

General Specifications

Model SM21
Industrial pH Electrodes

GS 12B06J01-00EN-P

■ Overview

The most crucial component of the pH measurement loop is the pH-sensitive measuring electrode. Yokogawa has developed a range of electrodes to ensure the best performance in each application.

The components of the measuring loop and their important qualities must be understood to select the right glass electrode for a given application. A choice must consider both the mechanical design shape and the chemical composition of "pH glass."

For most pH applications, the ball-shaped type (shockproof) will offer a fast response and high sensitivity. The heavy-duty dome-shaped type has an incredibly robust pH membrane that offers a high chemical resistance type. It ensures a long sensor lifetime and strong chemical resistance.

■ Features

- Wide range of electrodes to suit all process conditions
- High sensitivity and fast response (bulb shape)
- High chemical resistance (dome shape)
- Design and dimensions acc. to DIN 19263
- Maximum pressure: 10 bar / 145 psi
- Gold plated spring connector parts for good electrical contact



1. General Specifications SM21

Object of Measurement

pH measurements determine product quality or monitor chemical processes. Applications include wastewater treatment, water quality monitoring, and sugar production, among many others.

The glass membrane is the most important part of the complete pH measuring loop. pH-sensitive glass has the particular property that alkali metal ions present in the texture of the glass are exchanged with H⁺ ions of the liquid.

The selection of the correct type of glass electrode depends on the type of glass membrane and thickness of the glass membrane.

Two types of glass are available:

- "G" glass: is used for the membranes of electrodes in processes where the nominal pH value varies between pH0 and pH14. Since this type of glass has a wide application range, it is also termed "general purpose" glass.
- "L" glass is used for measurements in alkaline media with high process temperatures.

1.1 Measuring Elements

Sensor type : pH glass electrode
 Membrane : G or L glass

Glass shape
 -AG4 : Bulb
 -AG6 : Dome
 -AL4 : Bulb
 -AL6 : Dome

Glass impedance range @25°C
 -AG4 : 50 - 100 MΩ
 -AG6 : 120 - 200 MΩ
 -AL4 : 300 - 450 MΩ
 -AL6 : 600 - 900 MΩ

1.2 Wetted Parts constriction materials

Sensor body : Glass
 O-rings : N/A

1.3 Dynamic specifications (at 25°C)

Response time pH step (7 to 4)
 - AG4 : < 15 sec for 90%
 - AG6 : < 15 sec for 90%
 - AL4 : < 15 sec for 90%
 - AL6 : < 15 sec for 90%

Stabilisation time 0.02 pH/10sec:<30 sec

1.4 Operating range

Temperature
 -AG4 : -10°C ... 100°C
 -AG6 : 0°C ... 110°C
 -AL4 : 10°C ... 120°C
 -AL6 : 20°C ... 130°C

pH
 -AG4 : 0 ... 14
 -AG6 : 0 ... 14
 -AL4 : 0 ... 14
 -AL6 : 0 ... 14

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

Pressure (at 25°C)
 -AG4 : 1.5 kPa ... 1000 kPa
 -AG6 : 1.5 kPa ... 1000 kPa
 -AL4 : 1.5 kPa ... 1000 kPa
 -AL6 : 1.5 kPa ... 1000 kPa

Conductivity : > 50 μS/cm

1.5 Shipping Details (L*W*H)

Package size (LxWxH) : 260 x 45 x 45 mm
 : (10.2 x 1 x1 inch)

1.6 Environmental Conditions

Storage temperature : -15°C to +50°C
 : 5°F to 122°F

1.7 Regulatory standards

CE
 - RoHS Directive 2011/65/EU
 Commission Delegated Directive (EU) 2015/863 amending Annex II as regards the list of restricted substances, and by applying following standards:
 EN-IEC 63000: 2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

-Pressure Equipment Directive 2014/68/EU (PED) by applying Article 4.3: Sound Engineering Practice

UKCA
 - RoHS The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
 -Pressure Equipment Pressure Equipment (Safety) Regulation 2016
 by applying Article 8: Sound Engineering Practice

■ 2. Dimensions (Units in mm)

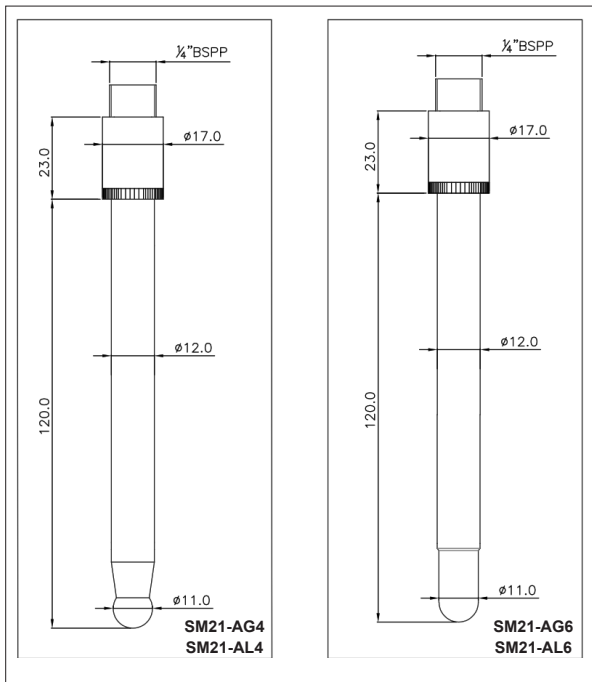


Figure 2: SM21 dimensions

■ 3. Model Codes and Parts

Table 1: Model & Suffix codes SM21

Model	Suffix Code	Option code	Description
SM21			
	-AG4		Meas. pH, shockproof
	-AG6		Meas. pH, heavy duty
	-AL4		Meas. pH, shockproof, H.temp.
	-AL6		Meas. pH, heavy duty, H.temp.

Table 2: pH single electrodes spare part list

Part Number	Description
K1520BA	Buffer Solution pH4.01+6.87+9.18(3x0.5L)
K1520BB	Buffer Solution pH 1.68 (3x 0.5L)
K1520BC	Buffer Solution pH 4.01 (3x 0.5L)
K1520BD	Buffer Solution pH 6.87 (3x 0.5L)
K1520BE	Buffer Solution pH 9.18 (3x 0.5L)
K1520JL	Adapter Y-CAP - PG13.5 SS
K1523JA	Adapter PG13.5 in F*40 PPO
K1523JB	Adapter PG13.5 to 1/4"NPT PPO
K1523JC	Adapter PG13.5-sensors in F*40 SS
K1523JD	Adapter PG13.5 to 1/4" NPT SS
K1524AA	O-ring SIL. 10.77x2.62&Slide Ring (1 pc.)
K1598AC	Flow fitting (3.1), for SC4A
K1500DW	Set of 12 cable nuts for WU20

■ 4. Cables

Table 3: Model & Suffix codes WU20

Model	Suffix Code	Option code	Description
WU20			Industrial pH/ORP cable
	-PC		Coax
		01	1 meter cable
		02	2 meter cable
		05	5½ meter cable
		10	10 meter cable
		15	15 meter cable
		20	20 meter cable
		25	25 meter cable

■ Addendum 1: Typical Installations

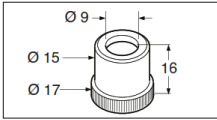


Figure 3: Yokogawa connector K1500DW (set of 12 cable nuts)

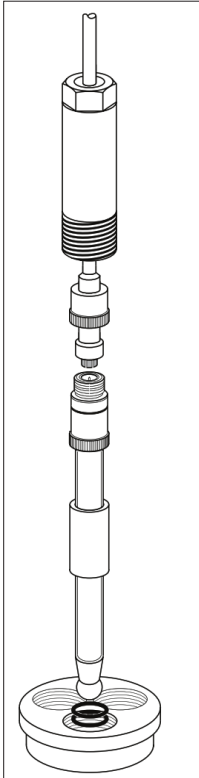


Figure 4: Standard mounting with mounting set FP20-R12, FP20-S12

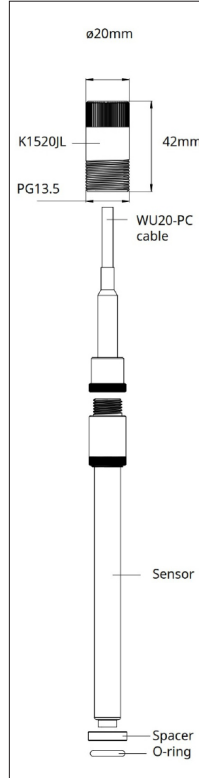


Figure 5: Mounting PG13.5 for Y-CAP sensors

■ Addendum 2: Available Model Codes

Table 4: SM21 pH Electrode Available models

MS-code	SM21-AG4
	SM21-AG6
	SM21-AL4
	SM21-AL6

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