General Specifications

GS 12C11A01-01E

EXA OR

Model OR100
EXA100 Series
Panel Mount ORP Measurement System

■ GENERAL

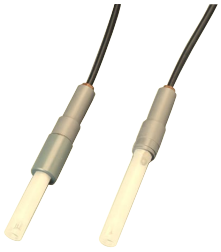
The EXA100 Series Panel Mount ORP Measurement System is ideally suited for applications using simplified instrumentation such as small-scale wastewater treatment equipment.

Based on the design concept of ORP meters through our experiences and achievements in the broad PA market for years, the system is highly reliable with limited practical functions while retaining capabilities of existing models. The converter packs simple functions in its compact housing, and also incorporates various self-diagnostics features for which the current EXA Series have a high reputation. The Yokogawa brand of security and reliability is delivered with a sophisticated and elegant design.

Dedicated ORP sensors to the EXA100 Series utilize the detection system, our field-proven technology. They are of miniaturized and lightweight design, offering improved ease of use. To meet your application needs, the EXA100 Series also accept other ORP sensors in our lineup (OR8EFG, etc.) or by other manufacturers.

Combination holders for the EXA100 Series are available in an adapter, Immersion, or Guide-pipe type depending on your application.

Converter



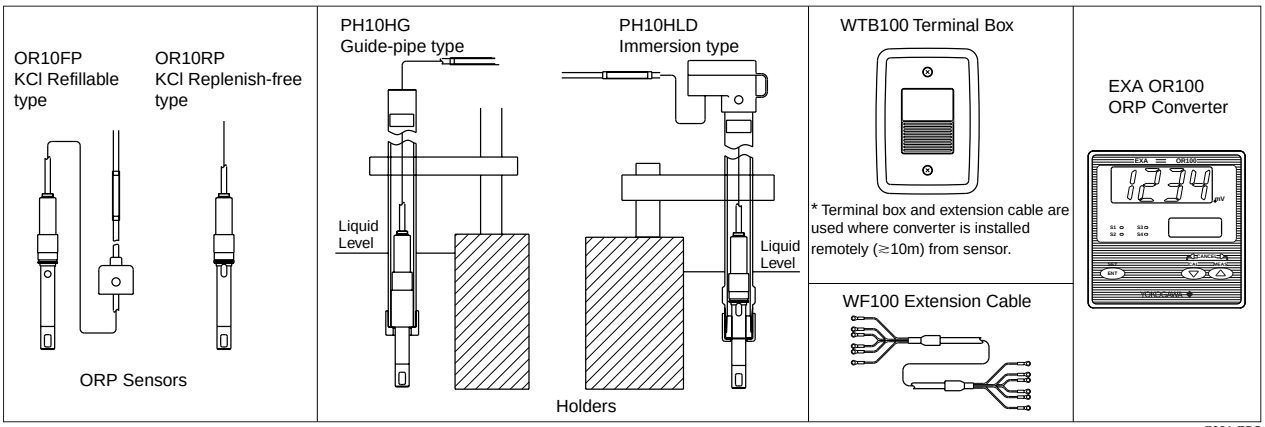
Sensors

Guide-pipe Holder Immersion Holder

■ FEATURES

- 96 x 96 mm panel mount design for indoor use
- Easy access to routine maintenance mode
- Practical functions packed in a compact housing
- Large 4-degit digital indication
- One analog output and two/four contact outputs as standard
- Self-diagnostics (e.g., calibration failure, measuring range failure, converter failure)

■ SYSTEM CONFIGURATION



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GS 12C11A01-01E

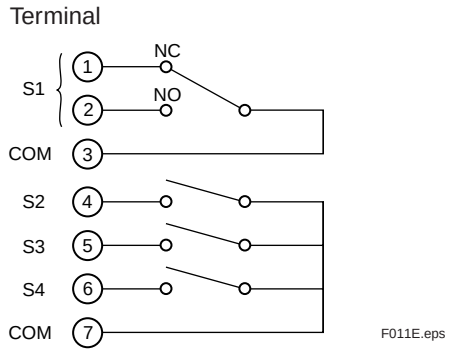
3rd Edition Oct. 2008

■ GENERAL SPECIFICATIONS

1. Panel Mounted ORP Converter

Model: OR100
Measurement: Oxidation-reduction potential (ORP) of a solution
Measuring range: -1500 to 1500 mV
Indication
Display: Digital (LED)
Range: -1500 to 1500 mV
Resolution: 1 mV
Indication items: ORP reading, setting, status
Input signal
ORP input range: -1500 to 1500 mV
Transmission signal output
Number of output points: 1 output, ORP reading only
Output signal: 4 to 20 mA DC, isolated
Load resistance: 600Ω or less
Transmission signal range: Configurable within measuring range (by 100 mV unit), factory setting: -1500 to 1500 mV, minimum span: 100 mV
Maintenance output signal: Output hold "enabled/disabled" selectable
Hold output value: Last measured value/preset value (2.0 to 20.8 mA) selectable
Fail output signal: Downscale burnout (2 mA) "enabled/disabled" selectable

Contact output
Type: Relay contact output
Number of contacts: 2 or 4 outputs (must be specified when ordering)
Contact action: On/Off
Contact functions: Selectable: High, low, high-high, low-low, high-high/low-low limit alarms, FAIL
Alarm setting resolution: 10 mV
Contact output hysteresis: 0 to 1000 mV (configurable)
Contact output delay time: 0 to 200 seconds (configurable)
Contact rating: In case of 2 contact outputs
S1: 240 VAC 3A or 30 VDC 3A (resistance load), Form C (NC/NO/COM, 3 terminals)
S2: 240 VAC 3A or 30 VDC 3A (resistance load), Form A (NO/COM, 2 terminals) In case of 4 contact outputs
S1: 240 VAC 3A or 30 VDC 3A (resistance load), Form C (NC/NO/COM, 3 terminals)
S2, S3, S4: 240 VAC 3A or 30 VDC 3A (resistance load), Form A, shared common Maximum load current on common is 3A.
Contact status:



Contact		Function selected					
		H, L, HH, LL, HH/LL limit alarms			FAIL		
		Power off	Power on		Power off	Power on	
			No alarm	Alarm		No alarm	Alarm
S1	NO-COM	Open	Open	Closed	Open	Closed	Open
	NC-COM	Closed	Closed	Open	Closed	Open	Closed
S2		Open	Open	Closed	Open	Closed	Open
S3 when specified		Open	Open	Closed	Open	Closed	Open
S4 when specified		Open	Open	Closed	Open	Closed	Open

Note: When a contact is activated, the LED on display panel turns on.
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Ambient temperature: -5 to 45ºC
Storage temperature: -25 to 70ºC
Ambient humidity: 10 to 90% RH, non-condensing
Construction: Front panel: Dust-proof and drip-proof construction IP55
IP65 (when "/65" option specified)
Materials: ABS resin and polycarbonate
Case color: Black
Power supply: Rated voltage 100 to 240 VAC (±10%), 50/60 Hz
Power consumption: Max. 9 VA
Weight: Approx. 600g
Dimensions: 96 (W) x 96 (H) x 122 (D) mm
Mounting: Panel mount
Panel cutout dimensions: 92 (W) x 92 (H) mm
Wiring: M4 screw terminal (Protective ground terminal), M3.5 screw terminal (other terminals)

Grounding: Ground to earth (grounding resistance 100Ω or less)

Functional specifications
Calibration function:
Manual shift calibration (one point calibration at specified setpoint)
Zero shift range: -500 to 500 mV
Self-diagnostics function:
FAIL output: ORP measuring range failure and converter failure
Error indication: Zero shift failure, standard solution measuring range failure
Converter performance: under normal operating conditions
Linearity: ±3 mV
Repeatability: ±2 mV

Sensors can be connected with OR100:
OR10FP KCl Refillable ORP Sensor for OR100,
OR10RP Replenish-free ORP Sensor for OR100,
FU20 (no simultaneous pH measurement available),
OR8ERG, OR8EFG
Maximum total connection cable length:
50 m (sensor cable length included)

2. ORP Sensors for OR100

Model: OR10□P
Measurement: Oxidation-reduction potential (ORP) of a solution
Measurement principle: Platinum electrode method
Type: OR10FP (KCl Refillable type) or OR10RP (KCl Replenish-free type)
Measuring range: -1500 to 1500 mV
Installation: Piping adapter connection (OR10RP)
Incorporated in Guide-pipe type holder (OR10RP)
Incorporated in Immersion type holder (OR10RP/OR10FP)
Sample temperature range: 0 to 60°C (OR10RP)
0 to 70°C (OR10FP)
Sample pressure: Atmospheric pressure (depth: 3 m max.)
Sample flow rate: 2 m/s max.
Sample conductivity: 50 µS/cm or greater
Wetted part materials: Polypropylene, rigid PVC resin, silicone rubber, glass, ceramics, chlorinated polyethylene rubber (cable sheath), fluorinated rubber (adapter O-ring for piping connection)
Adapter (optional) material: Rigid PVC resin
Cable length: 3, 5, 10 m (up to 50 m with sensor cable included when using terminal box)
Weight: Approx. 300g (3 m), 450g (5 m), 800g (10 m)

3. Holders (Immersion/Guide-pipe Type) for EXA100

Model: PH10HLD Immersion Holder
Weight: Approx. 400g (1 m), 800g (2 m)
Holder length: 1 or 2 m
Materials: Polypropylene (holder), polyethylene (spacer), silicone rubber (gasket), ethylene propylene rubber (cover), rigid PVC resin (nut)
Operating temperature: 0 to 70°C
Operating flow rate: 2 m/s or less

Model: PH10HG Guide-pipe Holder
Weight: Approx. 450g (1 m), 850g (2 m), 1.3kg (3 m), 1.7kg (4 m)
Holder length: 1, 2, 3, or 4 m
Materials: Rigid PVC resin
Operating temperature: 0 to 60°C
Operating flow rate: 2 m/s or less

4. Terminal Box for EXA100

Model: WTB100
Construction: Outdoor installation, JIS C0920 rain-proof
Case material: Glass fiber filled polycarbonate resin
Case color: Grayish green (Munsell 2.5GY5.0/1.0 equivalent)
Mounting: Bracket mounting (no hardware required), pipe mounting (optional hardware), wall mounting (optional hardware)
Weight:
Body: Approx. 0.5kg
Mounting hardware (optional): Approx. 0.7kg (pipe mounting), 0.3kg (wall mounting)
Operating ambient temperature: -10 to 50°C
Cable inlet: (to be drilled for wiring)
For sensor cable: 13 mm diameter hole, JIS A8-equivalent cable gland included
For dedicated extension cable: 21 mm diameter hole, JIS A15-equivalent cable gland included
Note: WF100 extension cable (but not sensor cable) can be protected by conduit using conduit adapter. A conduit adapter is supplied when "/AWTB" or "/ANSI" option code is specified.

5. Dedicated Cable for Terminal Box for EXA100

Model: WF100
Type: Specialty 4-conductor cable
Finished outside diameter: 6.5 mm
Sheath material: Chlorinated polyethylene rubber

■ Model and Suffix Codes

1. OR100 Panel Mounted ORP Converter

Model	Suffix code			Option code	Description
OR100	----------			----------	Panel mounted ORP converter
————	-A			----------	Always -A
Label language	-E			----------	English
	-J			----------	Japanese
Contact output		-21		----------	2 contact outputs
		-41		----------	4 contact outputs
————			-NN	----------	Always -NN
Option			Construction	/65	with sealing

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Maintenance Parts

Parts Name	Parts No.	Description
Mounting bracket	T9115NL	Large bracket (mount at up) and small bracket (mount at bottom)

2. ORP Sensors for OR100

OR10FP KCl Refillable ORP Sensor,

Model	Suffix code			Option code	Description
OR10FP*1	----------			----------	KCl Refillable ORP sensor for OR100
Cable length	-03			----------	3m
	-05			----------	5m
	-10			----------	10m
————		-AA		----------	Always -AA
Combination holder		-HST		----------	For KCl-filled Immersion type holder *2
————			-NN		Always -NN

Notes *1: Sensor cannot be used as a single unit and requires a dedicated Immersion type holder, PH10HLD-AA-□□-HST-PE, which should be ordered separately.
*2: Sensor cable incorporates the cover for a holder.
*3: KCl solutions for refill should be prepared by customer (ref. P/N K9084LP: KCl solution in six 250 ml-polyethylene bottles)

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OR10RP KCl Replenish-free ORP Sensor

Model	Suffix code			Option code	Description
OR10RP	----------			----------	KCl Replenish-free ORP sensor for OR100
Cable length	-03			----------	3m
	-05			----------	5m
	-10			----------	10m
————		-AA		----------	Always -AA
Combination holder	Adapter	-ADP		----------	For piping adapter *1
	Immersion type	-HSS		----------	For Immersion type holder *3
	Guide-pipe type	-GDH		----------	For Guide-pipe type holder *2
————			-NN	----------	Always -NN
Option			Piping adapter	/ADP	Piping adapter for Replenish-free type sensor R3/4

Notes *1: O-ring for piping adapter (/ADP) is included. Must be selected when optional piping adapter is specified.
*2: Configuration is of Guide-pipe type holder, PH10HG.
*3: PH10HLD Immersion holder should be ordered separately.

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3. Holders for EXA100

PH10HLD Immersion Holder for OR10□P

Model	Suffix code			Option code	Description
PH10HLD	----------			----------	Immersion holder for PH10□P/OR10□P *1
————	-AA			----------	Always -AA
Holder length	-10			----------	1m
	-20			----------	2m
Combination sensor		-HST		----------	For PH10FP KCl Refillable sensor *2
		-HSS		----------	For PH10RP KCl Replenish-free sensor
————			-PE	----------	Always -PE
Option			KCl powder	/KCL	KCl powder *3
			Mounting hardware	/MS1	Mounting hardware, 1 set
				/MS2	Mounting hardware, 2 sets
				/CALK	Calibration holder fixing hardware

Notes *1 : Applicable sensors are PH10□P and OR10□P, which should be ordered separately.
*2 : KCl Refillable sensors (PH10FP/OR10FP) require KCl-filled immersion type holders.
KCl pressurized type is not available.
KCl solution is not filled in the holder upon shipment. Holders can be filled with KCl solution : 500 mL for 1-m holder and 1000 mL for 2-m holder, which can be prepared by selecting the option.
During measurement, KCl solution level should be higher than sample solution level.
*3 : KCl powder is packed in 8 bags, each for 250-ml solution. (ref. 2 bags used for 1-m holder and 4 bags for 2-m holder)
KCl solutions can be purchased as an auxiliary part.
(ref. P/N K9084LP: KCl solution in six 250 ml-polyethylene bottles)

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PH10HG Guide-pipe Holder for OR10RP

Model	Suffix code			Option code	Description
PH10HG	----------			----------	Guide-pipe holder for PH10RP/OR10RP *1
————	-AA			----------	Always -AA
Holder length	-10			----------	1m
	-20			----------	2m
	-30			----------	3m
	-40			----------	4m
Material		-PVC		----------	PVC
————			-NN	----------	Always -NN
Option			Mounting hardware	/MS1	Mounting hardware: 1 set
				/MS2	Mounting hardware: 2 sets

Notes *1 : Applicable sensors are PH10RP and OR10RP KCl Replenish-free sensors only.

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4. WTB100 Terminal Box for EXA100

Model	Suffix code	Option code	Description
WTB100	----------	----------	Terminal box for EXA100 Series
Measurement system	-OR	----------	For OR100
————	-NN	----------	Always -NN
Option	Mounting hardware	/P	For pipe mounting
		/W	For wall mounting
	Conduit adapter	/AWTB	Conduit connection: G1/2 female
		/ANSI	Conduit connection: 1/2 NPT

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5. WF100 Cable for Terminal Box for EXA100

Model	Suffix code	Option code	Description
WF100	----------	----------	Extension cable for EXA100 Series
Measurement system	-OR	----------	For OR100
Option	Cable length	/C01	5m
		/C02	10m
		/C03	15m
		/C04	20m
		/C05	25m
		/C06	30m
		/C07	35m
		/C08	40m
		/C09	45m

Note *1 : Total length including sensor cable length should not exceed 50 m.

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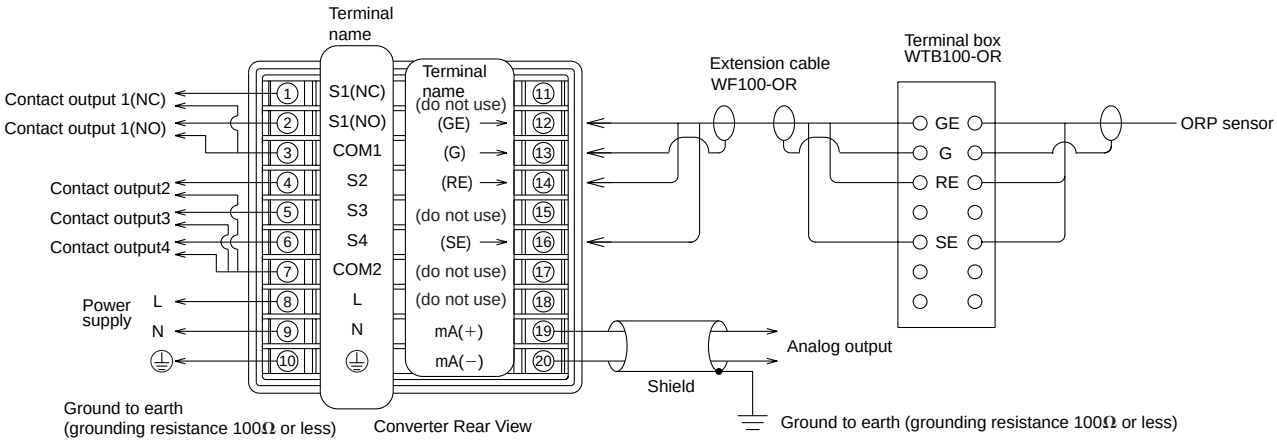
■External Wiring Diagram

• Wiring Diagram: Converter - Terminal box - Sensor

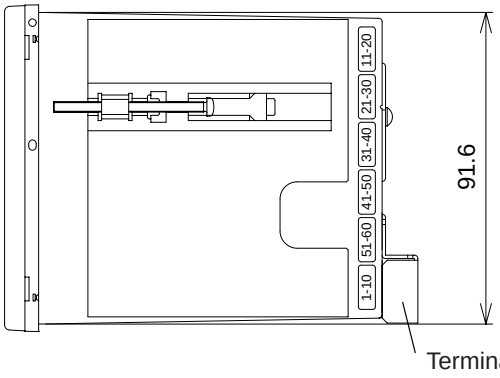


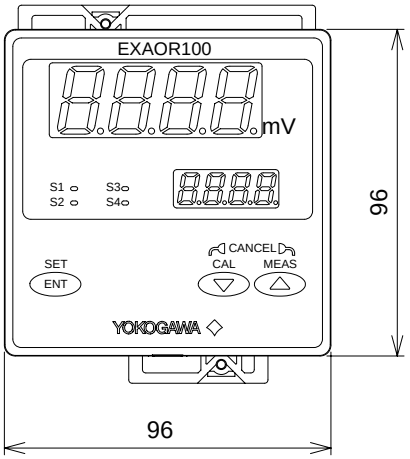
Note : (1) Terminal numbers are indicated on the label side of the converter.
(2) Fix sensor cable in place using a wiring clamp.
(3) The color in parenthesis indicates the corresponding wire color of a dedicated ORP sensor, OR10FP or OR10RP, to be connected.

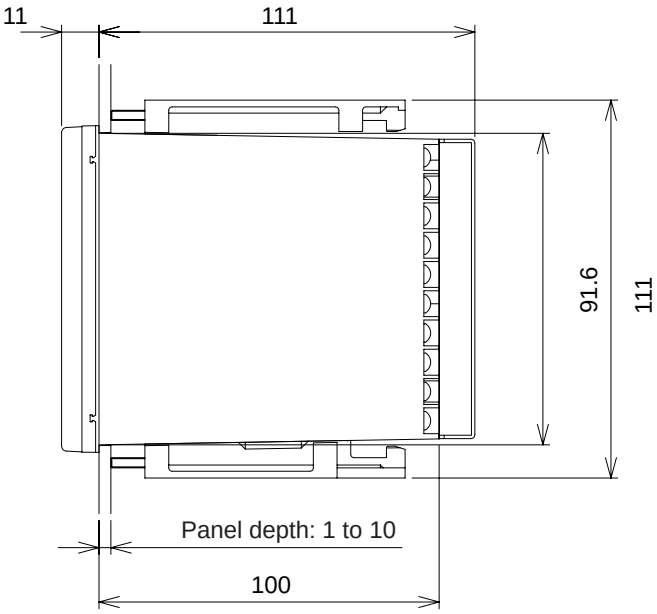
■Dimensions

1. OR100 Panel Mounted ORP Converter

Unit: mm

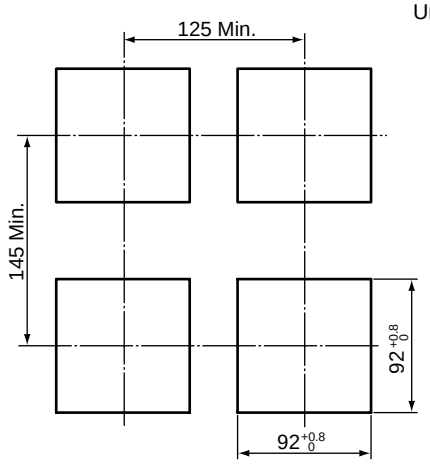






Panel Cutout Dimensions

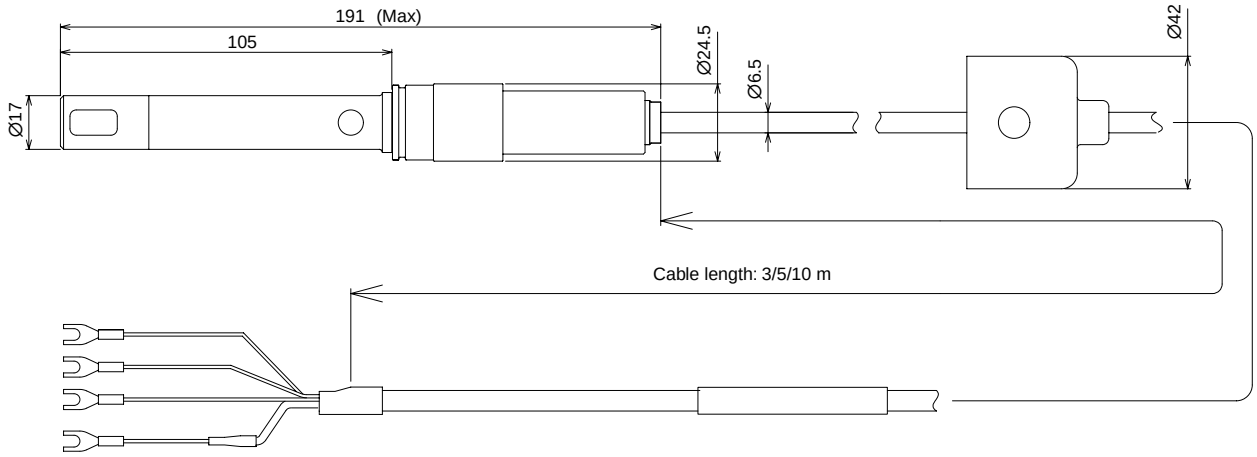
Unit : mm



2. OR10FP and OR10RP ORP Sensors for OR100

<OR10FP KCl Refillable ORP Sensor > Unit: mm

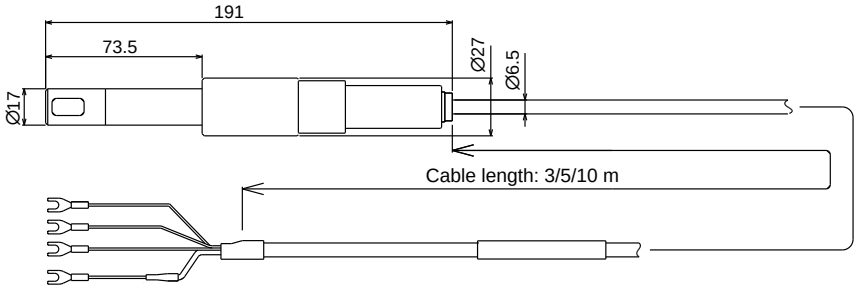
OR10FP-□□-AA-HST-NN



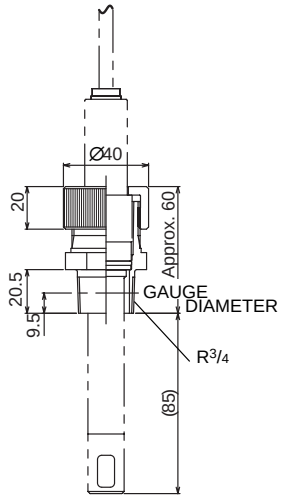
<OR10RP KCl Replenish-free ORP Sensor>

Unit: mm

・OR10RP-□□-AA-GDH-NN

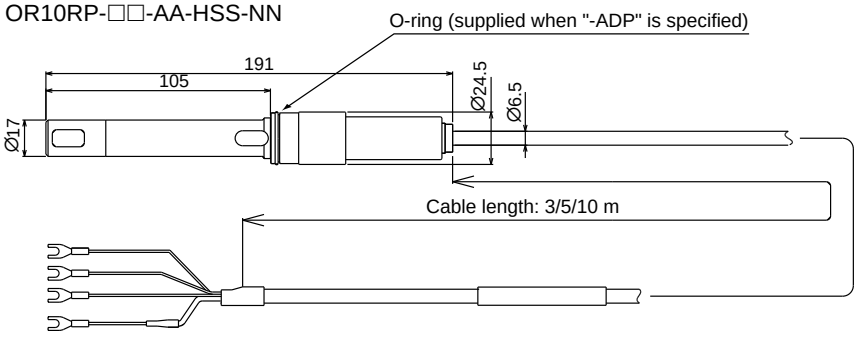


・OR10RP-□□-AA-ADP-NN/ADP



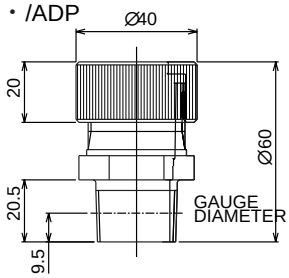
・OR10RP-□□-AA-ADP-NN

・OR10RP-□□-AA-HSS-NN



<Optional Adapter>

・/ADP

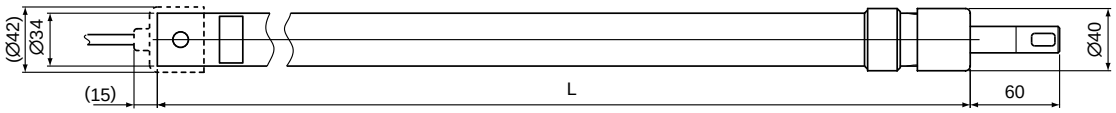


3. PH10HLD Immersion Holder and PH10HG Guide-pipe Holder for EXA100

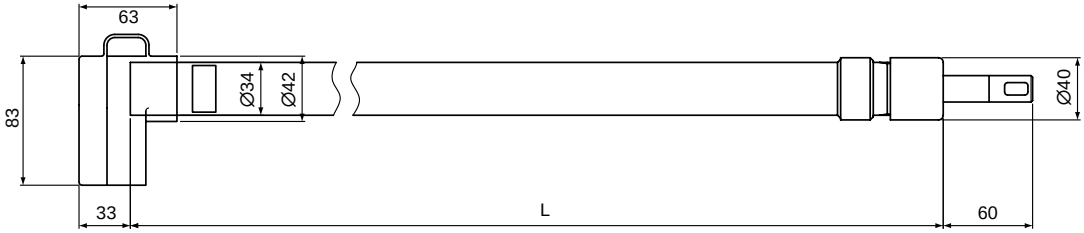
<PH10HLD> Unit: mm

•PH10HLD-AA-□□-HST-PE

· PH10HLD-AA-□□-HST-PE



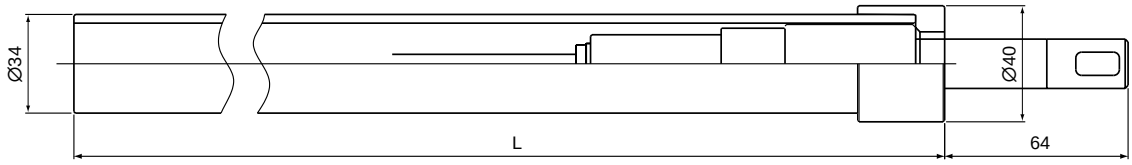
· PH10HLD-AA-□□-HSS-PE



MS Code	L(Holder length)
PH10HLD-AA-10-□□□-PE	1000 mm
PH10HLD-AA-20-□□□-PE	2000 mm

<PH10HG>

· PH10HG-AA-□□-PVC-NN

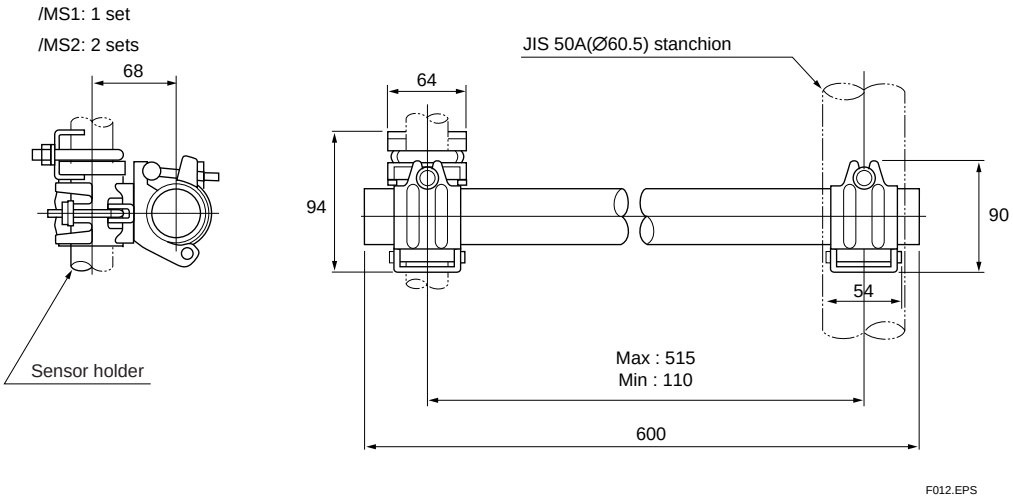


MS Code	L(Holder length)
PH10HG-AA-10-PVC-NN	1000 mm
PH10HG-AA-20-PVC-NN	2000 mm
PH10HG-AA-30-PVC-NN	3000 mm
PH10HG-AA-40-PVC-NN	4000 mm

CAUTION

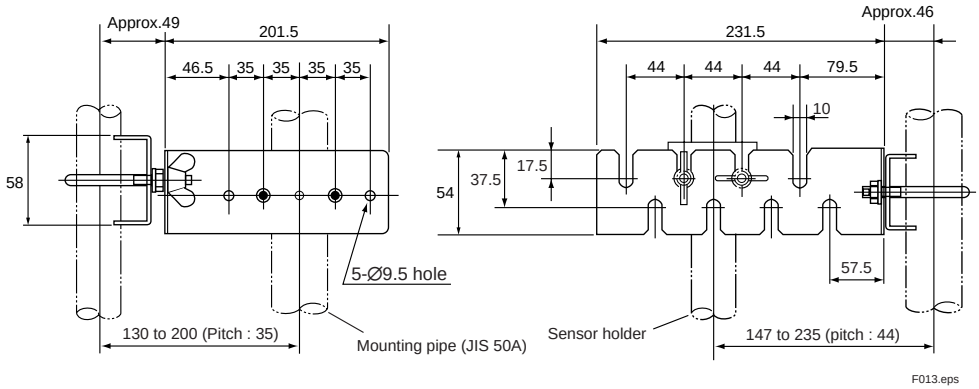
Installation Location of Holders (Guide Pipe, Submersion Type, etc)
The holder should be used in a place that is as vibration free as possible.
Using the holder in a place where it is affected by vibration, may result in damage to the holder.

• Mounting Hardware for Holders for EXA100 Unit: mm



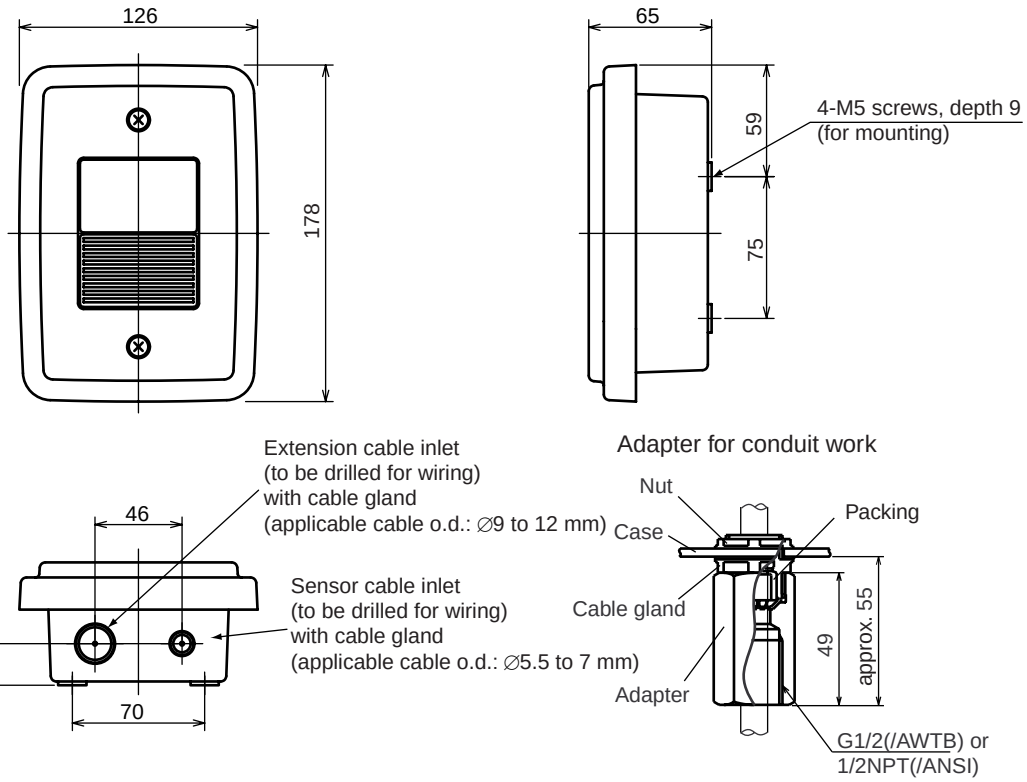
• Calibration Holder Fixing Hardware for Holders for EXA100

/CALK



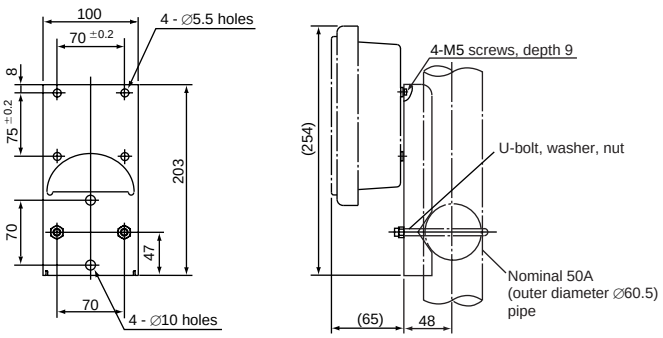
4. WTB100 Terminal Box for EXA100

<WTB100-OR> Unit: mm

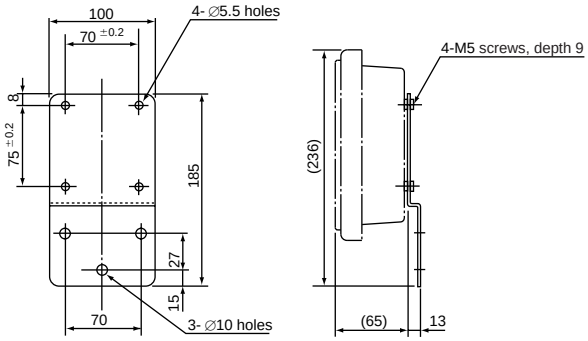


Note: Conduit adapter is used when the dedicated extension cable is protected by a conduit. Attach it to the cable gland of the converter sensor cable inlet port and the cable gland of the terminal box extension cable.

Pip- mounting Bracket (Option code: /P)

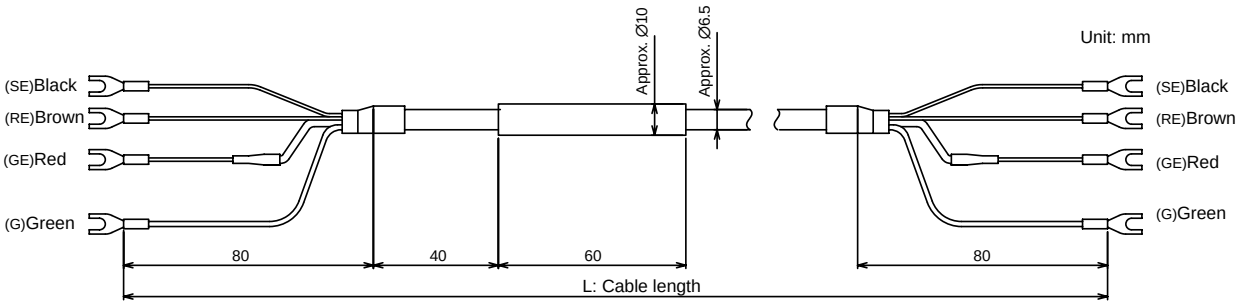


Wall- mounting Bracket (Option code: /W)



5. WF100 Extension Cable for Terminal Box for EXA100

<WF100-OR>



INQUIRY SHEET FOR PANEL MOUNT ORP MEASUREMENT SYSTEM

Thank you for your inquiry on our panel mount ORP measurement system. Please check the appropriate box and fill in the blanks below.

General Information

Company: _____
Contact person: _____ Section: _____ Phone: _____
Plant name: _____
Equipment name: _____
Measuring point: _____
Purpose of measurement: ☐ Reading ☐ Recording ☐ Alarm ☐ Control
Power supply: _____ VAC, _____ Hz

Measurement Conditions

(1) Sample name: _____
(2) Sample composition: _____
(3) Sample temperature: Min Max Normally [°C]
(4) Sample pressure: Min Max Normally [kPa]
(5) Flow rate: Min Max Normally [L/min]
(6) Velocity: Min Max Normally [m/s]
(7) Presence of slurry or contamination: ☐ No ☐ Yes
1 Approx. ____ mg/l
2 Approx. ____ mg/l
3 Approx. ____ mg/l
(8) SS concentration: Approx. _____ mg/l
(9) Others: _____

Installation
(1) Ambient temperature: Approx. _____ °C
(2) Installation site: ☐ Indoors ☐Outdoors (Please consider other ORP systems)
(3) Others: _____

Specification Requirements

(1) Measuring range: ☐ ORP from _____ to _____ mV
(2) System configuration: ☐ Converter: OR100 ☐ Sensor: _____ ☐ Holder: _____
☐ Terminal box: _____ ☐ Extension cable: _____
(3) Sensor cable length: ☐ 3 m ☐ 5 m ☐ 10 m ☐___ m
(4) Sensor operating pressure: ☐ Atmospheric pressure
☐ Higher (OR10☐P sensors are not applicable where the depth exceeds 3 m)
(5) Holder type: ☐ Guide-pipe ☐ Immersion ☐ Adapter
☐ Others _____
(6) Cleaning system: ☐ Not required
☐ Required (if so, please consider other systems. EXA100 Series are not equipped with a cleaning system.)
(7) Others _____