

PH4B pH Sensor for Small Culture Tank

IM 12B10B00-02EN

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
Converter	FLXA402	4-Wire Converter	IM 12A01F02-01EN etc.
Transmitter	FLXA202/FLXA21	2-Wire Analyzer	IM 12A01A02-01E etc.
Terminal box	WTB10	Terminal box	IM 19D01B01-01E
Distributor	PH201G	Distributor	IM 19B01E04-02E
	VJA1, MA1, etc.	Distributor	IM 77J01A01-01E, IM 77J04A01-01E etc.
Accessories	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.

■ 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.

Safety Precautions

■ 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.

■ 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.

■ 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.

PH4B

pH Sensor for Small Culture Tank

IM 12B10B00-02EN 4th 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
PH4B	.....	.....	pH Sensor for Small Culture Tank
Insertion Length	-120 -200 -325	..... ..... .....	120 mm 150 mm 325 mm
Cable Length	-00 -03 -05 -10	..... ..... ..... .....	No Cable *1 3 m 5 m 10 m
Terminal Type *2	D E N	..... ..... .....	Cable for PH400G (Fork Terminal) Cable for FLXA402, PH202, FLXA202/FLXA21 (Pin Terminal) No Cable *1
—	-N	.....	Always -N
Option	O-Ring	/PF	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	For PH4B
	5 m	K9691MP	
	10 m	K9691MQ	
Pin Terminal Cable for PH202, FLXA202/ FLXA21 Terminal Type: E	3 m	K9691PN	For PH4B
	5 m	K9691PP	
	10 m	K9691PQ	
O-Ring	Silicon rubber	K9691KC	For PH4B
	Perfluoroelastomer (FFKM)	K9319RJ	For PH4B, PH4P, PH4PT, PH4F, PH4FT, PH4C, PH4CT (Option code: /PF)
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.

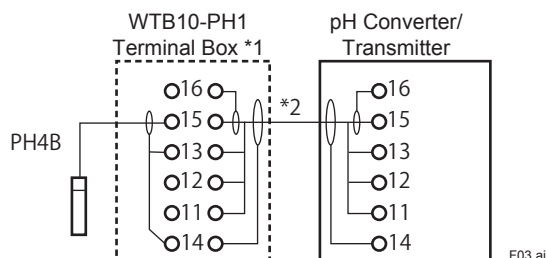
3. Wiring Diagrams

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

Cable core of pH sensor PH4B	Terminal of Converter/Transmitter
	FLXA402 FLXA202/FLXA21 PH202
	PH400G
GE (15)	○ 16 S
SE (14)	○ 15 GE
RE (13)	○ 14 SE
	○ 13 RE
	○ 12 T2
	○ 11 T1

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).

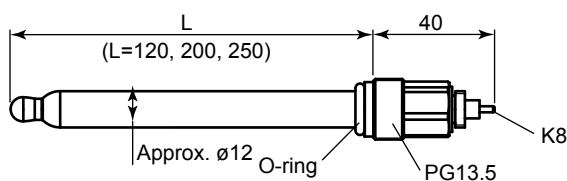
● When using Terminal box WTB10



- *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.

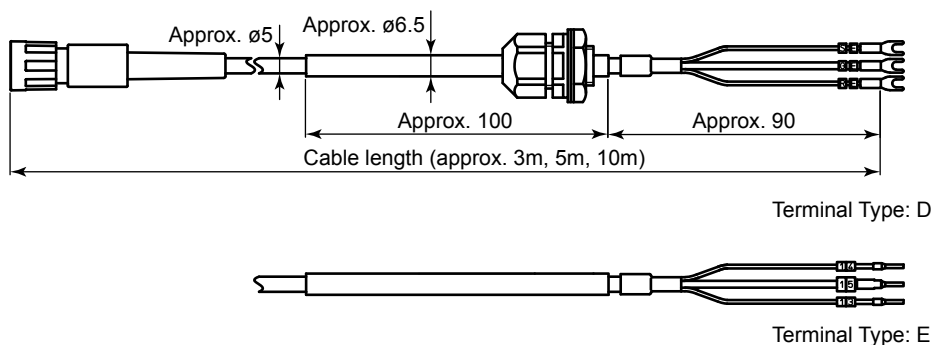
4. Dimensions

Unit: mm



● K8 cable for PH4B

Unit: mm



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!

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.

Revision Record

- Manual Title : PH4B pH Sensor for Small Culture Tank
- Manual No. : IM 12B10B00-02EN

Sep. 2023/4th Edition

Revised/added ■After-sales warranty. (Introduction)

Feb. 2020/3rd Edition

Added a terminal connection to -E: FLXA402 to Pin terminal (p.i, 1, 2)

Mar. 2018/2nd Edition

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