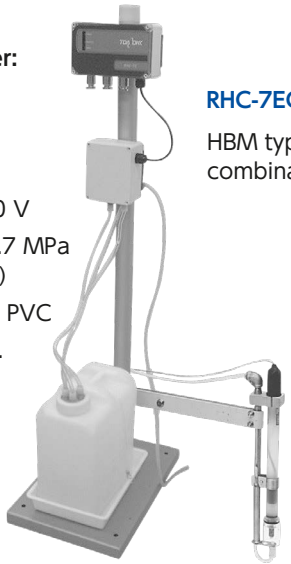
- Power supply: AC 100 V
- Instrumentation air: 0.7 MPa (Air pump is optional.)
- Material: SUS316 and PVC
- Protective pipe length: 2 to 6 m

■With chemical cleaner:

RHC-7C

HDM type transmitter combination

- Power supply: AC 100 V
- Instrumentation air: 0.7 MPa (Air pump is optional.)
- Material: SUS316 and PVC
- Chemical: 5% HCl etc.



RHC-7EC

HBM type transmitter combination

*In case of AC 100 V or higher, it is possible to deal with voltage converter unit ZP-30.

Cleaner selection material ▶ Refer to page 1-13・14

Flow-Through Type Holder

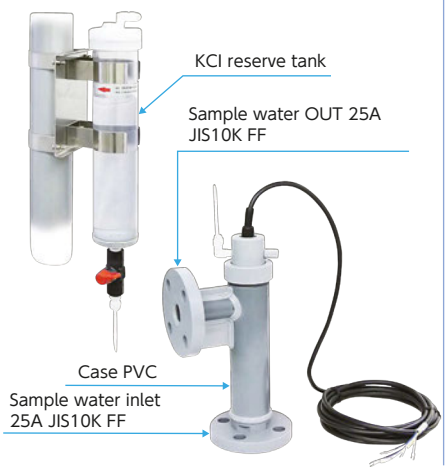
■For KCl supply type in-line

Pressurization type and head pressure type available

HC-G80P Resin Pressure resistance: 0.15 MPa

HC-G82P SUS Pressure resistance: 0.3 MPa

- Connection flange: 25A JIS 10K FF (Standard)



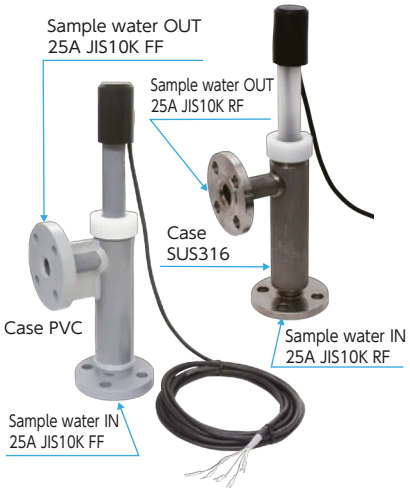
■For KCl non-supply type in-line

No pressurization required

HC-G80 Resin Pressure resistance: 0.15 MPa

HC-G82 SUS Pressure resistance: 0.3 MPa

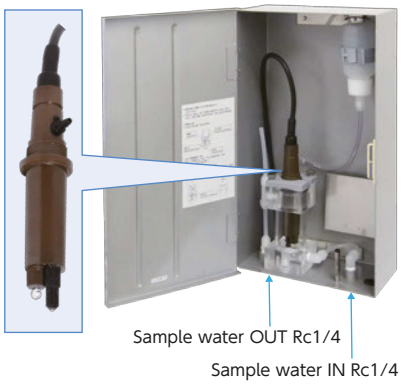
- Connection flange: 25A JIS 10K FF (Standard)



■For pure water / boiler water pH

HC-G65 (Micro-flow type)

- Combined electrode: **GSS-314P**
- Electric conductivity: 0.1 μS/cm (0.01 mS/m) or higher
- Flow rate: 30 to 200 mL/min
- Sample water connection thread: Rc1/4
- Dimensions: 221 (W) × 400 (H) × 110 (D) mm



Integrated 5600 Series Electrode

Type

For effluent treatment from process online

■For pH standard/head pressure type: 5600-5F(10F)
■For pH high temperature/Head pressure type: 5601-5F(10F)
■For pH chemical resistant/head pressure type: 5602-5F(10F)
■For pH hydrofluoric acid-resistant/head pressure type: 5605-5F(10F)
■For pH standard/pressurization type: 5610-5F(10F)
■For pH high temperature/pressurization type: 5611-5F(10F)
■ORP (Pt)/head pressure type: 2600-5F(10F)
■ORP (M)/head pressure type: 2605-5F(10F)
*5F is lead length 5 m and 10F is lead length 10 m

Main Specifications and Functions

◉Body Material: Glass Outer diameter: ϕ15
◉Lead wire Outer diameter: ϕ6 Length: 5 m (5F) or 10 m (10F)
◉Inner solution used: 3.0 M KCl
◉Sample water temperature: Max. 70°C, max. 95°C for high temperatures
Max. 50°C for hydrofluoric-acid-resistant
Pressure: Atmospheric pressure for head pressure type
Max. 0.5 MPa for pressurization type (single unit electrode)
Electric conductivity: 100 μS/cm (10 mS/m) or higher

Features

◉There are two liquid junctions (ceramic), resistant to dirt.
◉The inside of the reference electrode is filled with silver chloride inhibitor (chelate resin), with stable liquid junctions.
◉The electrode is built into the holder and the inner solution is filled before shipping. Installation and start of measurement are simple

Integrated 5600 Series Electrode, Installation Holder (Detector)

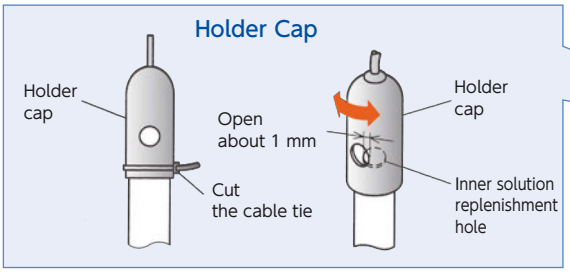
Immersion Type Holder

■For standard, transparent PVC
HC-703C
Sample water temperature: 60°C or lower, with weather resistance
◉Length: 0.5/1.0/1.5/2.0/2.5/3.0 m

■For high temperature, semitransparent PP
HC-763
Sample water temperature 80°C or lower, indoor installation recommended
◉Length: 0.5/1.0/1.5/2.0 m

■For heat resistance / chemical resistance, PVDF
HC-703F
Sample water temperature: 95°C or lower, high weather resistance
◉Length: 0.5/1.0/1.5/2.0 m

■For high temperature / organic solvent resistance, PFA
HC-703T
Sample water temperature: 80°C or lower, high weather resistance
◉Length: 0.5/1.0/1.5/2.0 m



Integrated 5600 Series Electrode, Installation Holder (Detector)

Immersion Type Holder with Cleaner

■With ultrasonic cleaner

UHC-7C

- Power supply: AC 100 V
- Material: SUS316 and PVC

■With pulse air jet cleaner

JHC-7C

- Power supply: AC 100 V
- Cleaning water: Industrial water
- Material: SUS316 and PVC
- Length: 0.5/1.0/1.5/2.0/2.5/3.0 m
  Immersion type common

■With pulse air jet cleaner

PHC-7D

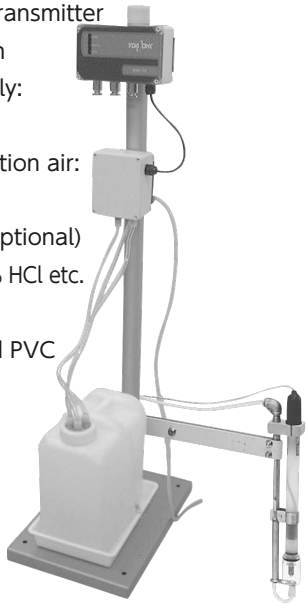
- Power supply: AC 100 V
- Instrumentation air: 0.7 MPa (Air pump optional)
- Material: SUS316 and PVC

■With chemical cleaner

RHC-7C

HDM type transmitter combination

- Power supply: AC 100 V
- Instrumentation air: 0.7 MPa (Air pump optional)
- Chemical: 5% HCl etc.
- Material: SUS316 and PVC



RHC-7EC

HBM type transmitter combination

■With lift-up type jet cleaning (air jet cleaning method)

LHC-7D

HDM type transmitter combination

- Power supply: AC 100 V
- Cleaning water: Industrial water
- Chemical: 5% HCl etc.
- Instrumentation air: 0.7 MPa
- Material: SUS316 and PVC
- Lift stroke: 600 mm or 250 mm
- Holder length: 1.6 m or 0.9 m (Throw-in type)

Cleaner selection material ▶ Refer to page 1-13・14

Flow-Through Type Holder

■ Head pressure type for outlet open

NHC-892

(Resin, atmospheric pressure)

NHC-893

(SUS, atmospheric pressure)

- Connection flange: 25A JIS10K
- Representative combined electrode: 5600-5F

■Pressurization type for closed loop

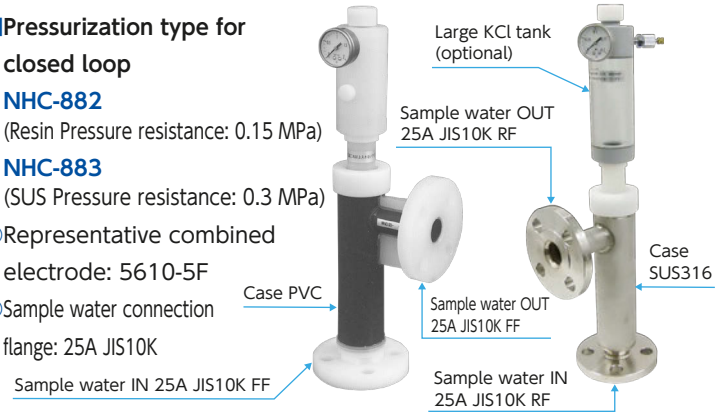
NHC-882

(Resin Pressure resistance: 0.15 MPa)

NHC-883

(SUS Pressure resistance: 0.3 MPa)

- Representative combined electrode: 5610-5F
- Sample water connection flange: 25A JIS10K



■With ultrasonic cleaner

UHC-8C

Resin or resin/SUS Head pressure or pressure resistance 0.1 MPa or below

- Power supply: AC 100 V
- Representative combined electrode: 5600-5F (head pressure) or 5610-5F (pressurization)
- Connection flange: 25A JIS10K RF

*In case of AC 100 V or higher, it is possible to deal with voltage converter unit ZP-30.

Auxiliary Devices (1): Types of Mounting Devices

Mount the immersion type holder (HC-7□□ type) with brackets.

■Pole stand

ZB-1

Mount field installation type transmitters and detectors

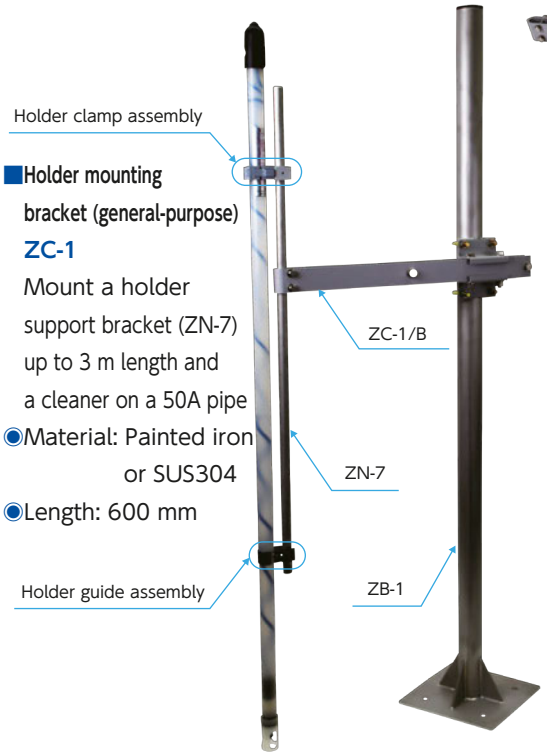
- Material: Painted iron or SUS304
- Diameter: 50A / Length: 1.6 m
- Base: 260×260 mm
- Mass: Approx. 10 kg

■Holder support bracket

ZN-7

Reinforce the holder at a length from 1.0 m to 3.0 m

- Material: SUS316
- Length: 0.5 to 2.0 m
- Mass: Approx. 1 kg/1 m



■Holder mounting bracket (general-purpose)

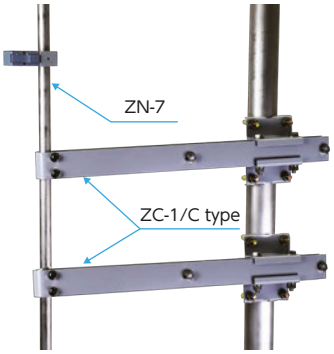
ZC-1

Mount a holder support bracket (ZN-7) up to 3 m length and a cleaner on a 50A pipe

- Material: Painted iron or SUS304
- Length: 600 mm

ZC-1/B type (1 bracket)

- Holder length: For 1.0 m/1.5 m
- Mass: Approx. 3 kg



ZC-1/C type (2 brackets)

- Holder length: For 2.0 to 3.0 m
- Mass: Approx. 6 kg

■Holder mounting bracket (simple type)

ZCD-2

Mount a holder up to 1.5 m length on the tank wall

- Material: SUS304
- Length: 250 mm
- Mass: Approx. 0.5 kg

■Holder mounting bracket (general-purpose)

ZC-2

Mount a holder up to 2.0 m length and a cleaner on a 50A pipe or tank wall

- Material: SUS304 Length: 500 mm
- Remarks: 2 holders can be mounted.
- Mass: Approx. 2 kg

■Mounting bracket (rigid type)

ZSSC-20

Mount a drop-in type protection pipe (50A/SUS or PVC) on a 50A pipe vertically or diagonally

- Material: SUS304 and aluminum casting
- Length: Approx. 600 mm
- Mass: Approx. 7 kg

Remarks: 2-piece set, angle adjustable

Mount the immersion type holder (HC-7□□ type) with a flange.

■Loose flange

ZFL-11 (resin) ●Mass: 0.5 kg
ZFL-2 (SUS) ●Mass: 2 kg

Insertion length can be adjusted at will with the flange used to mount HC-703C/763 (holder length up to 2.0 m) on the tank or closed tank

■Loose flange

ZFL-3 (resin) ●Mass: 0.5 kg
ZFL-4 **(SUS)** ●Mass: 2 kg

Mount HC-G70 (holder length up to 2.0 m) on the tank or closed tank

■Open flange

ZFK-1 (resin) ●Mass: 1 kg
ZFK-2 (SUS) ●Mass: 2 kg

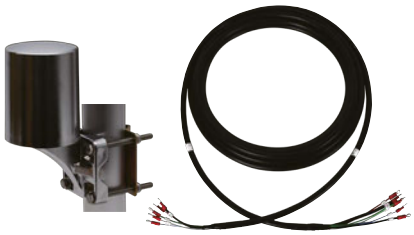
Mount a holder with cleaner (length up to 2.0 m) on the tank or closed tank

Auxiliary Devices (2): Dedicated Cables / Calibration Kits / Electric Devices, etc.

■Connector box and dedicated cable

FC-4 + EC-10

Mainly used between the panel type transmitter and the detector to extend the electrode lead wire



■Air set

PAS-10

Pressurize the pressurization type holder with instrumentation air

◉Mass: 0.5 kg

■Manual pressurization pump

125B971

Pressurize the pressurization type holder manually

◉Mass: 0.5 kg

■Hood (sun shade) for HDM transmitter

544493K

■Hood (sun shade) for HBM transmitter

7049930K 50A pipe mounting

69304500 Wall mounting

■Holder guide assembly

5983120K
For HC-7□□

7075120K
For HC-G7□

■Beaker stand

74200200

For flow-through type holder calibration

■Voltage conversion unit

ZP-30

This is a step-down transformer mainly used when the supply power to the cleaner is AC 100 V or higher

■pH calibration kit

pH 4-7 kit **6581420K**

pH 7-9 kit **6581430K**

■ORP check kit

6581440K

Spare Parts for pH Meter

1. Replacement Electrode or Tip

Electrode Model Name
For standard: 5600-5F
For high temperature: 5601-5F
For hydrofluoric acid-resistant: 5605-5F
Pressurization type: 5610-5F

*5F is lead length 5 m, 10F is lead length 10 m

5600-5F

GSS Series Replacement Tip	Code No.
Glass electrode tip	**HGS-300**
Hydrofluoric-acid-resistant glass electrode tip	**HGS-300F**
High alkaline glass electrode tip	**HGS-300A**
Liquid junction tip	**JC-300**
Liquid junction tip (for pure water)	**JC-300P**

HGS-300

JC-300

2. KCl Inner Solution for Detector

For 5600 Series Electrode	Code No.
3M KCl solution 500 mL bottled	**143A252**
KCl powder 112 g (3M/for 500 mL)	**143A253**

For GSS Series KCl Supply Type Electrode	Code No.
3. 3M KCl 500 mL bottled	**143F234**
3. 3M KCl 500 mL Poly bottled	**RE-4C**
KCl powder 123 g (3. 3M/for 500 mL)	**143A116**
KCl powder 500 g (REP-500G)	**143F232**

143A252

143A116

143A253

RE-4C

3. Calibration Kit

Classification	Application	Product Name	Code No.
Two-point calibration	For general measurement	pH calibration 4-7 kit (NN)	**6581420K**
	For alkali measurement	pH calibration 7-9 kit (PN)	**6581430K**

pH calibration 4-7 kit (NN)	Powder reagent for pH4 × 1　500 mL poly beaker × 3 Powder reagent for pH7 × 1　500 mL empty bottle × 2
pH calibration 7-9 kit (PN)	Powder reagent for pH7 × 1　500 mL poly beaker × 3 Powder reagent for pH9 × 1　500 mL empty bottle × 2

pH 4-7 kit

pH 7-9 kit

4. pH Standard Solution and Powder Reagent

Product Name	Content	Code No.
Phthalic acid pH standard solution	pH 4.01 500 mL	**143F191**
Neutral phosphate pH standard solution	pH 6.86 500 mL	**143F192**
Borate pH standard solution	pH 9.18 500 mL	**143F193**
Powder reagent for pH standard solution pH 4.01	For 500 mL 5 bags	**143F060**
Powder reagent for pH standard solution pH 6.86		**143F061**
Powder reagent for pH standard solution pH 9.18		**143F062**

Display of Model Name and Lot No. of pH Electrode

Type Name

Lot No. is on the back

Model name and lot No.

Spare Parts for ORP Meter

1. Replacement Electrode or Tip

Electrode Model Name
Platinum (Pt) **2600-5F**
Mixed metal (M) **2605-5F**

*5F is lead length 5 m, 10F is lead length 10 m

2600-5F

PSS Series Replacement Tip	Code No.
Platinum electrode tip	**HP-300**
Gold electrode tip	**HA-300**
Liquid junction tip	**JC-300**

HP-300

JC-300

HA-300

2. KCl Inner Solution for Detector

For 2600 Series Electrode	Code No.
3M KCl solution 500 mL bottled	**143A252**
KCl powder 112 g (3M/for 500 mL)	**143A253**

For PSS Series KCl Supply Type Electrode	Code No.
3. 3M KCl 500 mL bottled	**143F234**
3. 3M KCl 500 mL Poly bottled	**RE-4C**
KCl powder 123 g (3. 3M/for 500 mL)	**143A116**
KCl powder 500 g (REP-500G)	**143F232**

143A252

143A116

143A253

RE-4C

3. Check Kit

Application	Product Name	Code No.
Sensitivity check of metal electrode	ORP check kit (CN)	**6581440K**

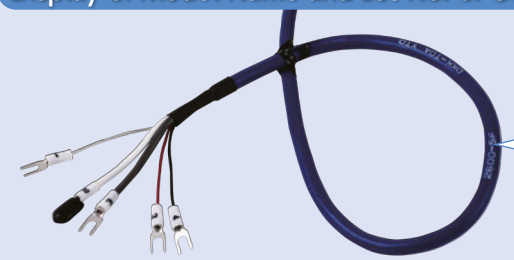
Contents of kit	Powder reagent for ORP × 1 500 mL poly beaker × 2 500 mL empty bottle × 1

ORP check kit

4. ORP Standard Solution and Powder Reagent

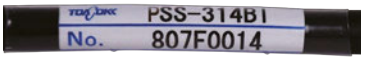
Product Name	Content	Code No.
ORP standard solution	pH 4 solution + Quinhydrone powder 500 mL	**143F196**
Powder reagent for ORP standard solution	pH 4 + quinhydrone powder for 500 mL × 5 bags each	**143F089**
Quinhydrone powder reagent for ORP standard solution	Powder for 500 mL × 5 bags	**143F059**

Display of Model Name and Lot No. of ORP Electrode



Type Name

Lot No. is on the back

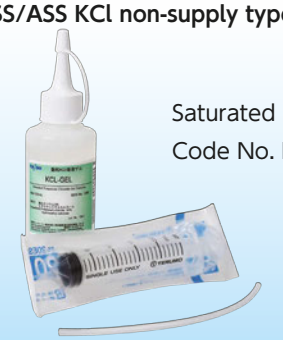


Model name and lot No.

pH Meter / ORP Meter Common Spare Parts

These are the parts that may be deteriorated and/or altered by the field environment (ultraviolet rays, dust, corrosive gas, sample water condition, etc.).

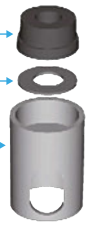
■For GSS/PSS/ASS KCl non-supply type electrode



Saturated KCl gel 100 mL
Code No. **KCL-GEL**

■HC-7□□ for holder

Common for **NHC-882/892** etc.



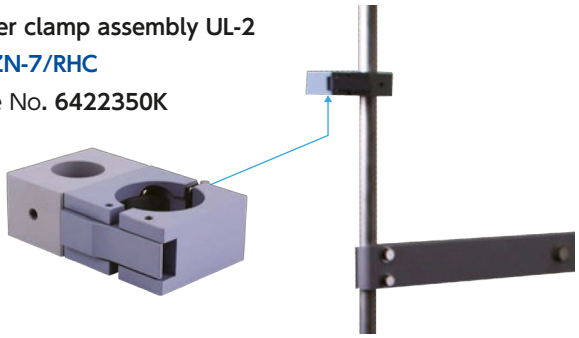
ϕ15 electrode packing: **43219400**
ϕ15 electrode washer: **43278700**
ϕ15 electrode protection tube (PP): **43312300**

■Holder clamp assembly UL-1

For UHC/BHC/JHC/JOC
Code No. **6422410K**

■Holder clamp assembly UL-2

For ZN-7/RHC
Code No. **6422350K**



■Holder guide assembly

For HC-7□□
Code No. **5983120K**

■Holder guide assembly

For HC-G7□
Code No. **7075120K**

■Intermediate support bracket assembly

For holder of length 2 m or longer
Code No. **5020500K**

■20 L poly tank for chemical cleaner

Code No. **6914420S**
Liquid transfer tube (Between liquid transfer part and tank) 2 m
Code No. **116E022**
Braided hose (Between tank and holder) 5 m
Code No. **116B0481**

■Loose flange cap nut (PP)

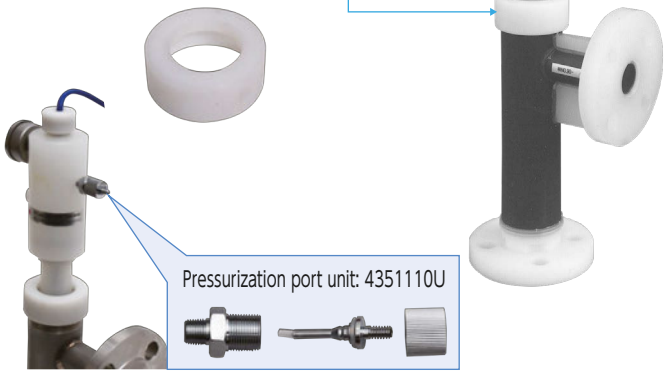
Code No. **60658100**
For ZFL-11

Code No. **48556300**
For ZFL-3

■Code No. of parts for flow-through type holder

NHC-882/892 for HC-880

- Cap: HC127300
- Pressure gauge: 0 to 0.2 MPa: 127B002
  0 to 0.4 MPa: 127B004
- Inner solution replenishment plug: 41512000
  O-ring: 115A022
- Cap nut PE: 42551200



Field Installation Type Transmitters

Intrinsically Safe Explosion-proof System

■**2-wire pH meter: SHBM-161**
■**2-wire ORP meter: SHBM-163**

Main Specifications

- Explosion-proof standard: TIIS Exia II CT4
- Type test acceptance No.: TC18098
- System type: SHBM-2-1
- Power supply: DC 24 V
- Transmission output: DC 4 to 20mA Load resistance 550 Ω or lower
- Meas. range: pH meter pH -1.00 to pH 15.00
  (Arbitrary setting with a width of pH 2 or higher)
  ORP meter -2000 to +2000 mV
  (Arbitrary setting with a width of 400 mV or higher)
- Structure and mounting: Outdoor installation IP65 50A pole or wall
- Ambient temperature and humidity: -20 to 55°C 90% RH or lower
- Mass: Approx. 2 kg
- Dimensions: 181 (W) × 180 (H) × 95 (D) mm
- Option: Hood

Zener Barrier

■**KFD2-STC4-Ex1 (Insulated type)**
Code No. **134G838**

- Rated voltage: DC 24 V
- Ambient temperature (Non-hazardous area): -20 to 60°C
- Manufacturer: Pepperl+Fuchs
- Dimensions: 20 (W) × 123 (H) × 115 (D) mm

<Note> DC 24 V power supply with output current capacity of 100 mA or higher is required.

Immersion Type Detector

■**SHC-703 (PVC, for outdoor use)**
(PVDF and PFA are also available)
+ electrode **5600/2600-5F**

- Length: 0.5 m to max. 4.0 m
- Heat resistance: 60°C

■**SHC-763 (PP, for high temperature)**
+ electrode **5601/2601-5F**

- Length: 0.5 m to max. 3.0 m
- Heat resistance: 80°C

<Note> Due to weather resistance, recommended for indoor use

■**Pressure resistant and explosion-proof type, ultrasonic cleaner, immersion type SUHC-70**

- Explosion-proof structure:
  Pressure resistant and explosion-proof d2G4
- Explosion-proof test acceptance No.: 38232
- Cleaning method:
  Ultrasonic continuous irradiation cleaning
- Oscillating frequency: Approx. 70 kHz
- Power supply: AC 100 V 50/60 Hz
- Power consumption: Approx. 30 VA
- Mass: Approx. 9 kg (Length: 1 m)

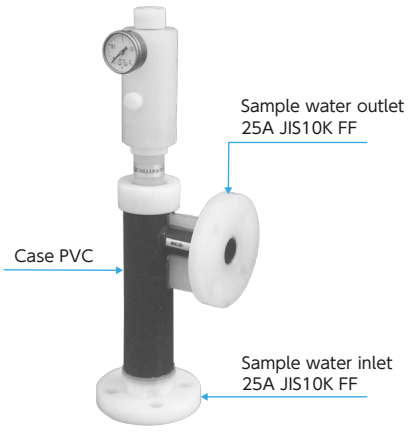
Flow-through type detector (pressurized)

■**SNHC-882 (PVC)**
+ electrode **5610/2610-5F**

- Connection flange: 25A JIS10K FF
- Heat resistance: 60°C
- Pressure resistance: 0.15 MPa

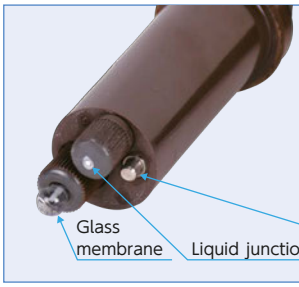
■**SNHC-883 (PP/SUS)**
+ electrode **5610/2610-5F**

- Connection flange: 25A JIS10K RF
- Heat resistance: 70°C
- Pressure resistance; 0.15 MPa
  (0.3 MPa is also available)



Types of Cleaning Methods

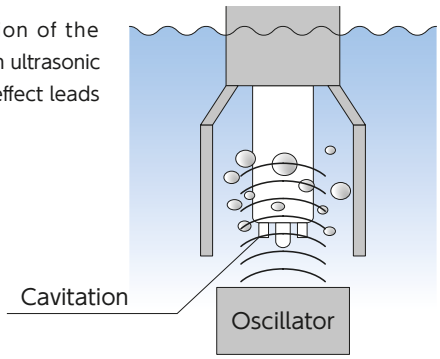
If dirt is adhered to the pH (ORP) electrode, the sensitivity will decrease and the response will be delayed. Therefore, it will not be possible to perform correct measurement / control.
There are various types of dirt attached to the electrode, and there are various automatic cleaning methods to remove or prevent attachment of the dirt.
By selecting an appropriate cleaning method, maintenance work such as washing the electrode by hand can be reduced and correct measurement / control can be maintained for a long time.



For pH (ORP) electrode, glass membrane (platinum electrode), liquid junction, and temperature sensor are placed facing downward, therefore various cleaning methods work more effectively.

Ultrasonic Cleaning Method: UHC

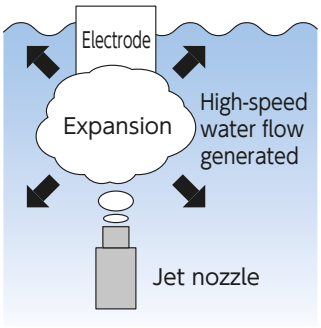
By efficient irradiation of the sensor portion with an ultrasonic wave, the cavitation effect leads to cleaning.



Pulse Air Jet Cleaning Method: PHC

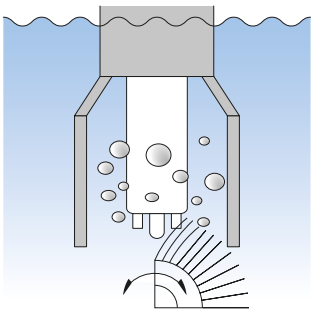
Dirt is removed by the high-speed water flow generated when the compressed air intermittently injected from the jet nozzle expands in the water.

This is our original cleaning method.



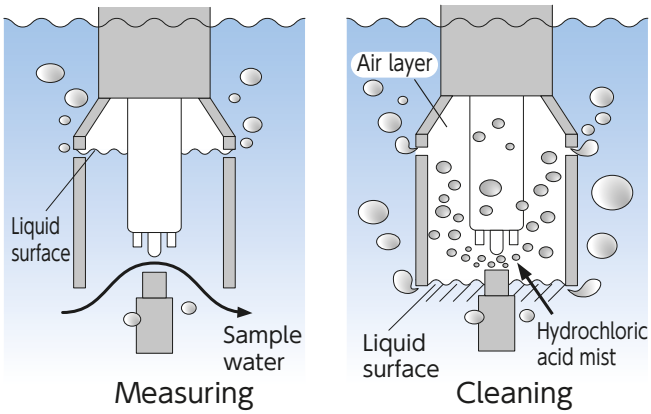
Brush Cleaning Method: BHC

The polypropylene cleaning brush swings the sensor portion intermittently and removes adhered dirt by brushing a dozen-odd times.



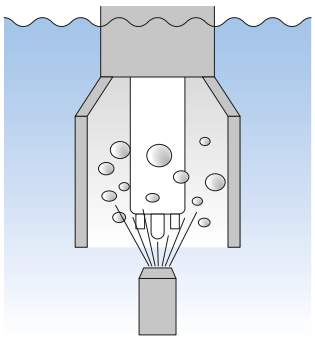
Chemical Cleaning Method: RHC

A large amount of air and chemical (generally 5% hydrochloric acid) are intermittently injected from the jet nozzle to chemically dissolve and remove the crystalline contamination adhering to the electrode sensor portion.



Water Jet Cleaning Method: JHC

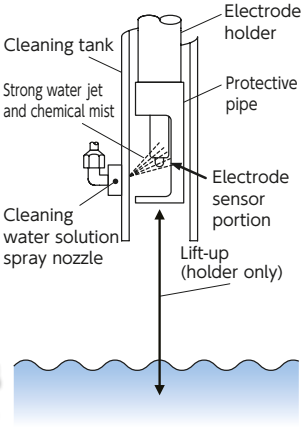
The cleaning water sprayed from the jet nozzle is intermittently sprayed onto the sensor portion, and the attached dirt is removed by pressure.



Lift-up Type Jet Cleaning Method: LHC

The electrode holder is lifted up from the sample water, the water jet and chemical (5% hydrochloric acid etc.) are alternately sprayed onto the electrode sensor portion, and the crystallized dirt is dissolved with the chemical and removed with the powerful water jet.
Additionally, it is also possible to clean the entire electrode holder.

This is our original cleaning method.



Recommended Examples by Cleaning Equipment (Type of Dirt)

Effect of each cleaning method ◎: High ○: Good △: Low –: Unsuitable

Type of dirt	Measurement target/ process	Automatic cleaning method						Points to note Remarks
		Ultrasonic wave UHC	Brush BHC	Water jet JHC	Pulse air jet PHC	Chemical RHC	Lift-up jet LHC	
Suspension Fiber Adhesive Substance Algae Microorganism	Effluent treatment water control*	△	△	△	○	○	◎	For BHC/JHC/PHC, no gravel or solid can be mixed in (possibly causing electrode damage) For the items with * mark, RHC or LHC is recommended when there is crystalline scale adhesion in the chemical injection control process
	Sewage / human waste treatment process	△	–	△	○	–	○	
	River, lake, pond, and seawater	○	△	○	○	–	○	
	Fishery processing, aquaculture	○	○	△	○	–	○	
	Water purification process*	△	○	○	○	○	○	
	Cooling water, pure water equipment*	△	△	–	○	○	◎	
	Food processing, sugar production	△	△	–	–	–	○	
	Final discharge water monitoring	○	○	○	◎	–	◎	
Crystalline Scale	Desulfurization / absorption liquid control	–	–	–	–	○	○	$CaCO_3$/$CaSO_4$/ $Fe(OH)_2$/$FeCl_3$, etc., dissolved in chemical liquid
	Desulfurization / absorption slurry liquid control	–	–	–	–	○	◎	
	Metal effluent treatment control	△	–	△	△	○	◎	
Oily Mixture	Effluent treatment process*	△	–	–	–	○	○	Light oil / machine oil, etc. dissolved in chemical liquid
	Oil refining process	△	–	–	–	○	○	

Installation conditions for each cleaning method

	UHC	BHC	JHC	PHC	RHC	LHC
Required Equipment (utility)	AC 100 V	AC 100 V	AC 100 V Industrial water	AC 100 V Compressed air	AC 100 V Compressed air Cleaning solution	AC 100 V Compressed air Industrial water Cleaning solution
Detector Installation Method	Immersion type Flow-through type	Immersion type	Immersion type Flow-through type	Immersion type	Immersion type	Immersion type Throw-in type

Voltage conversion unit (step-down transformer) ZP-30

This is an AC 100 V step-down transformer used when the power supply voltage to be supplied is AC 110 V to AC 240 V.
Field (outdoor) installation type: 50A pole mounting

Ultrasonic wave UHC

Water jet JHC

Pulse air jet PHC

Chemical RHC

Lift-up jet LHC

Reference Data: All About Process pH Meters

1. Introduction of pH

Theoretically, it is the hydrogen ion concentration index. In familiar terms, it is an indicator of whether a solution is acidic or alkaline. A pH of 7 or so is neutral, lower than 7 is acidic, and higher than 7 is alkaline.

pH Standard Solution	15°C	25°C	35°C
Phthalic Acid	pH 4.00	pH 4.01	pH 4.02
Neutral Phosphate	pH 6.90	pH 6.86	pH 6.84
Borate	pH 9.27	pH 9.18	pH 9.10

*pH value is based on the pH standard solution value specified in the JIS Z 8802 pH Measurement Method.
The three standard solutions shown in the table above are mainly used, but each has temperature characteristics. Additionally, these standard solutions have a strong buffering action (property to minimize changes in pH even when an acid or base is added from the outside) and are called buffer solutions. However, it should be noted that the borate standard solution (pH 9.18) changes its pH value when carbon dioxide is absorbed.

◆p : power ◆H : hydrogen

- ◆ Simple alkaline spring (pH 8 to pH 9)
- ◆ Japanese factory effluent standards:
  pH 5.8 to 8.6 for rivers and lakes
  pH 5.0 to 9.0 for the sea

◆Relation between pH and hydrogen ion concentration
····· pH = -Log10 (hydrogen ion concentration)

Type of Solution		Hydrogen Ion Concentration (mol/L)	pH
Acid	0.1mol/L HCl	10^{-1}	1
	0.01mol/L HCl	10^{-2}	2
Neutral	(Water)	10^{-7}	7
Alkaline	0.01mol/L NaOH	10^{-12}	12
	0.1mol/L NaOH	10^{-13}	13

2. pH Measurement Methods

As a simple measurement method, the indicator solution method using litmus test paper and pH test paper, which have a long history and are inexpensive and simple, is popular.

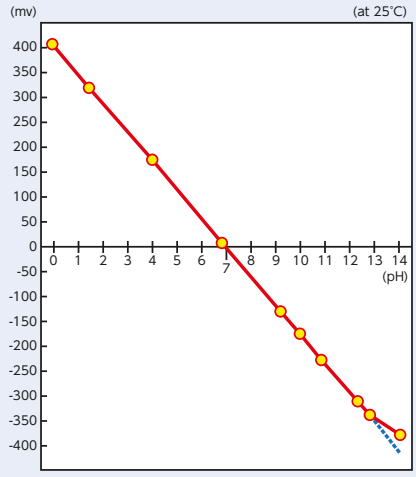
In addition, there was an antimony electrode method pH meter for continuous measurement, but it is not currently used due to poor performance and high cost.

◆ Glass Electrode Method

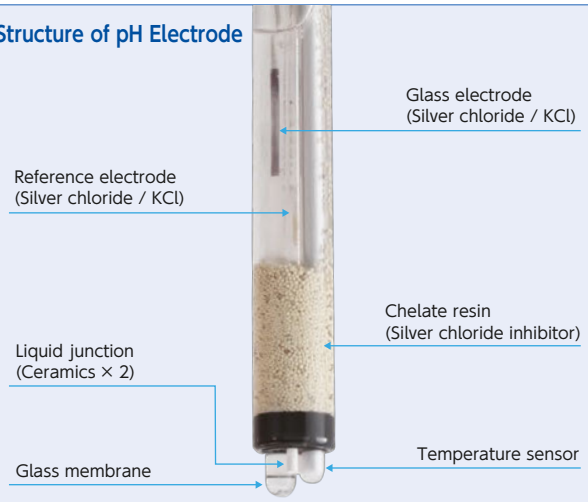
When a hemispherical thin glass membrane is immersed in a solution, a potential difference of 59. 16mV at 25°C per 1 pH occurs between the inside and outside of the glass film. This potential difference is continuously measured using a reference electrode and converted to pH. A pH7 neutral liquid generates almost 0 mV, an acidic liquid generates positive potential (approx. +175mV for pH 4), an alkaline liquid generates negative potential (approx. -110mV for pH9), and there is linearity over a wide range of pH 0 to 14. (See the graph below.) In addition, it has excellent heat resistance, pressure resistance and chemical resistance, and is widely used as a high-performance pH measurement method from laboratory and portable applications to process applications.

While recently improved by special manufacturing methods, glass electrodes are fragile and vulnerable to ambient noise. Additionally, the electro-motive force characteristics of the glass electrode naturally deteriorate little by little, and the sensitivity and response characteristics deteriorate due to adhesion of dirt, etc., so periodic maintenance such as cleaning, calibration and replacement of the electrode is required.
There are two types of temperature compensation for the glass electrode method: compensation for the temperature characteristics of the glass electrode electromotive force and compensation for the temperature characteristics of the sample water pH. The electromotive force per 1pH described above needs to be compensated for temperature because it decreases as the temperature decreases and increases as it increases. Since the temperature characteristics of the sample water pH vary depending on the solution, temperature compensation is not performed for effluent, but the pH standard solution and boiler water have a certain temperature coefficient, so temperature compensation can be performed. Note that the temperature sensor of the glass electrode method uses a metal resistance thermometer detector or platinum.

Electromotive Force Characteristics Graph of pH Electrode



Structure of pH Electrode



3. pH Certification System Based on the Measurement Act

For transactions or acts of evidence, a glass electrode type water ion concentration meter (pH meter) with a certified indicator detection part must be used.

◆ Certification validity

(in force as of April 1, 1998)

Indicator part: 6 years Detection part: 2 years

However, even within the period of validity, recertification is required for anything but very minor repairs.

◆ Instrument error certification method

(1) When the user undergoes certification testing directly, testing is available at Japan Quality Assurance Organization local branch certification offices. For type approval numbers, see each model's individual specifications.
(2) TOA DKK also handles testing on behalf of users. However, for rapid-delivery products, a maintenance and repair fee is charged along with the certification fee and other costs.

4. Features of Process pH Meters

■Continuously measured by the glass electrode method, and constantly controls or monitors pH.
There are outputs for measured value signal (DC 4 to 20 mA) and adjustment/alarm (ON-OFF contact), with a focus on robustness (no failure).

■Applications include treatment of water and sewage and effluent treatment for public waters and plants, as well as usage for production lines such as quality management of production facilities.
Most factories and facilities have effluent treatment facilities, and many pH meters are used from the neutralization process to the discharged water. For production online use, high reliability and performance (accuracy) are required.

■It consists of three or more systems, such as a transmitter (display) + detector (electrode holder) + auxiliary device and the like, and an automatic cleaner is also added to the effluent treatment facilities. It is important to select the most suitable model for each site and upgrade the system. Refer to the "pH Meter System Configuration Example" at right.

■Since the pH electrode and holder wear out and/or deteriorate, they need to be replaced in months or years depending on the measurement conditions on site.

■The transmitters (displays) are roughly divided into 2-wire and 4-wire field type and panel type.
There are three types of detectors (holders): immersion type, throw-in type, and flow-through type; pH electrodes are available in the integrated KCl supply type and replaceable tip type. Furthermore, the replaceable tip type includes the KCl supply type and KCl non-supply type. The latter is mainly used for effluent treatment, because it is easy to maintain.

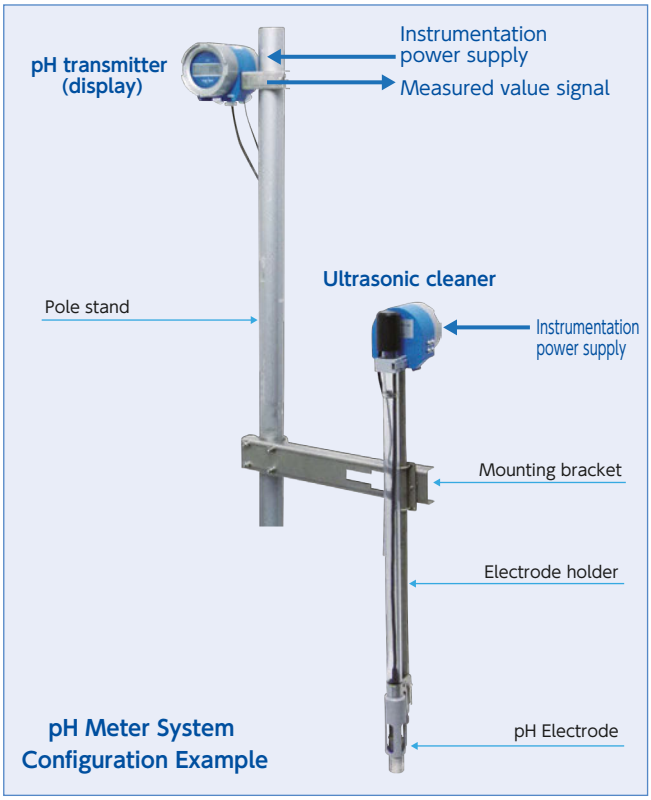
■The general-purpose cleaner uses ultrasonic waves; the pulse air jet cleaner is effective for effluent, sewage, and human waste treatment, while the chemical solution and lift-up jet cleaners are effective for crystallized dirt, etc.

■Auxiliary devices, such as pole stands, mounting brackets, dedicated cables, connector boxes, and calibration kits, are added according to the field situation.

■In addition, intrinsically safe explosion-proof types are also in demand for hazardous zones in plants where there is a risk of explosion.

■A simple type with single function and of easy operation is the mainstream, but self-diagnosis functions, such as glass electrode crack detection burnout (see note) are required.
(Note) Burnout is a function that notifies the user of an abnormality by scaling out the measured value signal DC 4 to 20 mA to 4 mA or below or 20 mA or above.

■Periodic pH electrode inspection (check for dirt adhesion or glass electrode damage), cleaning, and two-point calibration using a pH standard solution are required.
Period of maintenance: Depending on the control standards in the field (customer), two weeks to one month for effluent treatment and several days to two weeks for production online.
In general, pH 7 and pH 4 standard solutions are used for acidic to neutral measurement, while pH 7 and pH 9 standard solutions are used for neutral to alkali measurement.

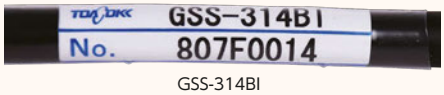


pH Meter System Configuration Example

The model name and serial number on the actual nameplate are important. An equipment nameplate is affixed to the transmitter and the cleaner, and the model name and lot No. are engraved at the tip of the lead wire for the pH electrode. This information is necessary for inquiries, such as failure and repair or replacement inquiry.

Terminal side of electrode lead wire

5600-5F



GSS-314BI

Nameplate of transmitter


HBM type


HDM type

Reference Data: All About Process ORP Meters

1. Introduction to ORP

ORP is short for Oxidation Reduction Potential and is also called Redox Potential.

In an oxidation-reduction reaction, the reaction that loses electrons is called oxidation, and the reaction that gains electrons is called reduction. When a chemically inert metal such as platinum is immersed in a solution, potential is generated on the metal surface. This potential is called oxidation-reduction potential (or redox potential) and is expressed in millivolts (mV).

■Treatment of toxins such as cyan and chromium in industrial effluent:

Cyan is injected with chlorine compounds and processed by the oxidative decomposition reaction, and chromium is injected with reducing agent and processed by the reduction reaction. Although this injection volume is controlled by the ORP value, the reaction time is greatly affected by conditions such as the pH value, so a pH meter is also required together with an ORP meter in order to perform proper ORP control.

■Microbial monitoring of activated sludge aeration tank for sewage and human waste treatment:

An ORP meter is required because the ORP value can be used to determine whether the microorganisms in the aeration tank are active.

If aeration is sufficient, dissolved oxygen (DO) is high and aerobic, and biological activity is good, the ORP value shows an oxidation state of +100 mV to +500 mV.

Also, in anaerobic treatment such as methane fermentation tanks, it is generally judged good if the ORP value is -200 mV or lower and in a reduced state.

2. ORP Measurement Methods

■The ORP meter in recent years uses the metal electrode method, and it is widely used from process use to laboratory / portable uses.

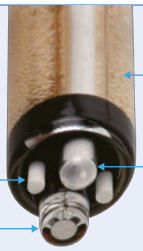
■When the glass electrode of the pH electrode is replaced with a metal electrode, it becomes an ORP electrode. The reference electrode is silver chloride with the same ceramic liquid junction as the pH electrode, and the transmitter is the same potentiometer as the pH meter. For the metal electrode, corrosion-resistant platinum (Pt) or gold (Au) is used.

■The measurement range of the ORP meter is -2000 to +2000 mV, but -700 to +700 mV is often used for processes.

■The ORP metal electrode (MV) does not require temperature compensation, but has a temperature sensor to measure the temperature of the sample water.

■Unlike the glass membrane of the pH electrode, the metal electrode has a low internal resistance, so a high insulation circuit as with the pH meter is not required. Therefore, this instrument is easy to use because it is unlikely to be affected by noise, etc.

Sensor Portion of ORP Electrode



3. Features of Process ORP Meter

■This meter continuously performs measurement by the metal electrode method and continuously measures or monitors the ORP value (MV).

There are outputs for measured value signal (DC 4 to 20 mA) and adjustment/alarm (ON-OFF contact), with a focus on robustness (no failure).

■Applications include ORP control of factory effluent treatment and sewage/human waste treatment, as well as usage for production lines such as quality management.

■Although the platinum (Pt) type is generally used for the ORP electrode, the gold (Au or M) type is suitable in effluent treatment, such as cyan and chromium, because it is unlikely to form oxide films. Additionally, there are integrated combination electrodes (2600 series) and the replaceable tip type PSS/ASS series, as well as the KCl supply type and non-supply type among replaceable tip types.

Platinum tip HP-300

Gold tip HA-300

■It consists of three or more systems, such as a transmitter (display) + detector (electrode and holder) + auxiliary device and the like, as with the pH meter.

There are various automatic cleaners for the ORP electrodes as with those for the pH electrode, but the pulse air jet cleaning method is effective.

■In addition, intrinsically safe explosion-proof types are also in demand for hazardous zones in plants where there is a risk of explosion.

■Since the ORP meter is a potentiometer, there is no calibration function unlike the pH meter. The quality of the ORP electrode is judged by measuring the potential with an ORP standard solution.

The ORP standard solution is a solution of quinhydrone powder reagent dissolved in phthalic acid pH standard solution (pH4. 01 at 25°C) and is called a quinhydrone standard solution.

The ORP electrode can be judged to be normal if the potential is between 245 mV and 275 mV using the quinhydrone standard solution at a temperature of 15 to 30°C.

Measure the ORP standard solution immediately after adjustment. The adjusted standard solution cannot be preserved.

■Periodic maintenance is required. Inspection (oxide film adhesion), cleaning, and polishing of the electrode, as well as 1-point check with ORP standard solution, are performed.

Period of maintenance: Depending on the control standards in the field (customer), two weeks to one month for effluent treatment and several days to two weeks for production online.

The model name and serial number on the actual nameplate are important. An equipment nameplate is affixed to the transmitter and the cleaner, and the model name and lot No. are engraved at the tip of the lead wire for the ORP electrode.
This information is necessary for inquiries, such as failure and repair or replacement inquiry.

Reference Data: All About System Up Type pH Meters and Other pH Meters

pH Meter with Auto Calibration MAC-355

- Detector (holder) lifting ⇒ Electrode cleaning ⇒ two-point calibration with standard solution ⇒ Pass/fail judgment ⇒ Resumption of measurement: This manual periodic maintenance work is automated in this pH meter.
- The period of automatic calibration is set to 2 to 7 days and the period of automatic cleaning is set to 5 to 12 hours.
- It is possible to realize operator-free pH measurement and maintain highly reliable pH measurement at dangerous sites.
- This pH meter is assembled with a dedicated transmitter, lift-up type detector, cleaning / calibration unit, pole stand, mounting bracket, etc.
- As a self-diagnosis function, a Maintenance Required Signal is sent out when the characteristics of the pH electrode are slightly deteriorated or when there is insufficient remaining pH standard solution or cleaning solution.
- There are two types of the lift-up type detector: the immersion type (the deep tank is optional) and the throw-in type.
- Using the Standby Mode when the plant is stopped, intermittent measurement at an arbitrary period can be performed.
- The power supply, instrumentation air and industrial water are required as utilities. For the cleaning solution, 5 to 10% hydrochloric acid is used.

pH Meter with Chemical Cleaner PAC-R7

- This pH meter is assembled with HBM-160B type transmitter and RHC-7EC type chemical cleaner using the mounting devices.
- Crystalline dirt adhering to the electrode sensor portion is dissolved and removed by air layer type chemical spraying cleaning.
- The period of automatic cleaning is set to 5 to 12 hours.
- AC 100 V power supply and instrumentation air are required as utilities, and an air pump unit (the square box at the center of the photo) is prepared as an option. For the cleaning solution, 5 to 10% hydrochloric acid is used.

pH Meter PAC-8

- This is a pH meter composed by assembling the HBM type or HDM type transmitter and the throw-in type detector NHC-892 on a self-supporting stand.
- Sample water IN/OUT connection ports and piping in equipment are installed, and the sample water is discharged to the atmosphere.
- The ultrasonic cleaner can be added to the throw-in type detector. (Option)
- The conductivity meter can be added. (Option)
- This analyzer will be mainly installed in the water quality monitoring room of water purification plants, sewage treatment plants, etc.

CALMEMO-pH Meter ELP-097 + ELW-072 + HBM-160D/100D

- This pH meter consists of the electrode ELP-097 with pH measurement and calibration functions, the digital amplifier cable ELW-072 with Modbus communication function, and the display transmitter.
- By transferring the electrode ELP-097 from an outdoor field to an analysis room or the like, it is possible to perform maintenance such as cleaning and calibration indoors safely.

HART Communication pH/ORP Meter Transmitter HBM-165H

- This is a field installation type pH/ORP meter with a 2-wire HART communication function.
- By superimposing digital signals on the conventional 2-wire instrumentation system, it is possible to send the water temperature (°C) and transmission output value (mA) to the HART-compliant DCS in the control room.
- It is possible to switch between pH measurement and ORP measurement.
- The combined detectors are the 5600/2600 series or replaceable tip type GSS/PSS series.

2 Model Selection of Conductivity Meters

Conductivity Meter Requested Specification Check

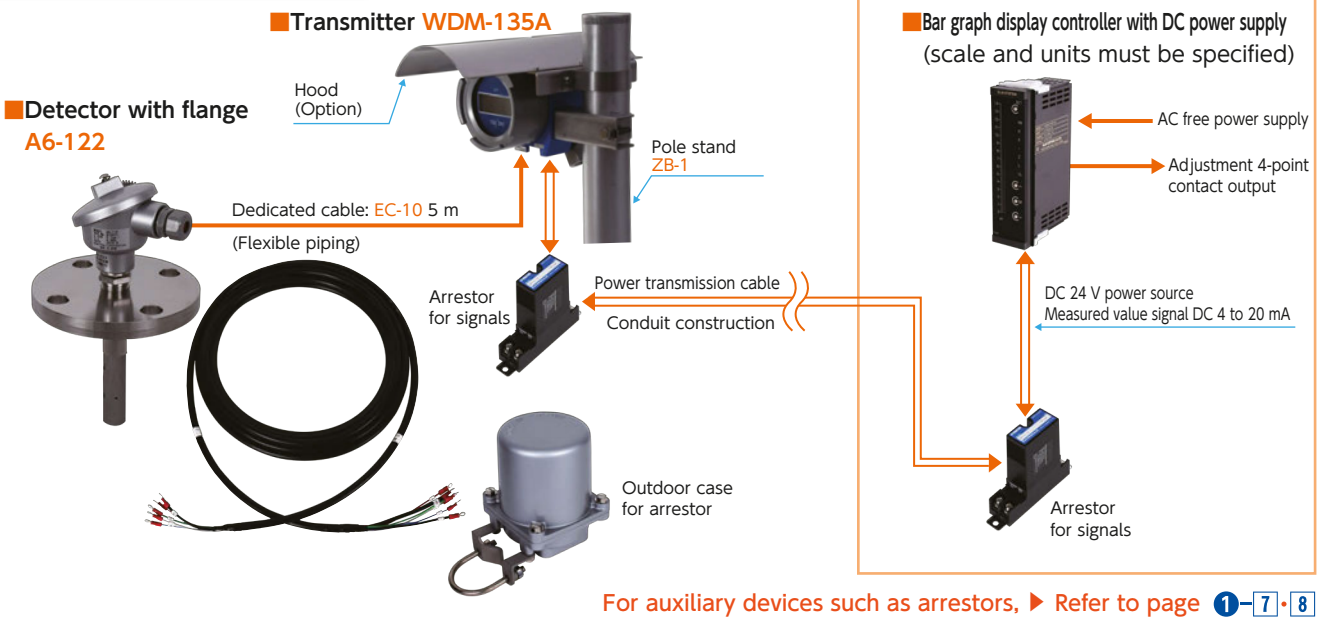
1. Facilities (Plant) to be Used••• ☐ Production line ☐ Quality control ☐ Effluent treatment ☐ Boilers / pure water ☐ River, lake, seawater (environment) ☐ Other
2. Location to be Installed••••••• ☐ Indoor ☐ Outdoor ☐ With direct sunlight ☐ With salt damage ☐ With dust / corrosive atmosphere ☐ With noise source ☐ High place ☐ High temperature place ☐ Non-hazardous area (non-explosion-proof specification) ☐ Hazardous area (explosion-proof specification)
3. Purpose of Continuous Measurement ☐ Display and recording only ☐ Monitoring / alarm ☐ General control (effluent, etc.) ☐ High-precision control ☐ Other
4. Sample Water•••••••••••••••• Name: _____ Measurement range: ____ to ____ Unit: ☐ μS/cm ☐ mS/cm ☐ μS/m ☐ mS/m ☐ S/m
   Temperature change: ____ to ____ °C Pressure: ____ kPa Flow velocity: ____ m/sec
   Conductivity control value: _____
5. Measurement Method•••••••• ☐ 20 mS/cm (2000 mS/m) or below (electromagnetic induction type is recommended for 1000 μS/cm (100 mS/m) or higher)
   ☐ Electromagnetic induction type 0.5 mS/cm (0.05 S/m) to 2000 mS/cm (200 S/m)
6. Transmitter Type•••••••••••••• ☐ Field installation type 2-wire type ☐ Field installation type 4-wire type ☐ Panel type ☐ Explosion-proof type ☐ Alarm (adjustment) output required
7. Detector Type••••••••••••••••• ☐ Pipe insertion type ☐ Tank insertion type ☐ Flow-through type ☐ Immersion type ☐ Throw-in / drop-in type
8. Wetted Part Material Selection ☐ SUS316 ☐ Heat-resistant polyvinyl chloride (C-PVC) ☐ Polyfluorovinylidene (PVDF) ☐ Fluororesin (PFA)
9. Auxiliary Device / Spare Parts ☐ Pole stand required ☐ Detector mounting device required ☐ Arrestor required ☐ Other _____
10. Other, Notes•••••••••••••••• _____

Electrode Type System Examples / Low Conductivity (pure water to river water) Measurement

2-wire Type Examples

Outdoor Field

Instrument Room / Instrument Panel



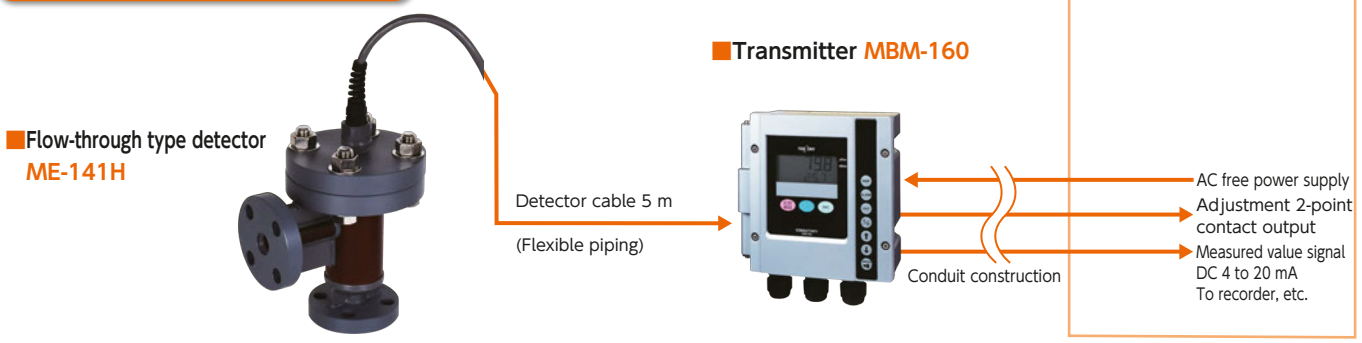
For auxiliary devices such as arrestors, ▶ Refer to page 1-7・8

Electromagnetic Induction Type System Examples / High Conductivity (river water to effluent/chemicals) Measurement

4-wire Type Examples

Installation Plan

Instrument Room / Instrument Panel



Types of Electrode Type Transmitter Low Conductivity Measurement

Main Specifications and Functions

Field Installation Type

■**2-wire: WDM-135A**

◉Power supply: DC 24 V

■**4-wire: WDM-136A**

◉Power supply: AC 100 to 120 V 50/60 Hz
or AC 200 to 240 V 50/60 Hz

◉Transmission output: DC 4 to 20mA Load resistance 650 Ω or lower
◉Measurement range: Minimum 0 to 0.200 μS/cm to maximum 20 mS/cm at 25°C
SI units: Minimum 0 to 20.0 μS/m to maximum 2000 mS/cm at 25°C
(There are 10 range options for each cell constant; see the spec sheet for details)
(electromagnetic induction type is recommended for 1000 μS/cm (100 mS/m) or higher)
Water temperature: -5 to 120°C
◉Temperature compensation range: -5 to 120°C
◉Structure and mounting: Outdoor installation IP55 50A pole mounting
◉Ambient temperature and humidity: -20 to 55°C 99% RH or lower
◉Mass: Approx. 3 kg
◉Dimensions: ϕ120 × 180 (D) mm
◉Options: Hood, heavy-duty coating, arrestor (simple type)

Field Installation Type / Multi-functional Type

■**4-wire: WBM-160**

◉2 measurement value signals:
conductivity and water temperature
◉Two-point alarm (adjustment) output signal

◉Power supply: AC 100 to 240 V 50/60 Hz
◉Transmission output: DC 4 to 20 mA Load resistance 650 Ω or lower
2 circuits: Conductivity and water temperature
◉Measurement range: Minimum 0 to 0.2000 μS/cm to maximum 20 mS/cm at 25°C
SI units: Minimum 0 to 20.0 μS/m to maximum 2000 mS/cm at 25°C
(Cell constant range can be set at will; see the spec sheet for details)
(Electromagnetic induction type is recommended for 1000 μS/cm (100 mS/m) or higher)
Water temperature: -5.0 to 120.0°C (Arbitrary setting of transmission output range with a width of 10°C or higher)
◉Temperature compensation range: -5 to 120°C
◉Alarm (adjustment) output: Two circuits, c contact, with adjustable sensitivity
◉Structure and mounting: Outdoor installation IP65 50A pole or wall mounting
◉Ambient temperature and humidity: -20 to 55°C 95% RH or lower
◉Mass: Approx. 2 kg
◉Dimensions: 181 (W) × 180 (H) × 95 (D) mm
◉Options: Hood, heavy-duty coating / arrestor (simple type) / RS-232C output / power cutoff signal

Panel Mounting Type

■**WBM-100**

◉Dimensions: 96 (W) × 96 (H) × 145 (D) mm

■**WBM-210A** (2-channel)

◉Dimensions: 96 (W) × 96 (H) × 171 (D) mm

WBM-100/210A Common Specifications

◉Power supply: AC 100 to 240 V 50/60 Hz
◉Transmission output: DC 4 to 20 mA Load resistance 600 Ω or lower (WBM-100)
◉Measurement range: Minimum 0 to 0.2000 μS/cm to maximum 20 mS/cm at 25°C
SI units: Minimum 0 to 20.0 μS/m to maximum 2000 mS/cm at 25°C
(Cell constant range can be set at will; see the spec sheet for details)
(electromagnetic induction type is recommended for 1000 μS/cm (100 mS/m) or higher)
Water temperature: -5.0 to 120.0°C
◉Temperature compensation range: -5 to 120°C
◉Alarm output: 2 circuits, c contact
◉Structure and panel cut size: Indoor installation (IP20), 92 mm × 92 mm
◉Ambient temperature and humidity: -5 to 50°C 95% RH or lower
◉Mass: Approx. 1 kg

WBM-210A Specifications

◉Two detectors can be connected, with measurement value display and transmission output for each
◉Transmission output load resistance 650 Ω or lower
◉Alarm output supports comparison of two measurement values and removal ratio as well as measurement values
◉Digital communication output RS-232C equipped as standard

Electrode Type Detectors (1)

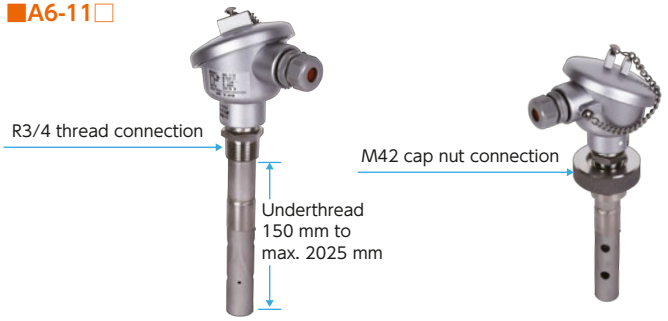
A general-purpose detector resistant to high temperatures and pressures, with three types of cell constant for measurement of ultra-pure water through industrial effluent.

Common Specifications

- Wetted part material: SUS316 or SUS316L (optional)
- Seal / insulation: Glass / PTFE
- Electrode (insertion part) outer diameter: ϕ23
- Reference cell constant: 0.01/cm / 0.1/cm / 1/cm / 10/cm
  SI Units 1/m / 10/m / 100/m / 1000/m
- Sample water temperature / pressure: Max. 100°C / max. 2.0 MPa
  (varies depending on manufacturing specification structure and material)
- Structure: Outdoor installation / rainproof type

General-purpose A6 Series

■A6-11□

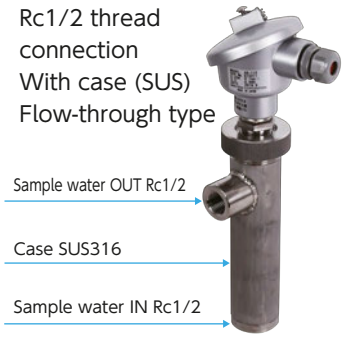


■A6-12□

50A JIS10K
flange connection

■A6-13□

Rc1/2 thread
connection
With case (SUS)
Flow-through type

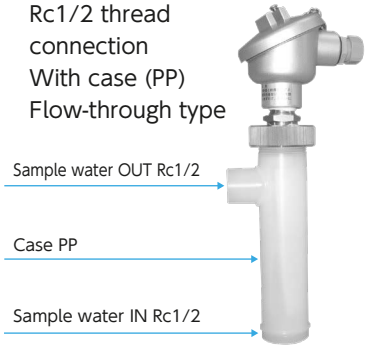


■A6-14□

15A flange connection
With case (SUS)
Flow-through type

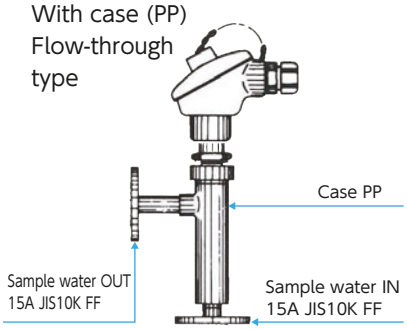
■A6-15□

Rc1/2 thread
connection
With case (PP)
Flow-through type



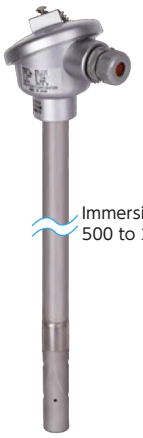
■A6-16□

15A flange connection
With case (PP)
Flow-through
type



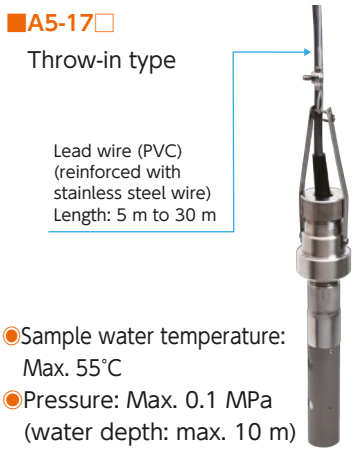
■A6-17□

Immersion
type



■A5-17□

Throw-in type

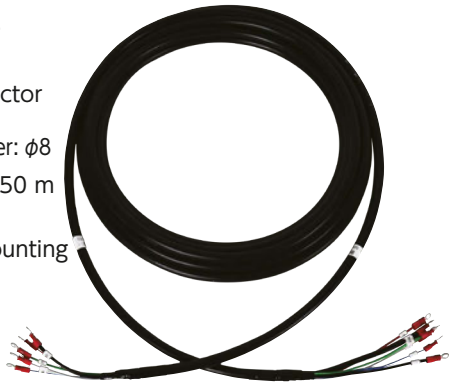


- Sample water temperature:
  Max. 55°C
- Pressure: Max. 0.1 MPa
  (water depth: max. 10 m)

Dedicated cable

■EC-10
Connects detector
to transmitter

- Outer diameter: ϕ8
- Length: 5 to 50 m
  (max. 100 m
  for panel mounting
  type)



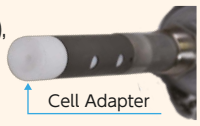
Cell Constant Selection (Guideline)

A6-1□1: Cell Constant 0. 01/cm: Pure water measurement (0 to 20 μS/cm)

A6-1□2: Cell Constant 0. 1/cm: Rainwater or tap water measurement (0 to 200 μS/cm)

A6-1□3: Cell Constant 1/cm: Measurement of river and lake water and effluent (0 to 2000 μS/cm)

Note A6-1□4: With cell constant 10/cm (1/cm with cell adapter), the electromagnetic induction type for high electrical conductivity use is recommended.



Electrode Type Detectors (2)

A compact thread-connection detector for indoor use, with two types of cell constant for measurement of ultra-pure water through rainwater and tap water.
Dedicated cable connection includes connector-type AR4 and terminal box-type AR5.

Compact AR Series Common Specifications

- Wetted part material: Titanium
- Insulation: PPS (or zylon)/FKM
- Sample water temperature / pressure: Max. 100°C / max. 0.5 MPa
- Piping connection standard: R3/4
- Electrode (insertion part) outer diameter: ϕ14
- Reference cell constant: 0.01/cm / 0.1/cm SI units 1/m / 10/m
- Structure: Indoor installation (not waterproof)

Cell Constant Selection (Guideline)

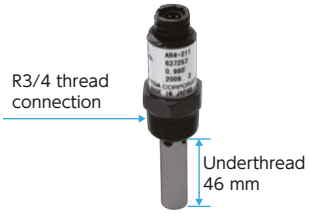
AR□-211: Cell Constant 0. 01/cm: Pure water measurement (0 to 20 μS/cm)

AR□-212: Cell Constant 0. 1/cm: Rainwater or tap water measurement (0 to 200 μS/cm)

Compact AR4 connector type

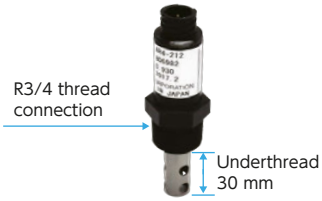
■AR4-211

Cell constant: 0.01/cm



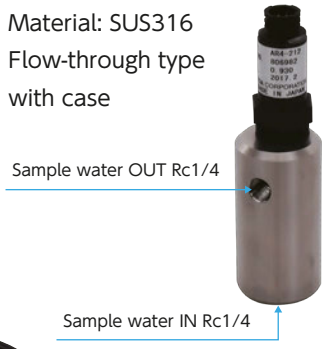
■AR4-212

Cell constant: 0.1/cm



■Case for AR4-21□ (optional)

Material: SUS316
Flow-through type with case



Dedicated cable

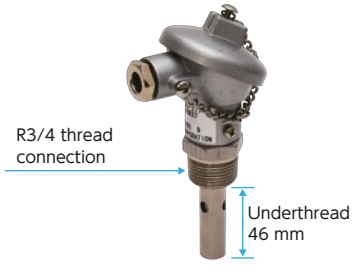
■EC-10

Connects detector to transmitter
- Outer diameter: ϕ8
- Length: 5 to 50 m
  (max. 100 m for panel mounting type)

Compact AR5 terminal box type

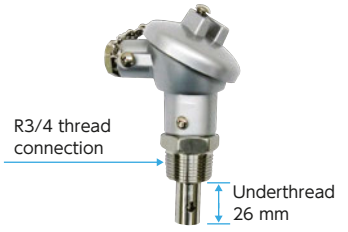
■AR5-211

Cell constant: 0.01/cm



■AR5-212

Cell constant: 0.1/cm



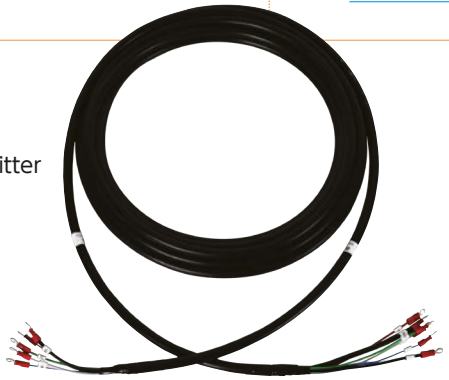
■Case for AR5-21□ (optional)

Material: SUS316
Flow-through type with case

Dedicated cable

■EC-10

Connects detector to transmitter
- Outer diameter: ϕ8
- Length: 5 to 50 m
  (max. 100 m for panel mounting type)



Electrode Type, Intrinsically Safe Explosion-Proof System

Field Installation Type Transmitters

■ **2-wire: SWBM-161**

◉Options: Hood, heavy-duty coating

Zener Barrier

■KFD2-STC4-Ex1 (insulated type)
Code No. 134G838

DC Power Source

■Recommended Power Source Unit
HDC1-K
Code No. 134C620

Main Specifications

◉Explosion-proof standard: TIIS Exia II CT4X
◉Type test acceptance No.: TC21495
◉System type: SWBM-2-1
◉Power supply: DC 24 V
◉Transmission output: DC 4 to 20 mA
◉Measurement range: Minimum 0 to .2000 μS/cm to maximum 0 to 20.00 mS/cm at 25°C
SI units: Minimum 0 to 20.00 μS/m to maximum 0 to 2000 mS/m at 25°C
(Cell constant range can be set at will; see the spec sheet for details)
Water temperature: -5.0 to 105.0°C
◉Temperature compensation range: -5 to 105°C
◉Structure and mounting: Outdoor installation IP65 50A pole or wall mounting
◉Ambient temperature and humidity: -20 to 55°C, 95% RH or lower
◉Dimensions: 181 (W) × 180 (H) × 95 (D) mm
◉Mass: Approx. 2.2 kg

◉Rated voltage: DC 24 V
◉Ambient temperature (Non-hazardous area): -20 to 60°C
◉Manufacturer: Pepperl+Fuchs
◉Dimensions: 20 (W) × 123 (H) × 115 (D) mm
Note DC 24 V power supply with output current capacity of 100 mA or higher is required.

◉Supply power: AC 85 to 132 V
◉Output voltage: DC 24 V ±3%
◉Normal consumption current: 350 mA or below
◉Manufacturer: M-System
◉Dimensions: 26 (W) × 93 (H) × 137 (D) mm

Detectors

Common Specifications

◉Wetted part material: SUS316 or SUS316L
◉Insulation: Glass / PTFE
◉Electrode (insertion part) outer diameter: ϕ23
◉Reference cell constant: 0.01/cm / 0.1/cm / 1/cm / 10/cm
SI Units 1/m / 10/m / 100/m / 1000/m
◉Sample water temperature/pressure: Max. 100°C / max. 2.0 MPa
(varies depending on manufacturing specification structure and material)
◉Structure: Outdoor installation/rainproof type

Cell Constant Selection (Guideline)

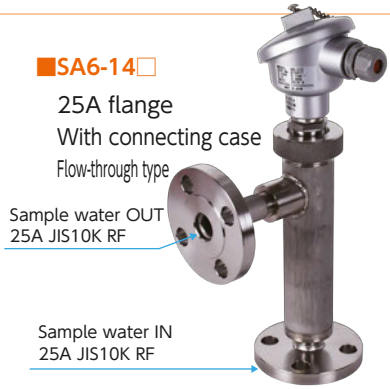
SA6-1□1: Cell constant 0. 01/cm: Pure water measurement (0 to 20 μS/cm)
SA6-1□2: Cell constant 0. 1/cm: Rainwater or tap water measurement (0 to 200 μS/cm)
SA6-1□3: Cell constant 1/cm: Measurement of river and lake water and effluent (0 to 2000 μS/cm)
SA6-1□4: Cell constant 10/cm: Measurement of industrial effluent and chemicals (0 to 20 mS/cm)

■SA6-11□
R3/4 thread connection

■SA6-12□
50A JIS10K Flange connection

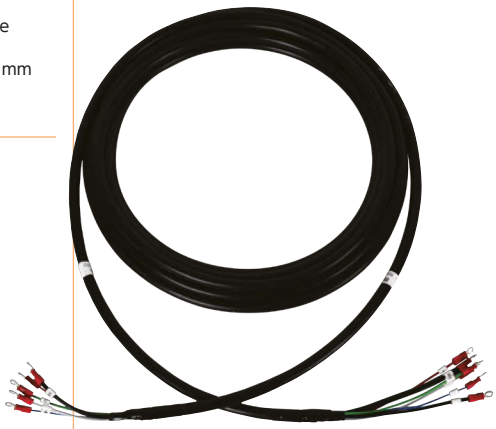
■SA6-13□
Rc1/2 thread
With connecting case
Flow-through type

■SA6-14□
25A flange
With connecting case
Flow-through type



Dedicated cable

■EC-10
Connects detector to transmitter
◉Outer diameter: ϕ8
◉Length: 5 to 50 m



Main Specifications and Functions

Field Installation Type

■2-wire: MDM-135A

- Power supply: DC 24 V
- Transmission output: DC 4 to 20mA Load resistance 650 Ω or lower
- Measurement range: 0 to 2.000/20.00/200.0/2000 mS/cm at 25°C
  SI units: 0 to 200.0 mS/m, 0 to 2.000/20.00/200.0 S/m at 25°C
  Arbitrary setting from 1/4 (25%) of each measurement range up
  Water temperature: -5 to 120°C
- Temperature compensation range: -5 to 105°C
- Structure and mounting: Outdoor installation IP55 50A pole mounting
- Ambient temperature and humidity: -20 to 55°C 99% RH or lower
- Mass: Approx. 3 kg
- Dimensions: ϕ120 × 180 (D) mm
- Options: Hood, heavy-duty coating, arrestor (simple type)

■4-wire: MBM-160

- Power supply: AC 100 to 240 V 50/60 Hz
- Transmission output: DC 4 to 20 mA Load resistance 650 Ω or lower
  2 circuits: Conductivity and water temperature
- Measurement range: 0 to 2.100/7.00/21.00/70.0/210.0/700/2100 mS/cm at 25°C
  SI units: 0 to .2100/0.700/2.100/7.00/21.00/70.00/210.0 S/m at 25°C
  Arbitrary setting from 5/21 (23.8%) of each measurement range up
  Water temperature: -5.0 to 120.0°C (Arbitrary setting of transmission output range with a width of 10°C or higher)
- Temperature compensation range: -5 to 105°C
- Alarm (adjustment) output: Two circuits, c contact, with adjustable sensitivity
- Structure and mounting: Outdoor installation IP65 50A pole or wall mounting
- Ambient temperature and humidity: -20 to 55°C 95% RH or lower
- Mass: Approx. 2 kg
- Dimensions: 181 (W) × 180 (H) × 95 (D) mm
- Options: Hood, heavy-duty coating / arrestor (simple type) / RS-232C output / power cutoff signal

Panel Mounting Type

■MBM-100A

- Power supply: AC 100 to 240 V 50/60 Hz
- Transmission output: DC 4 to 20 mA Load resistance 650 Ω or lower
- Measurement range: 0 to 2.100/7.00/21.00/70.0/210.0/700/2100 mS/cm at 25°C
  SI units: 0 to .2100/0.700/2.100/7.00/21.00/70.00/210.0 S/m at 25°C
  Arbitrary setting from 5/21 (23.8%) of each measurement range up
  Water temperature: -5.0 to 120.0°C
- Temperature compensation range: -5 to 105°C
- Alarm (adjustment) output: Two circuits, c contact, with adjustable sensitivity
- Structure and panel cut size: Indoor installation (IP20), 92 mm × 92 mm
- Ambient temperature and humidity: -10 to 50°C 90% RH or lower
- Mass: Approx. 0.5 kg
- Dimensions: 96 (W) × 96 (H) × 90 (D) mm
- Options: RS-232C output

Compact ME-100 Series Heat-resistant PVC detectors

A compact resin vertical-hole type detector which can measure (high) conductivity of industrial effluent, seawater, and various chemicals.
There are three types of wetted part material, heat-resistant PVC, PVDF, and PFA; cable integrated type and waterproof connector type are available.

Common Specifications

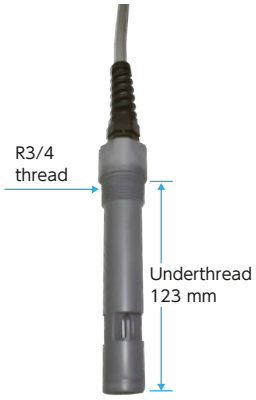
- Wetted part material: Heat-resistant PVC (H)
- Detecting tip outer diameter: ϕ22.5
- Reference cell constant: 9.0/cm
- Sample water temperature / pressure: Max. 65°C / max. 0.3 MPa
- Structure: Outdoor installation possible / rainproof type
- Mounting orientation: Unrestricted
- Cable length: 5 m or 10 m, max. 20 m

Cable integrated type

■ME-111H

Heat-resistant PVC

- R3/4 thread connection
- Throw-in or immersed use also possible

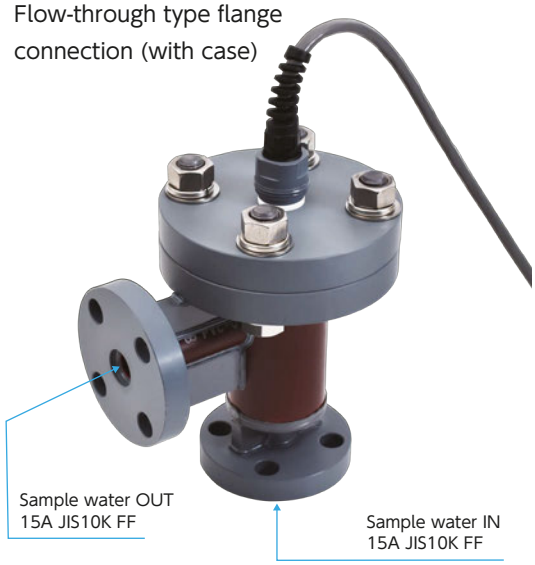


■ME-121H

Heat-resistant PVC
50A JIS10K flange connection

■ME-141H

Heat-resistant PVC
Flow-through type flange connection (with case)



■ ME-171H Immersion Type

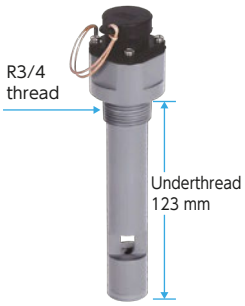
- Length: 200 mm to max. 2 m
- Mounting part outer diameter: 32 mm

Mounting bracket ZC-2 ▶Refer to page 1-7

Cable separate type

■ME-112H

R3/4 thread connection



Note: Throw-in use is not possible

■ME-122H

50A JIS10K flange connection

■Dedicated cable EC-11

■ME-142H

Flow-through type flange connection (with case)

Compact ME-100 Series PVDF or PFA detectors

A vertical-hole type detector made of PVDF or PFA, compact and lightweight. Continuous measurement of conductivity of high-concentration, high-temperature hydrochloric acid, sulfuric acid, nitric acid, and sodium hydroxide (caustic soda) is possible. Cable integrated type and waterproof connector type are available.

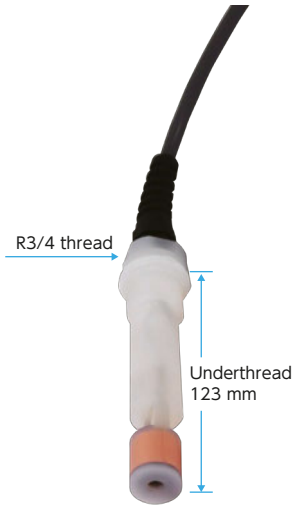
Common Specifications

◉Wetted part material: PVDF (F) or PFA (T) ◉Detecting tip outer diameter: ϕ22.5 ・Reference cell constant: 9.0/cm
◉Sample water temperature / pressure: Max. 100°C / max. 0.5 MPa for PVDF, max. 120°C / max. 0.5 MPa for PFA
◉Structure: Outdoor installation possible / rainproof type ◉Mounting orientation: Unrestricted ◉Cable length: 5 m or 10 m, max. 20 m

Cable integrated type

■ME-111F/T

PVDF/PFA
R3/4 thread connection



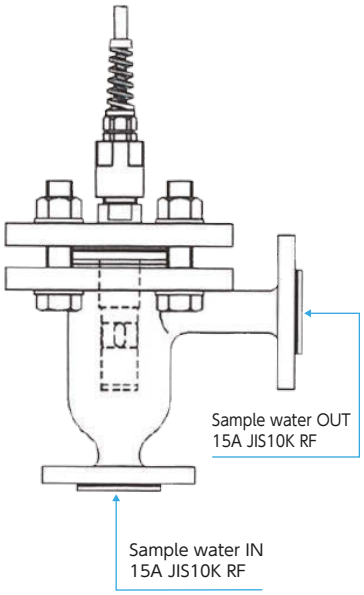
Note: Throw-in use is not possible

■ME-121F/T

PVDF/PFA
50A JIS10K flange connection

■ME-141F/T

PVDF/PFA
Flow-through type flange connection (with case)



Cast case
Interior PFA lining

Cable separate type

■ME-122F/T

R3/4 thread connection

Note: Throw-in use is not possible

■ME-122F/T

PVDF/PFA
50A JIS10K flange connection

■Dedicated cable EC-11

■ME-142F/T

PVDF/PFA
Flow-through type flange connection (with case)

Cast case
Interior PFA lining

Robust ME-11T/6/7 Series PFA detectors

A PFA (fluororesin) detector with excellent chemical resistance. Continuous measurement of conductivity of high-temperature, high-pressure, high-concentration hydrochloric acid, sulfuric acid, sodium hydroxide (caustic soda), and nitric acid is possible. Lateral-hole type and vertical-hole type detecting tips are available, with a 5 m cable included.

Common Specifications

- Wetted part material: PFA (translucent fluororesin)
- Temperature compensation sensor: Built-in thermistor (external thermistor with fast temperature response also possible)
- Detecting tip outer diameter: ϕ44 (lateral-hole or vertical-hole type)
- Reference cell constant: 2.6/cm
- Sample water temperature / pressure: Max. 120°C / max. 1.0 MPa (varies depending on manufacturing specification structure and material)
- Cable length: 5 m, max. 20 m
- Structure: Rainproof type / outdoor installation possible
- Mounting orientation: Unrestricted

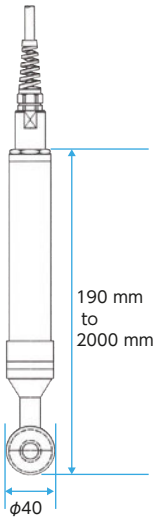
Detector single unit

■ME-11T

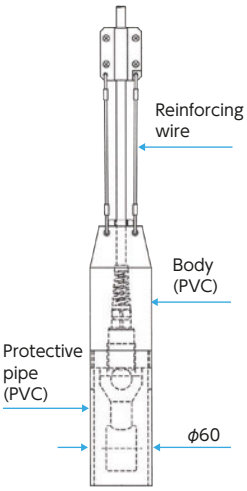
Lateral-hole type

Vertical-hole type

Immersion type



Throw-in type



Flange connection/flow-through type

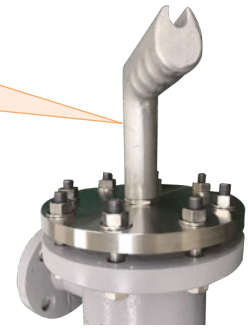
■ME-61T/62T

Flow-through type
(with case)
Lateral-hole type /
vertical-hole type

Sample water IN/OUT
25A JIS10K RF
Cast case
Interior PFA lining

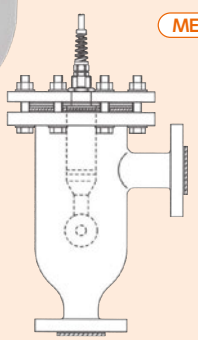
Cable protective handle (included)

Keep it regularly mounted
and use it when the detector is pulled up

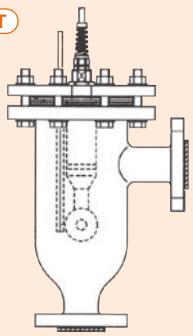


Detector tip and temperature sensor format

ME-61T

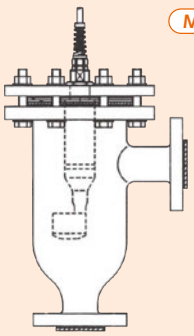


Lateral-hole type detector tip with built-in temperature sensor

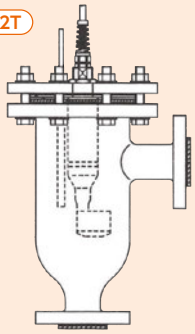


Lateral-hole type detector tip with external temperature sensor

ME-62T



Vertical-hole type detector tip with built-in temperature sensor



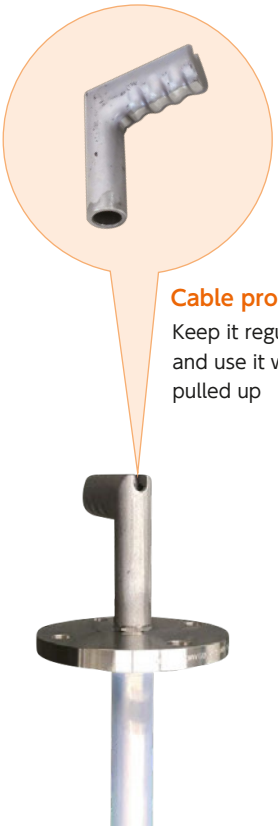
Vertical-hole type detector tip with external temperature sensor

■ME-71T

Immersion type flange connection Lateral-hole type

100A JIS10K RF
SUS316 flange connection

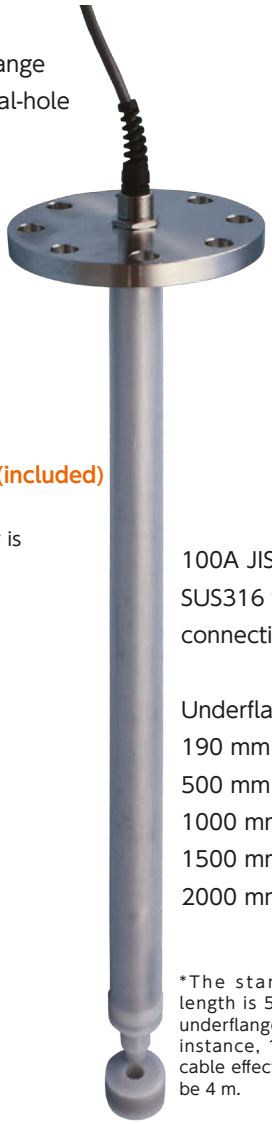
Underflange
190 mm
500 mm (standard)
1000 mm
1500 mm
2000 mm



Cable protective handle (included)
Keep it regularly mounted and use it when the detector is pulled up

■ME-72T

Immersion type flange connection Vertical-hole type



100A JIS10K RF
SUS316 flange connection

Underflange
190 mm
500 mm (standard)
1000 mm
1500 mm
2000 mm

*The standard cable length is 5 m, but if the underflange length is, for instance, 1000 mm, the cable effective length will be 4 m.

A hard PVC detector which can measure the conductivity of sodium chloride, hydrochloric acid, low-concentration caustic soda and nitric acid, etc. up to 60°C. Diagonal-hole type detecting tip, with a 5 m cable included.

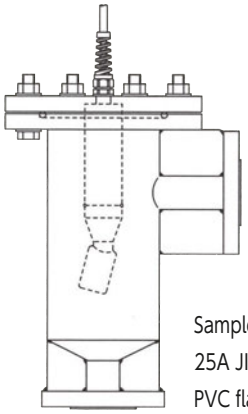
Specifications

- ◉Wetted part material: Hard PVC
- ◉Temperature compensation sensor: Built-in thermistor (external thermistor with fast temperature response also possible)
- ◉Detecting tip outer diameter: ϕ44 (diagonal-hole type)
- ◉Reference cell constant: 2.6/cm
- ◉Sample water temperature / pressure: Max. 60°C / max. 0.1 MPa (varies depending on manufacturing specification structure and material)
- ◉Cable length: 5 m, max. 20 m
- ◉Structure: Rainproof type / outdoor installation possible
- ◉Mounting orientation: Unrestricted

ME-63E External temperature sensor type

■ME-63E

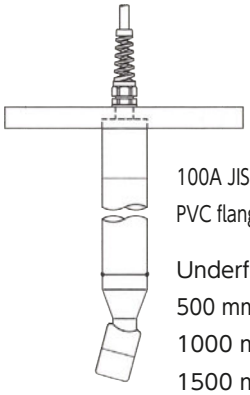
Flow-through type flange connection (with case)



Sample water IN/OUT
25A JIS10K FF
PVC flange connection

■ME-73E

Immersion type flange connection



100A JIS10K FF
PVC flange connection

Underflange
500 mm (standard)
1000 mm
1500 mm
2000 mm

Reference Data: All About Process Conductivity Meters

1. What is conductivity? The ease of electrical transmission within a solvent, expressed in numbers

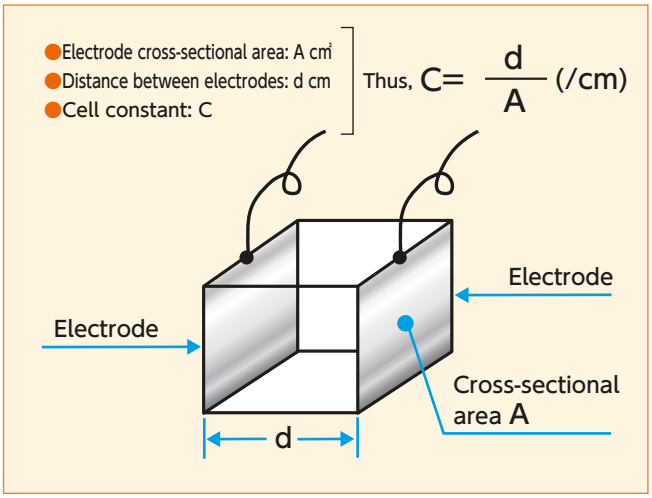
Water quality control is important, not to say essential, in every industry; conductivity is as important an indicator as pH therein.
Conductivity is shown, as in the table below, with figures in an extremely wide range from ultra-pure water to effluent and chemicals. The international SI unit is S/m*1, with S/cm also used in Japan for convenience. The SI unit name is electrical conductivity (EC*2), sometimes shortened to conductivity alone.
Unit conversion is 1 S/cm = 100 S/m and 1 S/m = 0.01 S/cm.
Because the conductivity of various solutions has temperature characteristics (the conductivity rises along with the water temperature), temperature compensation, conversion at a fixed temperature, is required.
In accordance with the temperature characteristics of NaCl solution (about 2%/°C), it is converted to the figure at 25°C. For pure water, the temperature coefficient is large, so different compensation is required.
The conductivity figure for (ultra-) pure water is low, so in many cases its reciprocal, the resistivity (difficulty of electric transmission) is used.
Continuous measurement methods for conductivity include the electrode type and the electromagnetic induction type. The measurement ranges are as shown in the table below: the electrode type measures conductivity of ultra-pure water through river water and industrial effluent, while the electromagnetic induction type handles high conductivity such as river water, industrial effluent, and seawater through chemicals.

*1: Siemens/m *2: Electric conductivity

Target water	Ultra-pure water	Pure water	Boiler supply water	Rainwater/tap water	River water	Industrial effluent	Seawater/chemicals such as HCl
Conductivity	0.01 mS/m 0.1 μS/cm	0.1 mS/m 1 μS/cm	1 mS/m up 10 μS/cm up	10 mS/m up 100 μS/cm up	100 mS/m 1000 μS/cm	1 S/m 10 mS/cm	100 S/m up 1000 mS/cm up
Measurement method	Electrode type (Cell constant: 0.01/cm)		Electrode type (Cell constant: 0.1/cm)		Electrode type (Cell constant: 1/cm)	Electromagnetic induction type	

2. What is a cell constant? ••• A figure dividing the distance d between electrodes by the electrode cross-sectional area A; the smaller it is, the more it is suited to measurement of low conductivity, explained as the basic "parallel flat surface electrode."

As in the figure at right, electrodes of cross-sectional area A (cm^2) face each other across distance d (cm), with the electrolytic solution resistance between them in the electrolyte solution represented as $R = \rho \times d/A$. d and A are fixed values determined by the mechanical structure, so d/A is called the cell constant. (When d = 1 cm and A = 1 cm^2, the cell constant is 1/cm.)
ρ is called the resistivity, a fixed value for the electrolytic solution, showing how difficult it is to transmit electricity. (Its reciprocal, $1/\rho$, = how easy it is for electricity to flow, or conductivity.)
That is, the conductivity $k = 1/R \times d/A$, and can be calculated by measuring the resistance of the electrolytic solution.



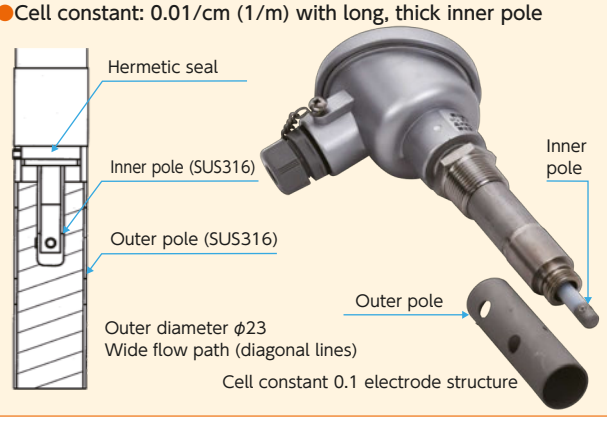
3. Features of Process Conductivity Meters

■Conductivity meter transmitters and detectors (electrodes) come in many types (models) to support a variety of applications. It is important to select the optimal system for the site (requested specifications).
■Types include the electrode type, for measurement of low conductivity (from pure water to tap water, river water, etc.), and the electromagnetic induction type, for measurement of high conductivity (industrial effluent, seawater, chemicals, etc.).
■Transmitters and detectors (cells) can be combined and adjusted, including dedicated cables. (Combination with other detectors is not possible.)
■The main causes of measurement error are contamination of the sample water, adhered air, or adhered dirt which has hardened. Be careful not to admit air into the sample water. Periodic cleaning is also required.
■Zero-point confirmation is easy. Simply remove the cell from the sample water and expose it to atmosphere to display a measurement value of zero. (In the low ranges such as measurement of pure water, the value may not reach zero depending on the ambient temperature.)

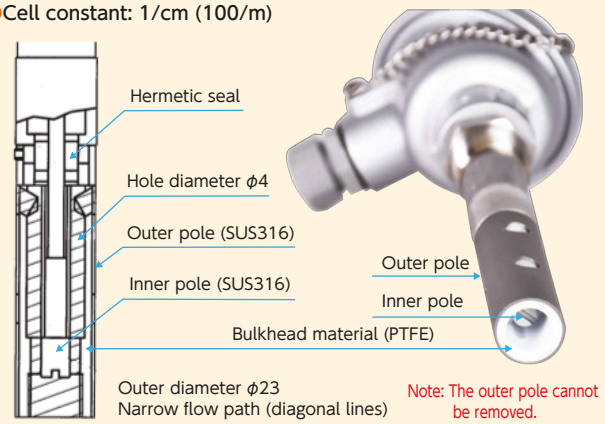
4. Electrode Type Conductivity Detectors: A6 Series

A stainless steel (SUS316) A6 Series detector with a dual electrode structure (inner and outer poles). There are three types of cell constant. The inner and outer poles are hermetically sealed, enabling support at high pressures and temperatures.
The measurement range is from minimum 0 to 0.200 μS/cm (20.0 μS/m) to maximum 0 to 20 mS/cm (2000 mS/m).

●Cell constant: 0.1/cm (10/m)
●Cell constant: 0.01/cm (1/m) with long, thick inner pole



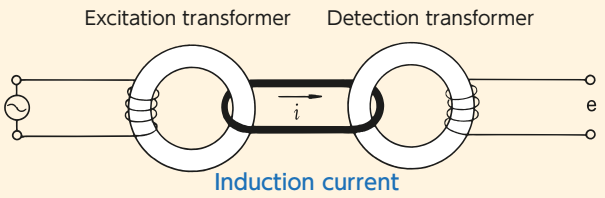
●Cell constant: 1/cm (100/m)



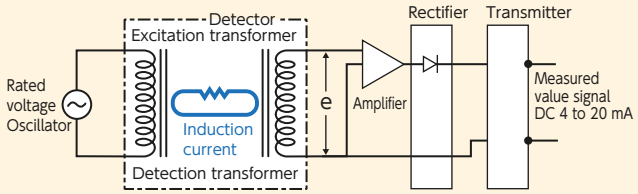
5. What is electromagnetic induction?

AC current flows through the solution via electromagnetic induction (excitation transformer), and its conductivity value is detected by electromagnetic induction (detection transformer) to find the conductivity of the solution.
It can measure high conductivity rates which cannot be measured with the electrode method.

Diagram of principle



Circuit configuration diagram

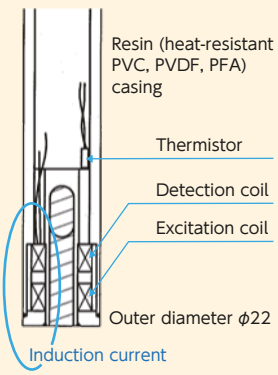


6. Electromagnetic Induction Type Detector: ME Series

An electromagnetic induction type detector with an excitation coil and detection coil enclosed in the resin (PVC or PFA) insulating casing. Detection of the induction current generated through the holes between the coils enables measurement of the conductivity of the sample water. The wetted parts are resin, so measurement of strongly corrosive chemicals such as hydrochloric acid or sulfuric acid is also possible. The measurement range is from minimum 0 to 0.5 mS/cm (0.05 S/m) to maximum 0 to 2000 mS/cm (200 S/m).
A thermistor is used for the temperature compensation temperature sensor, built into the detector tip.

■Compact Type ME-100 Series

Vertical-hole type Cell Constant: 9.0/cm (900/m)



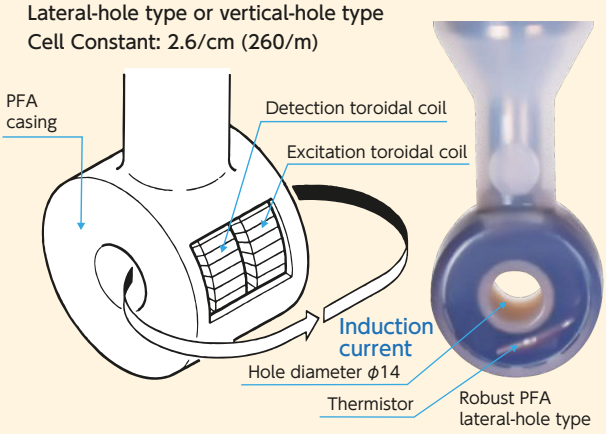
Compact PFA vertical-hole type

Recommended applications For small-scale (compact) facilities

- ◆The heat-resistant PVC type includes inexpensive and leadless types as well
- ◆Wetted part material selection enables support for various measurement conditions

■Robust Type ME-11T Series

Lateral-hole type or vertical-hole type
Cell Constant: 2.6/cm (260/m)



Recommended applications For large-scale facilities (large plants)

- ◆High-sensitivity type using a large toroidal coil
- ◆Supports high-concentration measurement of various solutions at high temperatures and pressures

7. A6 Cell Model Name and Product Code

A6 Cell Model Name Configuration

A6-1 □□ (A B C D)

A Electrical connection
Connector box type for general use (wiring port G1/2) ••• Uses EC-10 type dedicated cable

B Temperature compensation
For general water/ultra-pure water ••••• Thermistor

C Piping connection
1: Insertion type screw-in connection ••• R3/4 thread, insertion length 150 mm
2: Insertion type flange connection ••••• 50A JIS10K RF, insertion length 125 mm
3: Flow-through type SUS case thread connection ••• Rc1/2 thread
4: Flow-through type SUS case flange connection ••• IN/OUT 15A JIS10K RF
5: Flow-through type PP case thread connection ••• Rc1/2 thread
6: Flow-through type PP case flange connection ••• IN/OUT 15A JIS10K FF
7: Immersion type, No connection part ••• Immersion length 500 mm

D Cell constant
1: 0. 01/cm (1/m) ••••••••••••••••••••• For ultra-pure water
2: 0. 1/cm (10/m) ••••••••••••••••••••• Pure water / tap water
3: 1/cm (100/m) ••••••••••••••••••••• For lake and river water, effluent
4: 10/cm (1000/m) ••••••••••••••••••••• Effluent / chemicals, etc.
{Electromagnetic induction type recommended}

A6 Cell Product Code "Model Name Category" and Model Name

Model Name Category	Connection Standard	Model Name
Insertion Type: A61D	Screw-in type (R3/4)	A6-11□
	Flange type (50A JIS10K FF)	A6-12□
	Immersion type	A6-17□

□ is the cell constant
1: 0. 01/cm (1/m)
2: 0. 1/cm (10/m)
3: 1/cm (100/m)
4: 10/cm (1000/m) (Electromagnetic induction type recommended)

Model Name Category	Case material	Case Connection Standard	Model Name
Flow-through Type: A61F (with case)	Stainless steel (SUS316)	Screw-in type (Rc1/2)	A6-13□
		Flange type (15A JIS10K RF)	A6-14□
	Polypropylene (PP)	Screw-in type (Rc1/2)	A6-15□
		Flange type (15A JIS10K RF)	A6-16□

For the model name configuration of the Electromagnetic Conductivity Detector ME Series, see ▶ page 4-10

8. Sanitary Conductivity Meter WBM-121A/AK Cell

Panel Type Transmitter

WBM-121A

Detector (Electrode)

AK-33

A conductivity meter with sanitary specifications, used at beverage plants such as breweries and on various food production lines. The transmitter is the compact DIN96 panel mounting type. The detector is a simple buff-polished IDF flange mounting type, with a structure resistant to high temperatures (100°C) and pressures (1.0 MPa).

The measurement range is 0 to 300/3000 μS/cm at 25°C; it can be switched manually between the general range for beverages and the CIP (Cleaning in Place) range for cleaning solutions. Used to detect whether the production line is running beverages or cleaning solution, it cannot be used as a general conductivity meter.

9. Detectors with Amplifier (no indicator) AA Series

A single-unit conductivity meter combining the electrode type A6 Series detector with a measurement amplifier unit as a transmitter type outputting measurement signals of DC 4 to 20 mA. There is no display for measurement values. Power supply is AC 100 V 50/60 Hz. (Higher specs are optional)

Available types include the AA-1□□, with a wide range from ultra-pure water to effluent, and the AA-2□1, dedicated for ultra-pure water.

AA-1□□ measurement range: Minimum 0 to 2 μS/cm to maximum 0 to 10000 μS/cm

AA-2□1 measurement range: 0 to 0.2 μS/cm, 0 to 0.5 μS/cm, 0 to 1.0 μS/cm

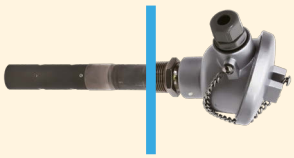
The mounting methods are the same as those of the A6 Series: R3/4 screw-in, 50A JIS10K flange, or flow-through.

10. Precautions for Detector Mounting

It is important for accuracy that the entire electrode is constantly immersed in the sample water, with all directions open (no obstacles).

Electrode Type Detector

There are no restrictions on mounting orientation (angle) for the cell constant 0.01/cm and 0.1/cm types.
They may be mounted vertically or horizontally in piping or tanks.

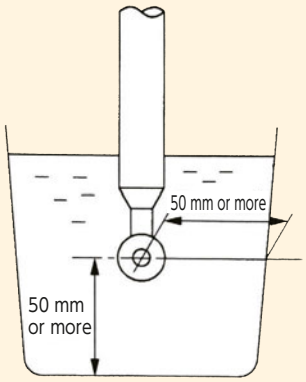


Cell constant 1/cm

Horizontal mounting is not possible for the cell constant 1/cm type.
When mounting in vertical pipes or on a tank side, an angle of 45° or higher is required.

Electromagnetic Induction Type Detector

The mounting orientation (angle) is unrestricted, whether vertical up or down or horizontal.
It is important to have no obstacles within a range of 50 mm from the center of the detecting tip. (See figure below)
When using a small volume flow-through case as in the photograph, the cell constant must be calibrated.



Flow-through type case

Detector Upgrades

- When upgrading only the A6/AR cell detector, notify us of the transmitter model name and production number.
- When upgrading only the ME detector, the entire transmitter and detector (dedicated cable) must be sent to us.

Each detector bears the same production number as the transmitter.

Nameplate position for the WDM/MDM types

Nameplate position for the WBM/MBM types

3 Model Selection of Resistivity Meters

Panel Mounting Type Transmitters

Model Name and Appearance

■AQM-100A (1-channel)

■AQM-210A (2-channel)

Main Specifications and Functions

The 1-channel specification AQM-100A and 2-channel specification AQM-210A are available,
with a measurement range of 0.00 to 20.00 MΩ· cm at 25˚C.
Each can be connected to detectors A and B (optional), although with AQM-100A, detector B provides measurement value display only, with no transmission output.
AQM-210A has transmission output for both detectors A and B.

Common Specifications

- Power supply: AC 100 to 240 V 50/60 Hz
- Measurement range: 0.00 to 20.00 MΩ· cm at 25˚C
- Transmission output: DC 4 to 20 mA Load resistance 650 Ω or lower
- Transmission output range: Arbitrary setting at a 25% width or higher of 0.00 to 20.00 MΩ· cm
- Alarm output: 2 circuits, c contact
- Structure and panel cut size: Indoor installation (IP20), 92 mm × 92 mm
- Ambient temperature and humidity: -10 to 50˚C, 95% RH or lower

AQM-100A Specifications

- Dimensions: 96 (W) × 96 (H) × 90 (D) mm Mass: Approx. 0.5 kg
- Temperature compensation range: 0 to 100˚C
- Digital output: RS-232C optional

AQM-210A Specifications

- Dimensions: 96 (W) × 96 (H) × 171 (D) mm Mass: Approx. 0.8 kg
- Temperature compensation range: -5 to 120˚C
- Transmission output: DC 4 to 20 mA 2-circuit (also supports measurement value comparison and removal ratio)
- Digital output: RS-232C equipped as standard

Detectors

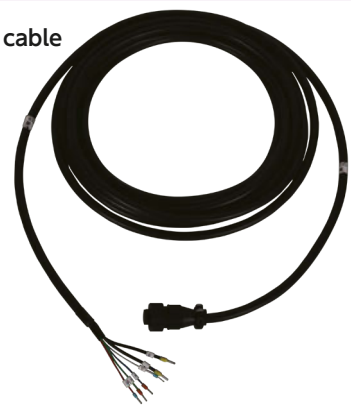
■AR4-212

Mass: Approx. 0.2 kg

A leadless R3/4 thread connection detector for indoor use.
The dedicated cable uses a connector for connection.
The mounting angle is unrestricted, whether vertical, horizontal, or diagonal.

- Reference cell constant: 0.1/cm
- Wetted part (electrode) material: Titanium
- Body material: SUS316 (Teflon coating)
- Insulation: FKM/PPS
- Sample water temperature: Max. 100˚C
  Pressure: Max. 0.5 MPa
- Connection thread standard: R3/4
- Electrode (insertion part) outer diameter: ϕ14
- Structure: Indoor installation (not waterproof)

Dedicated cable
■EC-10



- Terminal processing: Pin terminal on transmitter side
  Connector on AR4 detector side
- Outer diameter: ϕ8
- Length: 5 to 30 m (max. 100 m)

Reference Data: All About Resistivity Meters

1. What is Resistivity?

This figure indicates how difficult it is for electricity to pass through water (water purity), as the reciprocal of conductivity, which indicates how easy it is for electricity to pass (solubility). It is also called specific resistance.

Resistivity, which can be expressed in larger figures than conductivity, is usually used. Its unit is MΩ· cm.

Water with conductivity of 1 μS/cm or below is usually considered pure water, with its reciprocal resistivity thus 1 MΩ· cm or above. Further, water with conductivity of 0.1 μS/cm or below is called ultra-pure water, with its reciprocal resistivity thus 10 MΩ· cm or above.

The purity limit of pure water is said to be 0.055 μS/cm. Converted into resistivity, this is 18.24 MΩ· cm at 25°C, or theoretical pure water.

Like conductivity, resistivity changes with temperature, so it must be compensated to the value at 25°C. The resistivity of pure water has a higher temperature coefficient than general water, so high-precision temperature compensation is required. In particular, when measuring the resistivity of ultra-pure water, room temperature without sudden temperature changes is ideal.

2. Qualities, Applications, and Purposes of Pure Water

Natural water and tap water contain dissolved hardness ingredients such as calcium and salts such as sodium and silica, which lower the quality of drinking water and cosmetic washes, as well as causing mechanical equipment such as boilers to deteriorate.

Most facilities require pure water with these impurities removed. Pure water is refined via ion exchange resin and RO (reverse osmosis membrane) or UF (ultrafiltration); this equipment is called water purification equipment.

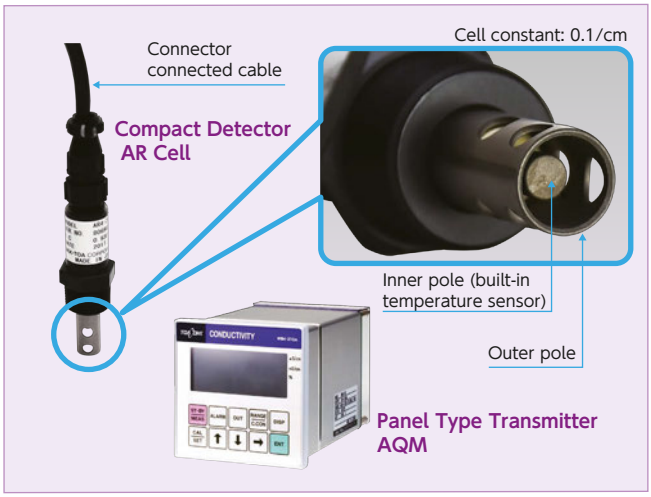
Pure water does not leave scale when evaporated, and can dissolve oil and various other components of dirt.

Application examples of (ultra-) pure water	Purpose
Generator boiler supply water	Prevention of scale adherence / turbine protection
Office building HVAC	Prevention of scattered dust/odor elimination
Base water for eyedrops and cosmetic washes	Improved quality (safety) maintenance
LCD cleaning	Washing away oil and minuscule debris
Semiconductor device cleaning	Same as above

3. Panel Type Transmitters AQM and Compact AR Cells

Multiple resistivity meters are installed at checkpoints (and the final use point) from downstream to upstream in the water purification equipment. The resistivity meters are indoor devices with compact detectors. In semiconductor plants in particular, several dozen meters are installed, using panel-type transmitters. The detectors are compact titanium electrode screw-in types.

Usage examples in water purification equipment include connecting detectors A and B to a two-channel transmitter, enabling monitoring resistivity at inlets and outlets with transmission output (for recording) and contact output (for alarms).

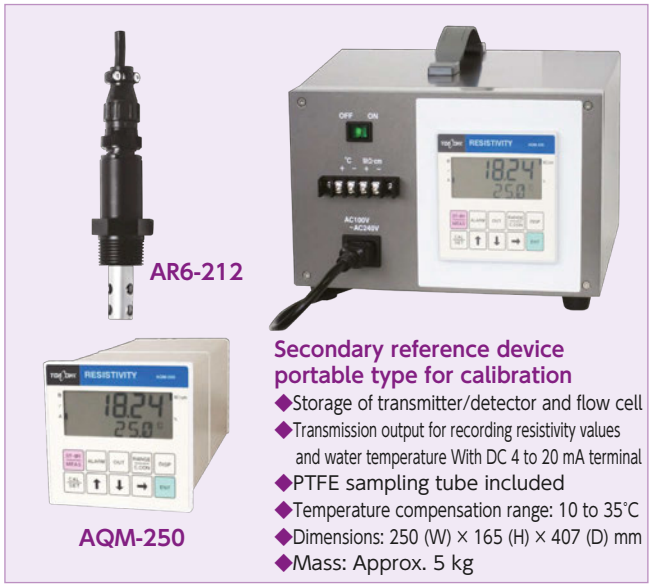


4. Calibration Methods and Secondary Reference Devices

Resistivity meters are regularly calibrated against the facility's sample water (pure water), cross-checking with secondary reference devices.

Secondary reference device resistivity meters include the AQM-250 and AR6-212 High Sensitivity Resistivity Meters for ultra-pure water. Portable types (transmitter/detector and flow cell stored in a box) can be brought on site for calibration at facilities.

Connect the included PTFE tube at the same sampling point as the resistivity meter to be calibrated and run water through for measurement. Monitoring (recording) the resistivity and the temperature, calibrate at a location where the resistivity value is stable.



4 Model Selection of Electromagnetic Concentration Meters

Electromagnetic Concentration Meter Requested Specification Check

1. Facilities (Plant) to be Used••• ☐ Production line ☐ Quality control ☐ Effluent treatment ☐ Smoke cleaning facility ☐ River, lake, seawater (environment) ☐ Other
2. Location to be Installed••••••• ☐ Indoor ☐ Outdoor ☐ With direct sunlight ☐ With salt damage ☐ With dust / corrosive atmosphere ☐ With noise source ☐ High location ☐ High-temperature location
3. Purpose of Continuous Measurement ☐ Display and recording only ☐ Monitoring / alarm ☐ General control (effluent, etc.) ☐ High-precision control ☐ Other
4. Measurement Solution (Sample Water) Name: ____ Measurement range: ____ to ____% Temperature change: ____ to ____˚C Pressure: ____ kPa Flow velocity: ____ m/sec Concentration control value: _____ %
5. Transmitter Type•••••••••••••• ☐ Field installation type 2-wire type ☐ Field installation type 4-wire type ☐ Panel type ☐ Alarm (adjustment) output required
6. Detector Type••••••••••••••••• ☐ Pipe insertion type ☐ Tank insertion type ☐ Flow-through type ☐ Immersion type ☐ Throw-in / drop-in type
7. Wetted Part Material Selection ☐ Hard polyvinyl chloride (PVC) ☐ Heat-resistant polyvinyl chloride (C-PVC) ☐ Polyfluorovinylidene (PVDF) ☐ Fluororesin (PFA)
8. Auxiliary Device / Spare Parts ☐ Pole stand required ☐ Detector mounting device required ☐ Arrestor required ☐ Other _____
9. Other, Notes••••••••••••••••• _____

Two Representative System Examples: Transmitter + Detector + Auxiliary Device

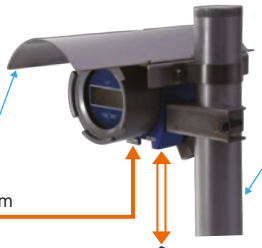
2-Wire / Table Salt Concentration Meter

Outdoor Field

Instrument Room / Instrument Panel

Manufacturing Specification Example
Measurement range: 0 to 10% NaCl
Temperature compensation range: 10 to 30˚C

■Transmitter MDM-137A



Hood (Option)

Pole stand ZB-1

■Flange connection type detector ME-122H

Dedicated cable 5 m (flexible piping)

Arrestor for signals

Power transmission cable

Conduit construction

Dedicated Cable: EC-11

Outdoor case for arrestor

■Bar graph display controller with DC power supply (scale and units must be specified)

AC free power supply

Adjustment 4-point contact output

DC 24 V power supply
Measured value signal
DC 4 to 20 mA

Arrestor for signals

For auxiliary devices such as arrestors, ▶ see page 1-7・8

4-Wire / Sulfuric Acid Concentration Meter

Installation plan

Instrument Room / Instrument Panel

Manufacturing Specification Example
Measurement range: 93 to 99.5% H_2SO_4
Temperature compensation range: 50 to 70˚C

■Flow-through type detector ME-61T

Detector cable 5 m (flexible piping)

■Transmitters MBM-162

Conduit construction

AC free power supply
Adjustment 2-point contact output
Measured value signal DC 4 to 20 mA To recorder, etc.

Field Installation Type

Type of Transmitter

■**2-wire:** MDM-137A

■**4-wire:** MBM-162

Main Specifications and Functions

- Power supply: DC 24 V
- Transmission output: DC 4 to 20mA Load resistance 650 Ω or lower
- Measurement solution name and measurement range: See table below (water temperature -5 to 120˚C)
- Temperature compensation range: Designated temperature ±10˚C; see table below
- Structure and mounting: Outdoor installation IP55 50A pole mounting
- Ambient temperature and humidity: -20 to 55˚C 99% RH or lower
- Dimensions: ϕ120 × 180 (D) mm
- Mass: Approx. 3 kg
- Options: Hood, heavy-duty coating, arrestor (simple type)

- Power supply: AC 100 to 240 V 50/60 Hz
- Transmission output: DC 4 to 20 mA Load resistance 650 Ω or lower 2 circuits: conductivity and water temperature
- Measurement solution name and measurement range: See table below (Water temperature -5 to 120˚C, arbitrary setting of transmission output range with a width of 10˚C or higher)
- Temperature compensation range: Designated temperature ±10˚C; see table below
- Alarm (adjustment) output: Two circuits, c contact, with adjustable sensitivity
- Structure and mounting: Outdoor installation IP65 50A pole or wall mounting
- Ambient temperature and humidity: -20 to 55˚C, 95% RH or lower
- Dimensions: 181 (W) × 180 (H) × 95 (D) mm
- Mass: Approx. 2 kg
- Options: Hood, heavy-duty coating / arrestor (simple type) / RS-232C output / Power cutoff signal

Panel Mounting Type

■**MBM-102A**

- Power supply: AC 100 to 240 V 50/60 Hz
- Transmission output: DC 4 to 20 mA Load resistance 650 Ω or lower
- Measurement solution name and measurement range: See table below (water temperature -5 to 120˚C)
- Temperature compensation range: Designated temperature ±10˚C; see table below
- Alarm (adjustment) output: Two circuits, c contact, with adjustable sensitivity
- Structure: Indoor installation (IP20) Panel cut dimensions: 92 mm × 92 mm
- Ambient temperature and humidity: -10 to 50˚C 90% RH or lower
- Dimensions: 96 (W) × 96 (H) × 90 (D) mm
- Mass: Approx. 0.5 kg
- Options: RS-232C output

Measurement solution name*	Measurement range (common for all transmitters)	Temperature compensation range (common for all transmitters)
Sodium chloride (NaCl)	0 to 5% / 0 to 10% / 0 to 20% / 0 to 25% (Seawater salinity concentration: generally 3.4%)	0 to 20˚C to 80 to 100˚C, 10˚C intervals
Hydrochloric acid (HCl)	0 to 5% / 0 to 10% / 0 to 15% 25 to 35% / 25 to 40% / 30 to 40%	0 to 20˚C to 80 to 100˚C, 10˚C intervals
Nitric acid (HNO_3)	0 to 5% / 0 to 10% / 0 to 20% / 0 to 25% 40 to 80% / 60 to 70% / 60 to 80%	0 to 20˚C to 80 to 100˚C, 10˚C intervals
Sodium hydroxide (NaOH)	0 to 5% / 0 to 10% / 0 to 15% 20 to 40%	0 to 20˚C to 80 to 100˚C, 10˚C intervals Limited by measurement range; see manufacturing specifications on page 4-7
Sulfuric acid (H_2SO_4)	0 to 5% / 0 to 10% / 0 to 20% / 0 to 30% 40 to 80% / 60 to 80% / 93 to 99.5%	0 to 20˚C to 80 to 100˚C, 10˚C intervals Limited by measurement range; see manufacturing specifications on page 4-7

*Only for measurement of single components.

Compact ME-100 Series Heat-resistant PVC Detectors

A vertical-hole type detector made of heat-resistant PVC, compact and lightweight. Continuous measurement of concentration of sodium chloride, hydrochloric acid, sulfuric acid, low-concentration sodium hydroxide (caustic soda), and so on is possible. Cable integrated type and waterproof connector type are available.

Common Specifications

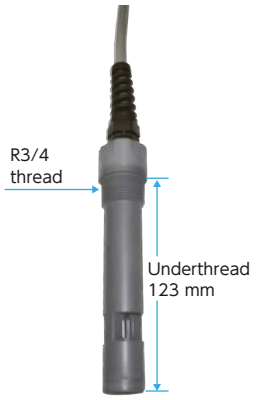
- Wetted part material: Heat-resistant PVC (H)
- Detecting tip outer diameter: ϕ22.5
- Reference cell constant: 9.0/cm
- Sample water temperature / pressure: Max. 65°C / max. 0.3 MPa
- Structure: Outdoor installation possible / rainproof type
- Mounting orientation: Unrestricted
- Cable length: 5 m or 10 m, max. 20 m

Cable integrated type

■ME-111H

Heat-resistant PVC

- R3/4 thread connection
- Throw-in or immersed use also possible



■ME-121H

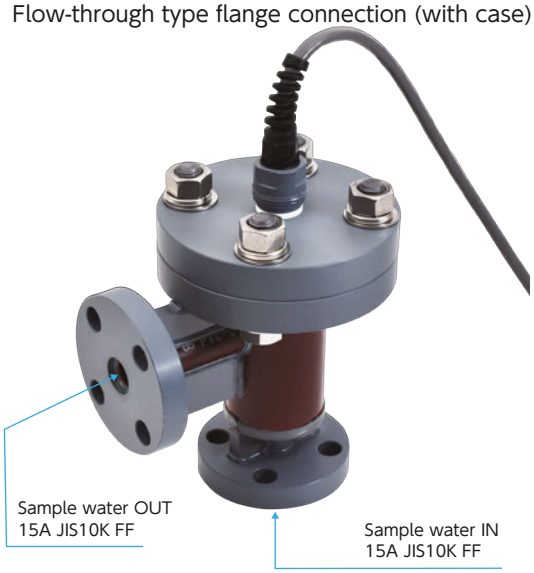
Heat-resistant PVC

50A JIS10K flange connection

■ME-141H

Heat-resistant PVC

Flow-through type flange connection (with case)



■ME-171H Immersion Type

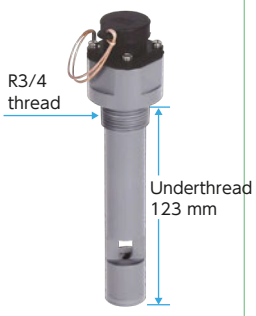
- Length: 200 mm to max. 2 m
- Mounting part outer diameter: 32 mm

Mounting bracket ZC-2 ▶ Refer to page 1-7

Cable separate type

■ME-112H

R3/4 thread connection



Note: Throw-in use is not possible

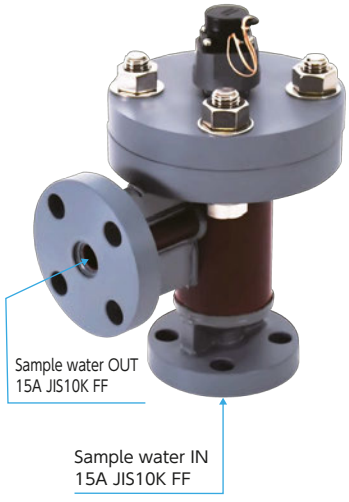
■ME-122H

50A JIS10K flange connection

■Dedicated cable EC-11

■ME-142H

Flow-through type flange connection (with case)



Compact ME-100 Series PVDF or PFA Detectors

A vertical-hole type detector made of PVDF or PFA, compact and lightweight. Continuous measurement of concentration of high-concentration, high-temperature hydrochloric acid, sulfuric acid, nitric acid, and sodium hydroxide (caustic soda) is possible. Cable integrated type and waterproof connector type are available.

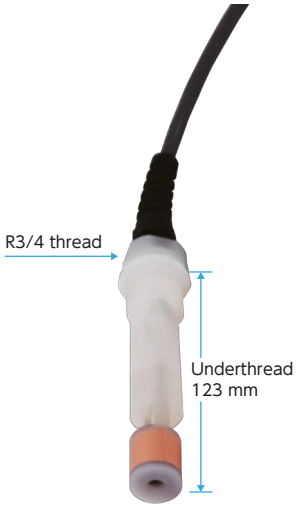
Common Specifications

◉Wetted part material: PVDF (F) or PFA (T) ◉Detecting tip outer diameter: ϕ22.5 ・Reference cell constant: 9.0/cm
◉Sample water temperature / pressure: Max. 100°C / max. 0.5 MPa for PVDF, max. 120°C / max. 0.5 MPa for PFA
◉Structure: Outdoor installation possible / rainproof type ◉Mounting orientation: Unrestricted ◉Cable length: 5 m or 10 m, max. 20 m

Cable integrated type

■ME-111F/T

PVDF/PFA
R3/4 thread connection



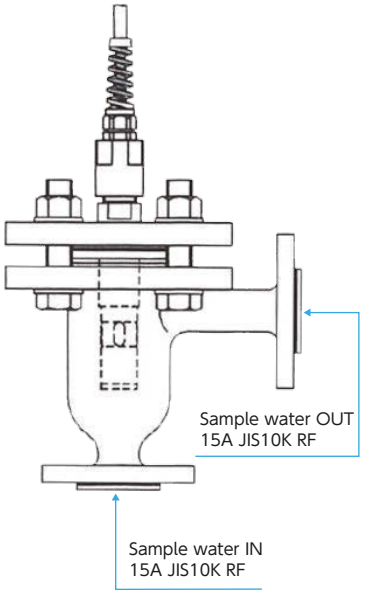
Note: Throw-in use is not possible

■ME-121F/T

PVDF/PFA
50A JIS10K flange connection

■ME-141F/T

PVDF/PFA
Flow-through type flange connection (with case)



Cable separate type

■ME-122F/T

PVDF/PFA
R3/4 thread connection

Note: Throw-in use is not possible

■ME-122F/T

PVDF/PFA
50A JIS10K flange connection

■Dedicated cable EC-11

■ME-142F/T

PVDF/PFA
Flow-through type flange connection (with case)

Cast case
Interior PFA lining

Robust ME-11T/6/7 Series PFA Detectors

A PFA (fluororesin) detector. Continuous measurement of high-temperature, high-pressure, high-concentration hydrochloric acid, sulfuric acid, sodium hydroxide (caustic soda), and nitric acid is possible. Lateral-hole type and vertical-hole type detecting tips are available, with a 5 m cable included.

Common Specifications

- Wetted part material: PFA (translucent fluororesin)
- Temperature compensation sensor: Built-in thermistor (external thermistor with fast temperature response also possible)
- Detecting tip outer diameter: ϕ44 (lateral-hole or vertical-hole type)
- Reference cell constant: 2.6/cm
- Sample water temperature / pressure: Max. 120°C / max. 1.0 MPa (varies depending on manufacturing specification structure and material)
- Cable length: 5 m, max. 20 m
- Structure: Rainproof type / outdoor installation possible
- Mounting orientation: Unrestricted

Detector single unit

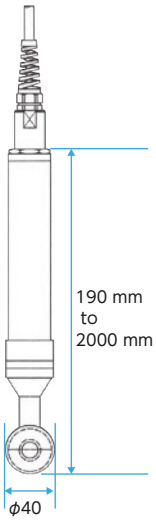
■ME-11T

PFA

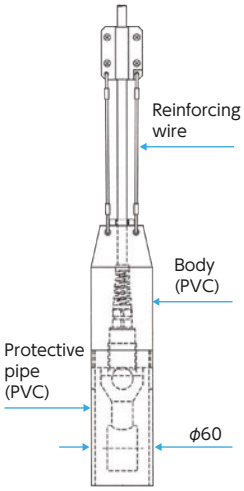
Lateral-hole type

Vertical-hole type

Immersion type



Throw-in type



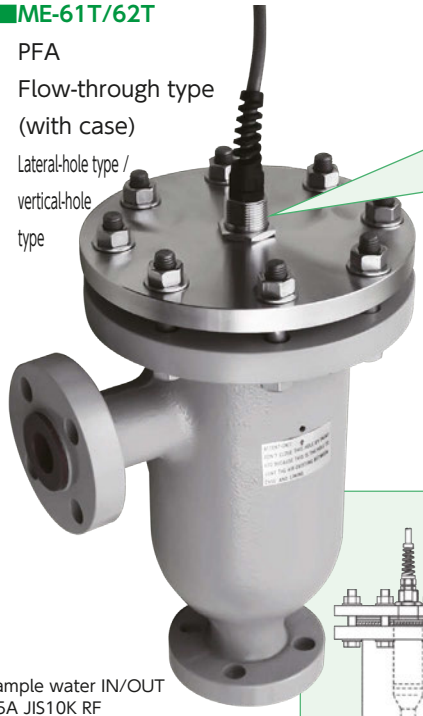
Flange connection/flow-through type

■ME-61T/62T

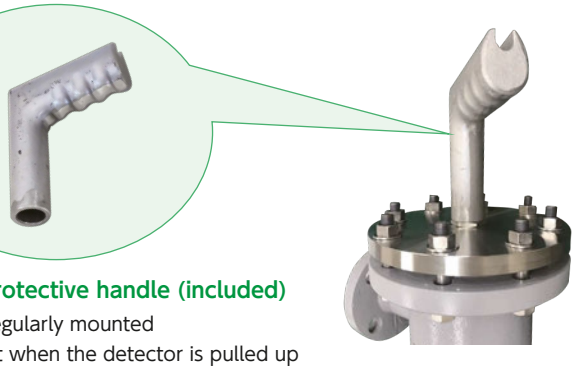
PFA

Flow-through type (with case)

Lateral-hole type / vertical-hole type



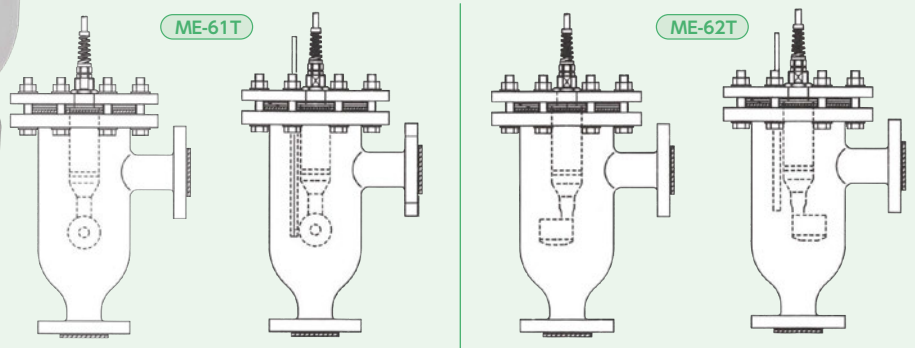
Sample water IN/OUT
25A JIS10K RF
Cast case
Interior PFA lining



Cable protective handle (included)

Keep it regularly mounted and use it when the detector is pulled up

Detector tip and temperature sensor format



Lateral-hole type detector tip with built-in temperature sensor

Lateral-hole type detector tip with external temperature sensor

Vertical-hole type detector tip with built-in temperature sensor

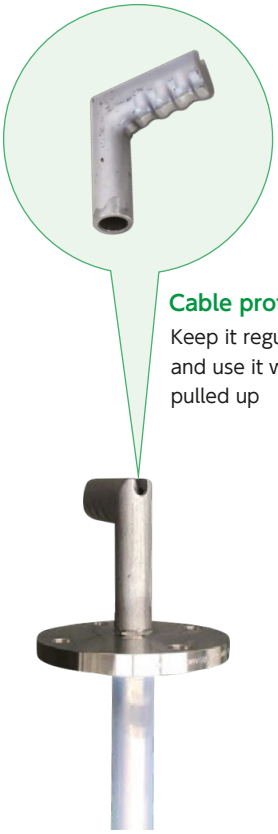
Vertical-hole type detector tip with external temperature sensor

■ME-71T

Immersion type flange connection Lateral-hole type

100A JIS10K RF
SUS316 flange connection

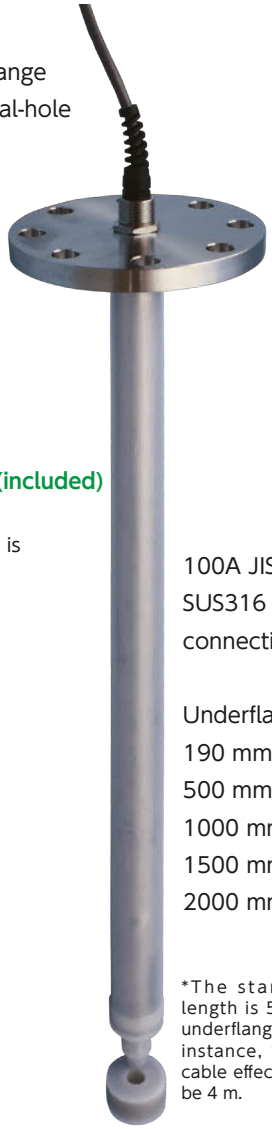
Underflange
190 mm
500 mm (standard)
1000 mm
1500 mm
2000 mm



Cable protective handle (included)
Keep it regularly mounted and use it when the detector is pulled up

■ME-72T

Immersion type flange connection Vertical-hole type



100A JIS10K RF
SUS316 flange connection

Underflange
190 mm
500 mm (standard)
1000 mm
1500 mm
2000 mm

*The standard cable length is 5 m, but if the underflange length is, for instance, 1000 mm, the cable effective length will be 4 m.

A hard PVC detector which can measure the concentration of sodium chloride, hydrochloric acid, low-concentration sodium hydroxide (caustic soda) and nitric acid, etc. up to 60°C. Diagonal-hole type detecting tip, with a 5 m cable included.

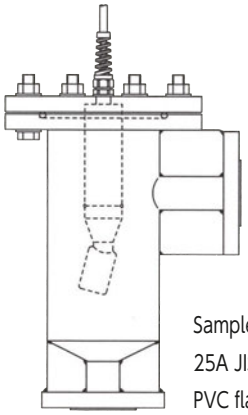
Specifications

- Wetted part material: Hard PVC
- Temperature compensation sensor: Built-in thermistor (external thermistor with fast temperature response also possible)
- Detecting tip outer diameter: ϕ44 (diagonal-hole type)
- Reference cell constant: 2.6/cm
- Sample water temperature / pressure: Max. 60°C / max. 0.1 MPa (depending on manufacturing specifications of structural material)
- Cable length: 5 m, max. 20 m
- Structure: Rainproof type / outdoor installation possible
- Mounting orientation: Unrestricted

ME-63E External temperature sensor type

■ME-63E

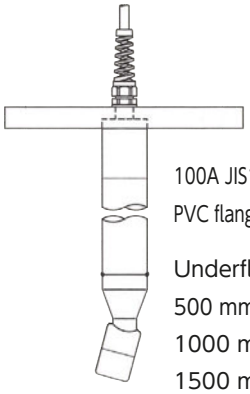
Flow-through type flange connection (with case)



Sample water IN/OUT
25A JIS10K FF
PVC flange connection

■ME-73E

Immersion type flange connection



100A JIS10K FF
PVC flange connection

Underflange
500 mm (standard)
1000 mm
1500 mm
2000 mm

Manufacturing Specifications for Electromagnetic Conc. Meters

Available solution names and measurement ranges are in the table below. As well, this serves as a basic (guideline) selection table for detector wetted part materials, based on measurement solutions and their temperatures (temperature compensation ranges). The letters below are abbreviations for wetted part materials added to the end of detector model names.

Detector wetted part material ···· E: Hard PVC H: Heat-resistant PVC F: PVDF T: PFA

Measurement solution name	Measurement range (%)	Temperature compensation range (°C) and detector wetted part material								
		0 to 20	10 to 30	20 to 40	30 to 50	40 to 60	50 to 70	60 to 80	70 to 90	80 to 100
Sodium chloride NaCl	0 to 5	E H	E H	E H	E H	H F	H F	F T	F T	F T
	0 to 10									
	0 to 20									
	0 to 25									
Hydrochloric acid HCl	0 to 5	E H	E H	E H	E H	H F	H F	F T	F T	F T
	0 to 10									
	0 to 15									
	25 to 35									
	25 to 40									
	30 to 40									
Nitric acid HNO_3	0 to 5	E H	E H	E H	E H	T	T	T	T	T
	0 to 10									
	0 to 20									
	0 to 25	T	T	T	T					
	40 to 80									
	60 to 70									
	60 to 80									
Sodium hydroxide NaOH	0 to 5	E H	E H	E H	E H	H F	H F	T	T	T
	0 to 10									
	0 to 15	Not available	Not available	T	T	T	T			
	20 to 40	T	T			Not available	Not available	Not available	Not available	Not available
Sulfuric acid H_2SO_4	0 to 5	E H	E H	E H	E H	H F	T	T	T	T
	0 to 10									
	0 to 20	T	T	T	T	T				
	0 to 30	Not available	Not available							
	40 to 80	T	T							
	60 to 80									
	93 to 99.5	Not available								
	94 to 99.5									
Hydrofluoric acid HF	0 to 2	Consult us regarding temperature compensation range and detector wetted part material								
	0 to 20									
Fuming sulfuric acid SO_3	15 to 30	Consult us regarding temperature compensation range and detector wetted part material								
	15 to 40									
Sodium sulfite Na_2SO_3	0 to 4	Consult us regarding temperature compensation range and detector wetted part material								
	5 to 20									
Sodium sulfate Na_2SO_4	0 to 15	Consult us regarding temperature compensation range and detector wetted part material								
Sodium carbonate Na_2CO_3	0 to 2	Consult us regarding temperature compensation range and detector wetted part material								
	0 to 18									
Potassium hydroxide KOH	0 to 2.5	Consult us regarding temperature compensation range and detector wetted part material								
	45 to 55									
Phosphoric acid H_3PO_4	3 to 8	Consult us regarding temperature compensation range and detector wetted part material								
	0 to 20									
Calcium chloride $CaCl_2$	0 to 15	Consult us regarding temperature compensation range and detector wetted part material								

Reference Data: All About Process Electromagnetic Concentration Meters

1. What is Electromagnetic Induction?

AC current flows through the solution via electromagnetic induction (excitation transformer), and its conductivity value is detected by electromagnetic induction (detection transformer) to find the conductivity of the solution.
It can measure high conductivity rates which cannot be measured with the electrode method, with little effect on measurement values even if the electrodes are dirty.

Circuit configuration diagram

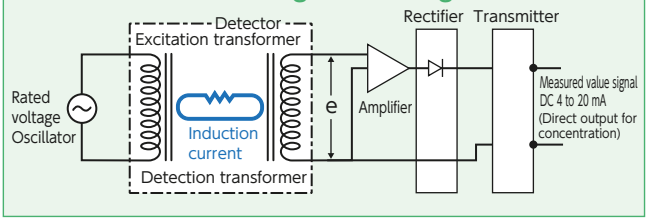
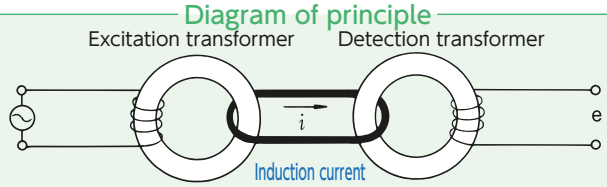


Diagram of principle

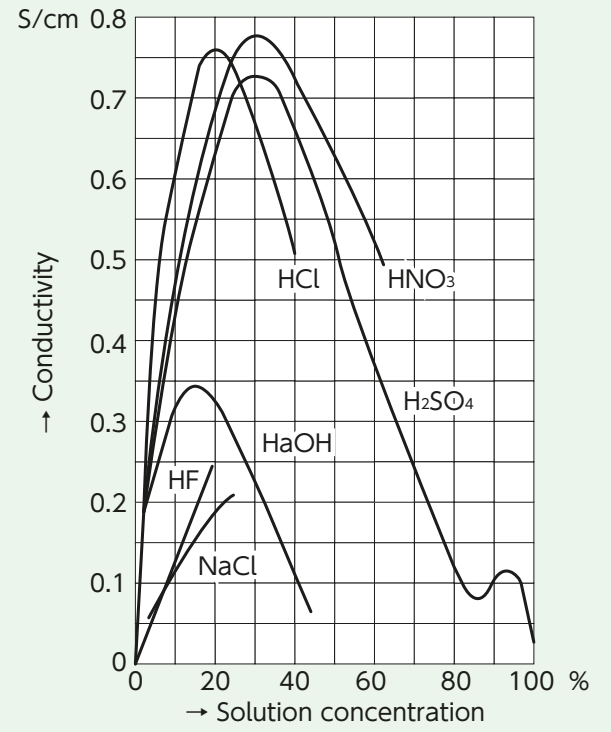


2. Relations between Solution Concentration and Conductivity

The graph at right shows the relations between solution concentration and conductivity under fixed-temperature conditions (18˚C). Solutions other than sulfuric acid (H_2SO_4) will dissolve only to partial concentration, thus the graph cuts off partway through.

Required solution measurement conditions for electromagnetic concentration meters

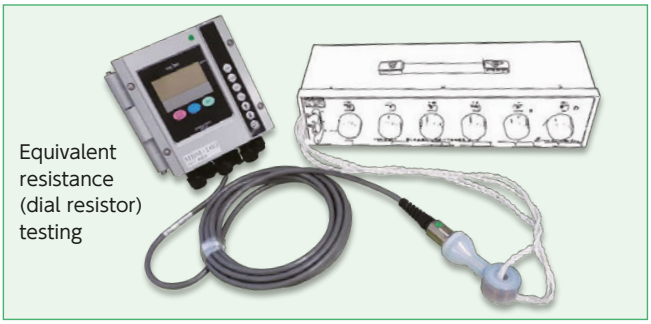
❶Must not include the conductivity peaks (polar maximum or minimum) within the measurement range.
❷Must not include impurities or common ingredients (other than extremely small amounts).
❸Must have a measurable conductivity range.
Minimum: 0 to 0.5 mS/cm (0.05 S/m)
Maximum: 0 to 2000 mS/cm (200 S/m)
❹Conductivity change must exceed concentration change.



Relations between Solution Concentration and Conductivity (18˚C)

3. Features of Process Electromagnetic Concentration Meters

- The solution's conductivity (S/cm) is measured using electromagnetic induction, and converted (calculated) into concentration (%) using the graph above. Because conductivity has temperature characteristics, concentration meters can only measure solution temperature changes within a range of 20˚C.
- Transmitters include field installation 2-wire and 4-wire types as well as panel mounting types. Transmission (measurement value) output DC 4 to 20 mA linearizes the concentration values (%) for output.
- The tip of the electromagnetic induction type detector is called the detecting tip; generally, compact/lightweight types and robust types are available.
  Both are covered in resin insulation for resistance to strong acids and high-alkaline solutions (pharmaceuticals). The standard material is heat-resistant PVC for the compact/lightweight type and PFA (fluororesin, which has the highest chemical and heat resistance) for the robust type.
- Various connection types such as piping insertion (thread/flange) type, flow-through type, insertion-type, and throw-in type enable support for various applications when connecting detectors to plants.
- Transmitters and detectors are adjusted for equivalent resistance (sensitivity), including the combination with cable, before shipping. Therefore, cable relay extension is not possible.
- When updating the detector alone, information including the combined transmitter model name and serial number will be required to search for its adjustment history.
- Because detectors have almost no deterioration in properties such as sensitivity, responsivity, etc., calibration as concentration meters is basically unnecessary; however, check the sensitivity periodically using sample water adjusted to a known concentration.
- The main causes of measurement error are contamination of the sample water, adhered air, or adhered dirt which has hardened. Be careful not to admit air into the sample water. Periodic cleaning is also required.
- When the measurement range is from 0%, zero-point confirmation is easy. Simply remove the detector from the sample water and expose it to atmosphere to display a measurement value of zero. For measurement ranges beginning from a middling %, enter the equivalent resistance (listed on the inspection certificate) to check.
- Pass-fail judgment (calibration) of transmitters and detectors is conducted by entering the equivalent resistance (listed on the inspection certificate); consult our technical service.



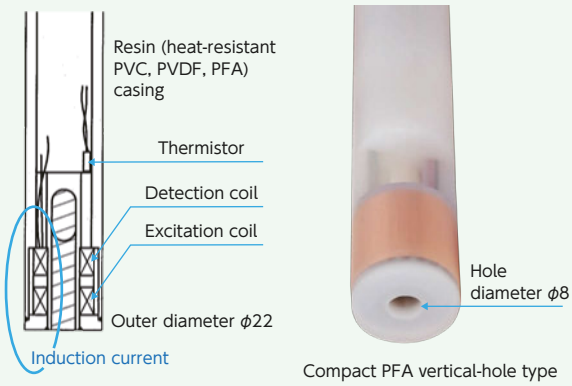
Reference Data: All About Process Electromagnetic Concentration Meters

4. Electromagnetic Induction Type Concentration Meter Detector: ME Series

An electromagnetic induction type detector with an excitation coil and detection coil enclosed in the resin (PVC or PFA) insulating casing. Detection of the induction current generated through the holes between the coils enables measurement of the conductivity of the sample water. The wetted parts are resin, so they can also be used for strongly corrosive sample water such as hydrochloric acid or sulfuric acid. The measurement range is from minimum 0 to 0.5 mS/cm (0.05 S/m) to maximum 0 to 2000 mS/cm (200 S/m), measuring conductivity within this range and using a transmitter to convert (calculate) it to solution concentration. A thermistor is used for the temperature compensation temperature sensor, built into the detector tip.

■ Compact Type ME-100 Series

Vertical-hole Type Cell Constant: 9.0/cm (900/m)

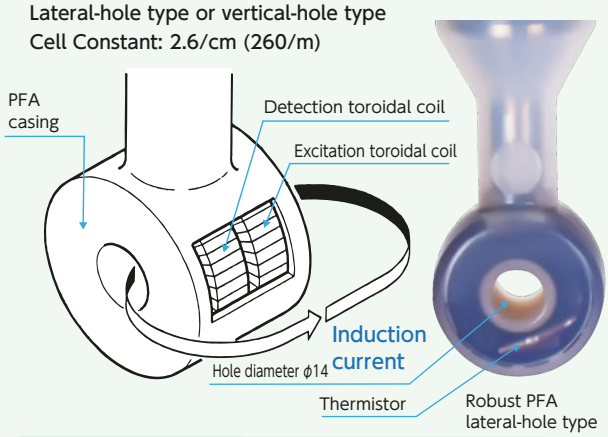


Recommended applications For small-scale (compact) facilities

- ◆The heat-resistant PVC type includes inexpensive and leadless types as well
- ◆Wetted part material selection enables support for various measurement conditions

■ Robust Type ME-11T Series

Lateral-hole type or vertical-hole type
Cell Constant: 2.6/cm (260/m)



Recommended applications For large-scale facilities (large plants)

- ◆High-sensitivity type using a large toroidal coil
- ◆Supports high-concentration measurement of various solutions at high temperatures and pressures

5. Model Name Configuration and Properties of Compact ME-100 Series Detectors

The ME-100 Series includes compact and lightweight vertical-hole type detectors.
The series includes piping insertion types, flow-through types, and immersion types, with connection to the plant via thread or flange.
Cable connection types include direct connection and separate cable (waterproof connector connection); the length is 5 m standard for direct connection and 20 m maximum (including detector length).
The wetted parts material includes standard C-PVC (heat-resistant polyvinyl chloride), PVDF (polyvinylidene fluoride), and PFA (fluororesin).

Caution: This series has different model names and production codes.

Example The model name is ME-111H, but the production code model name category is ME111-□- ...with no material indicated

ME-1 □□□ (A B C)

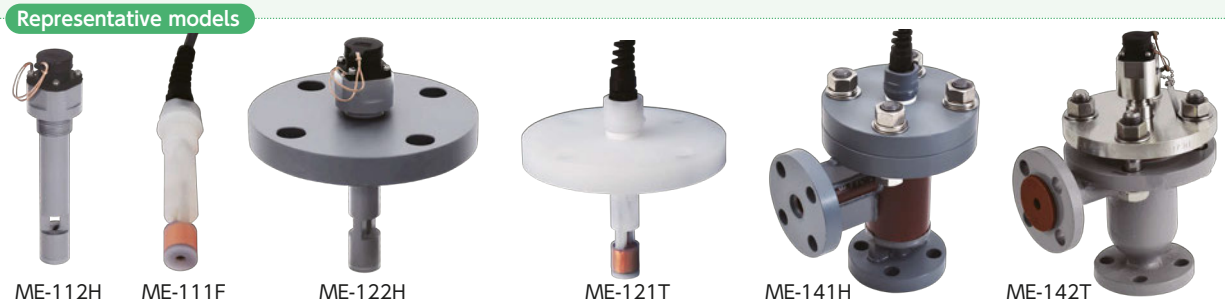
A Mounting method
- 1: Insertion type / immersion type, screw-in connection
- 2: Insertion type / immersion type, flange connection
- 4: Flow-through type with case
- 7: Immersion type, no piping connection part (Mounted with loose flange or bracket)

B Cable connection
- 1: No relay: Detector and cable direct connection (integrated)
- 2: Leadless type: Waterproof connector connection *1

C Wetted part material *2
- H: C-PVC (standard)
- F: PVDF
- T: PFA

*1 Dedicated cable EC-11 (with connector) is required.
*2 Heat resistance is 65°C for standard C-PVC, 100°C for PVDF, and 120°C for PFA. The flow-through type's pressure resistance differs according to the material and shape (structure), so refer to each model's specifications (production code).

Representative models



6. Model Name Configuration and Properties of Robust Type ME-6/7/11T Series Detectors

This series includes the flow-through types ME-61T / 62T / 63E, the immersion types ME-71T / 72T / 73E, and the multifunctional type ME-11T.

The wetted part material is either PFA (fluororesin) or hard PVC. Connection to the plant is either flange or thread type.
The detector cable is directly connected, 5 m standard and 20 m maximum (including detector length).

Caution: Flow-through types in this series (ME-61T / 62T / 63E) have different model names and production codes.

Example The model name is ME-61TNH, but the production code model name category is ME61T-□- ...with no N or H

Flow-through type

ME-6 □□□□

A Detecting tip shape *1
- 1: Lateral-hole type / flange connection
- 2: Vertical-hole type / flange connection
- 3: Diagonal hole / flange connection

B Wetted part material *2
- T: PFA (fluororesin)
- E: Hard PVC

C Thermistor structure *3
- N: Built into detecting tip
- T: Exterior (PFA)
- S: Exterior (SUS316)
- G: Exterior (Glass)

D Case (chamber) Y/N
- N: None
- H: Yes

Immersion type

ME-7 □□

A Detecting tip shape *1
- 1: Lateral-hole type / flange connection
- 2: Vertical-hole type / flange connection
- 3: Diagonal hole / flange connection

B Wetted part material *2
- T: PFA (fluororesin)
- E: Hard PVC

Multifunctional type (PFA, lateral-hole type)

ME-11T
- Detector single unit
- Immersion type (no flange)
- Screw-in type
- IDF flange (ferrule) type
- Throw-in type

*1 The lateral-hole type is suited to sample water flowing horizontally and the vertical-hole type to vertical measurement. This prevents bubbles catching in or dirt adhering to the detecting tip.
*2 Heat resistance is 120°C for PFA and 60°C for hard PVC.
The flow-through type's pressure resistance differs according to the material and shape (structure), so refer to each model's specifications (production code).
*3 When large and rapid temperature changes occur in the sample water, we recommend the exterior thermistor type (optional), which has rapid temperature response.

Representative models


ME-11T


ME-61TNH


ME-71T

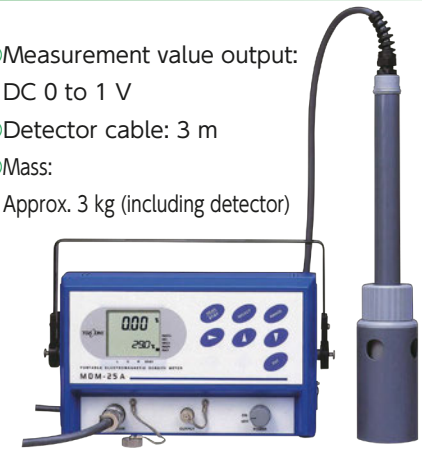

ME-63EGN

7. Portable Electromagnetic Meter MDM-25A

A portable electromagnetic meter that can be brought into the field. Measurement solutions and measurement ranges are in the table below.
The standard detector part material is hard PVC, but PFA is also available as an option, enabling measurement of high-concentration chemical liquids as well. The power source is six C batteries; an AC 100 V adapter is available for simple (brief) continuous measurement.

Measurement solution	Measurement range	
Sodium chloride (NaCl)	0 to 25%	
Hydrochloric acid (HCl)	0 to 15%	20 to 40%
Nitric acid (HNO_3)	0 to 25%	60 to 80%
Sodium hydroxide (NaOH)	0 to 15%	20 to 40%
Sulfuric acid (H_2SO_4)	0 to 30%	93 to 99.5%

- Measurement value output: DC 0 to 1 V
- Detector cable: 3 m
- Mass: Approx. 3 kg (including detector)



5 Model Selection of Dissolved Oxygen (DO) Meters

Dissolved Oxygen (DO) Meter Requested Specification Check

1. Facilities (Plant) to be Used••• ☐ Effluent treatment ☐ Sewage/human waste treatment ☐ Boilers/pure water ☐ River, lake, pond (environment) ☐ Other
2. Location to be Installed••••••• ☐ Indoor ☐ Outdoor ☐ With direct sunlight ☐ With salt damage ☐ With dust / corrosive atmosphere ☐ With noise source ☐ High location ☐ High-temperature location
3. Purpose of Continuous Measurement ☐ Display and recording only ☐ Monitoring / alarm ☐ General control ☐ High-precision control ☐ Other
4. Sample Water••••••••••••••••• Name: ____ Measurement range: ____ to ____ Units: ☐ mg/L ☐ ppm ☐ µg/L ☐ ppb
Pressure: ____ kPa Flow velocity: ____ m/sec Concentration control value: _____
5. Transmitter Type•••••••••••••• ☐ Field installation type 2-wire type ☐ Field installation type 4-wire type ☐ Panel type ☐ Alarm (adjustment) output required
6. Detector Type••••••••••••••••• ☐ Immersion type ☐ Throw-in / drop-in type ☐ Flow-through type ☐ Cleaner required:_____ method
7. Auxiliary Device / Spare Parts ☐ Pole stand required ☐ Detector mounting device required ☐ Arrester required ☐ Calibration kit required ☐ Other _____
8. Field Utilities••••••••••••••••• ☐ With power supply for instrumentation ☐ With commercial power supply ☐ With instrumentation air ☐ With industrial water

General concentration (effluent/sewage/human waste, etc.) measurement system example

2-wire Type Example

Outdoor Field

■Detector with pulse air jet cleaner POC-7D/7533

■Transmitter ODM-135A

Hood (Option)

■Electrode lead wire ELW-32

Measurement range example: 0 to 10.00 mg/L

Power supply AC 100 V

■Mounting bracket ZC-2

■Pole stand ZB-1

Power transmission cable

Conduit construction

Arrestor for signals

Outdoor case for arrestor

Instrument Room / Instrument Panel

■Bar graph display controller (scale and units must be specified)

AC free power supply

Adjustment 4-point contact output

DC 24 V power supply
Measured value signal
DC 4 to 20 mA

Arrestor for signals

For auxiliary devices such as arrestors, ▶ refer to page 1–7·8

Low concentration (boiler water, pure water, etc.) measurement system example

4-wire Type Example

Field

■Fine amount detector OC-64/7561L

Measurement range example: 0 to 20.0/500.0 µg/L

■Transmitter OBM-300

■Electrode lead wire ELW-32

Sample water IN

Sample water OUT 100 mL/min

Conduit construction

Instrument Room / Instrument Panel

AC free power supply

Adjustment 2-point contact output
Range switching signal

Measured value signal
DC 4 to 20 mA
To recorder, etc.

Type of Transmitter | Main Specifications and Functions

General concentration (effluent/sewage/human waste) measurement

Field Installation Type

■**2-wire:** ODM-135A

◉Power supply: DC 24 V

■**4-wire:** ODM-136A

◉Power supply: AC 100 to 120 V 50/60 Hz
or AC 200 to 240 V 50/60 Hz

◉Transmission output: DC 4 to 20 mA Load resistance 650 Ω or lower
◉Measurement range: Dissolved oxygen (DO): 0.00 to 50.00 mg/L
Arbitrary setting of transmission output range from 9 types: 0.00 to 1.00/2.00/5.00/10.00/15.00/20.00/25.00/30.00/50.00 mg/L
SAT: 0.0 to 150.0% O_2: 0.0 to 30.0% Water temperature: 0.0 to 100.0°C
◉Temperature compensation range: 0 to 45°C
◉Structure and mounting: Outdoor installation IP55 50 A pole mounting
◉Ambient temperature and humidity: -20 to 55°C 99% RH or lower
◉Mass: Approx. 3 kg
◉Dimensions: ϕ120 × 180 (D) mm
◉Options: Hood, heavy-duty coating, arrestor (simple type)

Field Installation Type / Multi-functional Type

■**4-wire:** OBM-162A

◉ 2 measurement value signals:
DO and water temperature
◉Two-point alarm (adjustment) output signal
◉Power output for cleaner (optional)
◉Membrane break detection (optional)

◉Power supply: AC 100 to 240 V 50/60 Hz
◉Transmission output: DC 4 to 20 mA Load resistance 650 Ω or lower
2 circuits: DO and water temperature
◉Measurement range: Dissolved oxygen (DO): 0.00 to 50.00 mg/L
Select transmission output range from 3 types: 0.00 to 5.00/10.00/20.00 mg/L
Upper limit can be arbitrarily set in a range from 1.00 to 50.00 mg/L
SAT: 0.0 to 200.0% O_2: 0.0 to 30.0%
Water temperature: -10.0 to 100.0°C
Arbitrary setting possible of transmission output range from -5 to 100°C
◉Temperature compensation range: 0 to 45°C
◉Alarm (adjustment) output: Two circuits, a contact, with adjustable sensitivity
◉Status output: Undergoing maintenance (a contact) Electrode abnormality or power cutoff (c contact)
◉Structure and mounting: Outdoor installation IP65 50 A pole or wall mounting
◉Ambient temperature and humidity: -20 to 55°C, 95% RH or lower
◉Mass: Approx. 2 kg
◉Dimensions: 181 (W) × 180 (H) × 95 (D) mm
◉Options: Hood, heavy-duty coating / arrestor (simple type) / RS-232C output/ power output for cleaner / membrane break detection

Panel Mounting Type

■OBM-102A

◉Power supply: AC 100 to 240 V 50/60 Hz
◉Transmission output: DC 4 to 20 mA Load resistance 650 Ω or lower
◉Measurement range: Dissolved oxygen (DO): 0.00 to 50.00 mg/L
Select transmission output range from 3 types: 0.00 to 5.00/10.00/20.00 mg/L
Upper limit can be arbitrarily set in a range from 1.00 to 50.00 mg/L
SAT: 0.0 to 200.0% O_2: 0.0 to 30.0%
Water temperature: -10.0 to 60.0°C
◉Temperature compensation range: 0 to 45°C
◉Alarm (adjustment) output: Two circuits, a contact, with adjustable sensitivity
◉Status output: Electrode abnormality/power cutoff
◉Structure and panel cut size: Indoor installation (IP20), 92 mm × 92 mm
◉Ambient temperature and humidity: -10 to 50°C 90% RH or lower
◉Mass: Approx. 0.5 kg
◉Dimensions: 96 (W) × 96 (H) × 90 (D) mm
◉Options: RS-232C output / power output for cleaner

Detector for general concentration (effluent/sewage/human waste) measurement

*To support various applications, available types include immersion, throw-in, drop-in, float, and flow-through. Types with automatic cleaning (water jet or pulse air jet cleaning) are also available to reduce maintenance work.

*Detectors are composed of electrodes, lead wires, and holders, shipped with connection assembled.

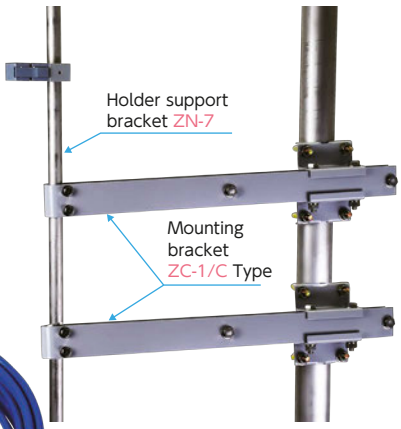
Application	Electrode Model Name	Lead wire *2	Combination holder
Effluent treatment aeration tank	7533L	ELW-32	OC-711/950/991
Human waste treatment aeration tank	7536L		NOC-814/815 JOC-711C/95C
	7540L *1	ELW-067	POC-7D/95D
	7546L	ELW-32	FOC-711 dedicated

*1 Combination transmitter is OBM-162A (with membrane break detection function) only
*2 ELW-32/067 Length: 1 m, 5 m, 10 m Outer diameter: ϕ8

■Immersion Type Holder OC-711

Standard specifications

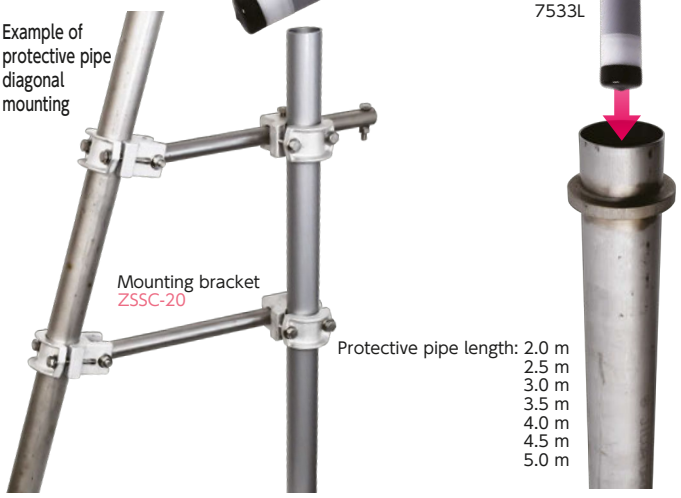
- Wetted part material: Hard PVC, PE, SUS316, PTFE
- Holder outer diameter: ϕ34
- Holder length: 0.5 m/1 m/1.5 m/2.0 m
- Sample water temperature: Max. 45°C
  Pressure: 0.03 MPa or below
  Flow speed: 10 cm/s or more
  at electrode tip



■Drop-in (Throw-in) Immersion Type Holder

OC-950: For deep tanks Protective pipe: SUS304
OC-991: For deep tanks Protective pipe: Hard PVC

- Sample water temperature: Max. 45°C
- Pressure: Max. 0.1 MPa (water depth: max. 10 m)



■Flow-Through Type Holder

NOC-814: Case hard PVC
Sample water pressure: Max. 0.15 MPa
NOC-815: Case SUS316
Sample water pressure: Max. 0.3 MPa

Detector for general concentration (effluent/sewage/human waste) measurement

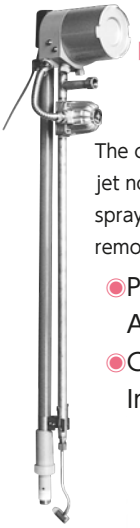
■Immersion Type with pulse air jet cleaner POC-7D

Dirt is removed by the high-speed water flow generated when the compressed air intermittently injected from the jet nozzle expands in the water.

- Power supply: AC 100 V
- Instrumentation air: 0.7 MPa (Air pump is optional.)

■Drop-in Type with pulse air jet cleaner POC-95D

- Protective pipe length: 2 to 6 m



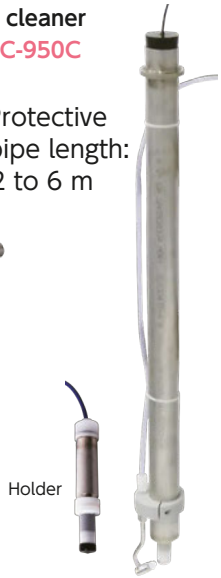
■Immersion Type with water jet cleaner JOC-711C

The cleaning water from the jet nozzle is intermittently sprayed onto the electrode, removing dirt.

- Power supply: AC 100 V
- Cleaning water: Industrial water

■Drop-in Type with water jet cleaner JOC-950C

- Protective pipe length: 2 to 6 m



■Float Immersion Type FOC-711

The electrode mounted on the float bottom surface tracks liquid surface fluctuations, measuring the surface layer DO. Simultaneously, the electrode is auto-washed via the float's vertical motion and the sample water's flow speed.

- Holder length: 2.5 m
- Material: Hard PVC

For details on mounting devices, see the pH/ORP meter volume, ▶ page 1-7

■ Spare Parts/Supplements

Product Name	Application	Code No.
Membrane L	For 7533L 10 pcs	5721570K
Membrane J	For 7536L/7540L 10 pcs	558732K
Electrolyte	50 ml common	143D169
DO Calibration Kit (A)	For span calibration with air-saturated water	6151840K
DO Calibration Kit (B)	For span calibration in air	6151850K
Anhydrous sodium sulfite	For zero-water preparation 500 g	143A002

Type of Transmitter

Main Specifications and Functions

Low concentration (boiler water, pure water) measurement

Field Installation Type

■**4-wire:** ODM-110A

- Power supply: AC 100 to 120 V 50/60 Hz
  or AC 200 to 240 V 50/60 Hz
- Transmission output: DC 4 to 20mA Load resistance 650 Ω or lower
- Measurement range: Dissolved oxygen (DO): 0 to 2000 μg/L
  Arbitrary setting of transmission output range from 7 types:
  0.0 to 20.0/50.0/100.0/200.0/500/1000/2000 μg/L
  SAT: 0.0 to 150.0% O_2: 0.0 to 30.0%
  Water temperature: 0.0 to 100.0°C
- Temperature compensation range: 0 to 45°C
- Structure and mounting: Outdoor installation IP55 50 A pole mounting
- Ambient temperature and humidity: -20 to 55°C 99% RH or lower
- Mass: Approx. 3 kg
- Dimensions: ϕ120 × 180 (D) mm
- Option: Hood

Field Installation Type / Multi-functional Type

■**4-wire:** OBM-300

- Two-point adjustment (upper/lower limit) output
- Range switching (auto or remote)
- Abnormality signal output

- Power supply: AC 100 to 120 V 50/60 Hz
- Transmission output: DC 4 to 20 mA Load resistance 600 Ω or lower
- Measurement range: Dissolved oxygen (DO): 0.0 to 999.9 μg/L [ppb] display switchable
  SAT: 0.0 to 200.0% O_2: 0.0 to 25.0%
  Water temperature: 0.0 to 100.0°C
- Transmission output range: 1st range 0.0 to (20.0 to 200.0) μg/L (arbitrary setting in units of 10)
  2nd range 0.0 to (200.0 to 999.9) μg/L (arbitrary setting in units of 10)
  (3rd range fixed at 0.00 to 20.00 mg/L)
- Temperature compensation range: 0 to 45°C
- Adjustment output: 1 circuit each for upper and lower limits c contact, cutoff error (sensitivity width) configurable
- Range switching: Set to manual, auto, or remote
  With remote range designation signal input and transmission output range display output
- Structure and mounting: Outdoor installation IP54 50 A pole or wall mounting
- Ambient temperature and humidity: -10 to 55°C 95% RH or lower
- Mass: Approx. 5 kg
- Dimensions: 192 (W) × 292 (H) × 120 (D) mm
- Option: Power source AC 200 to 240 V / Hood

Panel Mounting Type

■OBM-100H

- Power supply: AC 100 to 240 V 50/60 Hz
- Transmission output: DC 4 to 20 mA Load resistance 650 Ω or lower
- Measurement range: Dissolved oxygen (DO): 0.0 to 1000 μg/L
  Transmission output range can be changed among 0 to 50.00/150.0/490.0/1000 μg/L
  SAT: 0.000 to 200.0% O_2: 0.000 to 25.00%
  Water temperature: -5.0 to 100.0°C
- Temperature compensation range: -1.0 to 50.0°C
- Alarm (adjustment) output: Two circuits, a contact, with adjustable sensitivity
  Abnormality signal output during maintenance
- Structure and panel cut size: Indoor installation (IP20), 92 mm × 92 mm
- Ambient temperature and humidity: -10 to 50°C 90% RH or lower
- Mass: Approx. 0.5 kg
- Dimensions: 96 (W) × 96 (H) × 90 (D) mm
- Options: RS-232C output

Detector for low concentration (boiler water, pure water) measurement

■DO Detector OC-64

A micro-flow type flow cell detector which measures low-concentration DO in boiler water (power plants, etc.), pure water (semiconductor plants, etc.) and so on.

Standard specifications

- Sample water conditions: Temperature: 0 to 45°C
  Flow rate (consumption amount): Fixed at 100 to 300 mL/min
  Pressure: 50 kPa or less, outlet side open to atmosphere
- Sample water connection port: IN/OUT both Rc1/4
- Mounting method: Wall or rack
- Wetted material: Measurement cell: Heat-resistant PVC
  Piping tube: Nylon
- Case structure: Indoor type
- Mass: Approx. 4 kg

Option

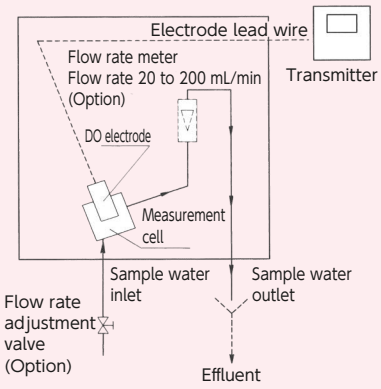
- Measurement cell and piping material:
  All stainless steel (SUS316)
  For measurement of ultra-low concentration in ultra-pure water (near zero μg/L)
- Sample water flow rate meter: Assembled
- Sample water flow rate adjusting valve: Assembled
- Case structure: Rain-proof/dust-proof type IP54 equivalent
- Pole mounting: Bracket for 50A pole assembled

■DO Electrode 756□L Series

*The double cathode structure enables excellent linearity, responsivity, and repeatability from low to high concentrations.

*The cartridge-type membrane makes it easy to replace the membrane and electrolyte.

Flow sheet



220 (W) × 400 (H) × 80 (D) mm

Standard (resin) piping specifications

Stainless steel piping specifications (with flow rate meter and adjusting valve)

■Electrode Lead Wire ELW-32

- Length: Standard 1 m
  Max. Length 10 m
- Outer diameter: ϕ8

Type Name	Main applications	Body material	Detecting pole material	Features
7561L	Thermal power plant boiler water	PP	Ag (Silver)	Unlikely to be affected even if hydrogen and carbon dioxide gas are dissolved in sample water
7562L	Nuclear power plant	SUS316		
7563L	Semiconductor plant ultra-pure water	PP	Au (Gold)	Fast response, enabling stable measurement of ultra-low concentration near zero μg/L
7564L		SUS316		

■Supplements/Spare Parts 756□L Series

Product Name	Code No.	Remarks
Membrane cartridge assembly	6928730K	5 pcs
Electrolyte R-11	143A043	50 ml
DO Calibration Kit (A)	6151840K	For span calibration with air-saturated water
DO Calibration Kit (B)	6151850K	For span calibration in air
Anhydrous sodium sulfite	143A002	For zero-water preparation 500 g

Electrolyte R-11

Membrane cartridge assembly

Reference Data: All About Process Dissolved Oxygen (DO) Meters

1. What is Dissolved Oxygen (DO)? The amount of oxygen dissolved in water

Like pH and conductivity, DO is a necessary indicator for water quality control and pass/fail judgments in various industries.
An essential monitoring item for oxygen supply control for fish at fish farms or activated sludge bacteria in sewage treatment plant reaction tanks, for water quality monitoring in the sea, rivers, or lakes, or for degassing of boiler water at power plants or pure water at semiconductor plants. The unit is mg/L or μg/L.
The maximum amount which will dissolve in water is called the saturated DO amount. The amount of oxygen which dissolves increases in lower water temperatures and higher pressures. As well, the amount of oxygen which dissolves decreases with higher concentration due to the oxidation of various dissolving common components and organic matter, as well as the respiration of microorganisms.
The saturated DO amount of pure water at atmospheric pressure and 25°C was 8.11 mg/L until 2015, but due to a JIS revision, it is now 8.26 mg/L.

2. Measurement Method

Methods of measuring dissolved oxygen (DO) include manual methods such as iodometric titration (the Winkler method) and the Miller method, as well as industrial methods such as the membrane electrode method (which enables continuous measurement) and the optical sensor method.
Here we will discuss the membrane electrode and optical sensor methods.

■ Membrane Electrode Method [Fig. 1]

With an oxygen- (gas-)permeable thin "membrane" film mounted on the tip, the interior contains an electrolyte and two types of metal (the operating electrode and its opposite pole), using the oxidation-reduction reaction which takes place between the oxygen and the metal for measurement.
In short, a current proportional to the DO amount which permeates the membrane (oxygen partial pressure) is measured; as in Figure 1, the type which uses a fixed voltage between the poles is called a polarograph.
Because oxygen is being consumed at the membrane part in contact with the sample water, a constant flow rate (10 cm/s or above) must be consistently applied.
Regular replacement of the electrolyte and membrane is required because of deterioration.

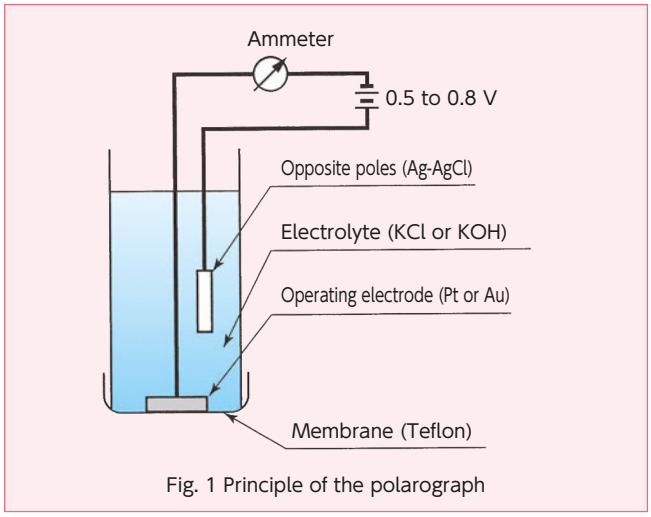
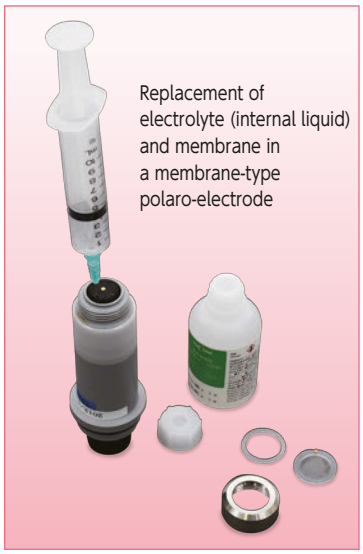
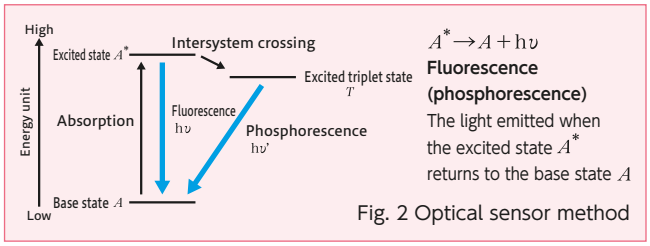


Fig. 1 Principle of the polarograph



■ Optical Sensor Method [Fig. 2]

The configuration includes a sensor cap with a tip coated with fluorescent material and containing a light source and light receiver. Fluorescence in accordance with the sample water's DO amount (inversely proportional to the DO amount during the fluorescence quenching time) is optically detected and converted into the DO amount. The sensor cap must be replaced periodically.



$A^* \rightarrow A + h\upsilon$
Fluorescence (phosphorescence)
The light emitted when the excited state A^* returns to the base state A

Fig. 2 Optical sensor method

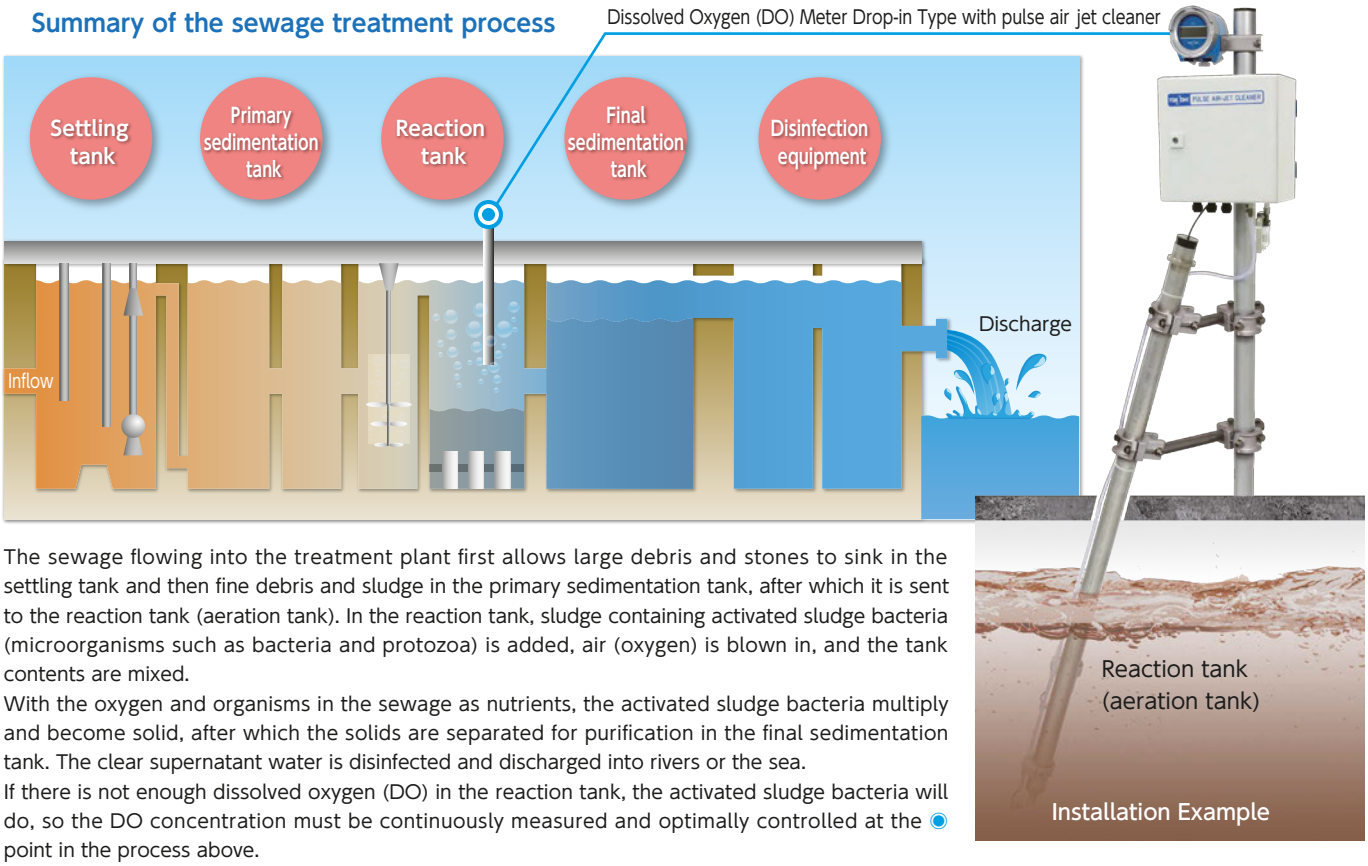
3. Dissolved Oxygen (DO) Meter Calibration and Salinity Compensation

The zero point is calibrated by immersing the electrode in zeroing solution (sodium sulfite solution). The span is calibrated by immersion in air-saturated water; its amount at 25°C was changed in 2015 from 8.11 mg/L to 8.26 mg/L. Practical values from 10 to 40°C vary widely, as in the tables at right, but the instruments have both temperature property tables in their memory. Simple calibration methods include zero calibration by leaving the instrument input open and span calibration by exposing the electrode to atmosphere. However, correctly (in particular for low concentration measurement), actual solution calibration with the zeroing solution and air-saturated water above is required.
As well, the DO amount decreases when salt is dissolved. For example, the saturated DO amount of seawater (chloride ion concentration approx. 2000 mg/L) is, as in the table at right, 6.73 mg/L at 25°C. However, as the instrument indicator remains at 8.11 (8.26) mg/L, calibration for DO measurement in seawater is required.

Saturated DO amount			
Temperature °C	Old JIS mg/L	New JIS mg/L	Seawater mg/L
10	10.92	11.29	8.97
15	9.76	10.08	8.09
20	8.84	9.09	7.35
25	8.11	8.26	6.73
30	7.53	7.56	6.20
35	7.04	6.95	5.78
40	6.60	6.41	5.32

4. Dissolved Oxygen (DO) Meters for Sewage Treatment Process

Summary of the sewage treatment process



The sewage flowing into the treatment plant first allows large debris and stones to sink in the settling tank and then fine debris and sludge in the primary sedimentation tank, after which it is sent to the reaction tank (aeration tank). In the reaction tank, sludge containing activated sludge bacteria (microorganisms such as bacteria and protozoa) is added, air (oxygen) is blown in, and the tank contents are mixed.
With the oxygen and organisms in the sewage as nutrients, the activated sludge bacteria multiply and become solid, after which the solids are separated for purification in the final sedimentation tank. The clear supernatant water is disinfected and discharged into rivers or the sea.
If there is not enough dissolved oxygen (DO) in the reaction tank, the activated sludge bacteria will do, so the DO concentration must be continuously measured and optimally controlled at the ◉ point in the process above.

5. Characteristics of Process Dissolved Oxygen (DO) Meters

- Products for general concentration measurement (environmental water, effluent, sewage, human waste) and low concentration measurement (boiler water, pure water) are available.
  The temperature sensor for temperature compensation uses a thermistor (10 kΩ at 25°C) etc.
- The detector for general concentration is composed of a holder, an electrode, and a lead wire, and will be shipped assembled when ordered as a set.
  Available membrane thicknesses include the standard thin membrane (0.025 mm) and the thick membrane suitable for strong aeration (human waste processing, etc.) (0.050 mm).
  We also offer a drop-in type detector for deep airtight tanks as well as water jet and pulse air jet type cleaners.
- The low concentration detector is composed of a fine amount flow cell storage box, a dedicated electrode, and a lead wire.
- Measurement items include dissolved oxygen in water, oxygen concentration in atmosphere, DO saturation in water, and water temperature.
  Each transmitter enables selection of the saturated DO amount from the old and new JIS tables.
  The DO value adjustment function also enables salinity calibration (the DO amount to be reduced per 100 mg/L of chloride ions).
- The main error factors are air or dirt adhered to the membrane surface, as well as deterioration of the electrolyte or membrane.
  Therefore, regular maintenance is required, such as electrode cleaning and zero/span calibration and replacement of the membrane and electrolyte.
- Pass/fail judgments can be made by removing the detector (electrode) from the sample water and exposing it to atmosphere; a pass judgment results if it shows the saturated value at that temperature.
  As well, a typical and simple method of confirming measurement value reliability in the field is cross-checking with a portable DO meter.
- There is no national institution which certifies performance or accuracy of DO measurement methods.

6. Low Concentration DO Meter DO-32A

A portable low-concentration DO meter that can be brought into the field. Using a membrane type polarograph electrode and a stainless steel flow cell, it measures low concentrations 0 to 20 μg/L (ppb) with high-speed response.
The power source is six C batteries; an AC 100 V adapter is available for simple (brief) continuous measurement.

◉Measurement range:
0 to 19.99/199.9 μg/L (ppb)
0 to 1.99/19.99 mg/L (ppm)
◉Range switching:
4-range manual or automatic switching
◉Measurement value signal:
DC 0 to 1 V

6 Technical Information

Technical Information All About Instrumentation

What is instrumentation?

It involves installing water quality meters, flow rate meters, pressure meters, control systems and so on in order to control production and water treatment processes.
Application in various facilities such as plant effluent treatment, water purification plants, sewage treatment plants and so on, with control systems such as DCS (Distributed Control System) installed in control and operation rooms, enables efficient control under suitable conditions.

Measurement value transmission method

Water quality meter measurement values generally include analog and digital transmission methods.

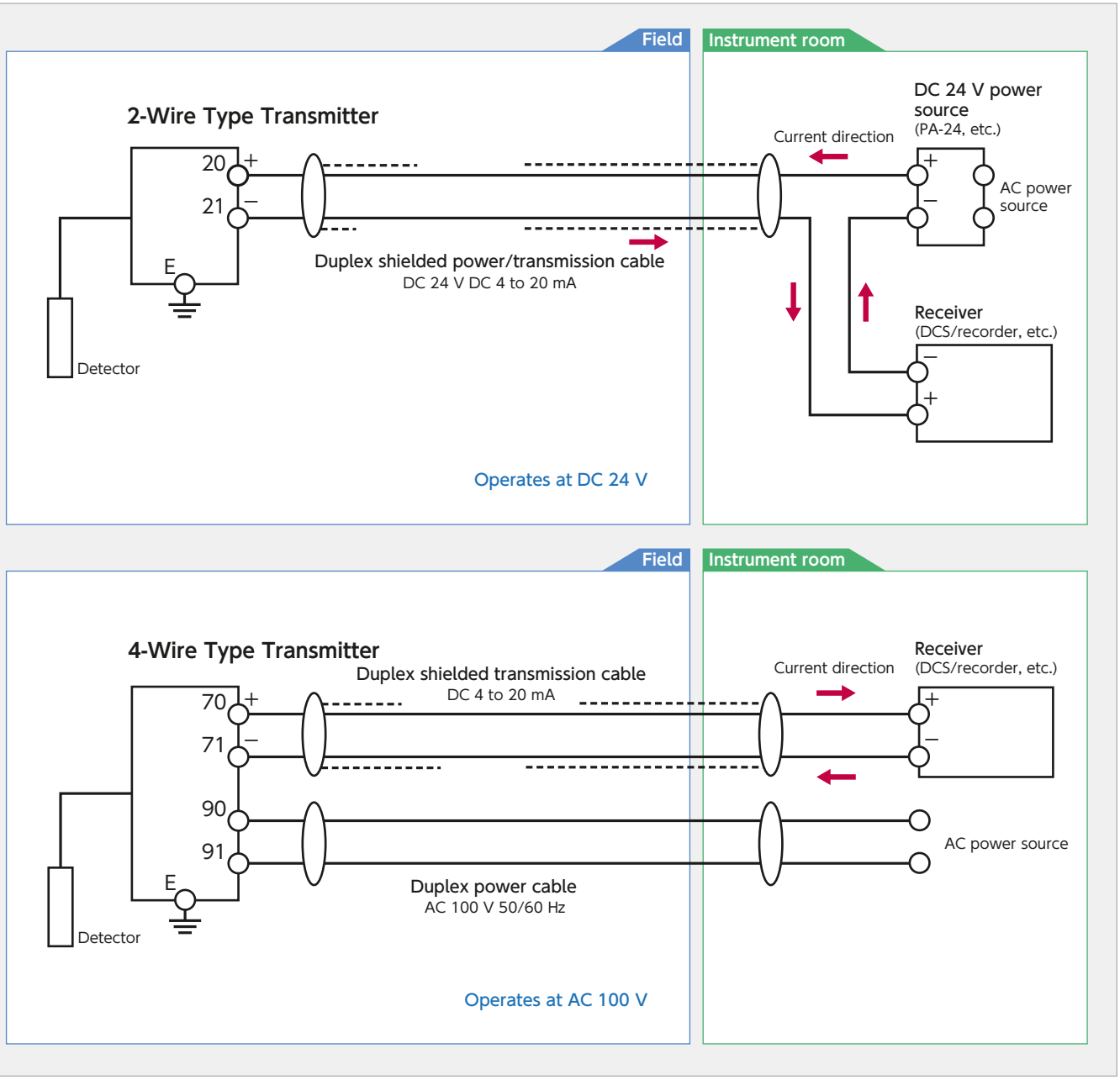
■ **Typical Analog Transmission Methods**

DC 4 to 20 mA (converting water quality meter measurement range into current signals for transmission)

Example: pH meter measurement range
pH 0 to 14 DC 4 to 20 mA

◆The current signal at pH 0 is 4 mA and that at pH 14 is 20 mA.
(The current signal is approximately 12 mA at pH 7.)

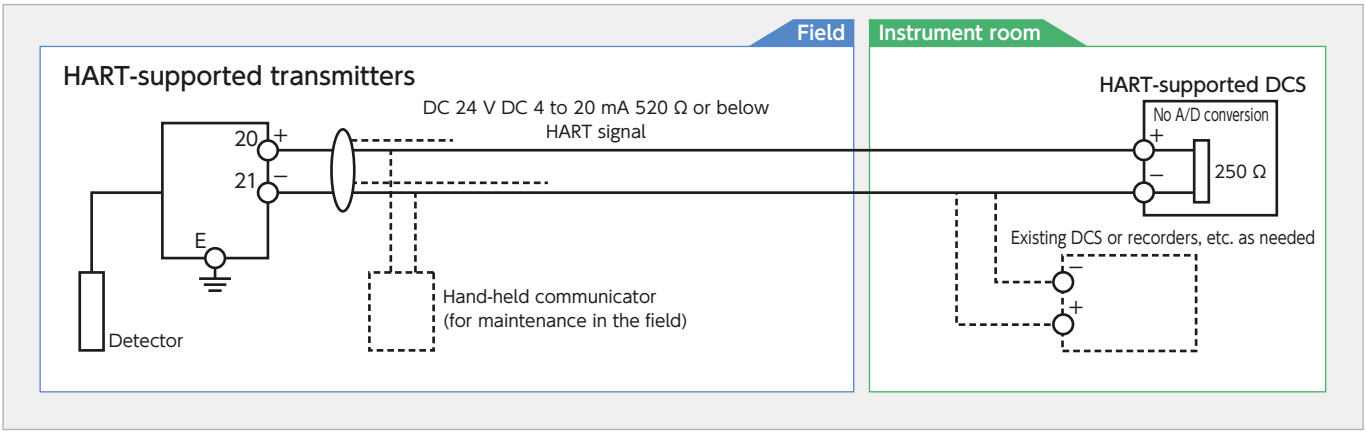
◉**Differences in analog transmission methods (2-wire and 4-wire types)**



■ Typical Digital Transmission Methods

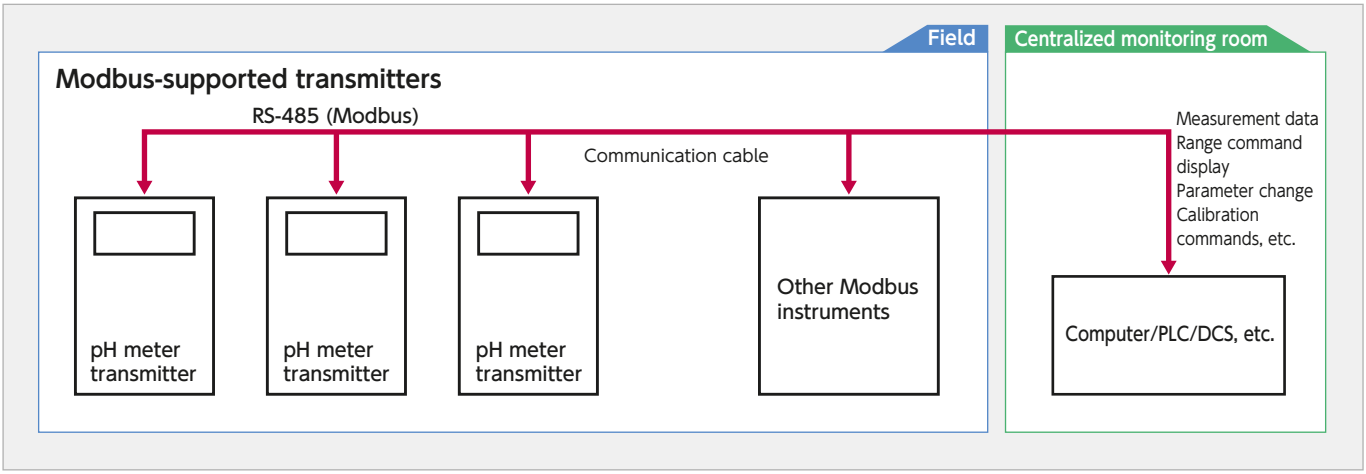
◉**HART** (Highway Addressable Remote Transducer) communication

HART communication is a method which superimposes digital signals on analog DC 4 to 20 mA output for transmission.
It also enables multidrop communication, with multiple field devices connected to one wiring system.
Sustainable development and certification of HART technology are taking place through the Field Comm Group (a merger of the former HART Communication Association and Fieldbus Foundation), with widespread usage around the world.



◉**Modbus**

Communication devices and networks equipped with Modbus protocol as a communication protocol.
This is a communication protocol developed for PLCs by Schneider Electric (formerly Modicon Inc.); its specifications can be viewed online.
Generally RS-232 and RS-485 are in use; there is no certifying organization.



■ IP Standards / Waterproof Protective Structures and Degrees of Protection (excerpt)

Device protective structures are classified by their dust-proofing and water-proofing, and their testing methods are regulated.
The IP display based thereon uses the IP tables standardized by the Japanese Industrial Standards and Japan Electrical Manufacturers' Association, in compliance with IEC 60529.

Class	Protection against the human body/solid objects (degree of protection)	Protection against the ingress of water (degree of protection)	TOA DKK and HACH product examples
IP20	Protection from the approach of fingers	Not specifically protected against the ingress of water	Panel type HBM, etc.
IP54	Protection from dust	Water splashes from any direction shall have no harmful effects	OBM-300, etc.
IP55		Direct water jets from any direction shall have no harmful effects	HDM, WDM Series, etc.
IP65	Fully dust-proof structure		HBM-160, WBM-160 Series, etc.
IP66		Direct and powerful water jets from any direction shall have no harmful effects	sc200, etc.

■ Instrumentation Air

Instrumentation air is the compressed air, with dust and moisture removed, which is used for instruments. As pressure and quality may vary by plant, advance confirmation of pressure fluctuations, presence of contaminants, need for air filters, drainage, etc. is required for use.

Technical Information All About Explosion-Proofing

Explosion-proofing refers to the prevention of fires and explosions which could cause electrical devices to become ignition points for flammable gas and steam.

1. What are explosion-proof types?

These devices, with structures guaranteed not to give off sparks (not to cause explosions), are certified by TIIS (Technology Institution of Industrial Safety) and others.
It is prohibited by law to manufacture or sell products outside the certification range.
Types of explosion-proof structures: Increased safety (e) / Internal pressure (f) / Pressure resistant (d) / Intrinsically safe (i, etc.)

2. Categories of hazardous zones (according to the Industrial Safety and Health Act in Japan)

Hazardous zones are classified into three types according to the time and frequency of explosive atmospheres.

Zone 0: Locations where explosive atmospheres are continuously or long-term present

Zone 1: Locations where explosive atmospheres may be frequently generated

Zone 2: Locations where explosive atmospheres are unlikely to be generated

Note 1: There are wide-ranging "hazardous zones" at petrochemical plants and their storage facilities, as well as hazardous zones as noted above in areas of thermal power plants, sewage treatment plants, cleaning plants, food processing plants, pharmaceutical plants and so on. These include storage areas for flammable gases and solutions (liquid solvents, ammonia, etc.) and areas where these substances may be generated.
Note 2: Electrical devices to be installed in hazardous zones require explosion-proof certification. Non-explosion-proof devices may not be used.
Explosion-proof electrical work is also required for their installation.
(For details, see the Industrial Safety and Health Act)

3. What are intrinsically safe explosion-proof structures?

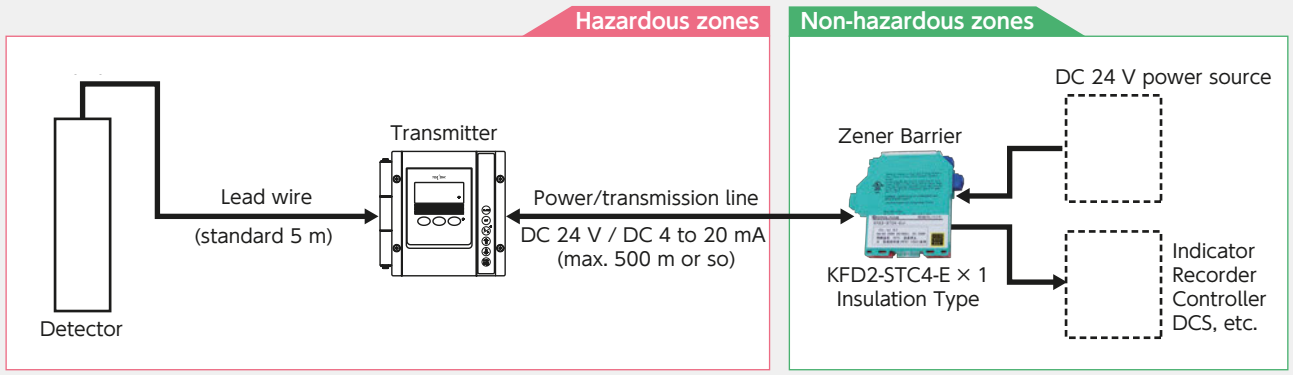
They are systems which suppress electrical energy so that whether electrical devices are operating normally or abnormally, they will not become ignition points.
Therefore, as two-wire types, they are combined with safety barriers.
Often referred to simply as "intrinsically safe," this certification applies to pH/ORP meters and conductivity meters.

4. What are pressure resistant explosion-proof structures?

They are structures in which ignition points are placed inside pressure-resistant containers, for example so that even if gas enters and causes an internal explosion, it will not reach dangerous gases in the area.
Our pressure-resistant explosion-proof products include the ultrasonic cleaner, etc.

5. Intrinsically safe explosion-proof instrumentation systems

The system operates at micropower, as a two-wire type (4 mA or below) via a Zener barrier.
Zener barriers are also called safety barriers. Insulated and non-insulated types are available. (TOA DKK currently offers only insulated types)
Intrinsically safe explosion-proof pH/ORP meters and conductivity meters are type certified as overall systems composed as below of transmitters, detectors, and Zener barriers.
Note Combination with non-type-certified Zener barriers or detectors is not possible.



*A control (instrumentation) cable (a sturdy, burn-resistant shielded cable) conforming to the specifications in the catalog/instruction manual, etc., is used for the power/transmission line.
... Selection and installation on the customer's part.

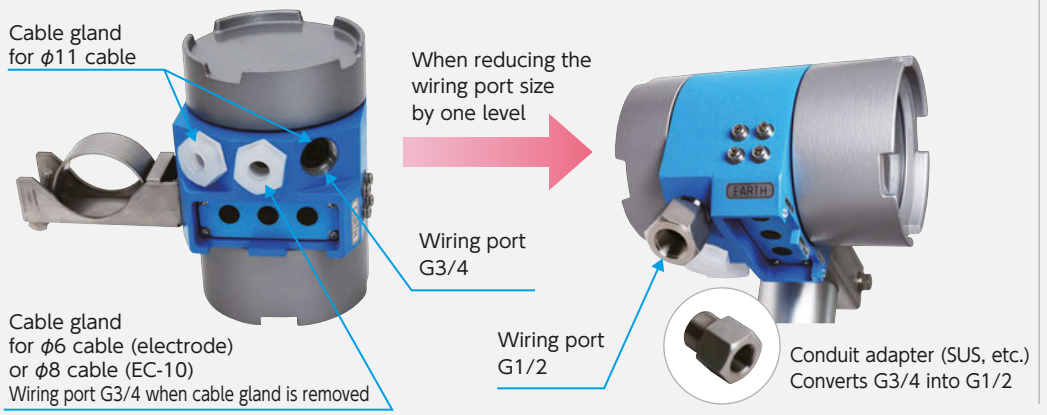
Example of control (instrumentation) cable:
CVVS (with vinyl insulation/vinyl sheath/shield) 2□ x 2C
CEES (with polyethylene insulation/polyethylene sheath/shield) 1.25□ x 2C

Technical Information All About Threads

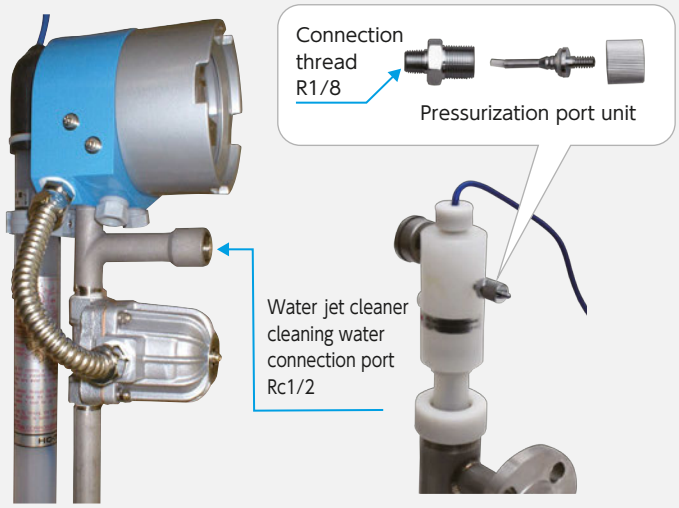
*The JIS standard for "Threads" is divided into "Pipe Threads G and R" and "Metric Threads (Coarse/Fine) M."
*Pipe threads include parallel threads (G), used for mechanical connection, and taper threads (R), used for airtight connection.
Also, male threads are displayed as R and female threads as Rc.
*"Thread nominals" refer to the thread's outer diameter; pipe threads G and R use inch units (approx. 25.4 mm) and metric threads M use mm units.

Example of pipe thread G

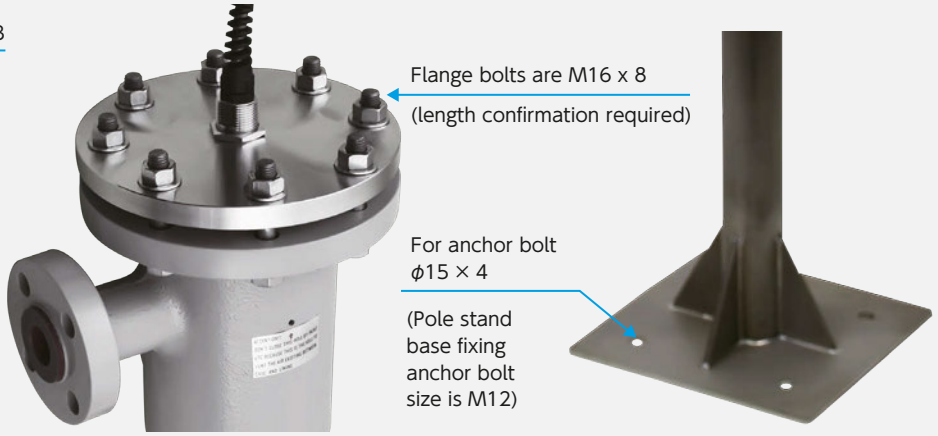
A conduit connector is connected to the D type transmitter cable wiring port thread standard G3/4.
Sealing tape or threadlock is used to make the thread area airtight.



Example of pipe thread R



Example of metric M thread



Technical Information All About Flanges

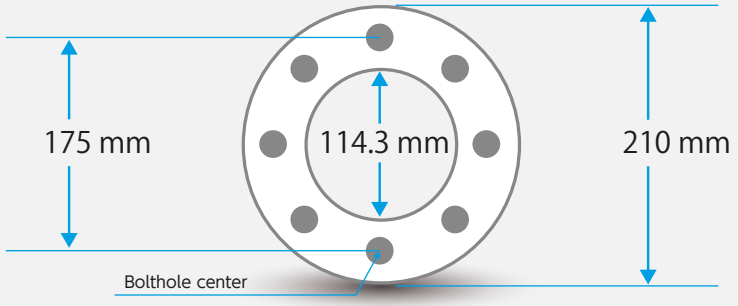
Flanges are the circular plates which connect two pipes: bolts and nuts are used to fasten two flanges of the same size together.

1. JIS flange nominal diameters and nominal pressures

Nominal diameter refers to the size (inner diameter) of the pipes being connected: its unit is A (mm), with 25 A roughly equivalent to 1 inch (B) = 25.4 mm.

Nominal pressure refers to the flange's pressure resistance: its unit is K (kg/cm²), with 5K and 10K JIS standards.

■ For example, the dimensions for 100A JIS10K are as shown in the separate table (JIS Flange Dimension Table) below; the thickness varies depending on the material.
As well, the number of bolts and thread nominals used for connection are as in the table at right.



- ◉Outer diameter: 210 mm
- ◉Thickness: 18 mm or 24 mm
- ◉Connection bore: 19 mm
- ◉Connection hole count: 8
- ◉Bolt size: M16

2. Material and connecting surface shape: FF and RF

Because there is no JIS standard for resin flanges, we use the flange thickness in JIS B 2239 (Cast iron pipe flanges). Therefore, the thickness dimensions for metal flanges and resin flanges differ. (see figure at right)

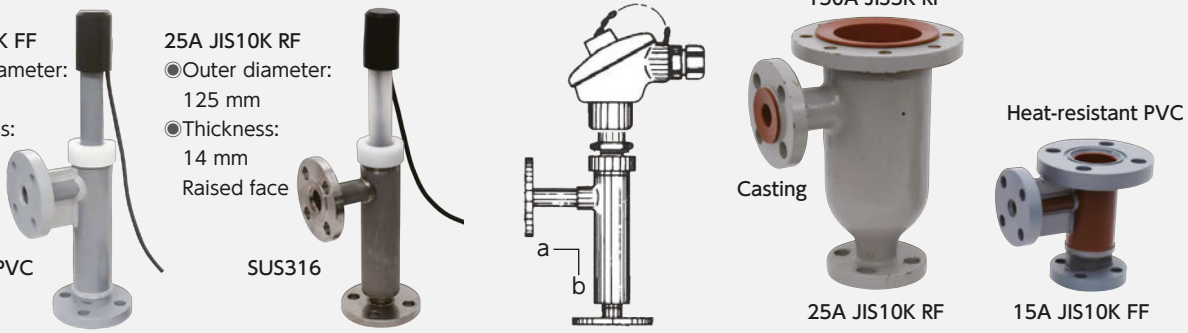
3. Flange material is determined by the material on the connected plant side (piping, tanks, etc.)

As a rule, the detector flange should be PVC if the plant side material is also PVC. If the plant side is SUS316, the detector flange also uses SUS316.

■ Flow-through type case flange example

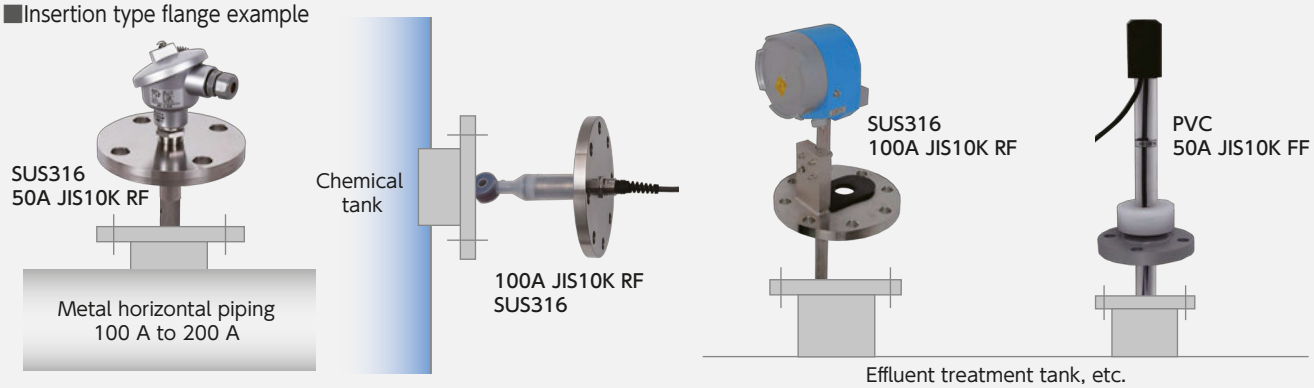
25A JIS10K FF
◉Outer diameter: 125 mm
◉Thickness: 18 mm
Flat face

25A JIS10K RF
◉Outer diameter: 125 mm
◉Thickness: 14 mm
Raised face



(Note) Flange face-to-face dimensions a and b are important in order to match the plant side flange position to a and b.

■ Insertion type flange example

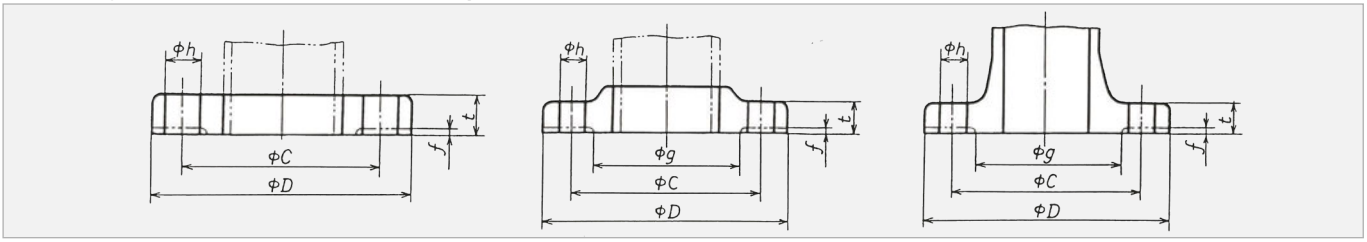


4. Precautions

*The detecting part maximum diameter should be smaller than the inserted flange size (nominal diameter).
*As a rule, the sealing material for plant side flanges (packing or gasket) and the bolts and nuts are to be provided by the customer (constructor).

*JIS is the general Japanese flange standard; overseas and in some industries, JPI (same as ANSI) is used. As well, food processing plants such as breweries use sanitary specification flanges and ferrules.

JIS Flange Dimension Table (excerpted from JIS B 2220 and 2239)



■ Reference Dimensions (mm) for Nominal Pressure 5K Flanges

Nominal diameter	Applicable steel pipe outer diameter	Flange outer diameter D	Flange part dimensions				Bolthole			Bolt thread nominal
			t		f	Diameter g	Central circle diameter C	Number	Diameter h	
			Metal (SUS316, etc.)	Resin (PVC, etc.)						
10	17.3	75	9	12	1	39	55	4	12	M10
15	21.7	80	9	12	1	44	60	4	12	M10
20	27.2	85	10	14	1	49	65	4	12	M10
25	34.0	95	10	14	1	59	75	4	12	M10
32	42.7	115	12	16	2	70	90	4	15	M12
40	48.6	120	12	16	2	75	95	4	15	M12
50	60.5	130	14	16	2	85	105	4	15	M12
65	76.3	155	14	18	2	110	130	4	15	M12
80	89.1	180	14	18	2	121	145	4	19	M16
100	114.3	200	16	20	2	141	165	8	19	M16
125	139.8	235	16	20	2	176	200	8	19	M16
150	165.2	265	18	22	2	206	230	8	19	M16
200	216.3	320	20	24	2	252	280	8	23	M20
250	267.4	385	22	26	2	317	345	12	23	M20
300	318.5	430	22	28	3	360	390	12	23	M20
350	355.6	480	24	30	3	403	435	12	25	M22
400	406.4	540	24	30	3	463	495	16	25	M22

■ Reference Dimensions (mm) for Nominal Pressure 10K Standard Flanges

Nominal diameter	Applicable steel pipe outer diameter	Flange outer diameter D	Flange part dimensions				Bolthole			Bolt thread nominal
			t		f	Diameter g	Central circle diameter C	Number	Diameter h	
			Metal (SUS316, etc.)	Resin (PVC, etc.)						
10	17.3	90	12	14	1	46	65	4	15	M12
15	21.7	95	12	16	1	51	70	4	15	M12
20	27.2	100	14	18	1	56	75	4	15	M12
25	34.0	125	14	18	1	67	90	4	19	M16
32	42.7	135	16	20	2	76	100	4	19	M16
40	48.6	140	16	20	2	81	105	4	19	M16
50	60.5	155	16	20	2	96	120	4	19	M16
65	76.3	175	18	22	2	116	140	4	19	M16
80	89.1	185	18	22	2	126	150	8	19	M16
100	114.3	210	18	24	2	151	175	8	19	M16
125	139.8	250	20	24	2	182	210	8	23	M20
150	165.2	280	22	26	2	212	240	8	23	M20
200	216.3	330	22	26	2	262	290	12	23	M20
250	267.4	400	24	30	2	324	355	12	25	M22
300	318.5	445	24	32	3	368	400	16	25	M22
350	355.6	490	26	34	3	413	445	16	25	M22
400	406.4	560	28	36	3	475	510	16	27	M24

Technical Information Materials and Corrosion Resistance Tables

The most important point is to determine the appropriate material for the installation location. Consideration of materials must take into account sunlight, wind and rain, salt spray, corrosive gases, dust, explosive gases, high temperatures and humidity, cold and freezing, etc.
As with the sample water to be measured, consideration is required for high temperatures, high pressures, toxicity, strong acids, strong alkalis, dirt (slurry), solvent contamination, etc.
Refer to the corrosion resistance tables (metal, synthetic resin, synthetic rubber, etc.) below. As corrosion resistance may differ depending on the sample water properties and conditions, use the tables as guidelines only.

1. Metal

- **Iron (Fe)**: Rusts easily, so surface treatment(painting, etc.) is required; not usable for wetted parts: General-purpose metal
- **Aluminum (Al)**: Lightweight but rusts easily, so surface treatment is required; easily machined (forming such as casting is possible)
- **Stainless steel (SUS304 / SUS316/316L)**: Rust-resistant (highly corrosion-resistant) and hard; SUS304 is for use in air while SUS316 and 316L can be used for wetted parts
- **Titanium (Ti)**: Extremely rust-resistant, usable for wetted parts, lightweight
- **Hastelloy C (nickel alloy)**: Excellent corrosion resistance

2. Synthetic resin (plastic)

- **Polyvinyl chloride (PVC)**: Types include hard, transparent, heat-resistant and so on. General-purpose resin
- **Polypropylene (PP)**: Resistant to heat and chemicals
- **Fluororesin (PFA/PVDF)**: Excellent on all fronts, including resistance to heat, chemicals, organic solvents, etc., but expensive (PTFE is usually called Teflon, a DuPont trademark)

Resin weather resistance (guideline)	Polyvinyl chloride		Polypropylene	Fluororesin	
	Hard PVC	Heat-resistant PVC	PP	PVDF	PFA
Weather resistance	△ to ○		× to △	○	

3. Synthetic rubber

- **Nitrile rubber (NBR)**: Resistant to oil and wear, less resistant to cold. General-purpose rubber
- **Silicone rubber (Si)**: Resistant to heat, cold, and chemicals. General-purpose rubber
- **Fluororubber (FPM ⇒ FKM)**: Excellent heat and chemical resistance. Generally called Viton, a DuPont trademark
- **Perfluororubber (FFKM)**: An improved form of fluororubber with better chemical and solvent resistance
- **Kalrez rubber (DuPont trademark)**: An expensive, all-powerful rubber which handles everything, including solvents (without swelling)

Wetted Materials Corrosion Resistance Table There are various sample water wetted part materials for detectors, as shown below. The corrosion resistance for each material is a guideline, depending on the sample water properties and temperature.

◎: Fully corrosion-resistant ○: Corrosion-resistant △: Corrosion-resistant under some conditions ×: Unsuitable

Contact material (chemicals, etc.) \ Wetted part material			Standard material									Made-to-order material					
			PVC Polyvinyl chloride			PP Polypropylene				SUS 316 Stainless steel	FKM Fluororubber (Viton)	PVDF Vinylidene fluoride	PTFE Fluororesin (Teflon)	TB Titanium	Hastelloy C	EPM Ethylene propylene rubber	Kalrez
			20°C	40°C	60°C	20°C	40°C	60°C	80°C								
Acids	Benzoic acid	50%	◎	◎	△	◎	◎	○	△	◎	◎	◎	◎	◎	◎	◎	○
	Hydrochloric acid	1%	◎	◎	◎	◎	◎	◎	◎	×	◎	◎	◎	◎	◎	◎	◎
		10%	◎	◎	○	◎	◎	◎	◎	×	◎	◎	◎	◎	◎	○	◎
		20%	◎	◎	○	◎	◎	◎	◎	×	◎	◎	◎	×	◎	○	◎
		35%	◎	◎	○	◎	○	△	△	×	◎	◎	◎	×	○	△	◎
	Oleic acid	100%	◎	◎	○	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	×	◎
	Perchloric acid	10%	◎	◎	○	◎	◎	◎	◎	○	◎	◎	◎	◎	◎	○	◎
		20%	◎	○	○	◎	◎	◎	◎	○	◎	◎	◎	◎	◎	△	◎
	Formic acid	≤ 50%	◎	◎	○	◎	◎	◎	◎	○	◎	◎	◎	×	◎	◎	◎
		> 50%	○	○	×	○	○	○	○	○	◎	◎	◎		◎	◎	◎
	Citric acid	10%	◎	◎	○	◎	◎	△	×	◎	◎	◎	◎	◎	◎	◎	◎
		25%	◎	◎	◎	◎	◎	○		△	◎	◎	◎	◎	◎	○	◎
	Chromic acid	5%	◎	◎	◎	◎	○	△	×	◎	◎	◎	◎	◎	◎	◎	◎
		10 to 20%	◎	◎	○	△	×	×	×	○	◎	◎	◎	◎	◎	○	◎
		50%	○	△	×	×	×	×	×	△	◎	◎	◎	△	△	×	◎
	Chromium acetate	100%	◎	◎	○	×	×	×	×	×	◎	×	×	◎	◎	×	◎

◎: Fully corrosion-resistant ○: Corrosion-resistant △: Corrosion-resistant under some conditions ×: Unsuitable

Contact material (chemicals, etc.) / Wetted part material			Standard material									Made-to-order material					
			PVC Polyvinyl chloride			PP Polypropylene				SUS 316 Stainless steel	FKM Fluororubber (Viton)	PVDF Vinylidene fluoride	PTFE Fluororesin (Teflon)	TB Titanium	Hastelloy C	EPM Ethylene propylene rubber	Kalrez
			20°C	40°C	60°C	20°C	40°C	60°C	80°C								
Acids	Hydrofluorosilicic acid	30%	◎	◎	○	◎	◎	○	△	×	◎	◎	◎	◎	◎	◎	◎
	Mixed acid: Hydrochloric acid	36%	◎	◎	○	◎	◎	◎	○	×	◎	◎	◎	◎	◎	×	◎
	Mixed acid: Sulfuric acid	98%															
	Mixed acid: Hydrochloric acid	20%	◎	◎	○	◎	○	△	×	×	◎	◎	◎	◎	◎	◎	◎
	Mixed acid: Sulfuric acid	5%															
	Mixed acid: Hydrochloric acid	20%	◎	◎	○	○	△	×	×	×	◎	◎	◎	◎	◎	○	◎
	Mixed acid: Nitric acid	50%															
	Mixed acid: Nitric acid	50%	○	×	×	○	○	△	×	×	◎	◎	◎	◎	◎	○	◎
	Mixed acid: Sulfuric acid	50%															
	Acetic acid	20%	◎	◎	◎	◎	◎	○	△	◎	◎	◎	◎	◎	◎	×	◎
		30%	◎	◎	○	◎	○	△	×	◎	◎	◎	◎	◎	◎	×	◎
		50 to 60%	◎	○	△	○	○	△	×	◎	◎	○	◎	◎	◎	×	◎
		70%	◎	○	×	○	○	△	×	◎	◎	△	◎	◎	◎	×	◎
	Glacial acetic acid	95%	○	△	×	○	△	×	×	○	◎	○	◎	◎	◎	×	◎
	Hydrogen cyanide	100%	◎	◎	◎	◎	◎	◎	◎	○	◎	◎	◎	○	◎	○	◎
	Hypochlorous acid	10%	◎	◎	◎	◎	○	○	△	×	◎	◎	◎	◎	◎	◎	◎
	Hydrobromic acid	47%	◎	◎	○	○	△	△	△	×	◎	◎	◎	○	△	◎	◎
	Oxalic acid	Saturated	◎	◎	◎	◎	◎	◎	◎	×	◎	◎	◎	×	◎	◎	◎
	Nitric acid	5 to 10%	◎	◎	○	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
		20 to 30%	◎	○	○	◎	◎	○	△	◎	◎	◎	◎	◎	◎	○	◎
		50%	◎	○	△	◎	◎	△	×	◎	◎	◎	◎	◎	○	×	◎
		70%	○	○	×	○	○	△	×	△	◎	◎	◎	◎	○	×	◎
		90%	△	△	×	△	△	×	×	△	◎	○	◎	○	○		○
		95%	×	×	×	×	×	×	×	×	◎	○	◎	△	○		○
	Stearic acid	100%	◎	◎	◎	◎	◎	◎	○	◎	◎	◎	◎	◎	◎	△	◎
	Tin plating solution		◎	◎	○	◎	◎	○	△	○	◎	◎	◎	◎	◎	○	◎
	Lactic acid	50%	◎	◎	◎	◎	◎	◎	◎	◎	△	◎	◎	◎	◎	△	◎
		75%	◎	○	○	◎	◎	◎	◎	◎	△	◎	◎	◎	◎	△	◎
	Picric acid	5%	×	×	×	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	×	◎
	Hydrofluoric acid	10%	◎	◎	○	◎	◎	◎	○	×	◎	◎	◎	×	◎	△	◎
		40%	◎	○	△	◎	◎	○	○	×	◎	◎	◎	×	◎	×	◎
		55%	○	△	×	◎	◎	○	○	×	◎	◎	◎	×	◎	×	◎
	Boric acid	Saturated	◎	◎	○	◎	◎	◎	○	◎	◎	◎	◎	◎	◎	○	◎
	Maleic acid	25%	◎	◎	○	◎	◎	◎	◎	◎	△	◎	◎	◎	◎	○	◎
	Acetic anhydride	100%	×	×	×	○	△	×	×	◎	×	◎	◎	◎	◎	×	◎
	Butyric acid	20%	◎	◎	◎	◎	◎	◎	◎	◎	×	◎	◎	◎	◎	×	◎
		100%	◎	×	×	◎	◎	○	○	◎	×	◎	◎	◎	◎	×	◎
	Phosphoric acid	30%	◎	◎	○	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	◎
		50%	◎	◎	○	◎	◎	◎	○	◎	◎	◎	◎	◎	◎	○	◎
		85%	◎	○	○	◎	◎	○	△	○	◎	◎	◎	◎	◎	○	◎

Technical Information Corrosion Resistance Table

◎: Fully corrosion-resistant ○: Corrosion-resistant △: Corrosion-resistant under some conditions ×: Unsuitable

Contact material (chemicals, etc.) / Wetted part material			Standard material									Made-to-order material					
			PVC Polyvinyl chloride			PP Polypropylene				SUS 316 Stainless steel	FKM Fluororubber (Viton)	PVDF Vinylidene fluoride	PTFE Fluororesin (Teflon)	TB Titanium	Hastelloy C	EPM Ethylene propylene rubber	Kalrez
			20°C	40°C	60°C	20°C	40°C	60°C	80°C								
Acids	Sulfuric acid	< 10%	◎	◎	○	◎	◎	◎	◎	×	◎	◎	◎	△	◎	×	◎
		< 30%	◎	◎	○	◎	◎	◎	◎	×	◎	◎	◎	×	◎	×	◎
		< 60%	◎	◎	○	◎	◎	◎	◎	×	◎	◎	◎	×	○	×	◎
		< 90%	◎	○	△	◎	◎	○	△	×	◎	◎	◎	×	○	×	◎
		98%	○	△	×	△	×	×	×	△	◎	◎	◎	×	○	×	○
	Fuming sulfuric acid		×	×	×	×	×	×	×	△	◎	◎	◎	×	△	×	○
Alkalis	Aqueous ammonia	15%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
		Saturated	◎	◎	◎	◎	◎	◎	○	◎	◎	◎	◎	◎	◎	◎	◎
	Caustic potash	60%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	×	◎	◎	◎
		Saturated	◎	◎	○	◎	◎	◎	◎	◎	△	○	◎	×	◎	◎	◎
	Caustic soda	20%	◎	◎	○	◎	◎	◎	◎	◎	×	◎	◎	○	◎	◎	◎
		30%	◎	◎	○	◎	◎	◎	◎	◎	×	◎	◎	◎	◎	◎	◎
		50%	◎	◎	○	◎	◎	◎	◎	◎	×	○	◎	◎	◎	◎	◎
	Limewater	Saturated	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
Salts	Zinc chloride	50%	◎	◎	◎	◎	◎	◎	◎	△	◎	◎	◎	◎	○	◎	◎
	Aluminum chloride	25%	◎	◎	△	◎	◎	◎	◎	×	◎	◎	◎	◎	◎	◎	◎
	Ammonium chloride	35%	◎	◎	○	◎	◎	○	○	○	◎	◎	◎		◎	◎	◎
	Calcium chloride	Saturated	◎	◎	◎	◎	◎	◎	◎	○	◎	◎	◎	◎	◎	◎	◎
	Ferric chloride	50%	◎	◎	◎	◎	◎	◎	◎	×	◎	◎	◎	◎	◎	◎	◎
	Copper chloride	100%	◎	◎	◎	◎	◎	◎	◎	△	◎	◎	◎	◎	◎	◎	◎
	Magnesium chloride	25%	◎	◎	◎	◎	◎	◎	◎	△	◎	◎	◎	◎	◎	◎	◎
		Saturated	◎	○	○	◎	◎	◎	◎	△	◎	◎	◎	◎	◎	◎	◎
	Potassium nitrate	Saturated	◎	◎	◎	◎	◎	◎	○	◎	◎	◎	◎	◎	◎	◎	◎
	Sodium nitrate	Saturated	◎	◎	◎	◎	◎	◎	○	◎	◎	◎	◎	◎	△	◎	◎
	Magnesium carbonate	Saturated	◎	◎	◎	◎	◎	◎	○	◎	◎	◎	◎	◎	◎	◎	◎
	Potassium carbonate	Saturated	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	Sodium carbonate	Saturated	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	Sodium bicarbonate	25%	◎	◎	◎	○	◎	◎	◎	○	○	◎	◎	◎	◎	◎	◎
	Aluminum sulfate	25%	◎	◎	◎	◎	◎	◎	◎	×	◎	◎	◎	◎	◎	◎	◎
	Ammonium sulfate	40%	◎	◎	○	◎	◎	◎	◎	×	◎	◎	◎	◎	◎	◎	◎
	Ferric sulfate	20%	◎	◎	◎	◎	◎	○	○	◎	◎	◎	◎	◎	◎	◎	◎
		Saturated	◎	◎	◎	◎	◎				○				△		
	Copper sulfate	Saturated	◎	◎	◎	◎	◎	◎	○	◎	◎	◎	◎	◎	◎	◎	◎
	Nickel sulfate	Saturated	◎	◎	◎	◎	◎	◎	◎	×	◎	◎	◎	×	△	◎	◎
	Magnesium sulfate	Saturated	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
Organic materials/solvents/others	Acetoaldehyde		×	×	×	◎	◎	○	○	◎	◎	×	◎	◎	◎	○	○
	Acetone		×	×	×	△	×	×	×	◎	○	×	◎	◎	◎	○	◎
	Aniline		×	×	×	◎	◎	○	△	◎	○	△	◎	◎	◎	◎	◎
	Ether		×	×	×	△	△	△	×	◎	×	○	◎	◎	◎	△	◎
	Ethylene glycol		◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

◎: Fully corrosion-resistant ○: Corrosion-resistant △: Corrosion-resistant under some conditions ×: Unsuitable

Contact material (chemicals, etc.)		Wetted part material	Standard material									Made-to-order material					
			PVC Polyvinyl chloride			PP Polypropylene				SUS 316 Stainless steel	FKM Fluororubber (Viton)	PVDF Vinylidene fluoride	PTFE Fluororesin (Teflon)	TB Titanium	Hastelloy C	EPM Ethylene propylene rubber	Kalrez
			20°C	40°C	60°C	20°C	40°C	60°C	80°C								
Organic materials/solvents/others	Ethyl alcohol		◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	Methyl chloride		×	×	×	△	△	×	×	◎	×	△	◎	◎	◎	△	◎
	Cresol		△	×	×	△	×	×	×	◎	◎	◎	◎	◎	◎	×	◎
	Glycerine		◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	Chlorophenol		×	×	×	◎	○	△	×	◎	△	◎	◎	◎	◎	×	◎
	Xylene		×	×	×	×	×	×	×	◎	◎	◎	◎	◎	◎	×	◎
	Chlorbenzene		×	×	×	×	×	×	×	◎	×	○	◎	◎	◎	×	◎
	Chloroform		×	×	×	×	×	×	×	○	◎	◎	◎	◎	◎	×	◎
	Dioxane		×	×	×	○	△	×	×	○	×	◎	◎	◎	◎	◎	◎
	Dichloroethane		×	×	×	×	×	×	×	◎	△	◎	◎	◎	◎	◎	◎
	Ethyl acetate		×	×	×	◎	○	△	△	◎	×	◎	◎	◎	◎	△	◎
	Carbon tetrachloride		△	×	×	×	×	×	×	◎	×	○	◎	◎	◎	×	○
	Trichlene		×	×	×	×	×	×	×	◎	○	◎	◎	◎	◎	×	◎
	Toluene		×	×	×	×	×	×	×	△	○	○	◎	◎	◎	×	◎
	Benzoaldehyde		×	×	×	◎	○	△	×	◎	◎	◎	◎	◎	◎	△	◎
	Benzine alcohol Benzene		△	×	×	△	△	×	×	○	○	◎	◎	◎	◎	×	◎
	Formaldehyde		○	○	○	◎	◎	◎	◎	○	◎	◎	◎	◎	◎	◎	◎
	Formalin		◎	◎	△	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
	Methyl ethyl ketone		×	×	×	○	△	△	×	◎	×	×	◎	◎	◎	◎	◎
	Methyl alcohol		◎	◎	◎	◎	◎	○	△	◎	△	◎	◎	◎	◎	○	◎
	Nitrobenzene		×	×	×	◎	○	○	×	◎	×	◎	◎	◎	◎	◎	◎
	Butyric acid		◎	○	△	◎	○	△	×	○	×	◎	◎	◎	◎	×	○
	Phenol		◎	○	△	◎	◎	○	○	○	△	◎	◎	◎	◎	×	◎
	Hypochlorite		○	○	△	○	○	△	△	◎	◎	◎	◎	◎	◎	◎	◎
	Chrome plating solution		◎	◎	○	◎	◎	◎	○	×	◎	◎	◎	○	◎	×	◎
	Heavy oil		◎	◎	○	×	×	×	×	◎	×	◎	◎	◎	◎	×	◎
	Kerosene		○	○	○	○	○	△	×	◎	◎	◎	◎	◎	◎	×	◎
	Tartaric acid		◎	○	○	◎	◎	○	△	◎	◎	◎	◎	◎	◎	×	○
	Carbon disulfide		×	×	×	×	×	×	×	◎	◎	◎	◎	◎	◎	×	◎
Gases	Sulfurous acid gas	100%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○	◎
	Gaseous ammonia	100%	◎	◎	○	◎	◎	◎	◎	◎	×	◎	◎	◎	◎	△	◎
	Chlorine gas	W5%	◎	◎	○	○	△	×	×	×	×	◎	◎	◎	◎	×	◎
		D100%	○	△	×	×	×	×	×	×	×	◎	◎	×	◎	×	◎
	Carbon dioxide gas	100%	◎	◎	○	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	◎
	Hydrogen fluoride gas	10%	◎	◎	○	◎	◎	◎	○	○	◎	◎	◎	◎	◎	○	◎
	Hydrogen sulfate gas	W100%	◎	◎	◎	◎	◎	◎	◎	△	◎	◎	◎	◎	◎	◎	◎
		D100%	◎	◎	○	◎	◎	◎	○	◎		◎	◎	◎	◎		◎

Related Products

For cross-checking in the field

Handheld Water Quality Meter P40 Series

Measurement of pH, ORP, conductivity, and dissolved oxygen (DO) is possible by exchanging probes.

pH | ORP | Conductivity | Optical dissolved oxygen

2ch type MM-42DP

1ch type MM-41DP

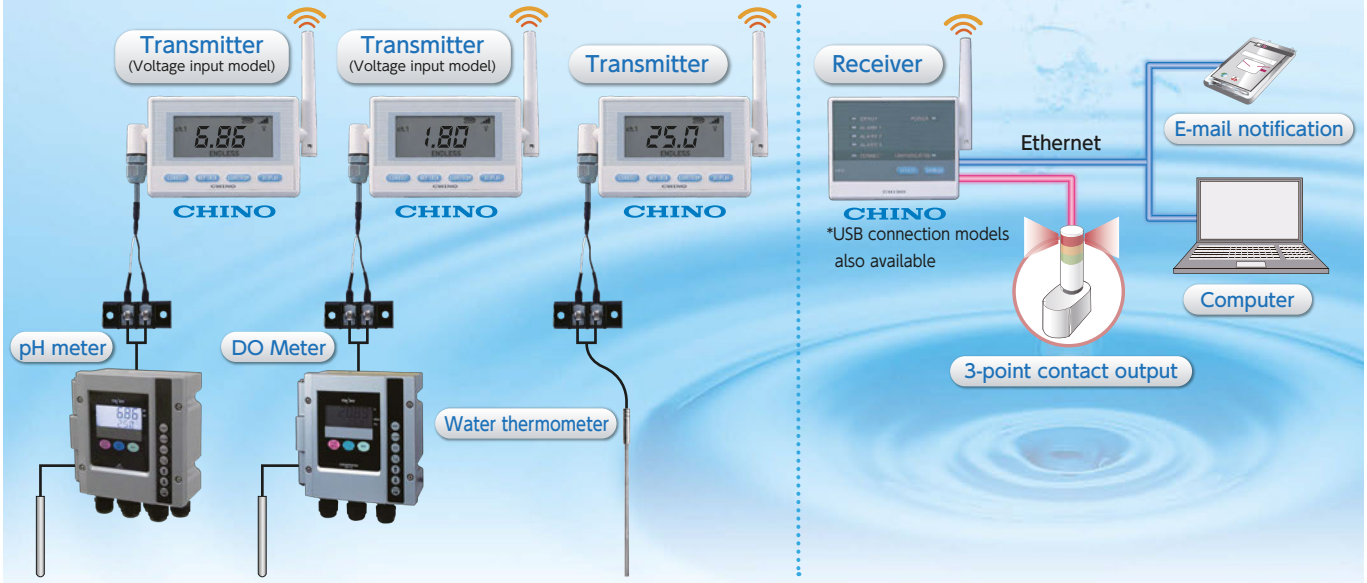
Mylana

Wireless monitoring system

Wireless Watcher MD8000 Series

Example of combination with products from our business partner, Chino Corporation

Wirelessly transmits the water quality meter's measurement data, recording and monitoring on a computer via the receiver.



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CAUTION Please read the operation manual carefully before using products.

https://www.toadkk.com/english

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