1 SPECIFICATIONS

1.1. GENERAL

- Isothermal point of intersection: pH 7 (nominal value at 0 mV)
- Maximum pressure: 1000 kPa (10 bar)
- Metal foil screening.

SM21-AG2

- pH, temperature range: 0 to 14 pH, 0 to 80 ºC
- Glass Resistance (25ºC): 25 to 50 MΩ
- Ag/AgCl wire reference system.

SM21(D)-AG4

- pH, temperature range: 0 to 14 pH, 0 to 100 ºC
- Glass Resistance (25ºC): 50 to 100 MΩ
- High quality Ag/AgCl pin reference system.

SM21(D)-AG6

- pH, temperature range: 0 to 14 pH, 0 to 100 ºC
- Glass Resistance (25ºC): 120 to 200 MΩ
- High quality Ag/AgCl pin reference system

SM21(D)-AL4

- pH, temperature range: 0 to 14 pH, 15 to 130 ºC
- Glass Resistance (25ºC): 300 to 450 MΩ
- High quality Ag/AgCl pin reference system.

SM21(D)-AL6

- pH, temperature range: 0 to 14 pH, 25 to 130 ºC
- Glass Resistance (25ºC): 600 to 900 MΩ
- High quality Ag/AgCl pin reference system.

1.2. TYPE NUMBER

The type number of the electrode is arranged as follows:

SM21-. . .

membrane shape
2 = ball
4 = ball (shock proof)
6 = dome (very strong)

kind of membrane
G = universal
L = high temperature
S = Low-ohmic

measuring system
A = Ag/AgCl (silver-silver chloride)

1.3. TYPE PLATE

The specifications for the sensor are clearly shown on the type plate attached to the electrode cap.

Remark: The glass resistance is given at 25ºC (each temperature increase of 10ºC halves the resistance of the membrane).

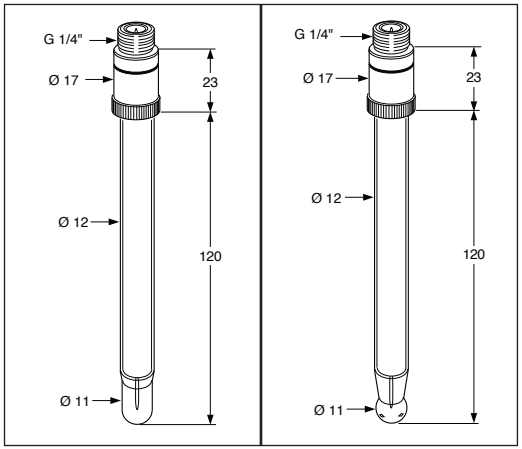

Fig.1. SM21-A.6

Fig.2. SM21-A.2, SM21-A.4

2. INSTALLATION

2.1. PREPARATION FOR USE

For accurate pH measurement a gel layer must be formed on the glass membrane surface. For this reason the pH sensitive part of the electrode should be soaked for 24 hours before the electrode is used.
When an electrode has been stored dry and you need to use it immediately (there is no time for soaking), you may do so, but as a result initial regular re-calibration will be required until the gel layer is formed.
The electrode when dispatched has a protective cover cap filled with 0,04% HCl solution around the membrane which ensures you can use the electrode immediately.

2.2. MOUNTING

The electrode must be fitted with an electrode cable (type WU20(D)-PC..). For the pH electrode please mark with a red strip.

The mounting of an electrode in a fitting should be carried out as shown in the figure 4, 5 or 6.

The electrode fits any Yokogawa cable fitted with the standard nut of which the dimensions are shown in figure 3. The nut can be ordered under part number K1500DW.

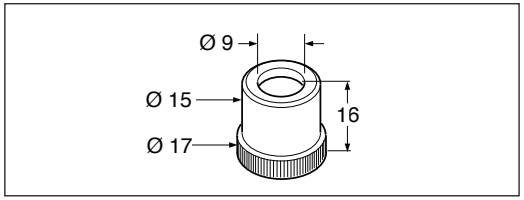

Fig. 3. K1500DW (set of 12 cable nuts)

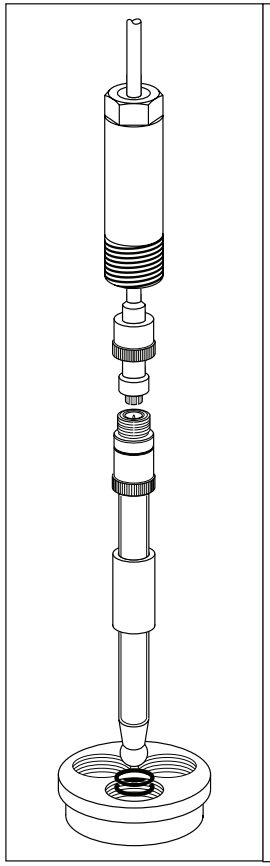

Fig. 4. Standard mounting with mounting set FP20-R12(M), FP20-S12(M)

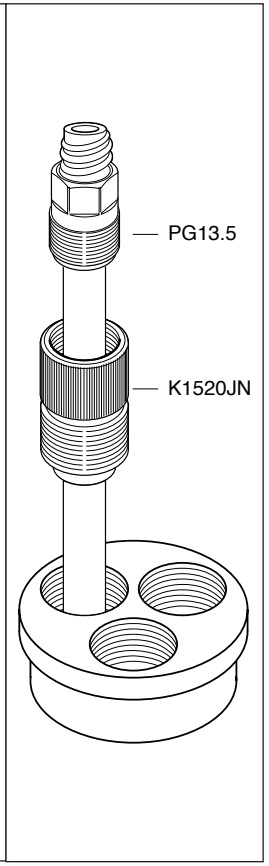

Fig. 5. Mounting PG13.5 in Yokogawa fitting using the adapter K1520JN (PVC-C) or K1500DV (PVDF)

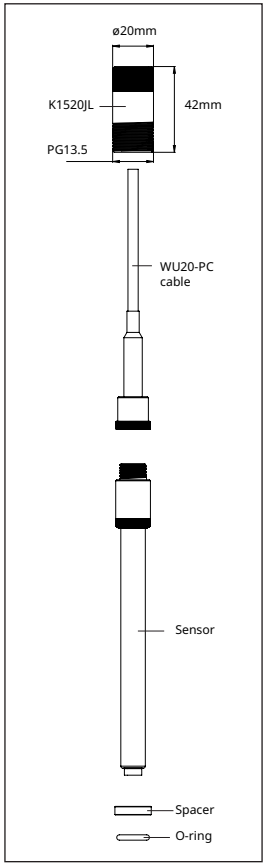

Fig 6. Mounting PG13.5 for Y-CAP sensors

2.3. COMPATABILITY

Generally, the glass electrode is used in conjunction with a reference electrode (with yellow marking strip) and a temperature sensor (green marking strip).

NOTE: The reference system of both glass and reference electrodes must be similar

3. USE AND MAINTENANCE

3.1. CALIBRATION AND BUFFERING

To calibrate a pH sensor, two buffer solutions with known pH values are required. It is recommended that one buffer solution have a value near to pH 7.00 (ITP). Depending on the process value to be measured, the second buffer solution should be either acidic (below 7.00) or alkaline (above 7.00) area. Normally, the IEC buffers (4.01, 6.87 and 9.18) are used. The following is a very general 2-point calibration procedure.

1. Clean the sensor (deposits may be removed using a 5% (approximate) solution of HCL).
2. Rinse the sensor thoroughly with clean (demi) water.
3. Immerse the sensor in the first buffer (6.87 pH is recommended).
4. Refer to appropriate Instrument Instruction Manual for Calibration procedures (Auto; Manual; Sample, etc.)
5. Rinse sensor thoroughly with clean (demi) water.
6. Immerse the sensor in the second buffer (4.01 or 9.18 recommended).

During calibration the temperature compensation should be active. The instrument automatically compensates temperature changes. After calibration is complete replace or re-install the sensor into the process.

WARNING:
During buffering the liquid earth and the temperature compensation must be connected. The temperature of the buffer solution must be within the limits of the technical specification as indicated on the type plate.

3.2. CLEANING

When the sensitivity of the electrode has noticeably decreased, the electrode must be cleaned with a suitable detergent.

a. Depositions of hydroxides, lime, iron hydroxide can be removed by immersing the electrode in a diluted solution of hydrochloric acid and then cleaning with water.
b. Depositions of oil and fat can be removed by means of hot water in conjunction with domes-tic washing solution.
   When the result is unsatisfactory a domestic abrasive may be used.
c. Albuminous depositions can be removed by means of a solvent containing: 8,5 ml concentrated hydroxide acid, 10 gr pepsin and 1 l demi water.

NOTE: When polar solvents are used for special cleaning purposes, it is necessary to soak the electrode for some time after cleaning as the polar solvent influences the gel layer. When an a-polar solvent is used (benzine, ethere, toluene) follow up treatment with a polar solvent (methanol, acetone) and soaking is necessary.

3.3. DEGRADED ELECTRODES

During measurement the glass membrane of the electrodes is affected. This has one or more of the following effects:

a. Decrease on the speed of response.
b. Increase of the electrical resistance.
c. Decrease of the sensitivity.
d. Zero point shift.

The effect of aging of the electrodes makes it necessary to carry out re-calibration of the electrode system regularly.

The frequency depends on the composition of the sample to be measured and the temperature, e.g.: If the lifetime of an electrode is 100% at the room temperature, it will be 20% at 80ºC and only 5% at 120ºC.

It is possible to re-active an aged electrode by immersing it for 10 seconds in a P.V.C. beaker containing a solution of vinegar (1 mol) and potassium fluoride (1 mol), ratio 1:1. After this the electrode must be cleaned carefully.

WARNING:
As a result of the strong etching proporties of the acid, the handling should be done carefully in consult with a security officer.

3.4. ISOLATION

Since the electrical resistance of the glass electrode is extremely high it is necessary to guarantee a high insulation between measuring electrode and screening. This requires a dry and clean connector before fitting and in addition, the connection to the electrode must be made by means of the correct electrode cable. When a connection box is used this must also be dry and clean.

YOKOGAWA ◆

EU DECLARATION OF CONFORMITY

We: **Yokogawa Process Analyzers Europe B.V.**
Euroweg 2, 3825 HD Amersfoort
The Netherlands

Herewith declare under our sole responsibility that the products, model: **SM21, SM21D and SM23**

further specified with model suffix- and option codes: **As listed in Annex-1 in this document**

is manufactured in accordance with the requirements for CE-marking of products as stated in EC Decision:

768/2008/EC on a common framework for the marketing of products

by applying the following standards:

EN-ISO 9001: 2015 Quality management systems - Requirements

Subject product is:

- In compliance with the essential requirements of the specific product legislation:
  - **Pressure Equipment** **Directive 2014/68/EU (PED)**
    by applying:
    Article 4.3: Sound Engineering Practice
  - **RoHS 2** **Directive 2011/65/EU**
    by applying:
    Category 9: Industrial monitoring and control instruments, ion selective electrode
- Produced according to appropriate quality control procedures.

The CE-mark has been affixed on the product in 2019 for the first time.

If applicable, the product is checked against the latest official released revision of the standards mentioned above; differences do not affect the certified product identified on this declaration.

Amersfoort – April 01, 2019

S. Kiyono
General Manager
Yokogawa Process Analyzers Europe B.V.

User Manual CE

Directions for use pH Electrodes

YOKOGAWA ◆ IM 12B06J01-E-E
11th Edition
Printed in The Netherlands,
Subject to change without notice

Instruction Manual

SC21, SC25F, SC29, SM21, SM23,
FU20, FU20F, FU24, FU24F, PH20, PH21

Protection of Environment (Use in China)

This manual is valid only in China.

产品中有害物质的名称及含量

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
传感器	×	○	○	○	○	○
电缆	×	○	○	○	○	○

○：表示该有害物质在该部件中所有均质材料中的含有量都在GB/T26572所规定的限量要求以下。
×：表示该有害物质至少在该部件的某一均质材料中的含有量超出GB/T26572所规定的限量要求。

环保使用期限：这个标志是基于SJ/T11364，在中国（不包括台湾，香港，澳门）贩售的电子电器产品所适用的环保使用期限。
只要遵守产品上关于安全及使用上的注意事项，从制造之日起计算在该年限内，不会发生制品内的有害物质外泄，突然变异，对环境或人体以及财产产生重大影响的情况。
（注） 该年限是《环境保护使用期限》，不是产品的保质期限。
另外，关于替换部件的推荐替换周期，请阅读使用说明书。

Production date

关于生产日期
生产日期在产品铭牌上9位数的序列号中，用以下形式表示生产日期。
从左数第3位数：生产年份
R:2015，S:2016，T:2017，U:2018，V:2019，W:2020，X:2021，Y:2022，Z:2023，
1:2024，2:2025，3:2026，…
从左数第4位数：生产月份
1：1月，2：2月，3：3月，…，9：9月，A：10月，B：11月，C：12月
（示例）N3S70001：2016 年 7 月

Subject to change without notice

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Euroweg 2, 3825 HD, Amersfoort The Netherlands
4th edition July, 2019
Printed in The Netherlands

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Annex-1

Model	Suffix Code	Option code	Description
SM21			
	-AG2		Meas. pH, gen. purp
	-AG4		Meas. pH, shockproof
	-AG6		Meas. pH, heavy duty
	-AL4		Meas. pH, shockproof, H.temp.
	-AL6		Meas. pH, heavy duty, H.temp.
	-AS4		Meas. pH, shockproof, low R
	-AS6		Meas. pH, heavy duty, low R

Model	Suffix Code	Option code	Description
SM21D			
	-AG4		Meas. pH, shockproof
	-AG6		Meas. pH, heavy duty
	-AL4		Meas. pH, shockproof, H.temp.
	-AL6		Meas. pH, heavy duty, H.temp.

Model	Suffix Code	Option code	Description
SM23			Ion selective sensor
	-AN4		Sodium sensitive (pNa)
	-AN6		Sodium sensitive (pNa) Heavy duty

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