User's Manual

WTB10-PH□
Terminal Box

IM 19D01B01-01E

YOKOGAWA
Yokogawa Electric Corporation

IM 19D01B01-01E
7th Edition

Introduction

The WTB10-PH☐ terminal box is used when the pH/ORP sensors are used in separate locations from pH/ORP transmitter/converters; FLXA402, PH202, FLXA202, FLXA21, PH450G.

This terminal box can be installed outdoors.

To prevent any problems in operation, read through this instruction manual before use. Important handling measures are indicated by Warning or Caution labels in the instruction manual depending on the degree of importance. The user should strictly observe these Warnings or Cautions to prevent possible product damage that may otherwise arise.

■ Confirming the Specifications

The WTB10-PH☐ terminal box is normally supplied with an extension cable of specified length. If desired, cables can be provided with conduits for extra protection.

Upon taking receipt of the product, unpack carefully and check that no damage has occurred during transport. Check to ensure that the specified product was supplied and that no accessories are missing.

■ Information Covered by This Manual

This manual covers specifications, installation and wiring of the WTB10-PH¨ terminal box.

User's manual to refer to are as below

Connection to	FLXA402 4-wired anaylyzer:	IM 12A01F01-02EN
	PH202 pH/ORP transmitter:	IM 12B07D02-01E
	FLXA202/FLXA21 2-wired analyzer:	IM 12A01A02-01E
	PH450G pH/ORP converter:	IM 12B07C05-01E

■ Notes on Handling User's Manuals

- Please hand over the user's manuals to your end users so that they can keep the user's manuals on hand for convenient reference.
- Please read the information thoroughly before using the product.
- The purpose of these user's manuals is not to warrant that the product is well suited to any particular purpose but rather to describe the functional details of the product.
- No part of the user's manuals may be transferred or reproduced without prior written consent from YOKOGAWA.
- YOKOGAWA reserves the right to make improvements in the user's manuals and product at any time, without notice or obligation.
- If you have any questions, or you find mistakes or omissions in the user's manuals, please contact our sales representative or your local distributor.

◆ For the safe use of this equipment

■ Safety, Protection, and Modification of the Product

- In order to protect the system controlled by the product and the product itself and ensure safe operation, observe the safety precautions described in this user's manual. We assume no liability for safety if users fail to observe these instructions when operating the product.
- If this instrument is used in a manner not specified in this user's manual, the protection provided by this instrument may be impaired.
- Be sure to use the spare parts approved by Yokogawa Electric Corporation (hereafter simply referred to as YOKOGAWA) when replacing parts or consumables.
- Modification of the product is strictly prohibited.
- The following symbols are used in the product and user's manual to indicate that there are precautions for safety:

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- If you have any questions, or you find mistakes or omissions in the user's manuals, please contact our sales representative or your local distributor.

■ Warning and Disclaimer

The product is provided on an "as is" basis. YOKOGAWA shall have neither liability nor responsibility to any person or entity with respect to any direct or indirect loss or damage arising from using the product or any defect of the product that YOKOGAWA can not predict in advance.

◆ Safety Precautions

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- If this instrument is used in a manner not specified in this user's manual, the protectionprovided by this instrument may be impaired.• If any protection or safety circuit is required for the system controlled by the product or forthe product itself, prepare it separately.
- Be sure to use the spare parts approved by Yokogawa Electric Corporation (hereaftersimply referred to as YOKOGAWA) when replacing parts or consumables.
- Modification of the product is strictly prohibited.
- The following safety symbols are used on the product as well as in this manual.

⚠ WARNING

This symbol indicates that an operator must follow the instructions laid out in this manual in order to avoid the risks for the human body and health including risk of injury, electric shock, or fatalities. or the damages to instruments. The manual describes what special care the operator must take to avoid such risks.

⚠ CAUTION

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

The following are signal words to be found only in our instruction manuals.

CAUTION

This symbol gives information essential for understanding the operations and functions.

NOTE

This symbol indicates information that complements the present topic.

After-sales Warranty

- **Do not modify the product.**

- **During the warranty period, for repair under warranty consult the local sales representative or service office. Yokogawa will replace or repair any damaged parts. Before consulting for repair under warranty, provide us with the model name and serial number and a description of the problem. Any diagrams or data explaining the problem would also be appreciated.**
  - If we replace the product with a new one, we won't provide you with a repair report.
  - Yokogawa warrants the product for the period stated in the pre-purchase quotation Yokogawa shall conduct defined warranty service based on its standard. When the customer site is located outside of the service area, a fee for dispatching the maintenance engineer will be charged to the customer.

- **In the following cases, customer will be charged repair fee regardless of warranty period.**
  - Failure of components which are out of scope of warranty stated in instruction manual.
  - Failure caused by usage of software, hardware or auxiliary equipment, which Yokogawa Electric did not supply.
  - Failure due to improper or insufficient maintenance by user.
  - Failure due to modification, misuse or outside-of-specifications operation which Yokogawa does not authorize.
  - Failure due to power supply (voltage, frequency) being outside specifications or abnormal.
  - Failure caused by any usage out of scope of recommended usage.
  - Any damage from fire, earthquake, storms and floods, lightning, disturbances, riots, warfare, radiation and other natural changes.

- **Yokogawa does not warrant conformance with the specific application at the user site. Yokogawa will not bear direct/indirect responsibility for damage due to a specific application.**

- **Yokogawa Electric will not bear responsibility when the user configures the product into systems or resells the product.**

- **Maintenance service and supplying repair parts will be covered for five years after the production ends. For repair for this product, please contact the nearest sales office described in this instruction manual.**

Model WTB10-PH□
Terminal Box

IM 19D01B01-01E 7th Edition

Contents

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1. Specifications

1.1 Standard Specifications

Structure: Outdoor type, JIS C0920 rain proof structure

Case material: Glass fiber-filled polycarbonate resin

Case color: Grayish green (Munsell 2.5 GY 5.0/1.0 or the equivalent)

Mounting: Bracket mounting (mounting bracket not required)
Pipe mounting (mounting bracket required)
Wall mounting (mounting bracket required)

Weight: Terminal box: 0.5 kg
Mounting bracket: approx. 0.7 kg (pipe mounting; /P option)
approx. 0.3 kg (wall mounting; /W option)

Operating temperature: -10 to 50 °C.

Cable inlet port: (opened with tool when wiring is performed)

For sensor cable: hole 21 mm in diameter with JIS A15 or equivalent cable gland

For dedicated extension cable: hole 13 mm diameter with JIS A8 or equivalent cable gland

(Note): The dedicated extension cable can be protected with a conduit (not required by the sensor cable). However, this requires a conduit work adapter.
When a dedicated extension cable is ordered (option code: /AWTB or /ANSI), a conduit work adapter (containing two adapters) and cable glands (JIS A15 or the equivalent) are supplied. The cable glands are attached to the sensor cable inlet port of the transmitter/converter (remove the DIN Pg13.5/M20 cable gland).

Dedicated extension cable:

Cable length: Selectable (5 m, 10 m, 15 m), End-treated

1.2 Model and Suffix codes

Model	Suffix Code	Option Code	Specifications
WTB10	- - - - - - - - - - - - - - - -	- - - - - - - -	Terminal box
Com-bined System	**-PH1**	- - - - - - - -	For FLXA402, PH202, FLXA202/FLXA21 (General sensor and PH4/OR4 sensor of pin terminals) (*6) (*7)
	-PH2	- - - - - - - -	For PH202, FLXA202/FLXA21 (PH4/OR4 sensor of pin terminals) (*1) (*6)
	-PH3	- - - - - - - -	For FLXA402, PH450G, PH202/TB (General sensor and PH4/OR4 sensor of M3 ring terminals) (*4) (*7)
	-PH4	- - - - - - - -	For FLXA402, PH450G, PH202/TB (PH4/OR4 sensor of M3 ring terminals) (*1) (*4)
	-PH5	- - - - - - - -	For FLXA202/FLXA21 (General sensor and PH4/OR4 sensor of M4 ring terminals) (*5) (*7)
	-PH6	- - - - - - - -	For FLXA202/FLXA21 (PH4/OR4 sensor of M4 ring terminals) (*1) (*5)
–	**-NN**	- - - - - - - -	Always -NN
Cable Length (*2)	**-00**	- - - - - - - -	0 m (*3)
	-05	- - - - - - - -	5 m
	-10	- - - - - - - -	10 m
	-15	- - - - - - - -	15 m
Option Conduit Adapter		**/P**	Pipe mounting bracket
		/W	Wall mounting bracket
Mounting bracket		**/AWTB**	G1/2
		/ANSI	1/2NPT

*1: Use -PH2, -PH4, -PH6 of combined system when using adapter with temperature sensor (SA405) is used.
*2: For WTB10 of combined system, maximum cable length including sensor cable length should be 20 m.
*3: The dedicated extension cable should be used.
*4: M3 screw terminals and cable with M3 ring terminals are used.
*5: M4 screw terminals and cable with M4 ring terminals are used.
*6: M4 screw terminals and cable with pin terminals are used.
*7: Use -PH1, -PH3, -PH5 of combinated system when not using SA405 in case of PH4/OR4.

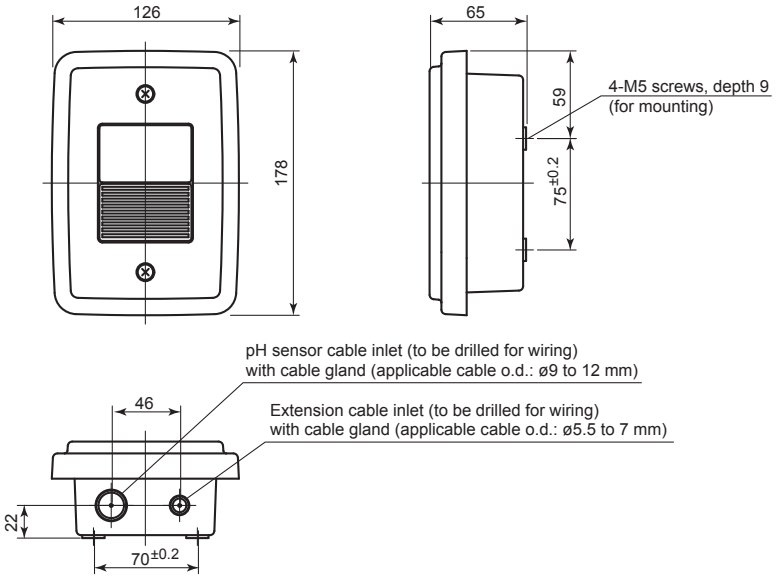
Accessories

Item	Part number	Remarks
Cable gland	B1001JZ	For extension cable inlet
	B1002JZ	For sensor cable inlet
	K9148UN	For -PH2, -PH4, -PH6
Extension cable	K9316R☐	For -PH1, -PH2 (Cable length: specified by suffix code)
	K9316V☐	For -PH3, -PH4 (Cable length: specified by suffix code)
	K9316W☐	For -PH5, -PH6 (Cable length: specified by suffix code)
Pipe mounting bracket	K9141SA	Attached when option code: /P is specified
Wall mounting bracket	K9141SC	Attached when option code: /W is specified
Conduit connection adapter	K9141TY	Attached when option code: /AWTB is specified
	K9141TX	Attached when option code: /AWTB is specified
	K9311KQ	Attached when option code: /ANSI is specified
	K9311KR	Attached when option code: /ANSI is specified
	B1002JZ	Attached when option code: /AWTB or /ANS

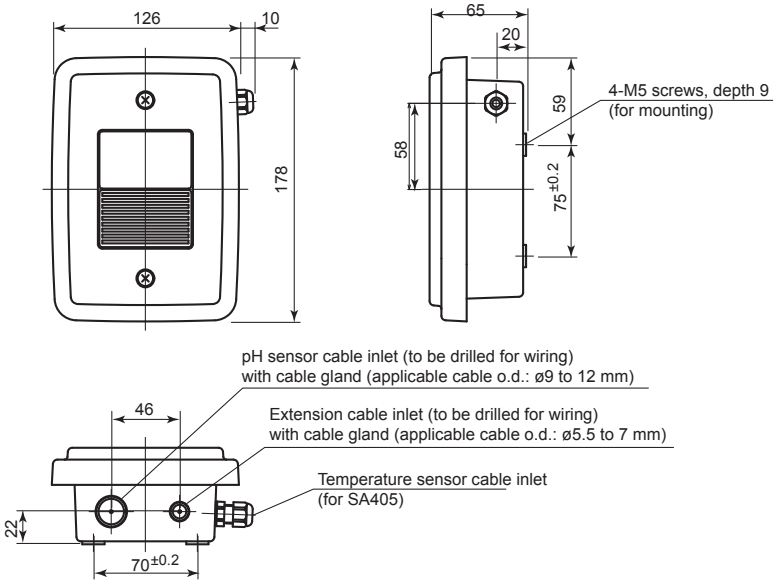
1.3 External Dimensions

Unit: mm

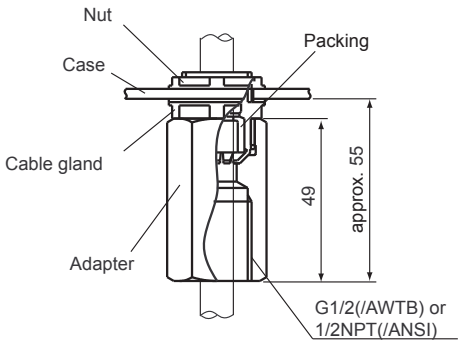
Terminal Box WTB10-PH1, -PH3, -PH5



Terminal Box WTB10-PH2, -PH4, -PH6

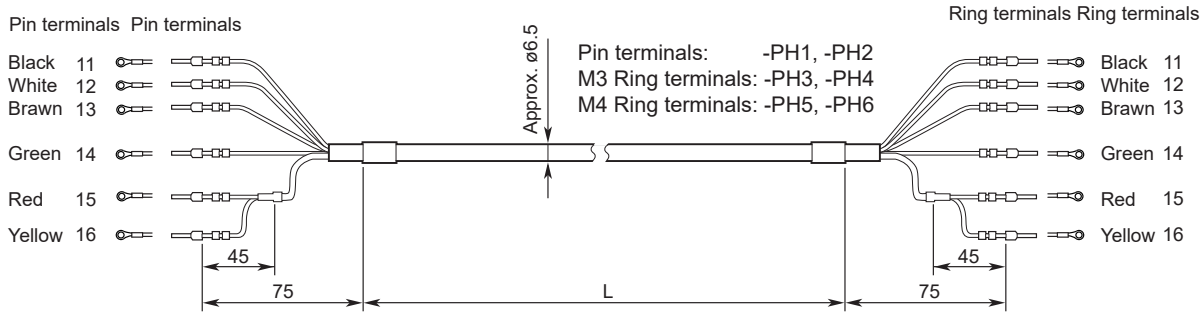


Conduit Adapter (/AWTB, /ANSI)



Note: A complete set of these adapters will protect the extension cable with a conduit from damage.
Attach these adapters to the cable gland of the extension cable and the extension cable opening on the terminal box.
A JIS A15 type cable gland for the transmitter is included.
Exchange a DIN Pg 13.5/M20 type cable gland of the transmitter/converter.
When a dedicated extension cable is protected with a conduit, attach a conduit adapter to a plastic cable gland for extension cable inlet of the terminal box. Using a plastic cable gland (insulation) prevents the inside of terminal box from being grounded via conduit.

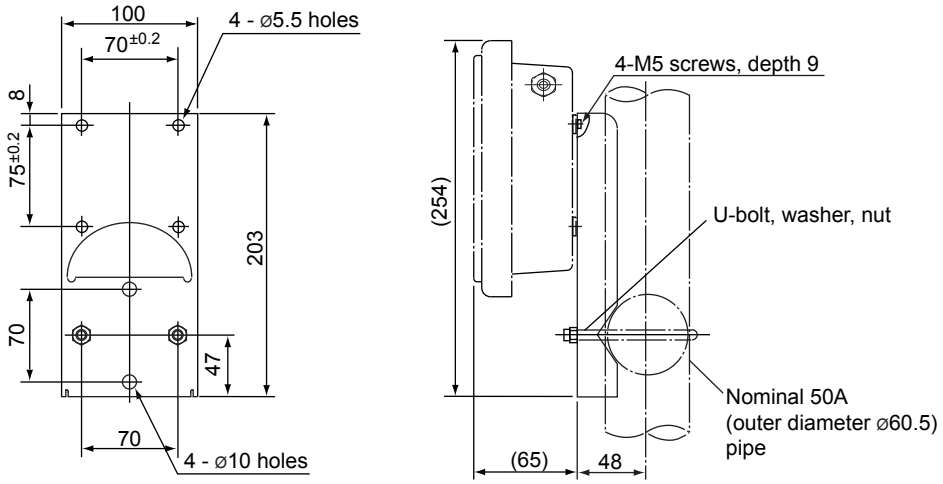
Figure 1.1 External Dimensions 1 of WTB10-PH Terminal Box**



Model and code	L
WTB10 - PH☐ - NN - 05	Approx. 5000
WTB10 - PH☐ - NN - 10	Approx. 10000
WTB10 - PH☐ - NN - 15	Approx. 15000

Weight : Approx. 0.12 kg/m

Pipe mounting bracket (with the / P option)



Wall mounting bracket (with the / W option)

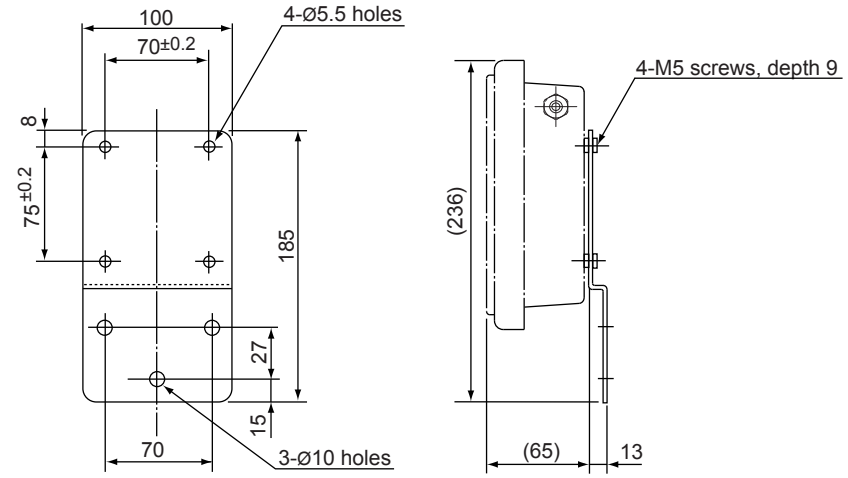


Figure 1.2 External Dimensions 2 of WTB10-PH☐ Terminal Box

2. Installation and Wiring

2.1 Installation

2.1.1 Place of Installation

The terminal box is rain proof and can be installed outdoors. Install the sensor as close to the terminal box as possible.

NOTE

Avoid locations exposed to humidity and corrosive gas. If installed in a location exposed to humidity and corrosive gas and the case cover is not properly attached, problems may arise (wire breakage, poor conductivity due to poor insulation or corrosion). The case cover contains a desiccant (silica gel).

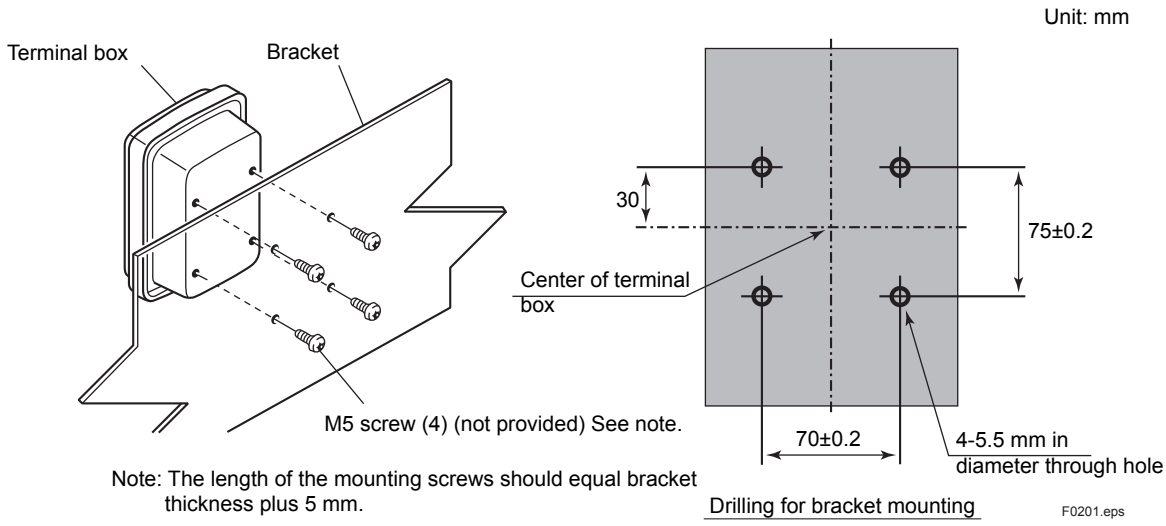
2.1.2 Mounting

The terminal box can be bracket, pipe (2-inch) or wall mounted. However, pipe and wall mounting require special mounting brackets, which are supplied when specified (use the four supplied screws to mount the case).

(1) Bracket Mounting

The depth of the mounting holes in the terminal box case is 9 mm. Use M5 screws of a length that takes the thickness of the bracket into account.

Drill holes in the bracket as shown in Figure 2.1.



Note: The length of the mounting screws should equal bracket thickness plus 5 mm.

Figure 2.1 Drilling and Mounting Procedure for Bracket Mounting

(2) Stanchion (pipe) Mounting

As shown in Figure 2.2, secure the terminal box to the stanchion (pipe) using a U-bolt. Attach the terminal vertically (or horizontally) to a strong pipe with an outer diameter of 60.5 mm.

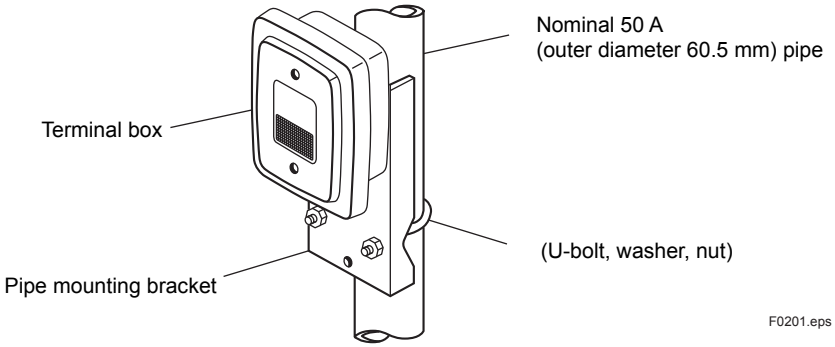


Figure 2.2 Pipe Mounting Procedure

(3) Wall Mounting

Secure the terminal box using three M8 bolts (not supplied). Drill holes in the wall as shown in Figure 2.3.

Unit: mm

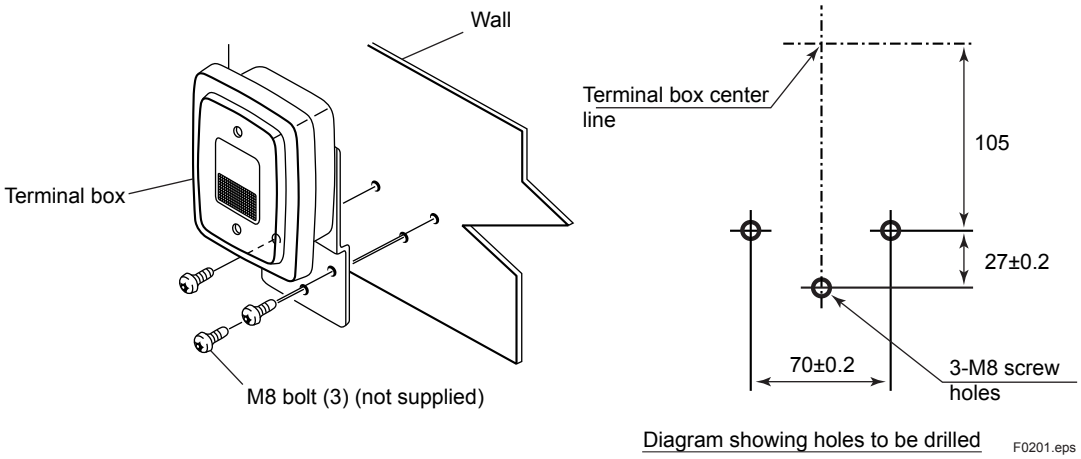


Figure 2.3 Hole Drilling and Mounting Procedure for Wall Mounting

NOTE

Opening holes for wires (cable inlet ports)
The cable inlet ports in the terminal box are designed to be opened during wiring. Should it be difficult to open these holes during wiring work (see Figure 2.5), they can be opened before installation.

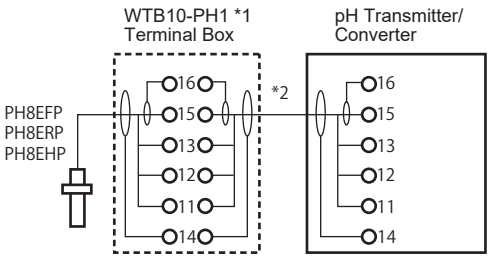
2.2 Wiring

Connect the sensor cable and the extension cable from the pH/ORP transmitter/converter to the terminal block inside the terminal box.

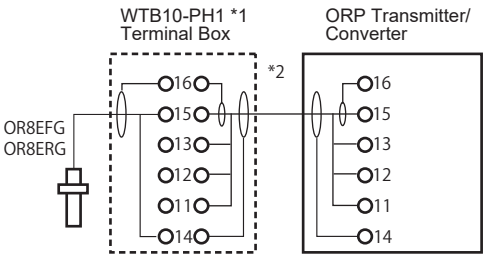
Wiring Diagram

● **General purpose pH/ORP sensor**

General purpose pH sensor

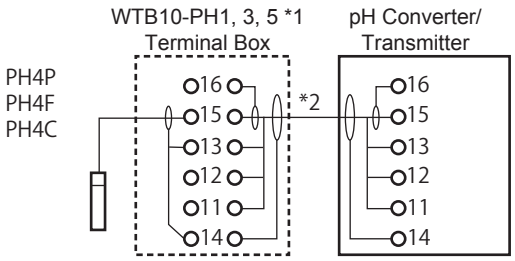


General purpose ORP sensor

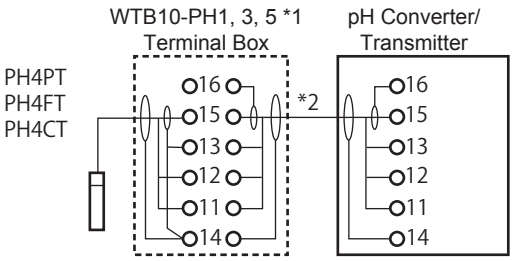


● **General purpose pH/ORP sensor**

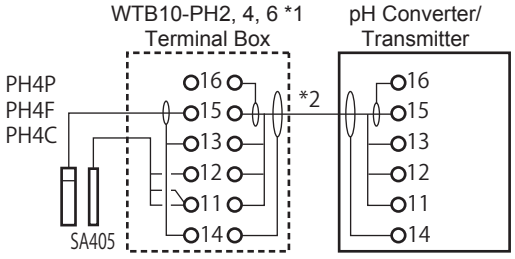
No combination with SA405



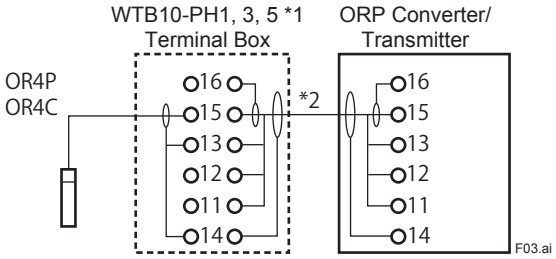
pH sensor with RTD



Combination with SA405



ORP sensor



*1. Terminal box is used only where pH analyzer/converter or ORP analyzer/converter is installed remotely from pH or ORP sensor (normally not needed).
Use this terminal box to connect to FLXA402, PH202G, FLXA202/FLXA21 with pin terminals.
Use WTB10-PH3 terminal box to connect to FLXA402, PH450G or PH202/TB with M3 ring terminals.
Use WTB10-PH5 terminal box to connect to FLXA202/FLXA21 with M4 ring terminals.

*2. This cable is specified in the option code for the terminal box.
Maximum cable length includibg sensor cable length should be within 20 m.

Figure 2.4 Wire Connections to WTB10-PH□ Terminal Box

NOTE

Do not ground the terminal box to earth.

2.2.1 Opening Cable Inlet Ports

Open unopened cable inlet ports. These ports which are located on the bottom of the case are indicated by a circular groove.

Place the front end of a tool (a Philips screwdriver or similar tool) against the center of the circle and hit the head of the tool with a mallet. This will open a hole marked by the circular groove.

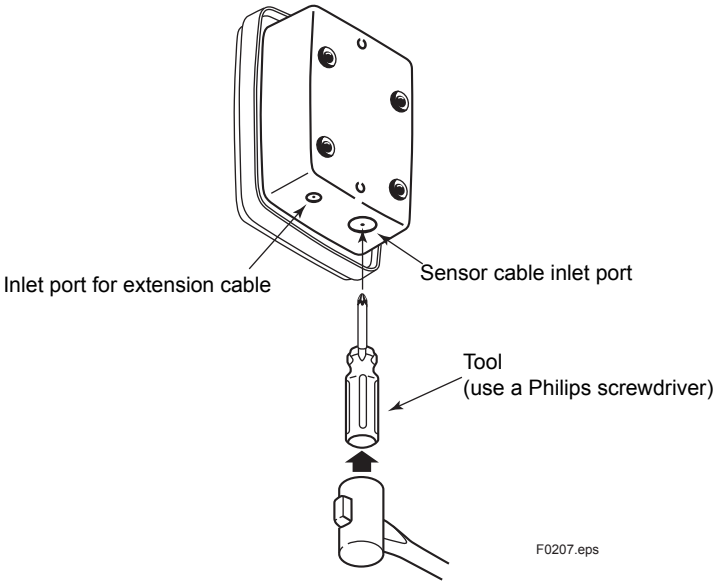


Figure 2.5 Opening Holes for Wiring

2.2.2 Sensor Cable Connections

(1) Loosen the two screws in the terminal box front panel and remove the cover.

(2) Install the cable gland (JIS A8 or the equivalent) in the sensor cable inlet port.

Remove the nut from the cable gland, and put it in the designated place.

Then screw on the main unit as shown in Figure 2.6.

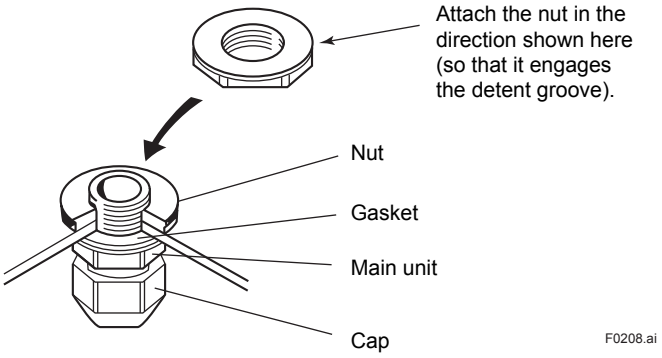
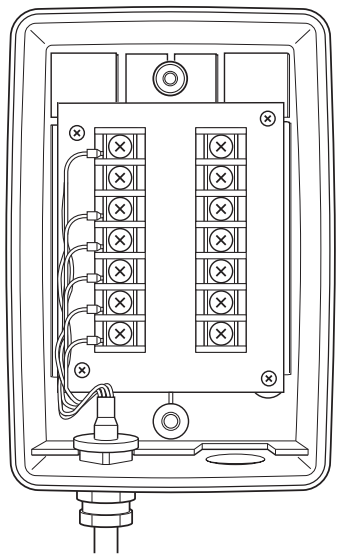


Figure 2.6 Attaching the Cable Gland

(3) Lead in the sensor cable to the terminal box via the inlet port. Remove the cap, clamp claw and rubber packing from the cable gland and attach it to the sensor cable. Lead in the front end of the cable into the terminal box.

(4) Connect the core wires of the sensor cable to each terminal.
Check the number of each core wire to make sure that they are connected to the correct terminals.



M4 screw terminals for -PH1. -PH2. -PH5. -PH6
M3 screw terminals for -PH3. -PH4

Figure 2.7 Sensor Cable Connections

(5) Secure the cable using a cable gland. Press in the rubber packing and clamp claw into the cable gland and screw on the cap tightly to make sure that moisture cannot enter. However, note that excessive tightening can damage the cable.

NOTE

No conduit work should be done with a sensor cable.

2.2.3 Extension Cable Connection

Connect the terminal box and the pH/ORP transmitter/converter with the dedicated extension cable. An extension cable of the specified length is supplied with the terminal box. To protect the extension cable with a conduit, remove the cap from the supplied cable gland (for leading the extension cable or converter sensor cable into the terminal box) and attach an adapter (supplied when option code of /AWTB or /ANSI is specified) in its place.

Note: To protect the extension cable with a conduit, replace the DIN Pg13.5/M20 cable gland attached to the transmitter extension cable inlet port with a JIS A15 cable gland. Attach a conduit adapter to a plastic cable gland for extension cable inlet of the terminal box. Using a plastic cable gland (insulation) prevents the inside of terminal box from being grounded via conduit.

Connect the extension cable to the terminal box according to the following steps.

(1) Attach the supplied cable gland to the extension cable. First disassemble the cable gland and then place the cap (or adapter) clamp claw, rubber packing, main unit and gasket in stated order on the cable. Attach the nut when the cable has been lead into the terminal box.

The cable gland shall be placed on the part of the cable that is covered by the heat-shrinkable tube.

Note: The extension cable has undergone the same end treatment at both ends. (There is no difference between the end for the terminal box and that of the converter.)

(2) Lead the cable into the terminal box. Place the nut on the cable before connecting the cable core wires to respective terminal.

(3) Attach the cable gland to the cable inlet port.

Place the nut at the designated location and screw on the main unit properly.

When the main unit has been properly secured, firmly attach the cap or adapter (when conduit work is to be performed) to prevent the entry of moisture.

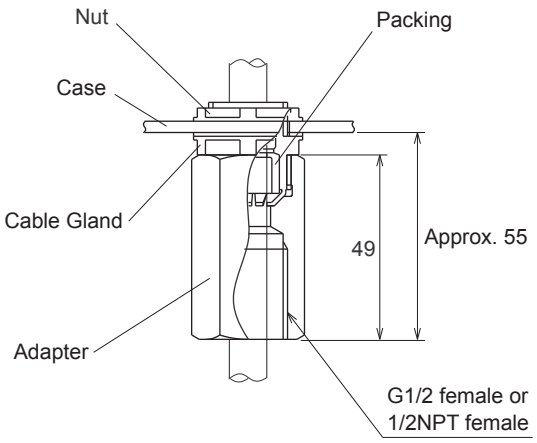


Figure 2.8 Attaching Cable Gland (when conduits are used)

(4) Put on the front panel cover on the terminal box. Be sure to properly tighten the screws to hermetically seal the box.

(5) When the cable is to be protected with a conduit, screw the conduit union joint onto the adapter.

3. Inspection and Maintenance

Normally, it is sufficient to inspect the WTB10-PH☐ terminal box during periodic system repairs (once a year or every two years), unless it operates abnormally. Daily inspection and maintenance are not required.

3.1 Terminal Box Inspection

3.1.1 Checking for Moisture and Performing the Required Maintenance

Remove the cover of the terminal box and check for moisture. If the inside is very damp, use a hair drier to dry the inside of the box. If you have a spare desiccative, replace the desiccative (approx. 30 g of silica gel).

3.1.2 Checking for Corrosion and Performing the Required Maintenance

Check that corrosive gas has not entered the terminal box and corroded the terminals and conductors. If the corrosion is excessive and problems such as poor contact and disconnection seem likely, replace the corroded parts. When crimping terminal lugs of the core wires are replaced, make sure not to lose the connection number label (mark band).

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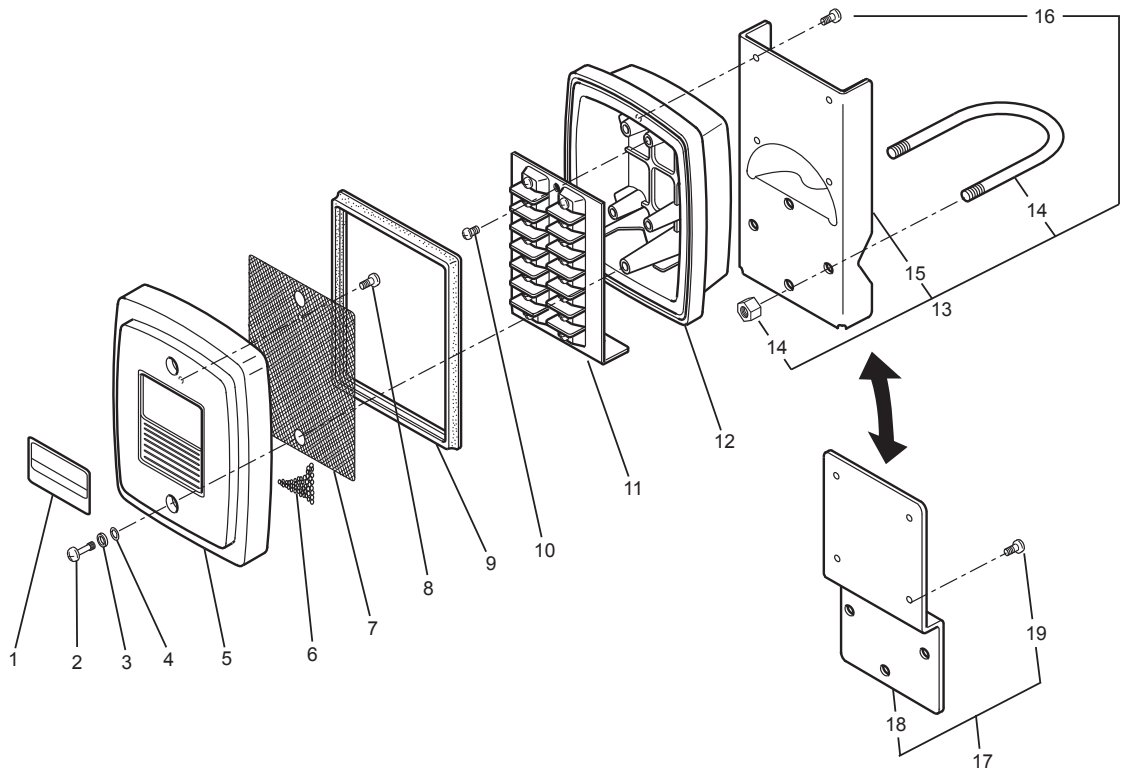
Customer Maintenance Parts List

WTB10-PH1, -PH2
WTB10-PH3, -PH4
WTB10-PH5, -PH6
Terminal Box



Item	Partt No.	Qty	Description
1	K9316NR	1	Nameplate
2	K9141XM	2	Screw
3	K9141XN	2	Gasket
4	G9303NB	2	O-Ring
5	K9141XD	1	Cover
6	K9020XR	1	Desiccative (30g)
7	K9141XT	1	Plate
8	Y9304LB	2	B.H. Screw, M3 x 4
9	K9141XQ	1	Gasket
10	Y9405LB	2	B.H. Screw, M4 x 5
11	—	1	Terminal Assembly
	K9316PA		For WTB10-PH1, -PH2
	K9316QA		For WTB10-PH3, -PH4
	K9316PA		For WTB10-PH5, -PH6
12	—		Case
	K9141XA	1	For WTB10-PH1, -PH3, -PH5
	K9148UM		For WTB10-PH2, -PH4, -PH6
13	K9141SA	1	Bracket Assembly (for pipe mounting); option
14	D0117XL-A	1	U-Bolt Assembly
15	K9141SB	1	Bracket
16	Y9508JU	2	Pan H. Screw, M5 x 8
17	K9141SC	1	Bracket Assembly (for wall mounting); option
18	K9141SD	1	Bracket
19	Y9508JU	2	Pan H. Screw, M5 x 8

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CMPL 19D01B01-01E
1st Edition : Nov. 1999 (YK)
7th Edition : May. 2011 (YK)

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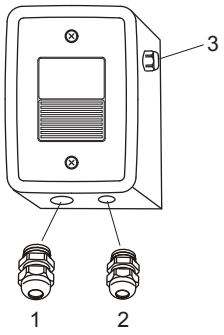

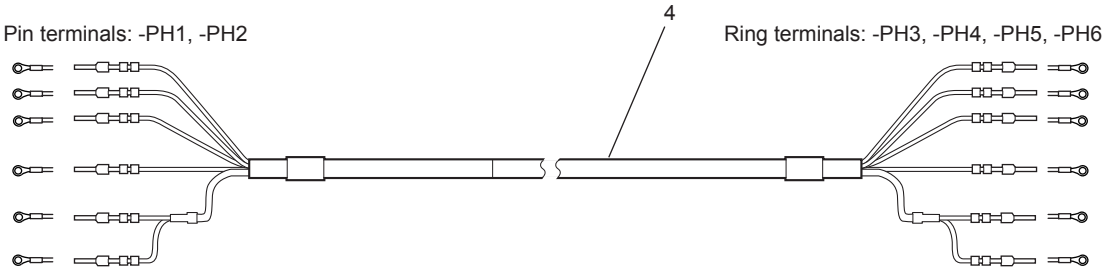

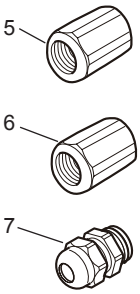

Item	Partt No.	Qty	Description
1	B1002JZ	1	Cable Gland (JIS A15)
2	B1001JZ	1	Cable Gland (JIS A8)
3	K9148UN	1	Cable Gland (for WTB10-PH2, - PH4, -PH6)
4	—	1	Cable Assembly
	K9316RU		Cable length 5 m (for WTB10-PH1, -PH2)
	K9316RV		Cable length 10 m (for WTB10-PH1, -PH2)
	K9316RW		Cable length 15 m (for WTB10-PH1, -PH2)
	K9316RX		Cable length 20 m (for WTB10-PH1, -PH2)
	K9316VA		Cable length 5 m (for WTB10-PH3, -PH4)
	K9316VB		Cable length 10 m (for WTB10-PH3, -PH4)
	K9316VC		Cable length 15 m (for WTB10-PH3, -PH4)
	K9316VD		Cable length 20 m (for WTB10-PH3, -PH4)
	K9316WA		Cable length 5 m (for WTB10-PH5, -PH6)
	K9316WB		Cable length 10 m (for WTB10-PH5, -PH6)
	K9316WC		Cable length 15 m (for WTB10-PH5, -PH6)
	K9316WD		Cable length 20 m (for WTB10-PH5, -PH6)
5	K9141TX	1	Conduit Adapter (G 1/2) ; option
	K9311KQ	1	Conduit Adapter (1/2 NPT); option
6	K9141TY	1	Conduit Adapter (G 1/2) ; option
	K9311KR	1	Conduit Adapter (1/2 NPT) ; option
7	B1002JZ	1	Cable Gland ; option

Revision Information

- Title : WTB10-PH□ Terminal Box
- Manual No. : IM 19D01B01-01E

Feb. 2020/7th Edition
Added FLXA402 to -PH1, -PH3, -PH4 (P.1-2, 2-3)

May 2016/6th Edition
Deleted for Special pH/ORP sensors and added for PH4/OR4.

Nov. 2015/5th Edition
Added for FLXA202, CMPL 19D01B01-01E revised to 7th edition.

Jun. 2011/4th Edition
Remake and all pages changed, CMPL 19D01B01-01E revised to 6th edition.

Apr. 2008/3rd Edition
M3 ring terminals added for PH450G, CMPL 19D01B01-01E revised to 5th edition.

Jun. 2007/2nd Edition
All over revised.

Oct. 2000/1st Edition
Newly published.

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