

**PH4B  
pH Sensor for Small Culture Tank**

IM 12B10B00-02EN

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# Introduction

Thank you for purchasing the PH4B pH Sensor for Small Culture Tank.

Please read the following respective documents before installing and using the sensors.

Other relevant models are described in the following manuals.

Equipment	Model	Model name	Manual
<b>Transmitter</b>	FLXA202/FLXA21	2-Wire Analyzer	IM 12A01A02-01E etc.
<b>Terminal box</b>	WTB10	Terminal box	IM 19D01B01-01E
<b>Distributor</b>	PH201G	Distributor	IM 19B01E04-02E
	VJA1, MA1, etc.	Distributor	IM 77J01A01-01E, IM 77J04A01-01E etc.
<b>Accessories</b>	PH8AX	Accessories for pH meter	IM 12B07W03-01E

Check the following when you receive the product:

- Appearance
- Model Name and Suffix Codes (on nameplate of packing box, See chapter 2)

If you have any questions, contact our sales representative or your local distributor.

## ■ 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.
- Some drawings may be partially emphasized, simplified, or omitted, for the convenience of description.

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# Safety Precautions

## ■ 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.
- If any protection or safety circuit is required for the system controlled by the product or for the product itself, prepare it separately.
- 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 words are used in this manual.

### **CAUTION**

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

### **NOTE**

This symbol indicates information that complements the present topic.

## ■ 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.

## ■ Trademark Acknowledgments

- FLEXA, FLXA are the registered trade marks or trade names of Yokogawa's products.
- All other company and product names mentioned in this user's manual are trademarks or registered trademarks of their respective companies.
- We do not use TM or ® mark to indicate those trademarks or registered trademarks in this user's manual.

# PH4B

## pH Sensor for Small Culture Tank

IM 12B10B00-02EN 2nd Edition

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# 1. Specifications

Model PH4B pH Sensor for Small Culture Tank is used for the pH measurement in culture using media containing a lot of protein or of tissue cultures for animals and plants. This pH sensor can be sterilized in an autoclave. The pH sensor can also be sterilized with steam if the sensor is mounted.

## NOTE

Some specifications are printed on a nameplate of sensor itself, but specifications of PH4B are as follows.

Measuring range:	pH 0 to 12
Measuring temperature:	0 to 100°C (applicable for autoclave) max. 130°C for sterilization
Measuring pressure:	Atmospheric pressure to 250kPa (PH4B is subject to restriction of the inner pressure which remains in the sensor)
Electrolyte inner solution:	High viscosity gel including KCl
RTD (Temperature element):	None (Select manual temperature compensation on the converter or transmitter.)
Diaphragm:	Ceramic junction x 1
Head form:	K8
Cable:	K8
Cable jacket material:	Polyvinyl Chloride (PVC)
Cable measuring temperature:	-25 to 85°C
Insertion Length:	120, 200, 325 mm
Glass tube diameter:	12 mm
Wetted part material:	Body; Glass, O-ring; Silicon rubber, Perfluoroelastomer (FFKM)
Reference electrode:	Silver ion trap
Applicable holder:	(When a holder is needed, consult sales personnel.)

## NOTE

Sensors mentioned above cannot be used outdoors or with guide holders.

Installation from lower position or a horizontal position is not possible. Install to the vertical position of more than 15 degrees against the horizontal portion.

Do not use PH4B at areas where a gas atmosphere and a dust atmosphere are or could be present, since IECEx/ATEX approval and TIIS approval are not certificated.

# 2. Model and Suffix Codes

Model	Suffix Code	Option Code	Specifications
<b>PH4B</b>	.....	.....	pH Sensor for Small Culture Tank
Insertion Length	<b>-120</b>	.....	120 mm
	<b>-200</b>	.....	150 mm
	<b>-325</b>	.....	325 mm
Cable Length	<b>-00</b>	.....	No Cable *1
	<b>-03</b>	.....	3 m
	<b>-05</b>	.....	5 m
	<b>-10</b>	.....	10 m
Terminal Type *2	<b>D</b>	.....	Cable for PH400G (Fork Terminal)
	<b>E</b>	.....	Cable for PH202, FLXA202/FLXA21 (Pin Terminal)
	<b>N</b>	.....	No Cable *1
—	<b>-N</b>	.....	Always -N
Option	O-Ring	<b>/PF</b>	Perfluoroelastomer (FFKM) *3

\*1: When using sensor only, select cable length -00 and Terminal type N.

\*2: When terminal box is used, select WTB10-PH1.

\*3: Select perfluoroelastomer when sensor is used in organic solvent, high alkaline or high temperature alkaline solution.

Model name and suffix codes are shown on a nameplate of the product's packing box. Note that the model name on the packing box is different from the one on a nameplate of the product itself.

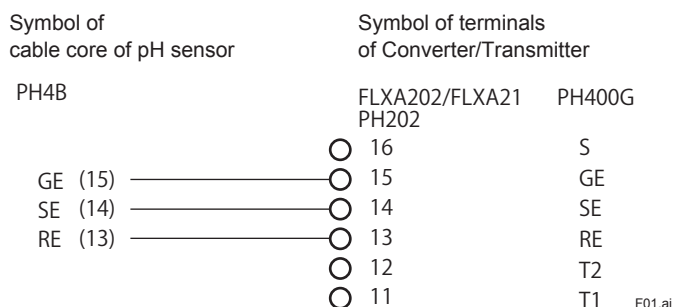
### ● Spare Parts

Part Name	Part Number	Remarks
Fork Terminal Cable for PH400G Terminal Type: D	3 m	K9691MN
	5 m	K9691MP
	10 m	K9691MQ
Pin Terminal Cable for PH202, FLXA202/ FLXA21 Terminal Type: E	3 m	K9691PN
	5 m	K9691PP
	10 m	K9691PQ
O-Ring	Silicon rubber	K9691KC
	Perfluoroelastomer (FFKM)	K9319RJ
Buffer solution for calibration (pH4)	K9084LL	Six 250 mL polyethylene bottles
Buffer solution for calibration (pH7)	K9084LM	Six 250 mL polyethylene bottles
Buffer solution for calibration (pH9)	K9084LN	Six 250 mL polyethylene bottles
Powder for buffer solution (pH4)	K9020XA	12 bags, each for preparation of 500 mL
Powder for buffer solution (pH7)	K9020XB	12 bags, each for preparation of 500 mL
Powder for buffer solution (pH9)	K9020XC	12 bags, each for preparation of 500 mL

Note: The pH value of the calibrating buffer solution may vary depending on storage conditions.

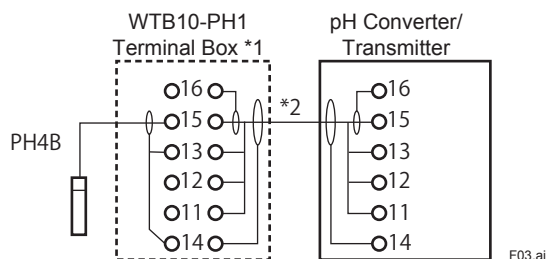
## 3. Wiring Diagrams

Symbols (alphabet / number) are assigned to each cable core of pH sensor, depending on the form of each cable terminal.



Note: Since RTD is not available, there is no wire connection to Converter/Transmitter 11 (T1) or 12 (T2). There is no wire connection to Converter/Transmitter 16 (S).

### ● When using Terminal box WTB10



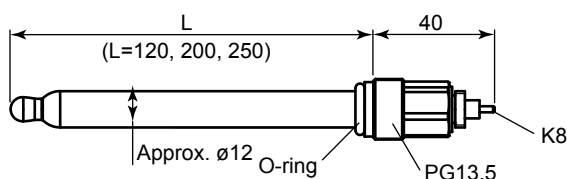
\*1: Terminal box is used only where pH/ORP transmitter is installed remotely from pH or ORP sensor (normally not needed).

\*2: This cable is specified in the option code for the terminal box.

For combined system with WTB10, maximum cable length including sensor cable length should be within 20 m.

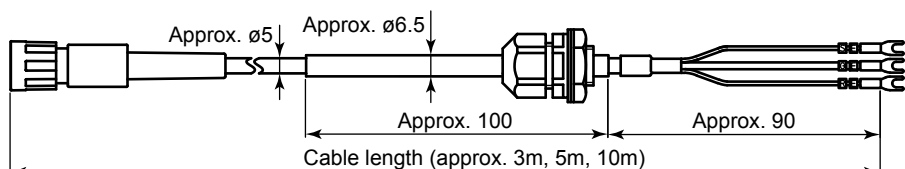
## 4. Dimensions

Unit: mm

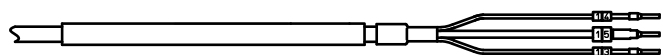


### ● K8 cable for PH4B

Unit: mm



Terminal Type: D



Terminal Type: E

## 5. Use

This sensor is only to be used for the intended purpose and under safe conditions. Improper use or misuse can be dangerous.

### CAUTION

Since these sensors are made of glass, they should be handled with care.

Take care that the PG13.5 thread and the O-ring are not damaged while the sensor is installed into the adapter etc.

### CAUTION

Be sure to carry out sterilization in autoclaves or steam sterilization in mounting sensor to a culture tank at 130°C or less.

### 5.1 Preparing

Carefully remove the storage cap by turning a screw located at a blue gasket. Rinse the sensor with water. Check the interior of the pH glass membrane for air bubbles. Allow any bubbles to rise to the top by shaking the sensor gently.

### 5.2 Electrical wiring

The sensors are equipped with a K8 connector head.

Before connecting the sensor to the cable, check that the connections are clean and dry. Do not touch the electrical contacts!



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Connectors especially should not be disconnected in moisture condensing environments. Unstable signals, low slope or long response time could indicate a moist or contaminated connector. Clean the connector head with a paper towel moistened with ethanol. Dry the connector head after this procedure with a dry paper towel.

### 5.3 Storage

Sensors should be stored with the storage cap attached, containing 1.5 to 2 mL of 3.3 mol/L KCl solution. Sensors stored dry exhibit temporary drifting values. If the sensor dries out inadvertently, it can be placed in 3.3 mol/L KCl solution, or pH standard buffer solution overnight to regenerate.

### 5.4 Regenerating

Entire regenerating is not always guarantee.

Immerse sensor for 10 min in 0.1 – 1M NaOH, then for 10 min in 0.1 – 1M HCl. After regeneration, place the sensor in 3.3 mol/L KCl solution for a further 15 min.

### 5.5 General

The new sensor is pre-pressurized at about 250 kPa. This pressure, after one year, at the liquid junction, will decrease to about half at normal ambient temperatures and atmospheric pressure. Taking this decrease into account, use the sensor. If the pressure of a sample solution becomes higher than the inner pressure of the sensor, the solution will permeate gel electrolyte in the sensor. As a result, the sensor can become unusable.

A rough change of the sensor inner pressure can be known by the air layer length of a narrow tube in the sensor. The higher the internal pressure, the shorter the air layer.

The life cycle of sensors is determined by requirements regarding response time, zero point and slope.

Some of harsh measurement conditions might shorten life cycle. There is also a slight ageing factor during storage, therefore avoid a long period of storage. Use within a year is recommended.

Do not clean the sensor with ultrasonic instrument which could destroy its internal gel electrolyte.

O-rings are subject to wear and tear and should be replaced regularly, at least once per year. Refer to “spare parts” regarding the parts number of O-rings.

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# Revision Record

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