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# Instruction Manual

Model FU24

pH/ORP Combination sensor  
with pressure compensation



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**YOKOGAWA** ◆

IM 12B06J03-03E-E  
10th edition



(BG)

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(CZ)

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(EST)

Kõik ATEX Ex toodete kasutamishendid on esitatud inglise keeles. Ex seadmete muukeelse dokumentatsiooni saamiseks pöörduge lähima lokagava (Yokogawa) kontori või esindaja poole.

(E)

Todos los manuales de instrucciones para los productos antiexplosivos de ATEX están disponibles en inglés. Si desea solicitar las instrucciones de estos artículos antiexplosivos en su idioma local, deberá ponerse en contacto con la oficina o el representante de Yokogawa más cercano.

(F)

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(GB)

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(GR)

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(H)

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(I)

Tutti i manuali operativi di prodotti ATEX contrassegnati con Ex sono disponibili in inglese. Se si desidera ricevere i manuali operativi di prodotti Ex in lingua locale, mettersi in contatto con l'ufficio Yokogawa più vicino o con un rappresentante.

(LV)

Visas ATEX Ex kategorijas izstrādājumu Lietošanas instrukcijas tiek piegādātas angļu valodās. Ja vēlaties saņemt Ex ierīšu dokumentāciju citā valodā, Jums ir jāsazinās ar firmas Jokogava (Yokogawa) tuvāko ofisu vai pārstāvi.

(LT)

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(M)

Il-manwali kollha ta' l-istruzzjonijiet għal prodotti marbuta ma' ATEX Ex huma disponibbli bl-Ingliż. Jekk tkun teħtieġ struzzjonijiet marbuta ma' Ex fil-lingwa lokali tiegħek, għandek tikkuntattja lill-eqreb rappreżentant jew ufficiċju ta' Yokogawa.

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(P)

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(PL)

Wszystkie instrukcje obsługi dla urządzeń w wykonaniu przeciwwybuchowym Ex, zgodnych z wymaganiami ATEX, dostępne są w języku angielskim. Jeżeli wymagana jest instrukcja obsługi w Państwa lokalnym języku, prosimy o kontakt z najbliższym biurem Yokogawy.

(RO)

Toate manualele de instructiuni pentru produsele ATEX Ex sunt in limba engleza. In cazul in care doriti instructiunile in limba locala, trebuie sa contactati cel mai apropiat birou sau reprezentant Yokogawa.

(S)

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(SF)

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(SK)

Všetky návody na obsluhu pre prístroje s ATEX Ex sú k dispozícii v jazyku anglickom. V prípade potreby návodu pre Ex-prístroje vo Vašom národnom jazyku, skontaktujte prosím miestnu kanceláriu firmy Yokogawa.

(SLO)

Vsi predpisi in navodila za AEX Ex sorodni pridelki so pri roki v angliščini. Če so Ex sorodna navodila potrebna v vašem tukejnem jeziku, kontaktirajte vaš najbliži Yokogawa office ili predstavnika.





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## 1. PREFACE

### 1.1 Introduction

This instruction manual provides information for the installation and use of the FU24 four-in-one wide body pH sensor, which is especially designed for harsh process applications.

The Model FU24 offers a simple and cost effective solution for process applications with fluctuating pressure and/or temperature which normally limit the lifetime of a sensor.

By using the patented Bellow system a strong pressure compensation mechanism is created. This ensures immediate interior pressure equalization to the outside process pressure, making the sensor virtually insensitive to process pressure variations.

A slight overpressure caused by the bellow tension prevents process fluid ingress and maintains a positive ion flow out of the sensor. This feature is of particular interest in pure water applications.

This all-in-one sensor provides simultaneous measurement of pH, redox (ORP) and temperature if desired. The rugged PPS 40GF body is designed for easy installation via the 1" NPT threaded connections provided on both ends of the sensor.

The FU24 sensor is available in two types:

- With fixed cable, 5 and 10 metres.
- With VarioPin connector:  
(VP and VS-model)

The VP model can be used with an analogue analyzer in combination with universal WU10-V-S cable or halogon free WE10-H-D cable. Both cables are available in different lengths.

The VS model can be used with SA11-P1 Smart Adapter which is placed directly on top of this connector, or remotely connected using the 3 meter WE10-H-D-003-V1 cable.

### 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 non-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 <sub>1</sub> X <sub>2</sub>	Production location
X <sub>3</sub> X <sub>4</sub>	Year/Month code
X <sub>5</sub> X <sub>6</sub> X <sub>7</sub> X <sub>8</sub> X <sub>9</sub>	Tracking number

Example: N3P600028

**Table 1:**

Year	Yearcode	Year	Yearcode
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:**

Month	Monthcode
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  
 : Solid platinum electrode  
 : Pt1000 temperature sensor.

### 2.2 Wetted parts

Sensor body : PPS 40GF  
 Earthing pin : Solid Platinum  
 Measuring sensor : G-glass  
 LE glass tube : AR-glass  
 O-ring : Viton  
 Reference junction : Porous PTFE  
 Bellow system : Viton

### 2.3 Functional specifications (at 25°C)

Isothermal point : pH 7  
 Reference system : Ag/AgCl with saturated KCl  
 Glass impedance  
 - Dome shape : 100 M $\Omega$  nominal  
 - Flat Surface : 500 M $\Omega$  nominal  
 Junction resistance : 1.0 to 15 k $\Omega$   
 Liquid outlet : non-flow double junction  
 Temperature element : Pt1000 to IEC 751  
 Asymmetry potential :  $8 \pm 15$  mV  
 Slope :  $> 96$  % (of theoretical value)

**Note:** The temperature sensor included in the FU24 is designed for cell compensation and for indication. It is **NOT** designed for process temperature control.

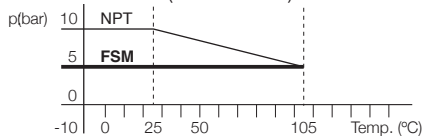
### 2.4 Dynamic specifications

Response time pH :  $t_{90} < 15$  sec. (for 7 to 4 pH step)  
 Response time temperature  
 - Dome shape :  $t_{90} < 1$  min. (for 10 °C step)  
 - Flat surface :  $t_{90} < 4$  min. (for 10 °C step)  
 Stabilization time pH :  $< 2$  min. (for 0.02 pH unit during 10 sec.)

### 2.5 Operating range

pH : 0 to 14  
 ORP : -1500 to 1500 mV  
 rH : 0 to 100  
 Temperature  
 - Dome shape : -10 to 105 °C (14 to 221 °F)  
 - Flat Surface : +15 to 105 °C (59 to 221 °F)

Pressure






Conductivity :  $> 10$   $\mu$ S/cm

**Note:** The pH operating range at room temperature is 0-14 pH, but at high temperatures or range outside 2-12 pH the lifetime will be seriously shortened.

**Note:** Sensor is suitable for pure water applications



## 2.6 Regulatory standards (Only for sensors without suffix -VS)

<b>CE</b>	: Decision 768/2008/EC	<b>CE</b>
- ATEX	: Directive 2014/34/EU, as amended by Regulation (EC) no. 1882/2003	
Certificate no.	: DEKRA 11ATEX0014 X	
Electrical data	:  II 1 G Ex ia IIC T3...T6 Ga	
	: For sensor input circuit connected to a certified intrinsically safe circuit with the following maximum values: U <sub>i</sub> = 18 V; I <sub>i</sub> = 170 mA; P <sub>i</sub> = 0.4 W; L <sub>i</sub> = 0 mH; C <sub>i</sub> = 0 nF (VP type) or 3.6 nF (permanently connected cable) or certified intrinsically safe Yokogawa pH/ORP transmitter Model FLXA21/ 202 series or Model PH202S series.	
Special conditions(X)	: T6 for Tamb. -40 °C to +40 °C T4 and T5 for Tamb. -40 °C to +55 °C T3 for Tam. -40 °C to +105 °C	
 <b>WARNING</b>	: Electrostatic charges on the sensor enclosure shall be avoided.	
- ROHS II	: Directive 2011/65/EU Applying articlecategory9; Industrial monitoring and control instrumentation selective electrodes.	
- Pressure	: Directive 2014/68/EU, as amended by Regulation (EC) no. 1882/2003	
Applying article	: 4.3 (Sound Engineering Practice) : Damaging the screw thread of the sensor might influence the maximum process pressure. : Sensor contains glass parts which if broken can cause cutting injuries.	
 <b>WARNING</b>		
<b>IECEX</b>		
Applying standards	: IEC 60079-0: 2012 IEC 60079-11: 2012 IEC 60079-26: 2007	
Certificate no.	: IECEX DEK 11.0064X Ex ia IIC T3...T6 Ga	

**Note:** When the sensor has been connected to none intrinsically safe equipment which exceeds the restrictions regarding the sensor input circuit (see electrical data), the sensor is not suitable anymore for intrinsically safe use.

2.7 Shipping details	FU24-05/10	FU24-VP/VS
Package size (LxWxH)	410x130x75 16.1x5.1x3.0	300x100x75 mm 11.8x3.9x3.0 inch
Package weight (max.)	0.92 kg (2.02 lbs)	0.33 kg (0.73 lbs)

## 2.8 Environmental conditions

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

## 2.9 Mechanical specifications

Max. torque on sensor body: 7,5 Nm

### 3. INSTALLATION OF FU24

For optimum measurement results, the FU24 should be installed in a location that offers an acceptable representation of the process composition and **DOES NOT** exceed the specifications of the sensor. The FU24 is designed with 1" NPT threaded connections on both ends of the sensor to allow installation in a wide variety of applications.

#### 3.1 Typical installation

The FU24 sensor is designed for versatile in-line, immersion or bypass loop installation. For best results the FU24 should be mounted with the process flow coming towards the sensor. The sensor can be mounted in all angles with respect to the horizontal plane.

#### 3.2 Preparing the sensor for use

Remove the sensor from its shipping box and slide off 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 is to use one of the 1" NPT threaded connection of the sensor. Apply Teflon tape to the appropriate threaded end, then install the sensor in the process. Tighten the sensor using a wrench on the sensor flats.

The FU24 can also be mounted in a FF20-\*22 and FF20-\*33 flow fitting or put in the process by making use of the FS20-\*22 and FS20-\*32 subassembly. In both cases this can be realized by using one of the spare part adapters

- 1 Apply Teflon tape to the threaded end of the sensor;
- 2 Install the sensor in the adapter. Tighten the sensor using a wrench on the sensor flats (see Figure 1 and 2).

**Note:** **DO NOT** over tighten the sensor to prevent damage. The maximum applicable torque is 7,5 Nm.

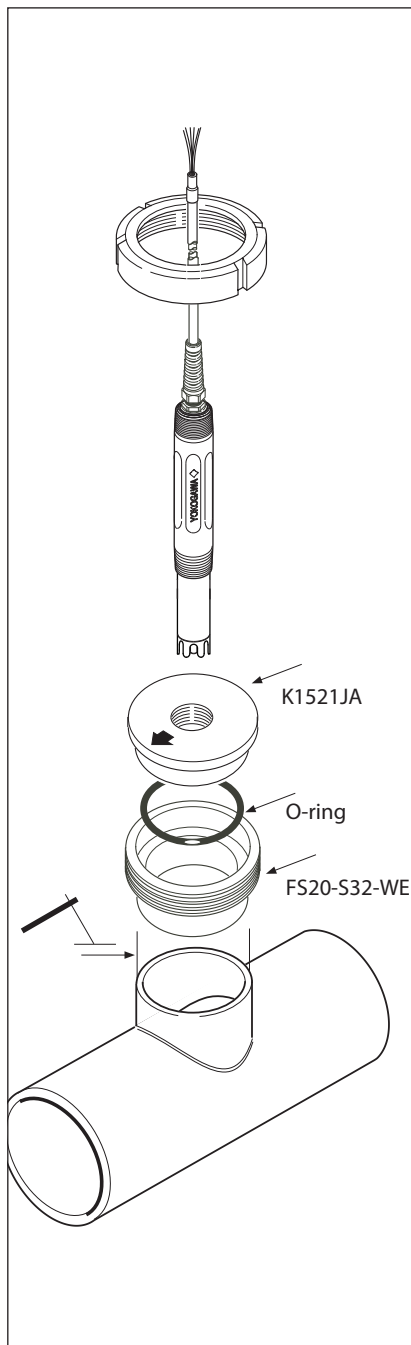


Figure 1. FS20 installation example FU24

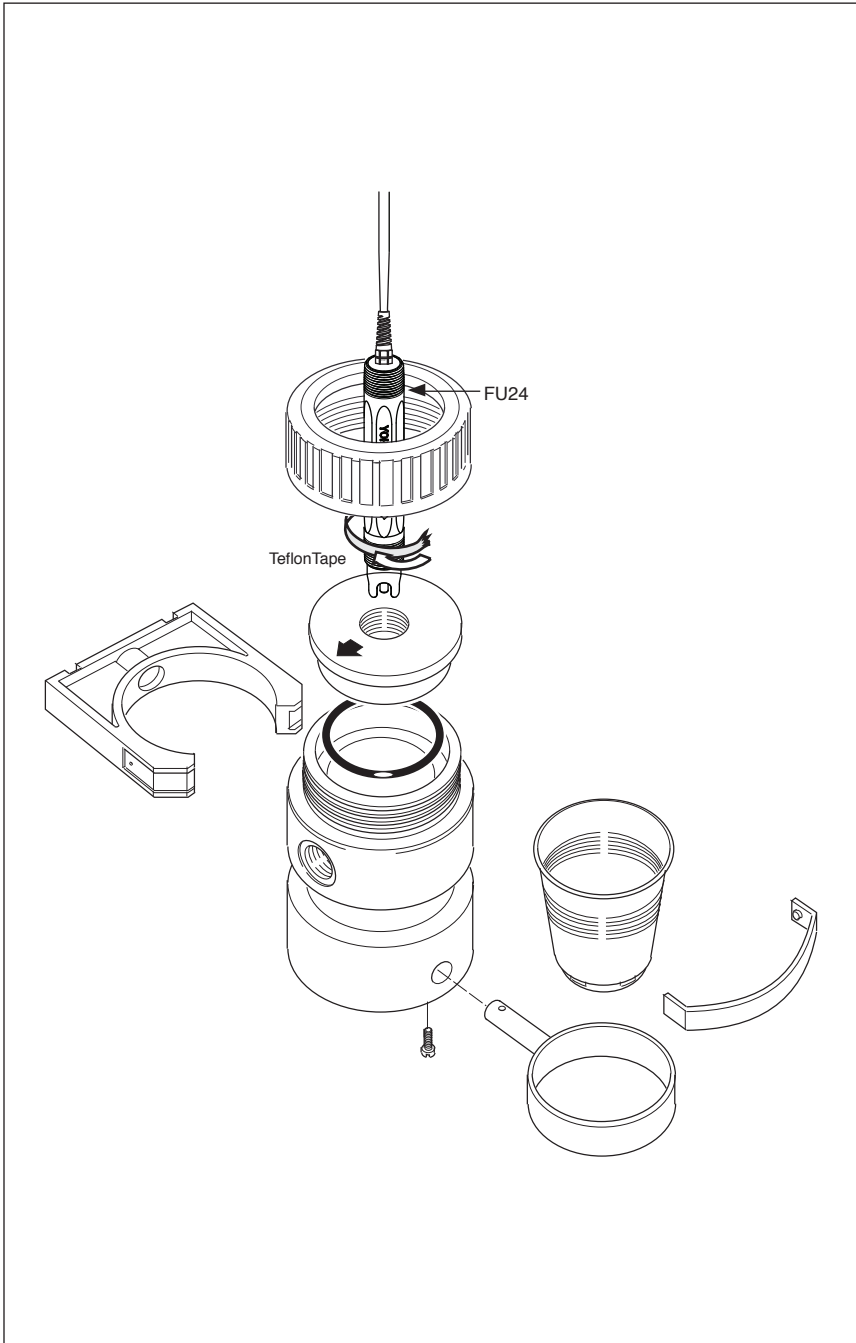


Figure 2. FF20-.33 installation example FU24



### 4. DIMENSIONS

Dimensions in mm (inches)

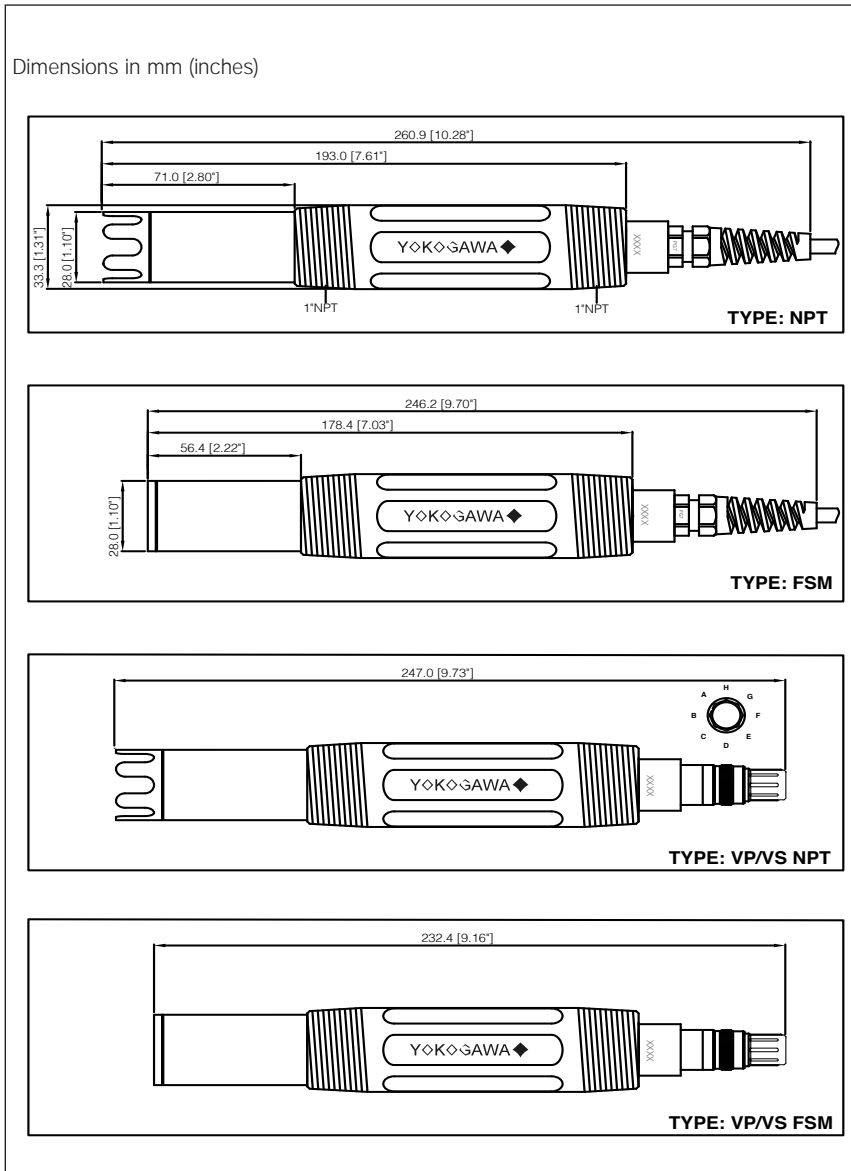


Figure 3. Dimensions FU24

## 5. WIRING

### 5.1 Connections

The FU24 sensor is provided with a fixed cable or Variopin (VP/VS) connector.

### 5.2 Definition EXA/FLXA terminal numbers to FU24 sensor

FU24-05/10 wire #			
EXA/FLXA terminal #	pH pH+ORP pH+rH	ORP	ORP pH compensated
11	11	11	11
12	12	12	12
13	13	13	15
14	14		
15	15	14	14
16	16		
17			16

FU24-VP and FU24-VS with WU10/WE10- wire color			
	WU10-V-S	WU10-V-D, WE10	WU10-V-D or WE10
EXA/FLXA terminal #	pH	ORP	ORP pH compensated
11	Red	Red	Red
12	Blue	Blue	Blue
13	Brown	Brown	Coax1 core transparent
14	Yellow		
15	Coax core transparent	Coax2 shield white	Coax2 core white
16	Black		
17			Coax2 core transparent

**Note:** For ORP measurement the EXA/FLXA terminals 13 and 14 should be interconnected.  
For ORP pH compensated measurement the EXA/FLXA terminals 14 and 15 should be interconnected.

**Note:** The new digital solution with suffix -VS can only function in combination with the SMART adapter SA11-P1.

### 5.3 Settings for PH402G and PH202G(S)

Function Setting	pH (default)	pH&ORP	pH&rH	ORP	pH compensated ORP
code 01	0(pH)	0(pH)	0(pH)	1(ORP)	1(ORP)
code 02	0(off)	1(ORP)	2(rH)	0(off)	0(off)
code 03	1.1.1	1.1.1	1.1.1	0.0.1	0.0.1
code 04	0.0.1	0.0.1	0.0.1	0.0.1	1.1.1
code 31	0	2	2		
jumper input 1	no	no	no	yes	yes
jumper input 2	yes	yes	yes	yes	no

### 5.4 Settings for PH150, PH450G and FLXA

Function Setting	pH (default)	pH&ORP	pH&rH	ORP	pH compensated ORP
sensor setup	pH	pH+ORP	pH+ORP	ORP	ORP
measurement setup		pH+ORP	pH+rH		
Impedance setting					
input1	High	High	High	Low	Low
input 2	Low	Low	Low	Low	High
jumper input 1	no	no	no	yes	yes
jumper input 2	yes	yes	yes	yes	no

## 6. GENERAL CALIBRATION & MAINTENANCE PROCEDURE

### 6.1 Calibration for pH measurement

To calibrate the FU24 pH/ORP 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 demineralized 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 demineralized 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.
6. Rinse sensor thoroughly with demineralized water.

During calibration, the temperature compensation should be active.

The EXA/FLXA analyzer automatically compensates for the sensitivity change of the pH sensor at different temperatures.

After calibration, replace or re-install the sensor into the process.

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## 6.2 Calibration for ORP and rH measurement

For calibration of ORP and rH, the procedure for MANUAL CALIBRATION can be used as described in the Instruction Manual of the analyzer.

The rH value is a function of the reference system and the pH value of the buffer solution. The FU24 sensor has a reference system of saturated Silver/Silver Chloride (Ag/AgCl). The commonly used standards for ORP and rH calibration are made from Chinhydrone (Quinhydrone) powder dissolved in pH buffer solutions (1 g / 200 ml). In Table 3 the measurement values are given as function of the used pH buffer solution with Chinhydrone powder. The accuracy of the standards is approximately  $\pm 10$  mV.

**Table 3: ORP, pH compensated ORP and rH as function of pH buffer solution with Chinhydrone powder.**

pH buffer	ORP (mV) ORP (mV)	pH compensated	rH
1.68	403	88	23.6
4.01	265	88	23.6
6.87	96	88	23.6
7.00	88	88	23.6

## 6.3 Maintenance of the FU24 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.



**WARNING**

Avoid cleaning the complete sensor with solution. Some cleaning solutions will damage the modelcode 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, iso-propanol or methanol is sufficient. In other cases the measuring elements of the sensor have to be cleaned with specific solutions.

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.
3. 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.

**Note:** Avoid cleaning with non-polar solvent like tri-chloro ethylene, toluene or hexane. The non-polar solvents will break up the gel-layer on the pH glass bulb and requires that the sensor has to be soaked in water for at least 12 hours before it will function again.

The Teflon diaphragm of the sensor can be regenerated by putting it in hot ( $\pm 70^\circ\text{C}$ ,  $158^\circ\text{F}$ ) 3 molar Potassium Chlorine (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 Code	Suffix Code	Option	Description
FU24			Wide body sensor
Type	- VP		Variopin connector
	- VS		Variopin connector for SENCOM
	- 05		Fixed cable, 5 meter
	- 10		Fixed cable, 10 meter
Temp. element	- T1		Pt1000
Model	- NPT		Dome shape model
	- FSM		Flat surface model

## 8. SPARE PARTS

Spare part	Description
	<b>FU24</b>
K1521JA	SS holder 1" NPT
K1521JB	PVDF holder 1" NPT
	<b>Buffer solutions</b>
K1520BA	Starters Kit: (3x 500 ml) Solution pH 4.01, pH 6.87, pH 9.18
K1520BB	Buffer Solution (500 ml) pH 1.68
K1520BC	Buffer Solution (500 ml) pH 4.01
K1520BD	Buffer Solution (500 ml) pH 6.87
K1520BE	Buffer Solution (500 ml) pH 9.18
	<b>Connection equipment for Suffix -05,-10,-VP</b>
BA10	Junction box for pH extension cables
WF10-XXX-F	pH signal cable with terminated ends. Available lengths (XXX = 005, 010, 025 & 050 m)
WU10-V-D-XX	Variopin cable (XX = 02, 05, 10, 15 and 20m)
WU10-V-S-XX	Variopin cable (XX = 02, 05, 10, 15 and 20m)
	<b>Connection equipment for Suffix -VS</b>
BA11	Active connection
WE10-H-D-XX	Extension cable for SENCOM SMART ADAPTER SA11
SA11-P1-	SENCOM SMART adapter
WU11	Interconnection cable
IB100	Interface box



## 9. CHEMICAL COMPATIBILITY CHART

		Conc.%		Temp. °C		Material																	
						Viton			PTFE (teflon)			PPS (Ryton)			Glass								
						20	80	100	20	80	100	20	80	100	20	80	100						
Inorganic acid	Sulfuric acid	10				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
		50				O	O	O	O	O	O	X	X	X	O	O	O						
		95				O	O	O	O	O	O	X	X	-	O	O	O						
		fuming				O	O	O	O	O	O				O	O	O						
	Hydrochloric acid	10				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
		sat.				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
	Nitric acid	25			X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
		50			-	-	-	O	O	O	O	X	X	X	O	O	O						
		95			-	-	-	O	O	O	O	-	-	-	O	O	O						
		fuming			-	-	-	O	O	O	O				O	O	O						
	Phosphoric acid	25				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
		50				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
		95				X	X	-	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Hydrofluoric acid	40				O	O	O	O	O	O	X	X	X	X	X	X	X	X	X	X	X	X	
	75				O	O	X	O	O	O	-	-	-	-	-	-	-	-	-	-	-	-	
Organic acid	Acetic acid	10				-	-	-	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
		glacial				-	-	-	O	O	O	O				O	O	O					
	Formic acid	80				-	-	-	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
	Citric acid	50				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
Alkali	Calcium hydroxide	sat.				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
	Potassium hydroxide	50				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	X	
	Sodium hydroxide	40				X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	X	
	Ammonia in water	30				X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	X	
Acid salt	Ammonium chloride	sat.				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
	Zinc chloride	50				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
	Iron(III) chloride	50				O	O	O	O	O	O	O				O	O	O					
	Sodium sulfite	sat.				-	-	-	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
Basic salt	Sodium carbonate	sat.				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
	Potassium chloride	sat.				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
	Sodium sulfate	sat.				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
	Calcium chloride	sat.				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
Neutral salt	Sodium chloride	sat.				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
	Sodium nitrate	50				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
	Aluminium chloride	sat.				O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
	Hydrogen peroxide	30				O	O	O	O	O	O	X	-	-	O	O	O						
Oxidizing agent	Sodium Hypochloride	50				O	O	X	O	O	O	X			O	O	O						
	Potassium dichromate	sat.				O	O	O	O	O	O	X			O	O	O						
	Chlorinated lime								O	O	O				O	O	O						
	Ethanol	80				X	-	-	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
Organic solvent	Cyclohexane					O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
	Toluene					-	-	-	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
	Trichloroethane					X	X	X	O	O	O	O	O			O	O	O					
	Water					O	O	O	O	O	X	O	O	O	O	O	O	O	O	O	O	O	

O = can be used; X = shortens useful life; - = cannot be used; Blank = no data available

**Note:** Information in this list is based on our general experience and literature data and given in good faith. However Yokogawa is unable to accept responsibility for claims related to this information.

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