
Instruction Manual

Model PH21



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1. Preface

1.1 Introduction

The PH21 is a 3/4" inch wide body sensor specifically designed for water and wastewater industry.

The sensor is designed for easy installation into on-line and immersion applications via the 3/4" NPT threaded connections provided on both ends of the sensor. Optional quick-removal stainless steel adapters are available to make calibration and maintenance even easier.

User's Manual

Contents	Document number	Note
Start-up Manual SA11 Smart Adapter	IM 12A06S01-01Z1-(P)	Attached to the product
User's Manual (English version) SA11 Smart Adapter	IM 12A06S01-00EN-(P)	Available for download
User's Manual (Japanese version) SA11 Smart Adapter	IM 12A06S01-00JA-(P)	Available for download
FLXA402 4-wire Analyzer User's Manual	IM 12A01F01-02	Attached to the product
UM33A-S00 Digital Indicator	IM 05P09D21-11EN	Attached to the product

The "E" or "EN" in the document number is the language code for English version, the "JA" indicates the Japanese version and the "Z" indicates it is a multi-language document.

Downloads can be done from: <https://www.YOKOGAWA.com/solutions/productsplatforms/process-analyzers/liquid-analyzers/#Downloads>

You can use the QR-code for quick-access.



NOTE

- 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.

1.2 Unpacking and Checking

Upon delivery, unpack the sensor carefully and inspect it to ensure it was not damaged during shipment. If damage is found, retain the original packing materials and then immediately notify the carrier and the relevant Yokogawa sales office. Make sure the Model Code and Serial Number on the sensor are the same as on the packing list. Also, check any option(s) that were ordered are included and correct.

1.3 Warranty and Service

Yokogawa products and parts are guaranteed free from defects in workmanship and material under normal use and service for a period of (typically) 12 months, from the date of shipment from the manufacturer. Individual sales organizations can deviate from the typical warranty period and the conditions of sale, relating to the original purchase order should be consulted. Damage caused by wear and tear, inadequate maintenance, corrosion, or by the effects of chemical processes are excluded from this warranty coverage. In the event of warranty claim, the defective goods should be sent (freight paid) to the Service Department of the relevant sales Organization, for repair or replacement (at Yokogawa's discretion).

The following information must be included in the letter accompanying the returned.

Goods:

- Model Code and Serial Number.
- Original Purchase Order and Date.
- Length of time in service and description of the process.
- Description of the fault and circumstances of the failure.
- Process/environmental conditions that may be related to the failure of the sensor.
- Statement as to whether warranty or no warranty service is requested.
- Complete shipping and billing instructions for return of material, plus the name and phone number of a contact person that can be reached for further information.
- Clean Statement .

Returned goods that have been in contact with process fluids must be decontaminated and disinfected prior to shipment. Goods should carry a certificate to this effect, for the health and safety of our employees. Material Safety Data sheets must be included for all components of the process to which the sensor (options) have been exposed.

1.4 Serial number

The Serial number is defined by nine (9) alphanumeric characters:

X ₁ X ₂	Production location
X ₃ X ₄	Year/Month code
X ₅ X ₆ X ₇ X ₈ X ₉	Tracking number
Example:	N3P600028

Method used for year/month numbering

Table 1: Production Year code

Year	Year code	Year	Year code
2014	P	2026	3
2015	R	2027	4
2016	S	2028	5
2017	T	2029	6
2018	U	2030	7
2019	V	2031	8
2020	W	2032	9
2021	X	2033	A
2022	Y	2034	B
2023	Z	2035	C
2024	1	2036	D
2025	2	2037	E

Table 2: Production Month code

Month	Month code
January	1
February	2
March	3
April	4
May	5
June	6
July	7
August	8
September	9
October	A
November	B
December	C

2. General specifications

2.1 Measuring elements

: pH glass electrode
 : Silver Chloride reference
 : Pt1000 temp sensor

2.2 Wetted parts

Sensor body : PPS
 Measuring sensor : G-Glass
 O-ring : Viton
 Reference junction : PTFE

2.3 Functional specifications (at 25°C)

Isothermal point : pH7
 Reference system : Ag/AgCl
 Glass impedance : 100-300 MΩ
 Junction resistance : < 1 KΩ
 Temperature element : Pt1000 IEC 751
 Asymmetry potential : 8 mV ± 15 mV
 Linearity pH (Slope) : >96% in pH 2-12

2.4 Dynamic specifications (at 25°C)

Response time pH step 7 to 4 : 15 sec for 90%
 Response time temp step 10°C : 160 sec
 Stabilization time
 (0.02 pH unit/10 s) : < 2 minutes

2.5 Operating range

pH : 0-14 pH
 Temperature : 0°C ... +60°C (32°F...140°F)
 Pressure (at 25°C) : 0 to 5 Bar (0 to 72 PSIG)
 Pressure (at 70°C) : 0 to 5 Bar (0 to 72 PSIG)
 Conductivity : > 50 μS/cm

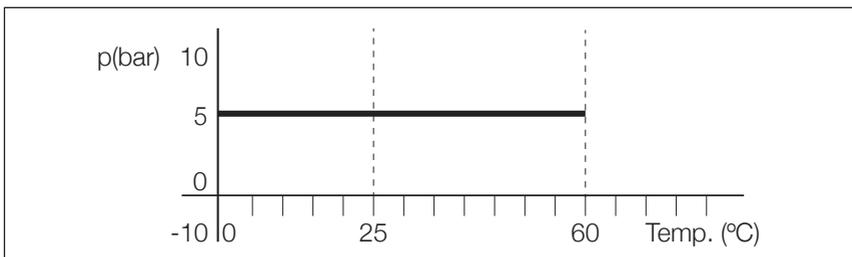


Figure 1: Graph p(bar) vs Temperature (°C)

Note: The pH operating range at room temperature is 0-14pH, but at high temperatures the lifetime will be seriously shortened outside 3-11 pH range.

2.7 Regulatory standards

-CE	: Decision 768/2008/EC
-ROHS II	: Directive 2011/65/EU Applying article category 9; Industrial monitoring and control instruments; ion selective electrodes

2.8 Shipping details

Package size (l x W x H)	: 300 x 100 x 75 mm : 11.8 x 3.9 x 3.0 inch
Package weight (max.)	: 0.20 kg (0.44 lbs)

2.9 Environmental conditions

Storage temperature	: -10 to +50 °C (14 to 122 °F)
Water proof	: IP67 (conform IEC 60529)

2.10 Mechanical Specifications

Max torque on sensor body	: 12 Nm
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3. Installation of PH21

For optimum measurement results, the PH21 should be installed in a location that offers an acceptable representation of the process composition and DOES NOT exceed the specifications of the sensor.

3.1 Typical installation

The PH21 sensor is designed for versatile in-line, immersion or off-line installation. For best results the PH21 should be mounted with the process flow coming towards the sensor, and positioned at least 15° above the horizontal plane to eliminate air bubbles in the pH glass bulb (see Figure 2).

3.2 Preparing the sensor for use

Remove the sensor from its shipping box and remove the so-called 'wet pocket', the tube filled with solution to prevent drying out of the measuring elements during shipment or storage. It is recommended to calibrate the sensor before first use. A general calibration procedure is described in section 6 of this Instruction Manual.

3.3 Mounting the sensor

The simplest mounting method is to use one of the 3/4" NPT threaded connection of the sensor. Apply Teflon tape to the appropriate threaded end, then install the sensor in the process (see Figure 3).

Note: Do not overtighten the sensor body. Max. Torque applicable in paragraph 2.10

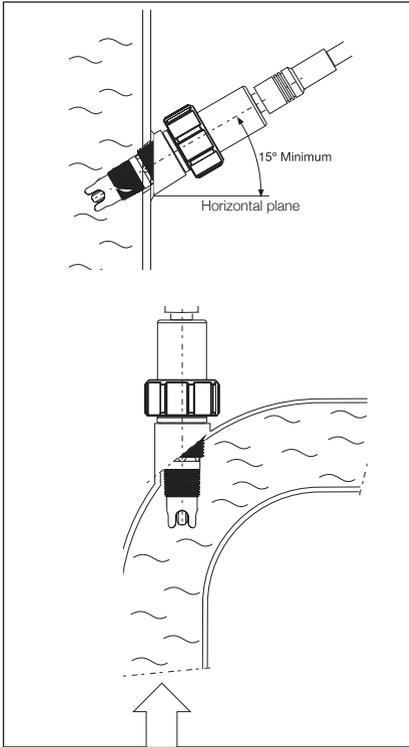


Figure 2 : Typical installation

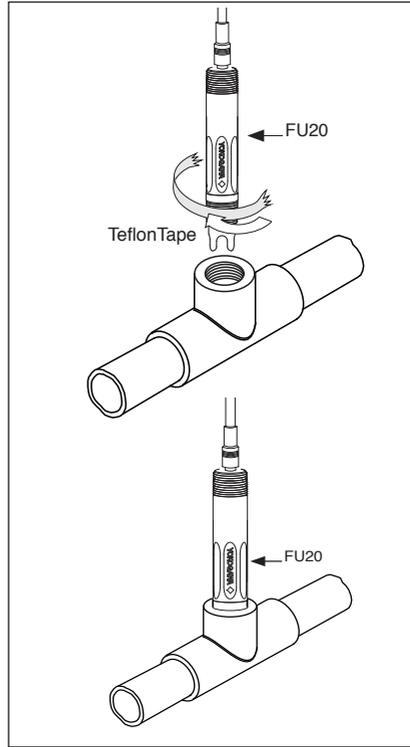


Figure 3: Mounting method

4. Dimensions

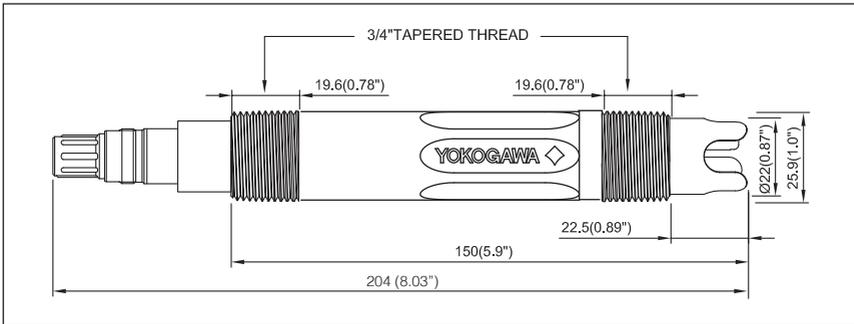


Figure 4: Dimensions PH21

5. Connections

The PH21 sensor is provided with a 8 pins Variopin connector. This sensor will only work in combination with the SMART Adapter SA11 by ID recognition.

6. General calibration & maintenance procedure

6.1 Calibration of the PH21 sensor

To calibrate the PH21 pH sensor, two buffer solutions with known pH values are required. It is recommended that one buffer solution has a value near to pH 7.00. Depending on the process value to be measured, the second buffer solution should be either acidic (below pH 7.00) or alkaline (above pH 7.00). Normally the IEC buffers (pH 4.01, 6.87 and 9.18) are used.

The following is a very general 2-point calibration procedure:

1. Clean the sensor using a 5% solution of HCl;
2. Rinse sensor thoroughly with tap water;
3. Immerse the sensor in the first buffer (pH 6.87 is recommended) and execute calibration as described in the Instruction Manual of the analyzer;
4. Rinse sensor thoroughly with tap water;
5. Immerse the sensor in the second buffer (pH 4.01 or 9.18 is recommended) and execute calibration as described in the Instruction Manual of the analyzer/ digital indicator and SENCOM SMART adapter;
6. Rinse sensor thoroughly with demineralized water. During calibration, the temperature compensation should be active. The SA11 Smart Adapter automatically compensates for the sensitivity change of the pH sensor at different temperatures. After calibration, replace or re-install the sensor into the process.

6.2 Maintenance of the PH21 sensor

A pH sensor requires routine maintenance to keep the measuring elements clean and functioning. Depending on the process, different cleaning solutions may be required. Avoid cleaning the complete sensor with solution. Some cleaning solutions will damage the model code sticker and connector which are placed on top of the sensor. Only clean the measuring elements at the bottom side of the sensor.



WARNING

Avoid cleaning the complete sensor with solution. Some cleaning solutions will damage the model code sticker and connector which are placed on top of the sensor. Only clean the measuring elements at the bottom side of the sensor.

In most cases cleaning with water (except the Variopin connector), iso-propanol or methanol is sufficient. In other cases the measuring elements of the sensor have to be cleaned with specific solutions.

Note: Variopin connector can be cleaned with iso-propanol. Please do not use water or methanol.

Examples:

1. Deposits of limes, hydroxides or carbonates can be removed by immersing the bottom part of the sensor in a solution containing dilute hydrochloric acid (5% is recommended). Afterwards rinse the sensor with water;
2. Deposits of oil and fat can be removed with hot water with a detergent. When the results are unsatisfactory, a mild (carbonate based) abrasive can be used;

- Protein deposits should be removed with a protein enzymatic solution, for instance a solution containing 8.5 mL concentrated hydrochloric acid and 10 grams of pepsin in 1 liter of water.

The Teflon diaphragm of the sensor can be regenerated by putting it in hot ($\pm 70^{\circ}\text{C}$, 158°F) 3 molar Potassium Chloride (KCl) solution and letting it cool down to room temperature. This procedure clears the diaphragm and will soak the diaphragm with conductive KCl again.

7. Model codes

Model	Suffix code	Option code	Description
PH21			Wide Body sensor specially for water and wastewater applications
Connection	-VS		Vario Pin with ID-chip for Sencom connector
Type	-RTD		PPS body / Tapered Thread / Dome shaped
Style	-NN		Always -NN
Options		/HCNF /FPS /NSS /BSS	Complete Hastelloy cleaning system Adapter F*40 from PPO 1" NPT, SS316 1" BSP, SS316

Cleaning system for PH21

Some applications require frequent cleaning of the electrode. For these applications Yokogawa designed a chemical cleaning system that can either be used in the Yokogawa fitting range (HCN2, HCN3 or HCN4) or as back-end mounting option for the PH21. The /HCNF option comes with a hastelloy cleaning nozzle, stainless steel mounting and ferrules sets and a nylon tube of 10 meters.

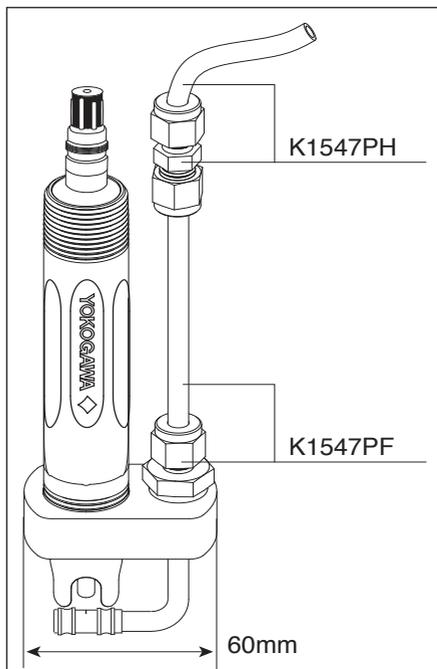


Figure 5: Cleaning system

8. Spare parts

Part number	Part number
K1523DD	/FPS PH21 -mounting in F*40
K1547PK	/NSS Adapter 1" NPT, SS 316 for PH21
K1547PL	/BSS Adapter 1" BSP, SS 316 for PH21
K1520BB	Buffer solution (3*500 ml) pH 1.98
K1520BC	Buffer Solution (3*500 ml) pH 4.01
K1520BD	Buffer Solution (3*500 ml) pH 6.87
K1520BE	Buffer Solution (3*500 ml) pH 9.18

YOKOGAWA ELECTRIC CORPORATION

World Headquarters

9-32, Nakacho 2-chome, Musashino-shi
Tokyo 180-8750
Japan

www.yokogawa.com

YOKOGAWA CORPORATION OF AMERICA

2 Dart Road
Newnan GA 30265
USA

www.yokogawa.com/us

YOKOGAWA EUROPE BV

Euroweg 2
3825 HD AMERSFOORT
The Netherlands

www.yokogawa.com/eu

YOKOGAWA ELECTRIC ASIA Pte. LTD.

5 Bedok South Road
Singapore 469270
Singapore

www.yokogawa.com/sg

YOKOGAWA CHINA CO. LTD.

3F Tower D Cartelo Crocodile Building
No.568 West Tianshan Road Changing District
Shanghai, China

www.yokogawa.com/cn

YOKOGAWA MIDDLE EAST B.S.C.(c)

P.O. Box 10070, Manama
Building 577, Road 2516, Busaiten 225
Muharraq, Bahrain

www.yokogawa.com/bh

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