

# Measuring equipment for pH value and redox potential



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# Measuring equipment for pH value and redox potential

## Application

The **SIPAN 32**, **SIPAN 32X** and **SIPAN 34** measuring equipment can be used to measure the pH value and/or redox potential of aqueous solutions.

The **SIPAN 32**, **SIPAN 32X** and **SIPAN 34** measuring equipment consists of:

- A sensor (measuring and reference electrodes, usually as combination electrode)
- A flow, immersion or replacement fitting
- A temperature sensor (Pt 1000 or Pt 100) with temperature-compensated pH measurements
- A **SIPAN 32**, **SIPAN 32X** or **SIPAN 34** analyzer.

The application range for pH measurements covers the complete pH scale (see Fig. 2/1) from  $\text{pH} = 0$  to  $\text{pH} = 14$  and for redox potential measurements from  $-2000 \text{ mV}$  to  $+2000 \text{ mV}$ .

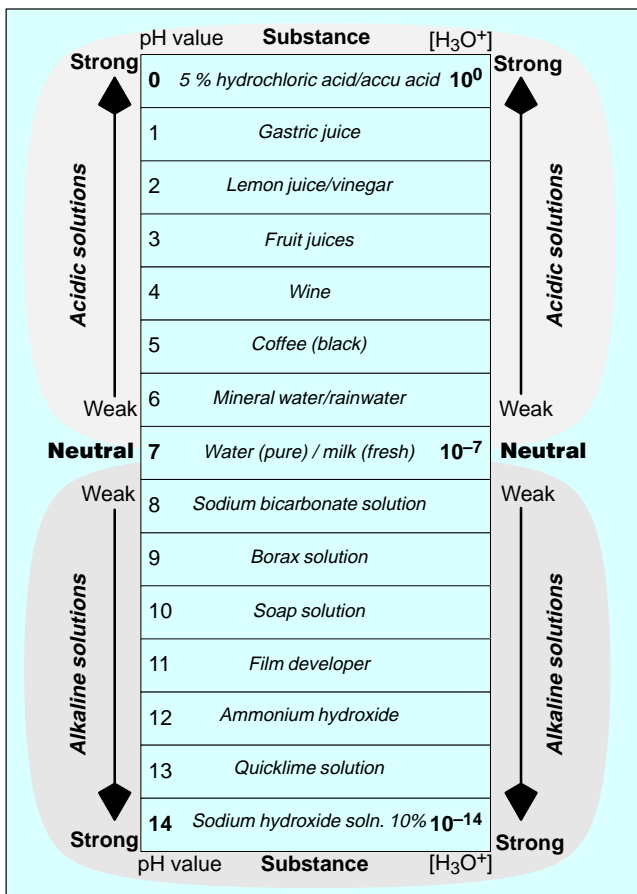


Fig. 2/1 SIPAN 32, SIPAN 32X and SIPAN 34 measuring equipment, pH scale, examples

### pH measurements

pH measurements are carried out in aqueous solutions for the following purposes:

- Manufacture of a product with defined characteristics
- Cost-saving production
- Protection of mankind, environment and material from damage
- Satisfy statutory requirements.

In the case of processes with varying temperatures, measurements are usually carried out with temperature compensation because the pH value changes with temperature according to the Nernst equation.

| Application field                                 | Application example   |
|---|---|
| Biology, medicine, bacteriology                   | Fermenter, (antibiotics)  |
| Breweries and yeast factories                     | Brewing water, mash, fermentation (favourable growth of yeast), cleaning solutions (CIP)  |
| Chemical industry                                 | Fat synthesis (saponification of fatty acids), esterification of alcohols, formation of aldol (production of plastics etc.), condensates and waste water in refineries, glue, gelatine and soap manufacture, production of antibiotics  |
| Electrical engineering, electroplating            | Electrolytic capacitors, electrolytic baths, waste water  |
| Tanneries   | Steeping the skins, alkalinity of the lime-pit, decalcification, staining, tanning, bleaching, dyeing   |
| Rubber industry                                   | Stability of latex  |
| Iron and steel works, coke ovens, gas works       | Ore preparation (flotation), gas purification (sulphur removal), waste water and water purification   |
| Power plants                                      | Avoidance of corrosion in steam circuit, waste water control  |
| Food industry                                     | Preservation of fruit juices, gelatinization of jams, souring of milk, cheese preparation, maturing of cream, yogurt production. Sugar factories: purification and refining of juices (pre-separation and saturation), inversion of glucose (to be avoided in vacuum pans), fermentation of molasses, press water   |
| Paper, cellulose, rayon and explosives industries | Water treatment, sulphite liquor, bleaching, soaping and wash baths, sizing with resin soap and aluminium sulphate, neutralization of waste water   |
| Textile industry                                  | Cleaning (soap) baths, bleaching baths, dye baths (efficiency, hue), wash water (acid-free to avoid spots)  |
| Hydroeconomy                                      | Sewage treatment plants (optimum growth conditions in biological stages), river water (monitoring of sewage ingress because of danger to fish), sedimentation and precipitation of colloidal suspensions, softening of water (optimum precipitation), neutralization with lime (danger of corrosion for pipes and concrete tanks), base exchange methods (Permutite, Wolfatite) |

# Measuring equipment for pH value and redox potential

## Application

### Redox potential measurements

Redox potential (ORP) measurements permit statements to be made on the oxidation or reduction power of an aqueous solution.

In contrast to pH measurements, redox potential measurements are not temperature-dependent.

Metal combination electrodes are used for the measurements, and can be installed in the same fittings as the pH sensors.

### Applications

- Monitoring of automatic sewage detoxification
- Monitoring of electrolytic baths and bleaching baths
- Measurements on developers with reducing action, and starting products for dyestuffs, e.g. methylene blue, anthraquinone sulphonate, indigo sulphate and naphthoquinone
- Monitoring of disinfection action in swimming pools

### Special characteristics

- Use of combination electrodes with integrated Pt1000 temperature sensor for applications where only one mounting location is available
- Special, robust and low-maintenance electrodes for complex measurements in the food/paper industries and in flue gas desulphurization plants
- Sterilizable electrodes for the food and pharmaceutical industries
- Low-maintenance electrodes with polymer or gel electrolytes which are insensitive to contamination
- Electrodes for installation in pipes or vessels where the measured medium is under pressure
- Replacement fittings for inline installation in reactors or process lines
- Automatic sensor cleaning
- All versions with explosion protection for zone 1



Fig. 2/2 SIPAN 32, SIPAN 32X and SIPAN 34 measuring equipment, sensors and analyzers

# Measuring equipment for pH value and redox potential

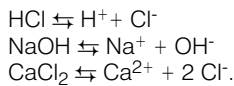
## Application

### Technical description

#### Method of pH measurement

Acids alkalis and most salts are soluble in water; the solutions then produced conduct an electric current and are described as electrolytes.

Such electrolyte solutions contain ions, i.e. atoms or groups of atoms with a negative or positive charge. This ionization in solutions is called electrolytic dissociation, e.g.



However, not all the modules in such an electrolyte are dissociated. The percentage of dissociated modules – the degree of dissociation – is a measure of the strength of the acid or alkali. As in every chemical reaction, a state of equilibrium is reached in electrolytic dissociation. The ratio between the product of the concentrations of the dissociated modules and the concentration of the non-dissociated modules is constant (law of mass action).

Applied to chemically pure water, this means it dissociate to:



The state of equilibrium is thus:

$$\frac{[\text{H}^+] \times [\text{OH}^-]}{[\text{H}_2\text{O}]} = \text{Constant} = 1.8 \times 10^{-16} \text{ mol/l} \quad (\text{b})$$

Since  $[\text{H}_2\text{O}]$  is practically constant, equation (b) can be rewritten as:

$$[\text{H}^+] \times [\text{OH}^-] = \text{Constant} \quad (\text{c})$$

This constant, the dissociation constant of water, can be determined experimentally and at 22 °C equals  $1 \times 10^{-14} \text{ (mol/l)}^2$ .

In pure water, the number of hydrogen ions and hydroxide ions is equal, since one hydrogen ion and one hydroxide ion are produced from each water molecule that dissociates. Therefore:

$$[\text{H}^+] = 10^{-7} \text{ mol/l}; \quad [\text{OH}^-] = 10^{-7} \text{ mol/l} \quad (\text{d})$$

Thus the hydroxide ion concentration can be expressed through the hydrogen ion concentration.

To prevent having to calculate with negative exponents, the pH value was introduced. This value is defined as the negated common logarithm of the hydrogen ion concentration  $[\text{H}^+]$ .

$$\text{pH} = -\log [\text{H}^+]$$

Equation (d) applied to pure water means that:

$$[\text{H}^+] = 10^{-7} \text{ mol/l} \rightarrow \text{pH value} = 7$$

The pH scale provides an overview of the hydrogen ion concentrations in acidic and alkaline solutions (Fig. 2/1).

With the addition of equal quantities of an acid or alkali, the change in pH value is greater the nearer the value is to the neutral point. With a rising or falling pH value, a greater quantity with the same concentration is needed to achieve an equal change in pH, e.g. by a power of ten. This relationship is shown in Fig. 2/3.

It can be seen that with very small or very large pH values, i.e. strong acids or alkalis, conclusions on the concentration cannot be drawn from the pH value since the change in pH is then very small compared to the change in concentration. In such cases, a conductivity measurement can be carried out to monitor the concentration.

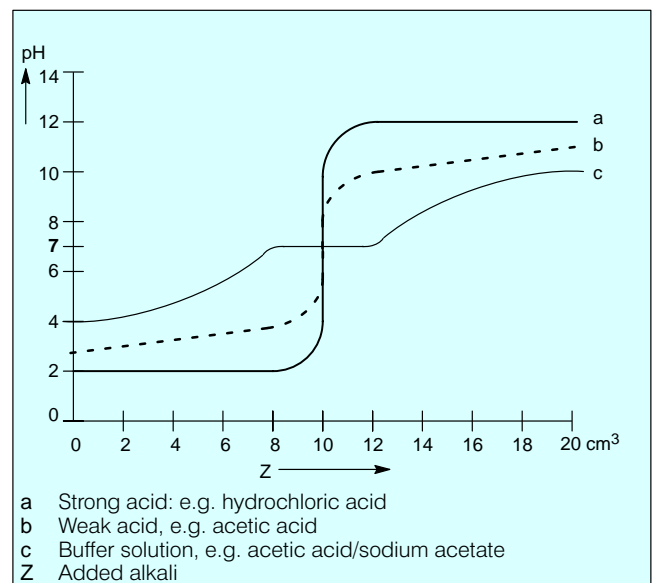


Fig. 2/3 Titration curves of buffered and unbuffered solutions

| Acid              | g/l  | pH value       | $\Delta\text{pH}$ |
|-------------------|------|----------------|-------------------|
| Strong acid:      |      |                |                   |
| Hydrochloric acid | 36.5 | $\approx 0.1$  |                   |
| Hydrochloric acid | 3.65 | $\approx 1.0$  | $\approx 1.0$     |
| Weak acid:        |      |                |                   |
| Acetic acid       | 60.0 | $\approx 2.40$ |                   |
| Acetic acid       | 6.0  | $\approx 2.87$ | $\approx 0.45$    |

Fig. 2/4 Examples of strong and weak acids

Curve c in Fig. 2/3 shows the behavior of a buffer solution when an alkaline solution is added. The term buffer solution is applied to mixtures which are capable of combining with hydrogen or hydroxide ions without a significant change in the pH value. They consist of weak acids or weak alkalis and their salts.

# Measuring equipment for pH value and redox potential

## Application

### Technical description

The pH measurement is based on determination of the cell voltage of a galvanic cell. This consists of two electrodes (measuring and reference electrodes) dipped into and electrolytically connected by the unknown solution.

A potential which is dependent on the concentration of hydrogen ions is generated on the pH-sensitive glass diaphragm of the measuring electrode.

The cell voltage varies linearly with the pH value as follows:

54.20 mV per  $\Delta\text{pH} = 1$  at 0 °C

56.18 mV per  $\Delta\text{pH} = 1$  at 10 °C

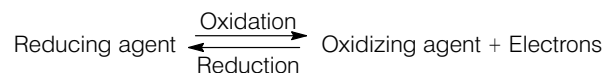
58.16 mV per  $\Delta\text{pH} = 1$  at 20 °C

64.12 mV per  $\Delta\text{pH} = 1$  at 50 °C

The output instruments (indications, recorders) and controllers must be connected to the galvanic cell via an analyzer.

### Method of redox potential (ORP value) measurement

The word "**redox**" is composed of the initial syllables of the words **reduction** and **oxidation**. Oxidation and reduction reactions are processes characterized by a reciprocal exchange of electrical charges between the reducing and oxidizing agents. In this physical/chemical process, the reducing agent gives up electrons and is itself oxidized. The oxidizing agent takes up these electrons and is itself reduced.



This process is an equilibrium reaction.

Oxidizing agents include:

- Halogens (chlorine, bromine etc.)
- Hydrogen peroxide
- Nitric acid

Reducing agents include:

- Alkali metals (sodium, potassium etc.)
- Hydrogen sulphide
- Hydrogen cyanide

If a noble-metal electrode (platinum, gold or silver) is immersed into a redox system, it assumes a potential whose magnitude depends on the oxidation/reduction concentration ratio.

This potential depends on the free electrons found in the solution. The decisive factor for its value is the interchanging of electrons at the metal electrode and thus the concentrations of the substances taking part in the oxidation and reduction process. If the potential at the electrode is negative (taking up electrons), then the reducing agents predominate in the solution. Conversely, it can be said that if the electrode is positive (giving up electrons), the oxidizing agents predominate in the solution.

It can be ascertained whether an aqueous solution contains reducing or oxidizing agents to a predominating extent by immersing a noble-metal electrode (e.g. platinum, gold, silver etc.) and a non-refillable reference electrode into the solution, thus determining the electric charge on the noble-metal electrode.

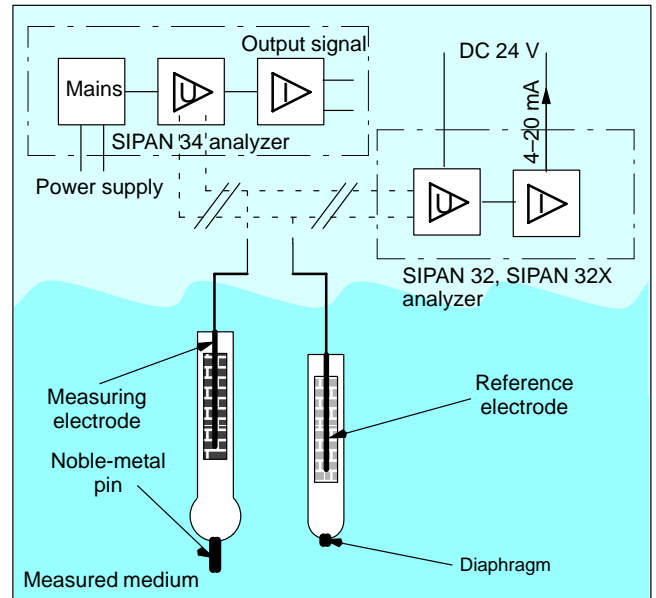


Fig. 2/5 Arrangement for redox potential measurements

A solution with an oxidizing action withdraws electrons from other components taking part in the reaction; the noble-metal electrode becomes positively charged as a result. If substances with a reducing action predominate in the solution, the noble-metal electrode becomes negatively charged since electrons are given to the system. The potential which forms on the noble-metal electrode is tapped off by a reference electrode which is also immersed in the solution. It can be concluded from the polarity of the measured redox voltage whether the oxidizing agents (positive polarity) or the reducing agents (negative polarity) predominate. In this context, however, the base potential of the tapping material of the reference electrode must be taken into account. The value of the potential is a measure of the concentration of the oxidizing or reducing agents.

The redox potential is stated in mV.

Since the redox potential is dependent on the pH value of the measured solution (it decreases with increasing pH value), care must be taken that the pH value remains constant.

# Measuring equipment for pH value and redox potential

## Mode of operation

SIPAN 32, SIPAN 32X analyzers

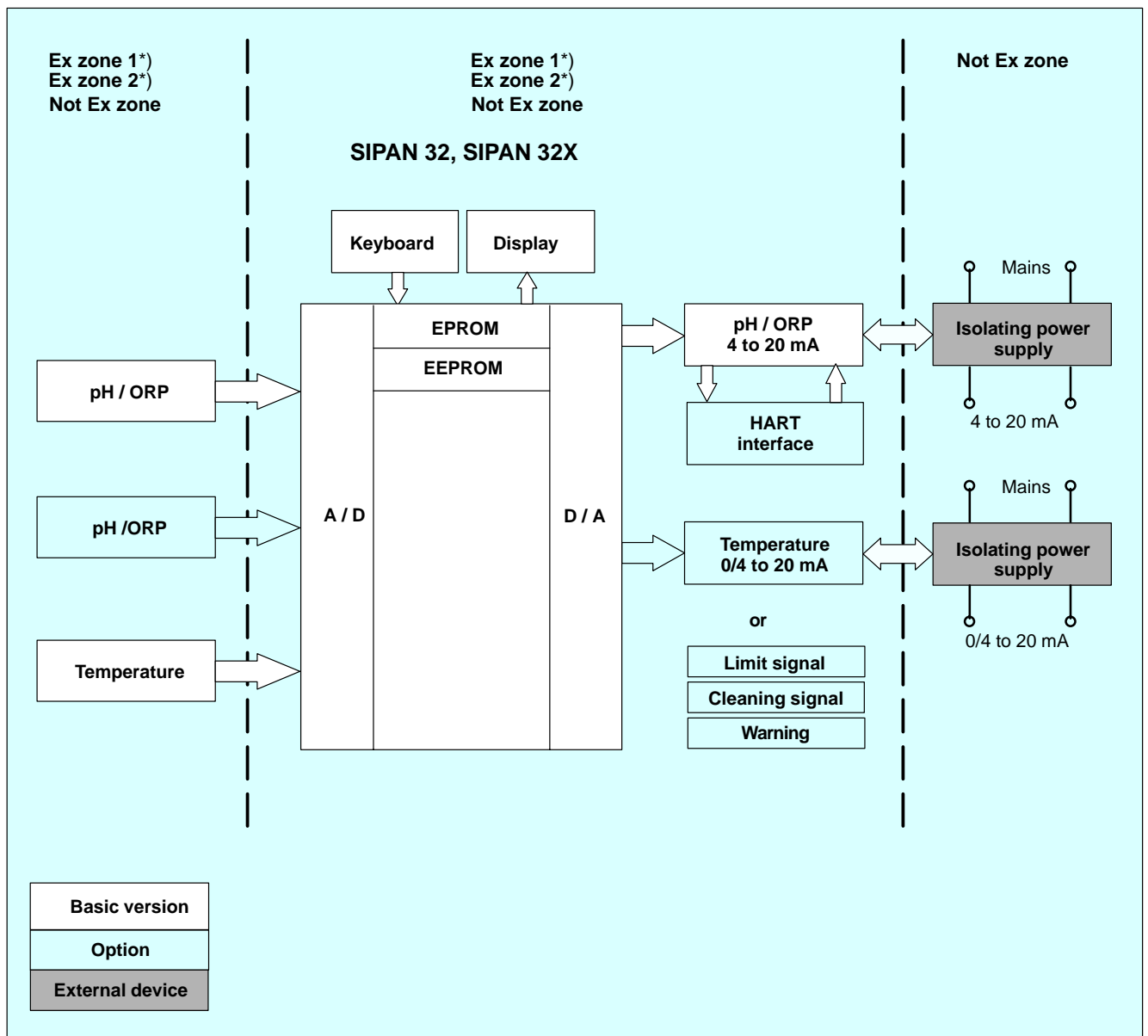


Fig. 2/6 SIPAN 32 and SIPAN 32X analyzers, mode of operation

\*) Only with SIPAN 32X

# Measuring equipment for pH value and redox potential

## Mode of operation

SIPAN 34 analyzer

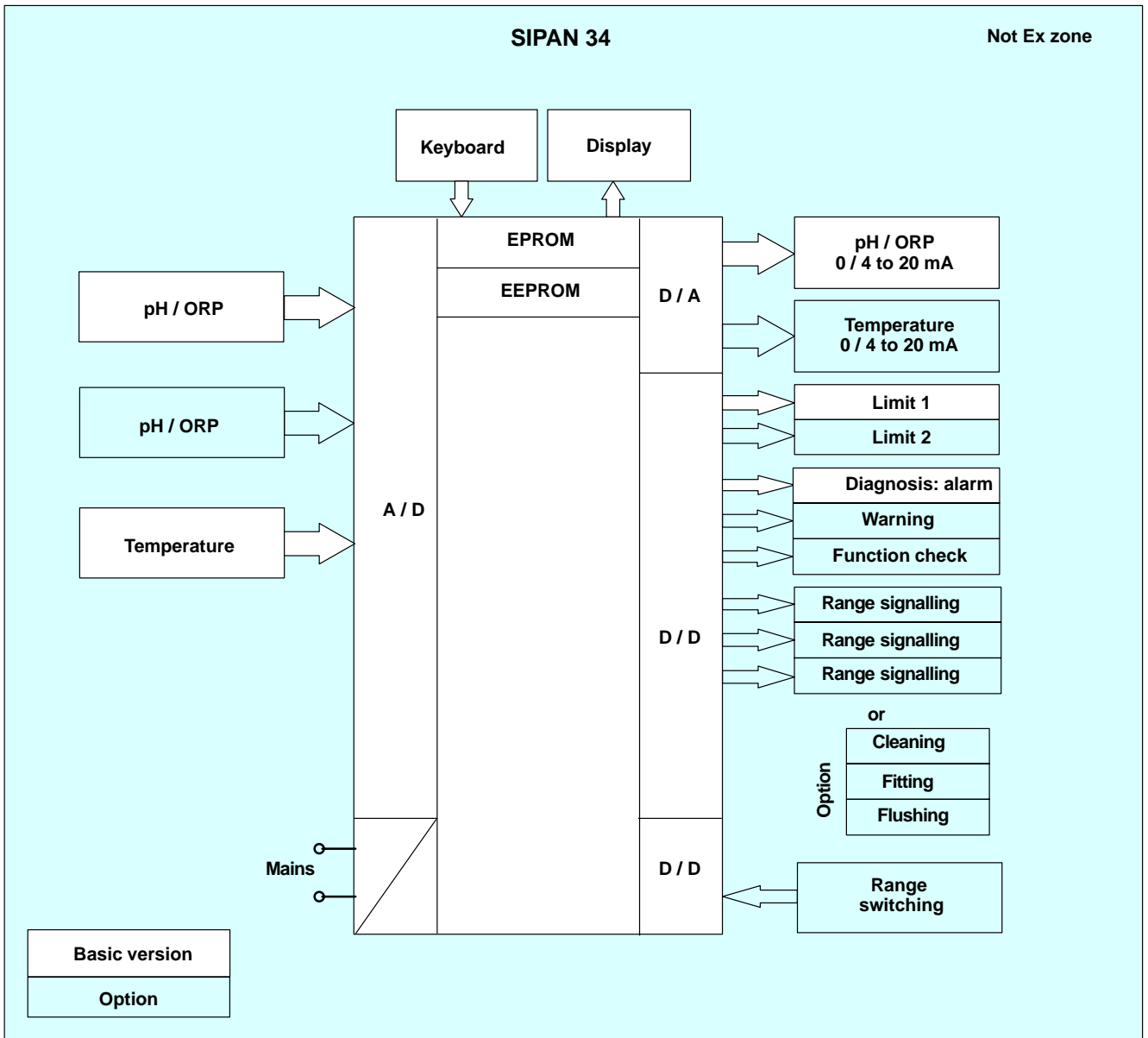


Fig. 2/7 SIPAN 34 analyzer, mode of operation

# Measuring equipment for pH value and redox potential

## Mode of operation

### SIPAN 32, SIPAN 32X analyzers

#### Measured-value processing

The signals delivered by the analog input amplifiers are processed into a temperature-compensated value by the digital data processing function.

#### pH value

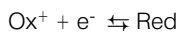
A potential depending on the concentration of hydrogen ions in the measured medium is generated on the pH sensor. The voltage between the pH electrode and the reference electrode is described by the Nernst equation:

$$U = U_0 + 2.3RT/F \times \log a_{H_3O^+}$$

The voltage which is proportional to the pH value is converted by the analyzer into a standardized output signal of 58.16 mV per  $\Delta pH=1$  (at 20 °C).

#### ORP value

The **redox** potential measurement determines the **reduction** or **oxidation** power of a solution. Oxidizing agents take up electrons, reducing agents give up electrons. The process is an equilibrium reaction:



The resulting potential U between the reference and measuring electrodes is applied to the analyzer as a proportional voltage.

#### Cleaning function (option for SIPAN 34)

Three relay contacts can be triggered via a timer in order to control a replacement fitting and to apply cleaning and flushing solutions.

#### Ex protection (SIPAN 32X)

Analyzers with the type of protection "Increased intrinsic safety" EEx ia can be mounted in potentially explosive atmospheres (zone 1). The conformity certificate corresponds to the European standard (CENELEC).

#### Parameter sets (option)

The analyzer contains complete parameter sets for 4 methods which can be set independent of one another. Thus optimum adaptation is possible in a process in which different media are to be measured in succession in one line. Selection of the respective parameter set can be controlled externally. Depending on the parameter settings of the analyzer, the following functions are executed in addition to output of the measured value:

| Functions   | SIPAN   |    |
|---|---------|----|
|   | 32, 32X | 34 |
| Output of measured signal on the display                | X       | X  |
| Output of measuring range and trend on the display      |         | X  |
| Switching of respective parameter sets onto the display |         | X  |
| Output of temperature via the second current output     | X       | X  |
| Limit monitoring  | X       | X  |
| Monitoring of sensor                                    | X       | X  |
| Digital communication via the interface                 | X       |    |
| Diagnostic functions                                    | X       | X  |
| Cleaning and timer function                             | X       | X  |
| PI controller   |         | X  |
| Software clock  | X       | X  |
| Logbook   | X       | X  |
| Illuminated display                                     |         | X  |
| Output of measuring-point name on the display           |         | X  |

2



# Measuring equipment for pH value and redox potential

## Mode of operation

Sensors

The pH value is defined as the negative decimal logarithm of the hydrogen ion activity "a" (simplified: hydrogen ion concentration)

$$\text{pH} = -\log a \text{H}_3\text{O}^+$$

and indicates whether a solution (the measured medium) is acidic, neutral or alkaline.

An assembly comprising a measuring electrode (glass electrode) and reference electrode is used to measure the pH value (see Fig. 2/8).

In the measuring electrode, use is made of the dependence of the potential of the glass membrane on the hydrogen ion activity. A spherical glass membrane as the pH sensor is usually joined by melting onto the end of the glass shaft. This sphere is filled with a buffer solution of known pH. The Ag/AgCl tapping electrode is immersed into the glass sphere which simultaneously contains KCl as the electrolyte. The potential difference between the inner and outer surfaces of the glass membrane is used for the pH measurement.

The reference electrode has electrical contact to the measured medium via a diaphragm so that the circuit is closed via the measured solution.

The Ag/AgCl tapping system is located in a KCl electrolyte which may be liquid or bound to a gel-type or polymer carrier material.

The measuring and reference electrodes must always have the same tapping system. They can also be supplied as combination electrodes and thus require only one mounting location. The Pt 1000 sensor for temperature compensation can also be integrated in the combination electrode.

Combination electrodes with integrated Pt 1000 are preferably used in replacement or immersion fittings in which only one mounting location is available.

Reference electrodes with a liquid electrolyte can be filled with KCl via a filling opening and subjected to pressure if necessary.

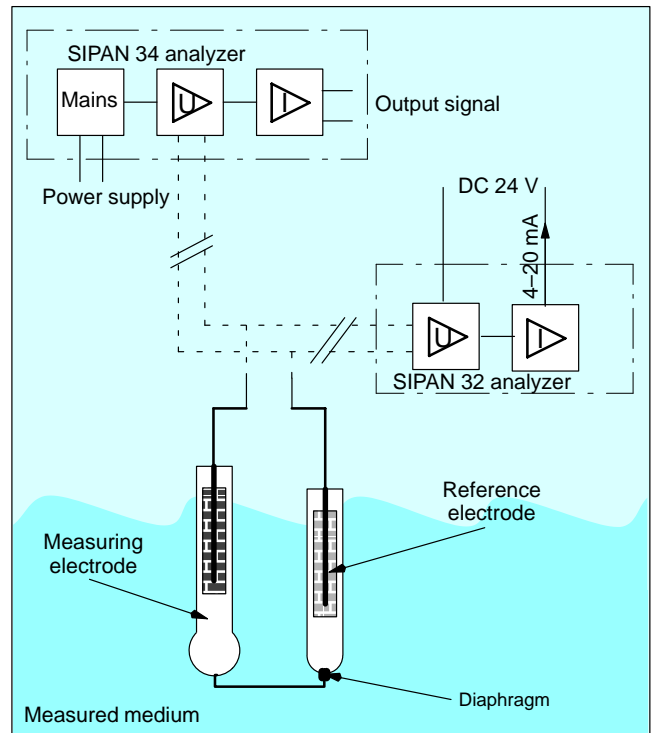


Fig. 2/8 Mode of operation of pH sensors

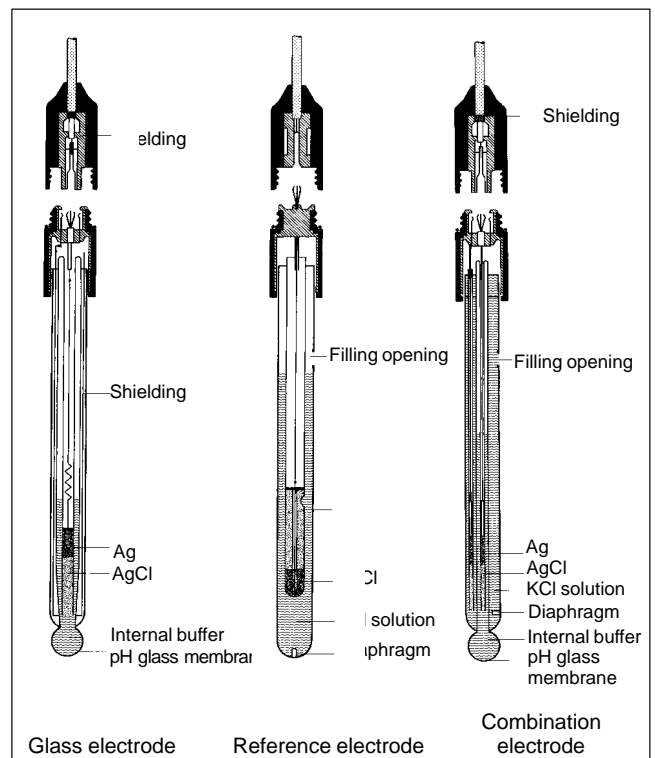


Fig. 2/9 pH sensors, cross-section

# Measuring equipment for pH value and redox potential

## SIPAN 32 and SIPAN 32X analyzers

### Characteristics

**SIPAN 32 and SIPAN 32X** are analyzers of the new two-wire generation with state-of-the-art micro-power technology with microprocessor control and multi-segment display. The **SIPAN 32 and SIPAN 32X** analyzers are optionally available with special features for process use.

The **SIPAN 32 and SIPAN 32X** analyzers are available in field housings.

They contain the analog and digital data processing functions for the signal delivered by the sensor.

A **SIPAN 32 or SIPAN 32X** analyzer can be used for all measuring ranges.

#### Special characteristics of SIPAN 32

- Two-wire analyzer with state-of-the-art micro-power technology
- Extremely simple field installation with only two wires
- Complete basic configuration
- Menu-based operation with understandable symbols (based on IEC)
- Complete local operation with directly accessible keypad with 8 keys and large, clearly-arranged multi-segment display
- Display of pH, mV
- Only one device version for all measuring ranges (pH, ORP)
- All measuring procedures for pH, ORP are available
- Additional permanent temperature display selectable in °C or °F
- Logbook with entry of faults or calibration procedures with date and time
- Output signal 4 to 20 mA
- Fault or limit output > 20 mA
- Automatic HOLD function
- Comprehensive fault diagnosis system
- 3 operating levels with coded protection for monitoring, routine and specialists
- Selectable tests for: display, keys, RAM, EPROM, EEPROM
- Output of defined current values for test purposes
- Maximum electromagnetic compatibility according to CE and NAMUR, sensitive lightning protection
- Robust field housing (IP 65/NEMA 4X) with four Pg screwed glands for easy connection
- No special or expensive mounting set required for wall or panel mounting






#### Special characteristics of SIPAN 32X

- Analyzers with type of protection "Increased intrinsic safety" EEx ia can be used within the potentially explosive atmospheres (zone 1, CENELEC).

#### Options

- Redundant pH value, or redundant ORP value, or pH + ORP value measurements with 2 measured-value outputs for increased measuring reliability
- Second passive output, freely-parameterizable as additional current output, for temperature or second measured value or contact for flushing function or limit or warning (pre-alarm)
- HART communication via handheld communicator or PC
- Available via HART interface: 4 parameter sets with remote selection for complete methods, not only for measuring ranges, e.g. also limits, temperature compensation, hysteresis

#### Functions

|          | Basic analyzer  | Options   |
|----------|---|---|
| Inputs   | <br>pH value<br><br>Temperature | <br>HART interface, thus access to 4 complete parameter sets for complete methods including measuring ranges, limits, physical dimensions, temp. compensation, hysteresis |
| Outputs  | <br>Analog output with alarm 21 mA   | <br>2nd analog output for temperature or flushing function or limit or warning   |
| Contacts | -   | -   |

#### Remote switching of method

| Method number            | 1               | 2           | 3           | 4           |
|--------------------------|-----------------|-------------|-------------|-------------|
| Medium                   | Measured medium | Water       | Cleaning 1  | Cleaning 2  |
| Range                    | pH 3-7          | pH 6-8      | pH 9-10     | pH 0-3      |
| Temperature compensation |                 |             |             |             |
|                          | Yes             | Yes         | No          | No          |
| 1 limit                  |                 |             |             |             |
|                          | pH 6.5 max.     | pH 7.5 max. | pH 9.2 min. | pH 1.6 min. |

# Measuring equipment for pH value and redox potential SIPAN 32 and SIPAN 32X analyzers

Display and control panel

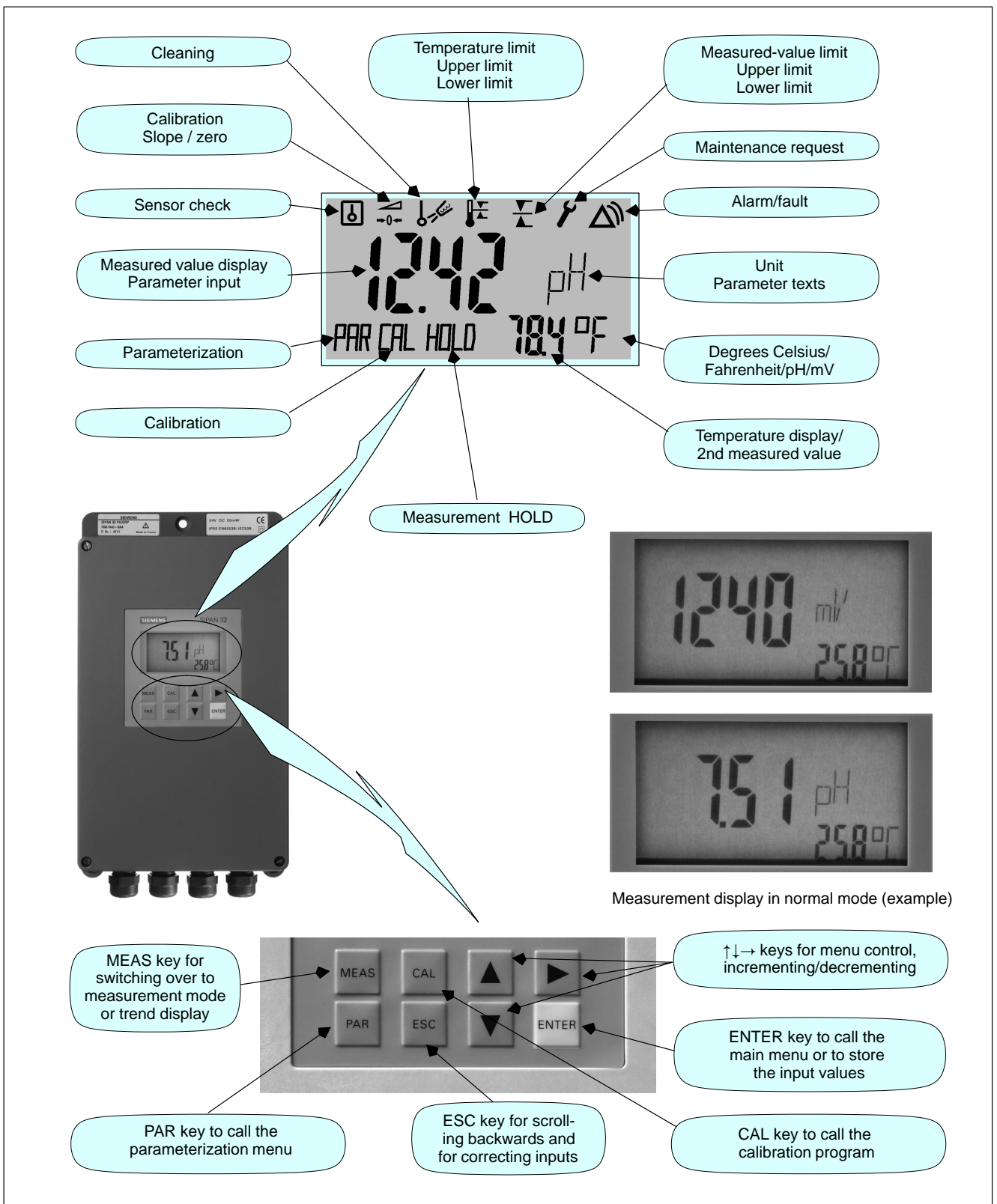


Fig. 2/10 SIPAN 32, SIPAN 32X analyzers, display and control panel

# Measuring equipment for pH value and redox potential

## SIPAN 32 and SIPAN 32X analyzers

### Technical data (two-wire system)

|                                     |  |                                  |  |
|-------------------------------------|--|----------------------------------|--|
| Display                             |  | Output signal                    | 4 to 20 mA, linear to measured value   |
| Measured value                      | Four 16-mm digits  | Max. permissible load            | (power supply - 14) V/0.02 A   |
| Secondary display                   | Four 8-mm digits   | Logbook                          | Automatic recording of warning and failure messages with date and time, 20 entries with overflow, non-erasable   |
| Text display                        | Five digits  |                                  |  |
| Others                              | Symbol displays  |                                  |  |
| Input display                       | Symbols  |                                  |  |
| Inputs                              |  | Data storage                     | > 10 years (EEPROM)  |
| 8 keys:                             | MEAS Measurement   | Device self-test                 | Testing of RAM, EPROM, EEPROM, display, keyboard; data can be called on display  |
|                                     | PAR Parameterization   |                                  |  |
|                                     | CAL Calibration  | Clock                            | Software clock   |
|                                     | ESC 1 step backwards in menu   | Identification                   | CE marking   |
|                                     | ▲ Increment the number / 1 line upwards  | EMC                              | NAMUR NE 21  |
|                                     | ▼ Decrement the number / 1 line downwards  | Applied harmonized standards     | EN 61010 (IEC 1010)<br>EN 55022 class B<br>IEC 1000-3-2<br>IEC 1000-4-2 class 2<br>IEC 1000-4-3 class 3(2)<br>IEC 1000-4-4 class 4<br>IEC 1000-4-5 class 3<br>IEC 801-6 class 3<br>(pr IEC 1000-4-6/1995)<br>pr. EN 61000-4-11 class C |
|                                     | ▶ 1 digit to right   | Radio interference suppression   | EN 55011 and EN 55022  |
| ENTER                               | Acceptance of entered value  | Lightning protection             | EN 61000 - 4 - 5   |
| Coding                              | 3 coding levels for operations (display level, user level, specialist level)   | Mechanical stress                | Vibration load of modules to IEC 68-2-6<br>Repetitive shocks to IEC 68-2-27  |
| Dimension                           | pH, mV   | Climatic loading                 | IEC 721-3-3<br>IEC 721-3-2   |
| Measuring range                     | -3 to +15 pH, -2000 to +2000 mV (observe technical data of sensors)  | Transport loading                | IEC 68-2-6   |
| Measuring span (expansion)          | Any, but at least 10% of smallest measuring range  | Electrical safety                | IEC 1010<br>IEC 664  |
| Output range                        | Optionally selectable between 0 and maximum full-scale value   | Foreign matter/ water protection | IEC 529  |
| Temperature compensation            | Input: Pt 100/Pt 1000, automatic selection, two-wire or three-wire system<br><br>Compensation of Nernst voltage, automatic, manual, adjustable temperature | Degree of protection             | IP 65 to EN 60529, NEMA 4X   |
| Measuring range for temperature     | -50 to +200 °C, -60 to +400 °F   | Quality assurance system         | DIN ISO 9001 / EN 29000  |
| Measuring span for temperature      | Any, but at least 10% of measuring range   | Material of field housing        | Macrolon (polycarbonate + 20% glass fiber)   |
| Error limits with pH/ORP meas.      | < 0.03 pH or 5 mV  |                                  |  |
| Error limits with temperature comp. | < 0.5 % of measured value  |                                  |  |
| Influencing effects                 | To DIN IEC 746, Part 1   |                                  |  |
| Repeatability                       | < 0.2 % of full-scale value  |                                  |  |
| Linearity                           | < 0.01 pH or 1 mV  |                                  |  |
| Ambient temperature                 | < 0.02 pH/10 K or 1 mV/10K   |                                  |  |
| Power supply                        | < 0.01 pH or 1 mV  |                                  |  |
| Load                                | < 0.01 pH/100 Ω or 1 mV/100 Ω  |                                  |  |
| Zero error                          | < 0.01 pH or 1 mV  |                                  |  |

# Measuring equipment for pH value and redox potential

## SIPAN 32 and SIPAN 32X analyzers

Technical data (two-wire system)

|  |  |
|--|--|
| Input resistance                                 |  |
| Glass electrode                                  | > 10 <sup>12</sup> Ω   |
| Reference electrode                              | > 10 <sup>10</sup> Ω   |
| Offset current                                   |  |
| Glass electrode                                  | < 5 · 10 <sup>-12</sup> A (at 20 °C) <sup>1)</sup>   |
| Reference electrode                              | < 1 · 10 <sup>-10</sup> A (at 20 °C) <sup>1)</sup>   |
| Electrodes                                       |  |
| Electrode assembly zero point                    | pH 0 to 10   |
| Slope range                                      | 54 to 60 mV (per ΔpH = 1) at 20 °C   |
| Isothermal intersection U <sub>is</sub>          | -1000 to +1000 mV  |
| Measuring impedance                              |  |
| Glass electrode                                  | 5 to 1000 MΩ   |
| Reference electrode                              | 1 to 100 kΩ  |
| Permissible ambient temperature                  |  |
| Operation (field device)                         | -20 to +55 °C  |
| Transport and storage                            | -25 to +85 °C  |
| Permissible relative humidity                    | 10 to 95%, no condensation   |
| Power supply                                     | DC 24 V (14 V to 30 V) 0.8 W<br>Protection class II  |
| Dimensions                                       | See Fig. 2/20  |
| Weight   | 2.5 kg field housing   |
| <b>Options</b>                                   | See page 2/10  |
| 2nd passive analog output                        | 0/4 to 20 mA linear to temperature, or flushing function, or limit, or warning (pre-alarm)   |
| Input resistance                                 |  |
| pH electrode                                     | pH 1 > 10 <sup>12</sup> Ω<br>pH 2 > 10 <sup>12</sup> Ω   |
| Reference electrode                              | > 10 <sup>10</sup> Ω   |
| <b>Communication</b>                             | PC/laptop or HART communicator with SIPAN 32 and SIPAN 32X analyzers   |
| Load with connection of HART modem               | 250 to 500 Ω   |
| HART communicator                                | 250 to 500 Ω   |
| Line   | Two-conductor, screened: ≤ 1.5 km  |
| Protocol   | HART, version 5.1  |
| <b>SIPAN 32X with Ex protection</b>              |  |
| <b>Explosion protection</b>                      | Type of protection "Increased intrinsic safety ia"   |
|  | to DIN EN 50014  |
|  | and DIN EN 50020   |
| Permissible ambient temperature during operation | II 2G EEx ia IIC T4<br>-20 to +50 °C   |
| Power supply/output signal circuit               | With type of protection "Intrinsic safety EEx ia IIC" only for connection to certified intrinsically-safe circuits with the following maximum values:<br>U <sub>i</sub> = 30 V, I <sub>i</sub> = 100 mA,<br>P <sub>i</sub> = 750 mW, R <sub>i</sub> = 300 Ω,<br>Effective internal inductance:<br>L <sub>i</sub> = negligible<br>Effective internal capacitance:<br>C <sub>i</sub> = 16 nF |

| pH sensors             | Fittings               |                         |                        |                   |                   |                                 |                         |             |                         |                                 |
|------------------------|------------------------|-------------------------|------------------------|-------------------|-------------------|---------------------------------|-------------------------|-------------|-------------------------|---------------------------------|
|                        | <b>C74451-A1789-A1</b> | <b>C74451-A1789-A21</b> | <b>C74451-A1789-A3</b> | <b>M54145-A92</b> | <b>M54145-A93</b> | <b>C74451-A1789-A10 to -A16</b> | 7MA8500-8FU, -8FV, -8FW | 7MA8500-8FK | 7MA8500-8FR, -8FS, -8FT | 7MA8500-8AU//AW//AV//BG//BH//BJ |
| 7MA8500-8FA            | X                      | X                       | X                      | ✓                 | ✓                 | ✓                               | X                       |             | X                       |                                 |
| 7MA8500-8FB            | X                      | X                       | X                      | ✓                 | X                 | ✓                               | X                       |             | X                       |                                 |
| 7MA8500-8FC            | ✓                      | ✓                       | X                      | X                 | X                 | X                               | X                       |             |                         |                                 |
| 7MA8500-8FD            | X                      | X                       | ✓                      | X                 | X                 | ✓                               | X                       |             | X                       |                                 |
| 7MA8500-8FE            |                        |                         |                        |                   |                   |                                 |                         | ✓           |                         |                                 |
| 7MA8500-8FF            | X                      | X                       | X                      | X                 | X                 | X                               | ✓                       |             | ✓                       |                                 |
| 7MA8500-8BV            |                        |                         |                        |                   |                   |                                 |                         |             |                         | ✓                               |
| <b>ORP sensor</b>      |                        |                         |                        |                   |                   |                                 |                         |             |                         |                                 |
| 7MA8500-8FG            | X                      | X                       | ✓                      | ✓                 | ✓                 | ✓                               | ✓                       |             | X                       |                                 |
| <b>Pt 1000 sensors</b> |                        |                         |                        |                   |                   |                                 |                         |             |                         |                                 |
| 7MA8500-8FH            | ✓                      | ✓                       | ✓                      | ✓                 | ✓                 | ✓                               | X                       |             | X                       |                                 |
| 7MA8500-8FJ            | ✓                      | ✓                       | ✓                      | ✓                 | ✓                 | ✓                               | X                       |             | X                       |                                 |

Fig. 2/11 Selection of flow fittings for sensors;  
 ✓ recommended, X possible  
**Fittings (in bold type):** only together with suitable electrode holder

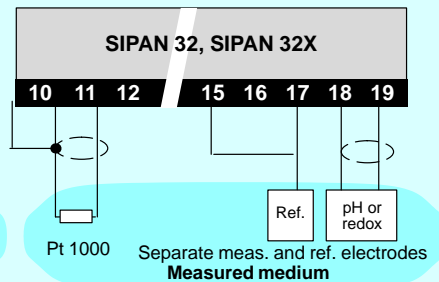
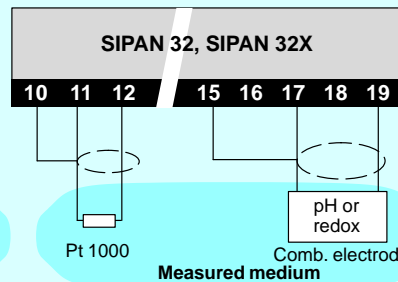
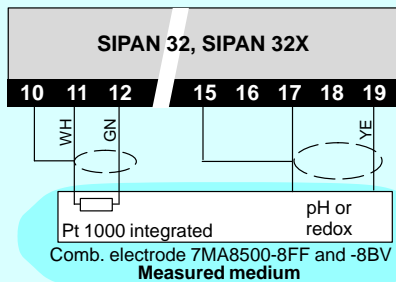
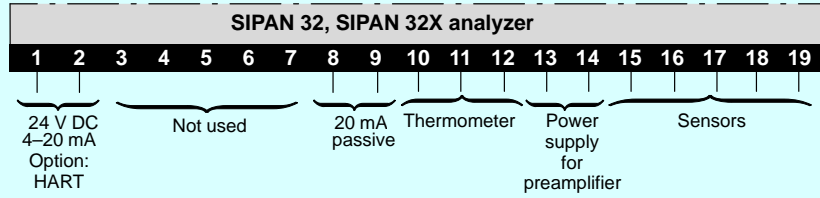
<sup>1)</sup> Doubled for every 10 K increase in temperature

# Measuring equipment for pH value and redox potential

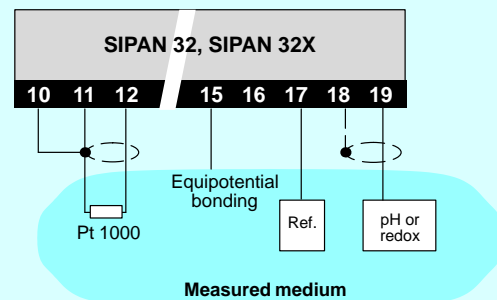
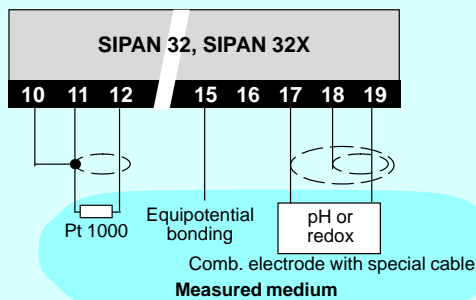
## SIPAN 32 and SIPAN 32X analyzers

### Electric connections

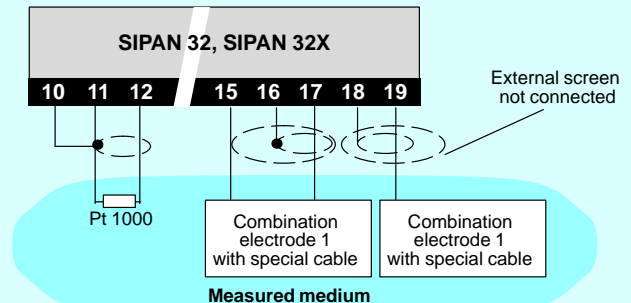
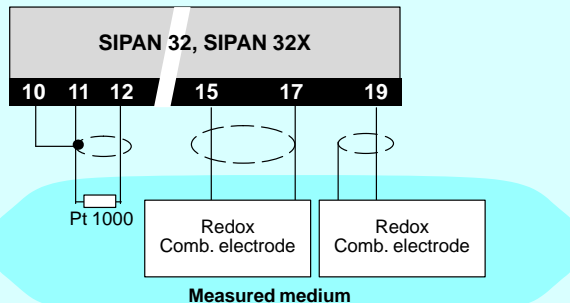
2



Electric sensor connections for pH or redox potential measurements



Electric sensor connections for pH or redox potential measurements with sensor monitoring



Electric sensor connections for **redundant** pH or redox measurements, 2 pH sensors in one measured medium with sensor monitoring

Fig. 2/12 SIPAN 32, SIPAN 32X analyzers, electric connections

# Measuring equipment for pH value and redox potential

## SIPAN 32 and SIPAN 32X analyzers

Electric connections

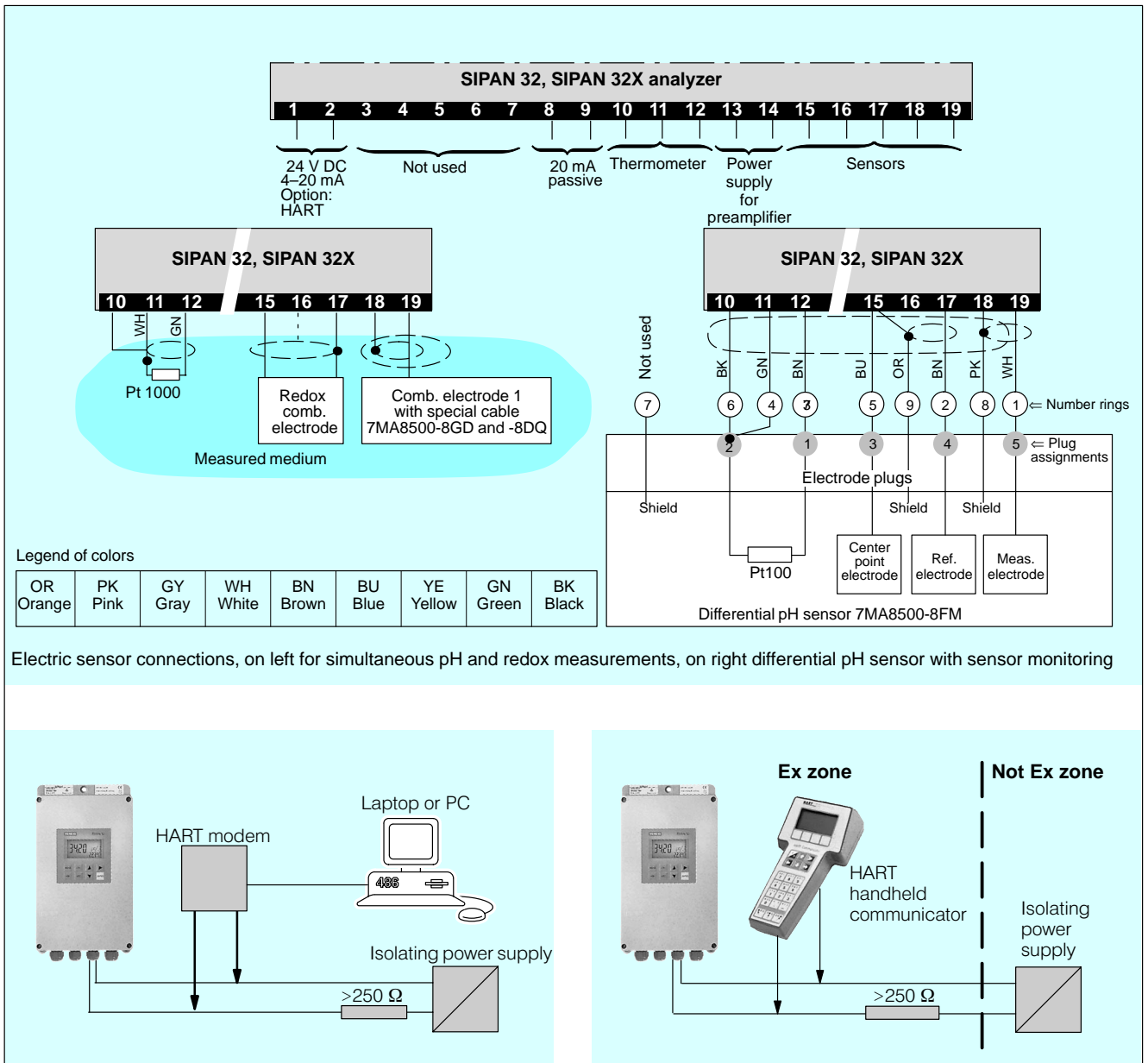


Fig. 2/13 SIPAN 32 or SIPAN 32X analyzer, electric connections; shown at bottom is communication between SIPAN 32 or SIPAN 32X and HART communicator or with HART modem and PC

# Measuring equipment for pH value and redox potential SIPAN 32 and SIPAN 32X analyzers

## Dimensions, design

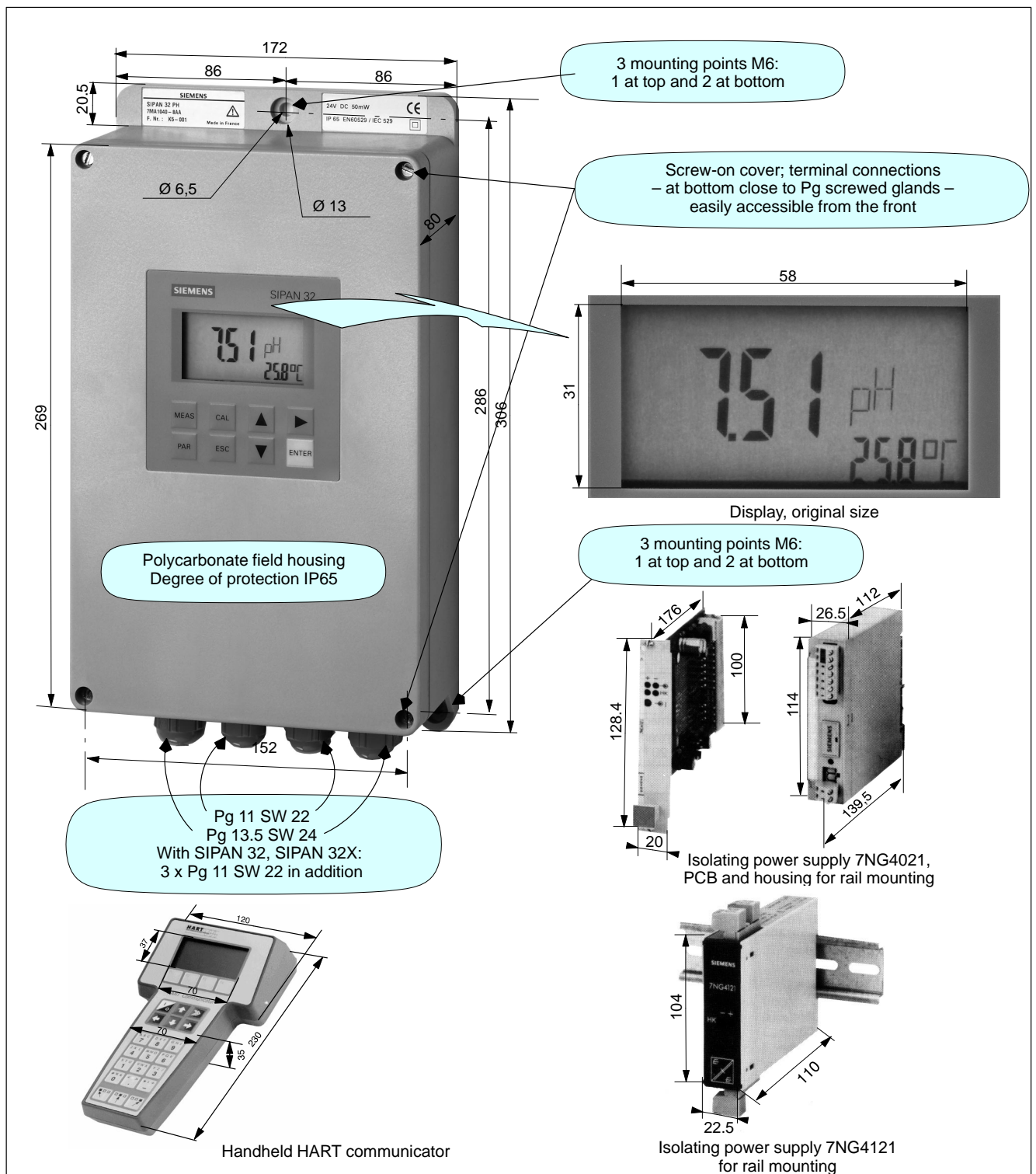


Fig. 2/14 SIPAN 32, SIPAN 32X analyzer, isolating power supply and handheld communicator, dimensions in mm



# Measuring equipment for pH value and redox potential

## SIPAN 32 and SIPAN 32X analyzers

Ordering data

|   | Order No.                           |
|---|-------------------------------------|
| <b>SIPAN 32 analyzer</b><br><b>Two-wire system,</b><br><b>for pH or ORP measurements</b><br><u>Single measurement:</u><br>1 x pH or 1 x ORP, membrane keyboard with LCD, menu control, logbook, concentration display, temperature compensation, diagnostic software, 1 parameter set, microprocessor-controlled, power supply: DC 24 V, in field housing | 7MA1040-8A <input type="checkbox"/> |
| Standard version,<br>1 signal output: 4 to 20 mA  | A                                   |
| 1 signal output: 4 to 20 mA,<br>with HART interface   | B                                   |
| 2 signal outputs<br>with HART interface:<br>1st signal output:<br>measured value 4 to 20 mA,<br>2nd signal output: temperature or<br>switching contact for limit or<br>cleaning or warning  | C                                   |

|  | Order No.                           |
|--|-------------------------------------|
| <b>SIPAN 32 analyzer</b><br><b>Two-wire system,</b><br><b>for pH or ORP measurements</b><br><u>Double measurement:</u> 2 x pH or<br>2 x ORP or 1 x pH and 1 x ORP,<br>membrane keyboard with LCD,<br>menu control, logbook,<br>concentration display,<br>temperature compensation,<br>diagnostic software, 1 parameter set,<br>microprocessor-controlled, power<br>supply: DC 24 V, in field housing | 7MA1140-8A <input type="checkbox"/> |
| 2 signal outputs<br>1st signal output:<br>measured value 4 to 20 mA,<br>2nd signal output:<br>temperature or switching<br>contact for limit or<br>cleaning or warning  | B                                   |
| 2 signal outputs: 4 to 20 mA,<br>with HART interface   | C                                   |

|  | Order No.  |
|--|--|
| <b>Isolating power supply</b><br>(see MP 19, Section 5 for technical data) <ul style="list-style-type: none"> <li>With AC/DC 24 V power supply, DIN rail mounting</li> <li>With AC/DC 24 V power supply, PCB, individual locking</li> <li>With AC 115 V power supply, DIN rail mounting</li> <li>With AC 230 V power supply, DIN rail mounting</li> <li>HART version with Ex protection EEx ia IIC, smart, with AC/DC 24 V power supply, compact subassembly, DIN rail mounting</li> <li>HART version with Ex protection EEx ia IIC, smart, with AC/DC 24 V power supply, PCB, individual locking</li> </ul> | 7NG4121-1AA00-1NNO<br>7NG4021-4CA33-0NNO<br>7NG4021-6BA33-0NNO<br>7NG4021-6AA33-0NNO<br>7NG4121-1AA20-1AN0<br>7NG4021-4CA33-2NA1 |

|  | Order No.                           |
|--|-------------------------------------|
| <b>SIPAN 32X analyzer with Ex protection,</b><br><b>intrinsically-safe version,</b><br><b>II 2 G EEx ia II C T4,</b><br><b>two-wire system,</b><br><b>for pH or ORP measurements</b><br><u>Single measurement:</u><br>1 x pH or 1 x ORP,<br>membrane keyboard with LCD,<br>menu control, logbook,<br>concentration display,<br>temperature compensation,<br>diagnostic software, 1 parameter set,<br>microprocessor-controlled, power<br>supply: DC 24 V, in field housing | 7MA1041-8A <input type="checkbox"/> |
| Standard version,<br>1 signal output: 4 to 20 mA   | A                                   |
| 1 signal output: 4 to 20 mA,<br>with HART interface  | B                                   |
| 2 signal outputs<br>with HART interface:<br>1st signal output:<br>measured value 4 to 20 mA,<br>2nd signal output: temperature or<br>switching contact for limit or<br>cleaning or warning   | C                                   |

|  | Order No.                           |
|--|-------------------------------------|
| <b>SIPAN 32X analyzer with Ex protection,</b><br><b>intrinsically-safe version,</b><br><b>II 2 G EEx ia II C T4,</b><br><b>two-wire system,</b><br><b>for pH or ORP measurements</b><br><u>Double measurement:</u><br>2 x pH or 2 x ORP or 1 x pH and<br>1 x ORP, membrane keyboard with<br>LCD, menu control, logbook,<br>concentration display,<br>temperature compensation,<br>diagnostic software, 1 parameter set,<br>microprocessor-controlled, power<br>supply: DC 24 V, in field housing | 7MA1141-8A <input type="checkbox"/> |
| 2 signal outputs<br>1st signal output:<br>measured value 4 to 20 mA,<br>2nd signal output:<br>temperature or switching contact<br>for limit or cleaning or warning   | B                                   |
| 2 signal outputs: 4 to 20 mA,<br>with HART interface   | C                                   |

|  | Order No.   |
|--|---|
| <b>Handheld HART communicator</b><br>Intrinsically-safe version EEx ia IIC T4<br>(see MP 17, Section 5 for technical data) <ul style="list-style-type: none"> <li>German version</li> <li>English version</li> </ul> <b>HART modem</b><br><b>Software for PC</b> | 7MF4998-8KF<br>7MF4998-8KT<br>7MF4997-1DA<br>On request |

| Accessories/mounting material  | Order No.        |
|--|------------------|
| For mounting of analyzer or isolating<br>power supply on a pipeline<br>(see Fig. 1/27 for dimensional drawing) |                  |
| <b>Protective hood</b> (1.4571) with base plate  | C79451-A3177-D12 |
| <b>Pipe clamp</b> (mat. No. 1.4571)  | 7MA8500-8DG      |
| <b>Base plate</b> (mat. No. 1.4571)  | C79451-A3177-D11 |
| <b>Set of screwdrivers</b> "TORX"  | C79451-A3246-D50 |

Available ex-stock: 7MA1040-8AA, 7MA1041-8AA

# Measuring equipment for pH value and redox potential

## SIPAN 34 analyzer

### Characteristics

**SIPAN 34** is an analyzer of the four-wire generation with state-of-the-art technology with microprocessor control and illuminated graphic display.

The **SIPAN 34** analyzer is optionally available with special features for process use.

The **SIPAN 34** analyzer is available in two designs:

- With a field housing
- With a panel housing

They contain the analog and digital data processing functions for the signal delivered by the sensor.

A **SIPAN 34** analyzer can be used for all measuring ranges.

### Special characteristics








- Four-wire analyzer with extremely easy operation
- Universal power supply (24 V AC/DC, 115 V AC, 230 V AC)
- Complete basic configuration
- Self-explanatory menu operation in plain text in five languages, without Instruction Manual, help function
- Operation according to NAMUR, i.e. complete local operation with directly accessible keypad with 8 keys and large, illuminated, full-graphic display
- Display of pH, mV, additional permanent bargraph of measuring range
- Graphic trend display of measured value
- Additional permanent temperature display in °C
- Output signal 0/4 to 20 mA, floating
- Freely-programmable, permanent measuring-point designation (saves tag labels)
- Logbook with entry of faults or calibration procedures with date and time
- Fault and limit contacts
- Automatic recognition of buffer (NIST and technical buffers)
- Maintenance switch with automatic HOLD function
- Comprehensive fault diagnosis and preventive maintenance system in plain text
- 3 operating levels with coded protection for monitoring, routine and specialists
- Selectable tests for: keys, RAM, EPROM, EEPROM, display

- Output of freely-defined current values for test purposes
- Maximum electromagnetic compatibility according to CE and NAMUR, sensitive lightning protection
- Panel housing made completely of metal, CE safety for every control cabinet installation engineer
- Robust field housing (IP 65) with seven Pg screwed glands for easy connection
- No special or expensive mounting set required for wall or panel mounting

### Options

- Second current output for measured value or temperature with additional limit
- Four parameter sets with remote selection for complete methods, not only for measuring ranges, e.g. also limits, temperature compensation, hysteresis
- Automatic cleaning function (3 relays) for cleaning, flushing, fitting control with cyclic time input, waiting and holding functions
- Two-point controller for pulse length (dosing valves) or pulse frequency (diaphragm pumps)
- Additional switching contact for maintenance (function check) and pre-alarm (warning)
- Redundant pH or ORP measurement with 2 measured-value outputs for increased measuring reliability

### Functions

|          | Basic analyzer  | Options   |
|----------|---|---|
| Inputs   | <br>pH / redox<br><br><br>Temperature | <br>Remote switching of range for 4 parameter sets, thus access to 4 complete parameter sets for complete methods including ranges, limits, temperature compensation, hysteresis |
| Outputs  | <br>Analog output  | <br>2nd analog output for temperature  |
| Contacts | <br>1x failure<br>1x limit and<br>2x NAMUR contacts  | <br>Second limit<br>2 limits with 3x range controller contacts<br>3x cleaning or signalling contacts   |

# Measuring equipment for pH value and redox potential

## SIPAN 34 analyzer

### Display and control panel

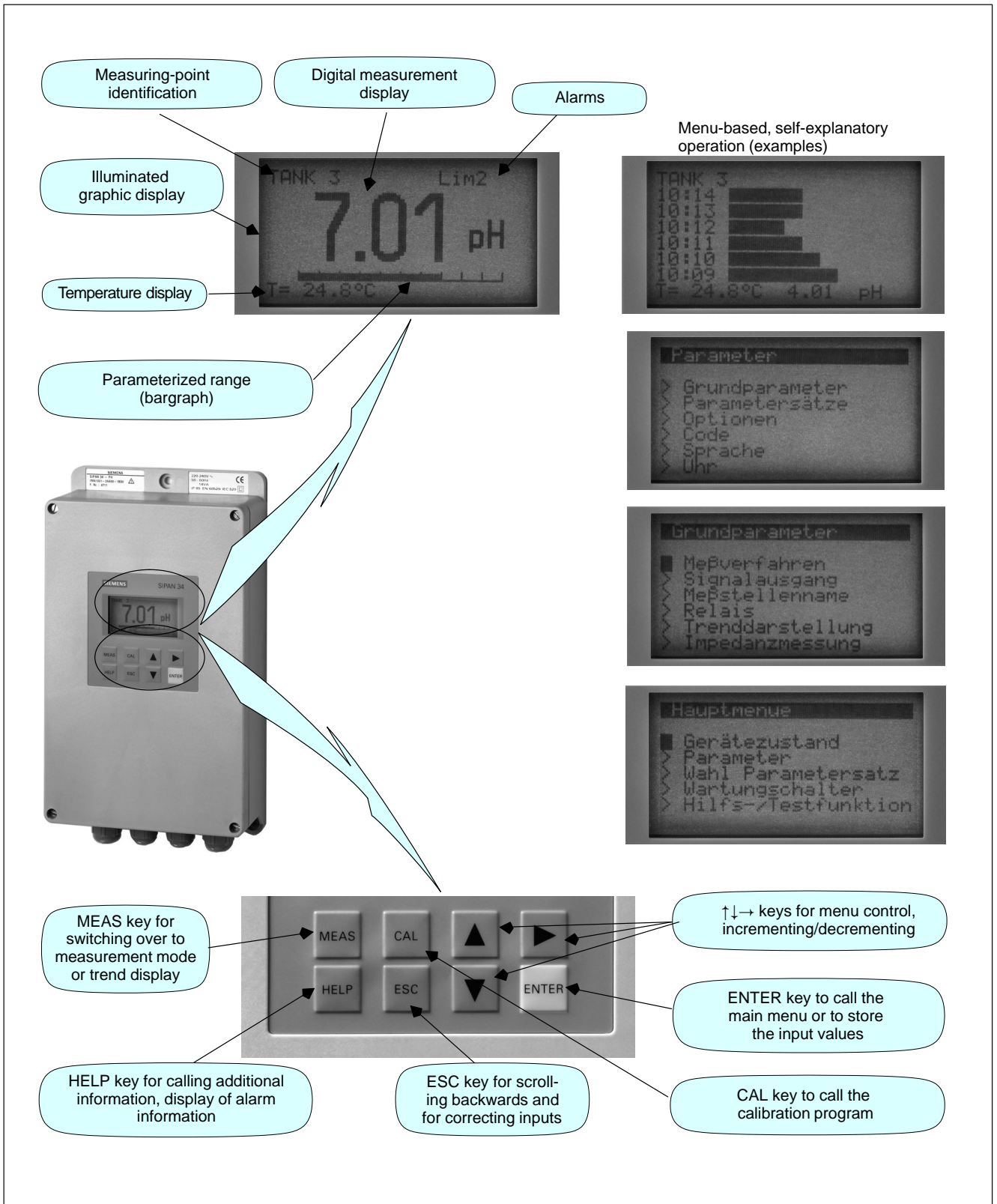


Fig. 2/15 SIPAN 34 analyzer, display and control panel

# Measuring equipment for pH value and redox potential

## SIPAN 34 analyzer

### Technical data (four-wire system)

|  |   |                                 |   |
|--|---|---------------------------------|---|
| Display                                    | Graphic   | Output signal                   | 0/4 to 20 mA, linear to measured value  |
| Measured value                             | Four 15-mm digits or trend display: 5 bars, 3 mm high   | Max. permissible load           | 750 Ω   |
| Others                                     | Temperature, alarms, measuring-point identification, 3-mm digits<br>Current output as bargraph, 3 mm high   | Limit                           | 1 NO or NC contact selectable, adjustable hysteresis and response time  |
| With inputs                                | 8 lines of text<br>1 heading (inverted display) and 6 text lines, letters 4 mm high   | Alarm contact                   | 1 alarm (failure)   |
| Illumination                               | LED   | Diagnostic contacts             | Two, pre-alarm and maintenance  |
| Inputs                                     | According to NAMUR  | Relay contacts                  | NO contact, rating DC 24 V, 1 A   |
| 8 keys:                                    | MEAS<br>HELP<br>CAL<br>ESC<br>▲<br>▼<br>▶<br>ENTER  | Logbook                         | Automatic recording of warning and failure messages with date and time, 20 entries with overflow, non-erasable  |
|  | Measurement/trend<br>Help<br>Calibration<br>1 step backwards in menu<br>Increment the number /<br>1 line upwards<br>Decrement the number /<br>1 line downwards<br>1 digit to right with numbers<br>Calling a menu item /<br>acceptance of entered value | Data storage                    | > 10 years (EEPROM)   |
| Languages                                  | 5: German, English, French, Italian, Spanish; selectable  | Device self-test                | Testing of RAM, EPROM, EEPROM, display, keyboard; data can be called on display   |
| Coding                                     | 3 coding levels for operations (display level, user level, specialist level)  | Clock                           | Software clock  |
| Dimension                                  | pH, mV  | Identification                  | CE marking  |
| Measuring range                            | -3 to +15 pH,<br>-2000 mV to +2000 mV<br>(observe technical data of sensors)  | EMC                             | NAMUR NE 21   |
| Measuring span (expansion)                 | Any, but at least 10% of smallest measuring range   | Applied harmonized standards    | EN 61010 (IEC 1010)<br>EN 55022 class B<br>IEC 1000-3-2<br>IEC 1000-4-2 class 2<br>IEC 1000-4-3 class 3(2)<br>IEC 1000-4-4 class 4<br>IEC 1000-4-5 class 3<br>IEC 801-6 class 3 (pr IEC 1000-4-6/1995)<br>pr. EN 61000-4-11 class C |
| Output range                               | Optionally selectable between 0 and maximum full-scale value  | Radio interference suppression  | EN 55011 and EN 55022   |
| Temperature compensation                   | Input: Pt 100/Pt 1000, automatic selection, two-wire or three-wire system<br><br>Compensation of Nernst voltage, automatic, manual, adjustable temperature  | Lightning protection            | EN 61000 - 4 - 5  |
| Measuring range for temperature            | -50 to +200 °C  | Mechanical stress               | Vibration load of modules to IEC 68-2-6<br>Repetitive shocks to IEC 68-2-27   |
| Measuring span for temperature             | Any, but at least 10% of measuring range  | Climatic loading                | IEC 721-3-3<br>IEC 721-3-2  |
| Error limits with pH/ORP measurement       | < 0.03 pH or 5 mV   | Transport loading               | IEC 68-2-6  |
| Error limits with temperature compensation | < 0.5 % of measured value   | Electrical safety               | IEC 1010<br>IEC 664   |
| Influencing effects                        | To DIN IEC 746, Part 1  | Foreign matter/water protection | IEC 529   |
| Repeatability                              | < 0.2 % of full-scale value   | Degree of protection            | Field device IP 65 to EN 60529, NEMA 4X<br>Panel mounting IP 54 to EN 60529 (front)   |
| Linearity                                  | < 0.01 pH or 1 mV   | Quality assurance system        | DIN ISO 9001 / EN 29000   |
| Ambient temperature                        | < 0.02 pH/10 K or 1 mV/10K  | Material of field housing       | Macrolon (polycarbonate + 20% glass fiber)  |
| Power supply                               | < 0.01 pH or 1 mV   | Panel mounting housing          | Aluminium   |
| Load                                       | < 0.01 pH/100 Ω or 1 mV/100 Ω   |                                 |   |
| Zero error                                 | < 0.01 pH or 1 mV   |                                 |   |

# Measuring equipment for pH value and redox potential

## SIPAN 34 analyzer

### Technical data (four-wire system)

|                                 |  |
|---------------------------------|--|
| Input resistance                |  |
| Glass electrode                 | > 10 <sup>12</sup> Ω   |
| Reference electrode             | > 10 <sup>10</sup> Ω   |
| Offset current                  |  |
| Glass electrode                 | < 5 · 10 <sup>-12</sup> A (at 20 °C) <sup>1)</sup>   |
| Reference electrode             | < 1 · 10 <sup>-10</sup> A (at 20 °C) <sup>1)</sup>   |
| Electrodes                      |  |
| Electrode assembly              |  |
| zero point                      | pH 0 to 10   |
| Slope range                     | 54 to 60 mV (per ΔpH = 1) at 20 °C   |
| Isothermal intersection         | -1000 to +1000 mV  |
| U <sub>is</sub>                 |  |
| Measuring impedance             |  |
| Glass electrode                 | 5 to 1 000 MΩ  |
| Reference electrode             | 1 to 100 kΩ  |
| Permissible ambient temperature |  |
| Operation (field device)        | -20 to +55 °C  |
| Operation (panel mounting)      | -5 to +70 °C   |
| Transport and storage           | -25 to +85 °C  |
| Permissible relative humidity   | 10 to 95 %, no condensation  |
| Power supply                    | AC 120 V (94 V to 132 V),<br>48 to 63 Hz, 10 VA<br>AC 230 V (187 V to 264 V),<br>48 to 63 Hz, 10 VA<br>AC 24 V (20 V to 26 V),<br>48 to 63 Hz, 10 VA<br>DC 24 V (20 V to 30 V), 8 W<br>Protection class II (field housing) |
| Dimensions                      | See Fig. 2/20  |
| Weight                          | 2.5 kg field housing<br>2.0 kg panel housing   |
| <b>Options</b>                  | See page 2/18  |
| Second output signal            | 0/4 to 20 mA linear to temperature   |
| Additional limit                | 1 x NO or NC contact selectable,<br>any assignment to measured value or temperature  |
| Parameter sets                  | 4  |
| Range signalling                | Signalling of current measuring range (3 contacts)   |
| Cleaning contacts with timer    | 3, fitting control, cleaning and flushing  |
| Range switchover                | 4, parameterizable as desired using range selection; external control possible   |
| Controller                      | 2 floating contacts (instead of limits) as PI controller   |
| Input resistance                |  |
| pH electrode                    | pH 1 > 10 <sup>12</sup> Ω<br>pH 2 > 10 <sup>12</sup> Ω   |
| Reference electrode             | > 10 <sup>10</sup> Ω   |

| pH sensors             | Fittings               |                         |                        |                   |                   |                                 |                         |             |                         |                            |
|------------------------|------------------------|-------------------------|------------------------|-------------------|-------------------|---------------------------------|-------------------------|-------------|-------------------------|----------------------------|
|                        | <b>C74451-A1789-A1</b> | <b>C74451-A1789-A21</b> | <b>C74451-A1789-A3</b> | <b>M54145-A92</b> | <b>M54145-A93</b> | <b>C74451-A1789-A10 to -A16</b> | 7MA8500-8FU, -8FV, -8FW | 7MA8500-8FK | 7MA8500-8FR, -8FS, -8FT | 7MA8500-8BG/AU//AW//BH//BJ |
| 7MA8500-8FA            | ✗                      | ✗                       | ✗                      | ✓                 | ✓                 | ✓                               | ✗                       |             | ✗                       |                            |
| 7MA8500-8FB            | ✗                      | ✗                       | ✗                      | ✓                 | ✗                 | ✓                               | ✗                       |             | ✗                       |                            |
| 7MA8500-8FC            | ✓                      | ✓                       | ✗                      | ✗                 | ✗                 | ✗                               | ✗                       |             |                         |                            |
| 7MA8500-8FD            | ✗                      | ✗                       | ✓                      | ✗                 | ✗                 | ✓                               | ✗                       |             | ✗                       |                            |
| 7MA8500-8FE            |                        |                         |                        |                   |                   |                                 |                         | ✓           |                         |                            |
| 7MA8500-8FF            | ✗                      | ✗                       | ✗                      | ✗                 | ✗                 | ✗                               | ✓                       |             | ✓                       |                            |
| 7MA8500-8BV            |                        |                         |                        |                   |                   |                                 |                         |             |                         | ✓                          |
| <b>ORP sensor</b>      |                        |                         |                        |                   |                   |                                 |                         |             |                         |                            |
| 7MA8500-8FG            | ✗                      | ✗                       | ✓                      | ✓                 | ✓                 | ✓                               | ✓                       |             | ✗                       |                            |
| <b>Pt 1000 sensors</b> |                        |                         |                        |                   |                   |                                 |                         |             |                         |                            |
| 7MA8500-8FH            | ✓                      | ✓                       | ✓                      | ✓                 | ✓                 | ✓                               | ✗                       |             | ✗                       |                            |
| 7MA8500-8FJ            | ✓                      | ✓                       | ✓                      | ✓                 | ✓                 | ✓                               | ✗                       |             | ✗                       |                            |

Fig. 2/16 Selection of flow fittings for sensors,

✓ recommended, ✗ possible

**Fittings (in bold type):** only together with suitable electrode holder

### Remote switching of method

| Parameter                | 1                | 2                | 3                | 4                |
|--------------------------|------------------|------------------|------------------|------------------|
| Medium                   | Measured medium  | Water            | Cleaning 1       | Cleaning 2       |
| Range                    | pH 3-7           | pH 6-8           | pH 9-10          | pH 0-3           |
| Temperature compensation |                  |                  |                  |                  |
|                          | Yes              | Yes              | No               | No               |
| 2 limits                 |                  |                  |                  |                  |
|                          | pH 3.5<br>pH 6.5 | pH 6.5<br>pH 7.5 | pH 9.2<br>pH 9.8 | pH 1.5<br>pH 2.0 |
| Contact state            |                  |                  |                  |                  |
| 1                        | Open             | Closed           | Open             | Closed           |
| 2                        | Open             |                  | Closed           |                  |

<sup>1)</sup> Doubled for every 10 K increase in temperature

# Measuring equipment for pH value and redox potential

## SIPAN 34 analyzer

### Electric connections

2

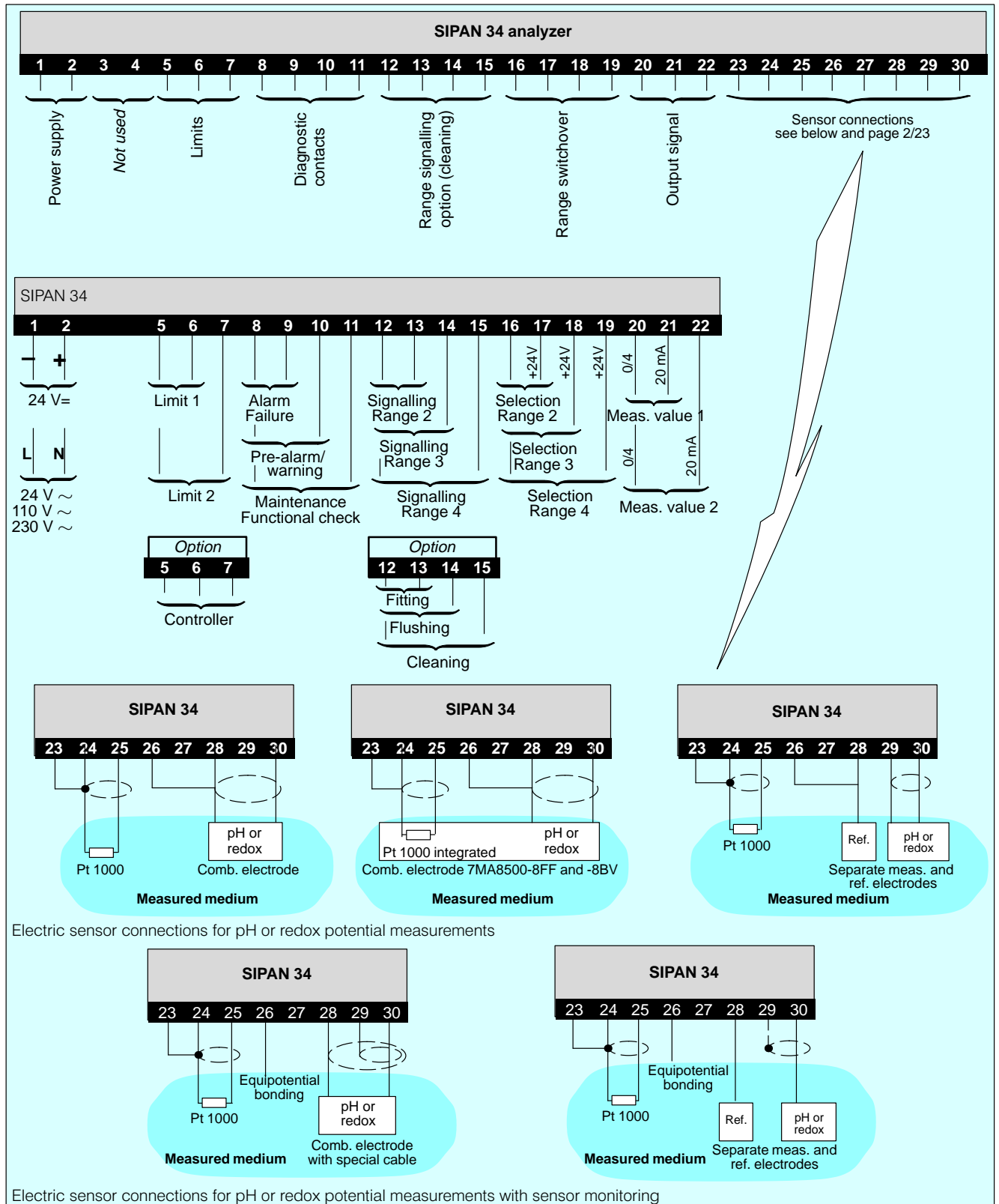


Fig. 2/17 SIPAN 34 analyzer, electric connections

# Measuring equipment for pH value and redox potential

## SIPAN 34 analyzer

Electric connections

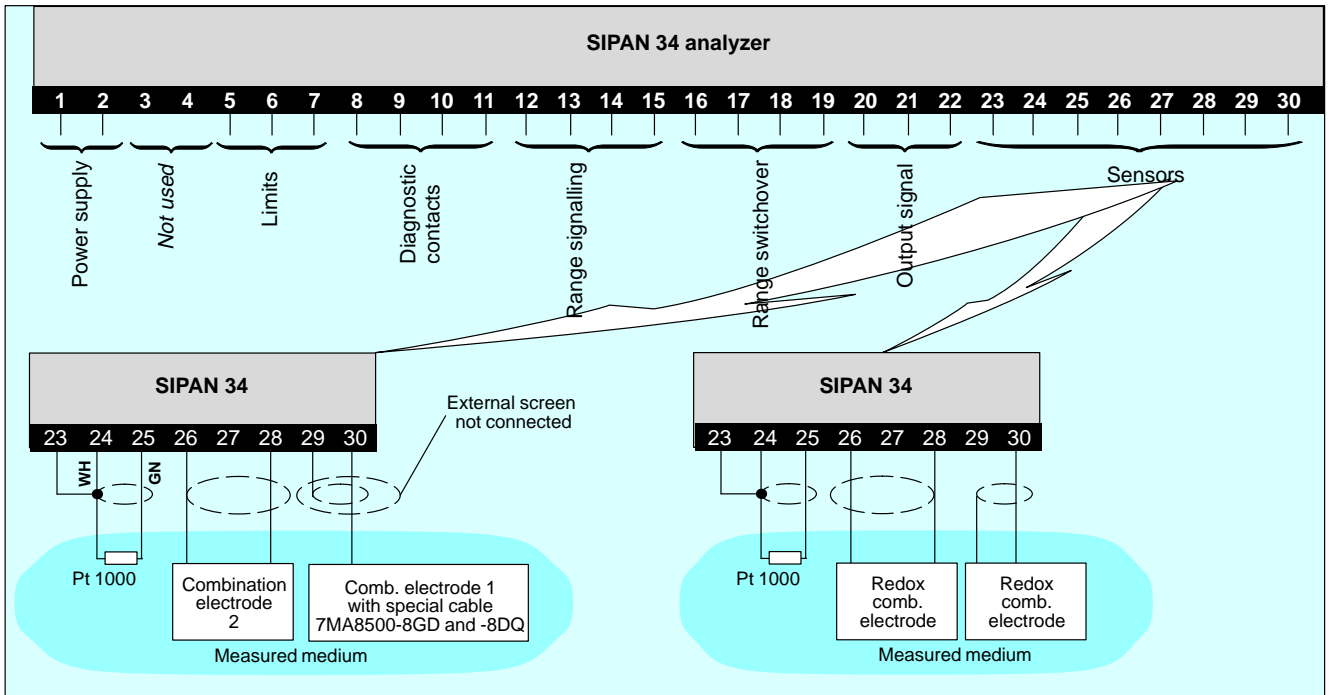


Fig. 2/18 SIPAN 34 analyzer, electric sensor connections for **redundant** pH or redox measurements, 2 pH sensors or 2 redox sensors in one measured medium with sensor monitoring

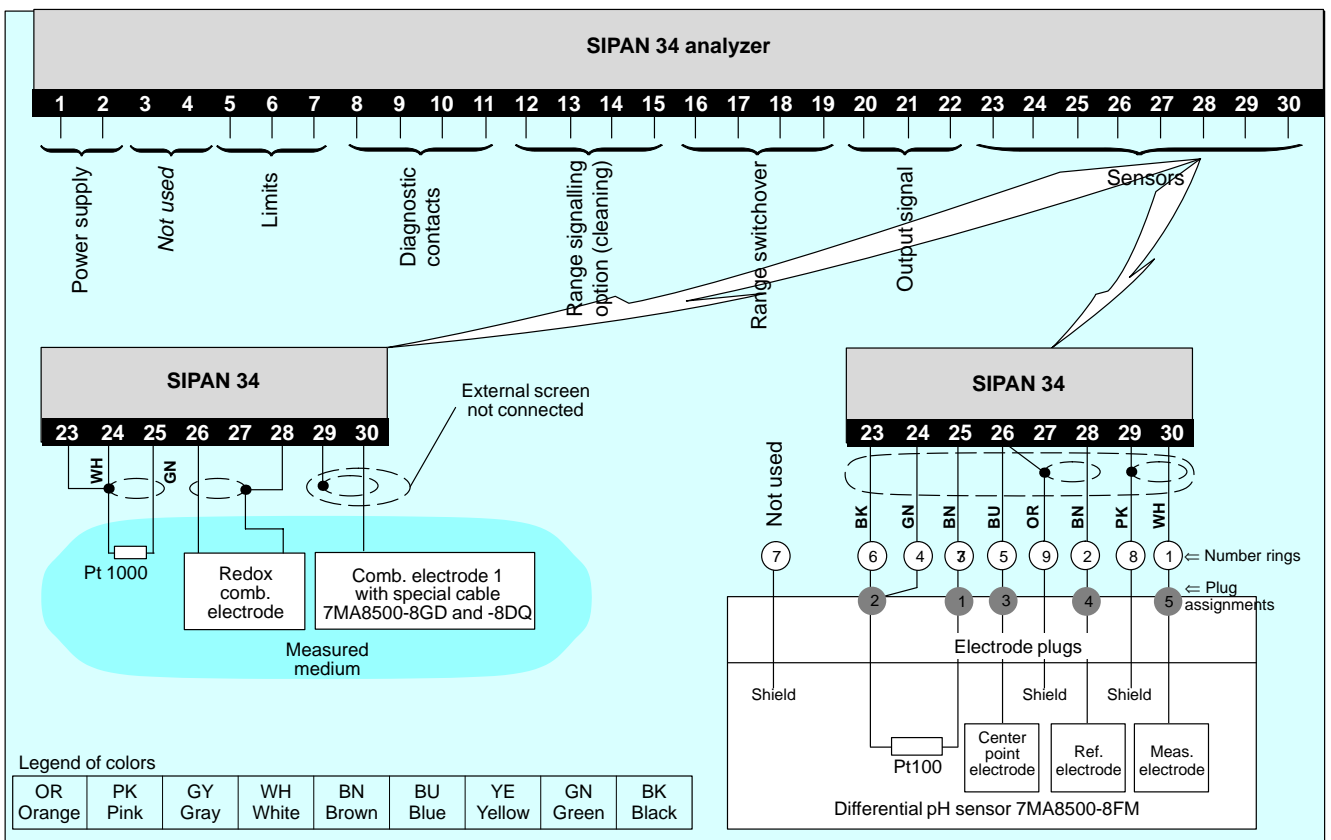


Fig. 2/19 SIPAN 34 analyzer, electric sensor connections, on left for simultaneous pH and redox measurements, on right differential pH sensor with sensor monitoring

# Measuring equipment for pH value and redox potential

## SIPAN 34 analyzer

### Dimensions, design

2

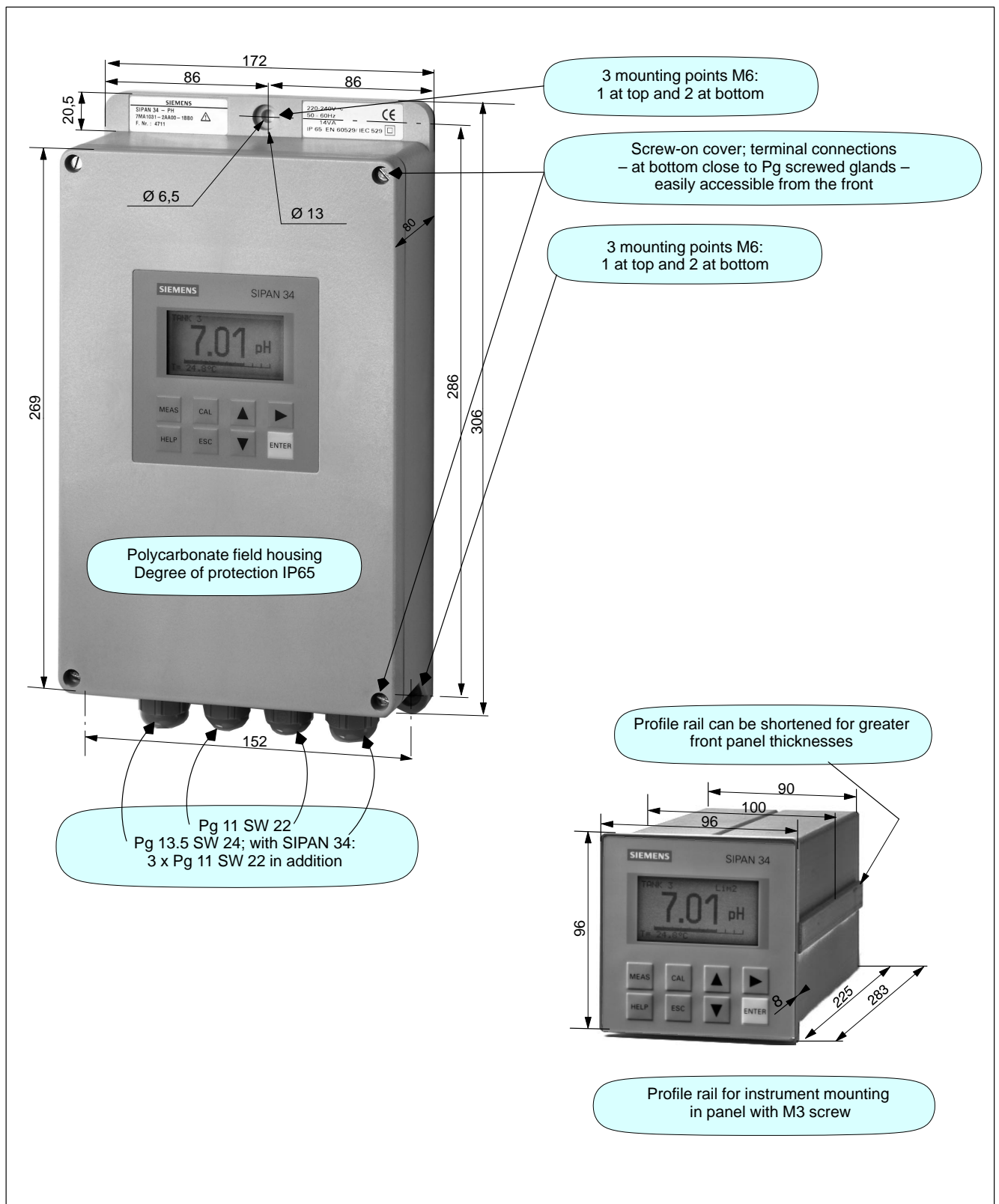


Fig. 2/20 SIPAN 34 analyzer, shown at top as field housing and at bottom as panel housing, dimensions in mm



# Measuring equipment for pH value and redox potential

## SIPAN 34 analyzer

Ordering data

|   | Order No.  |
|---|--|
| <b>SIPAN 34 analyzer</b><br><b>Four-wire system,</b><br><b>for pH or ORP measurements</b><br><b>Process version,</b><br>microprocessor-based with illuminated graphic display, membrane keyboard, trend display, menu-based operation (5 languages), diagnostic software, logbook, temperature compensation,<br>1 parameter set,<br>1 signal output 0/4 to 20 mA,<br>1 alarm contact, 1 limit contact,<br>2 diagnostic contacts | <b>7MA1034-</b><br>- [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] |
| Power supply<br>DC 24 V/AC 24 V, 48 to 63 Hz<br>AC 120 V, 48 to 63 Hz<br>AC 230 V, 48 to 63 Hz  | 0<br>1<br>2  |
| Measuring procedure:<br>1 x pH or 1 x redox input<br>2 x pH inputs<br>1 x pH input and 1 x redox input,<br>or 2 x redox inputs  | A<br>B<br>C  |
| Instrument design<br>Field housing<br>Panel housing 96 x 96   | A<br>B   |
| <ul style="list-style-type: none"> <li>● Without additional option</li> <li>● With second signal output 0/4 to 20 mA and second limit contact</li> <li>● With 4 selectable parameter sets and 3 range signalling contacts</li> <li>● With second signal output 0/4 to 20 mA, second limit contact, 4 selectable parameter sets and 3 range signalling contacts</li> </ul>   | 0<br>1<br>2<br>3   |
| Limits with controller function<br>Without<br>With  | A<br>B   |
| Automatic cleaning/flushing<br>(3 contacts + timer for fitting, cleaning, flushing)<br>Without<br>With  | A<br>B   |

| Accessories   | Order No.   |
|---|---|
| For mounting of analyzer on a pipeline (see Fig. 2/40 for dimensional drawing)<br><b>Protective hood</b> (mat. No. 1.4571) with base plate<br><b>Pipe clamp</b> (mat. No. 1.4571)<br><b>Base plate</b> (mat. No. 1.4571)<br><b>Set of screwdrivers "TORX"</b> | <b>C79451-A3177-D12</b><br><b>7MA8500-8DG</b><br><b>C79451-A3177-D11</b><br><b>C79451-A3246-D50</b> |

# Measuring equipment for pH value and redox potential

## Sensors and fittings for ultra-pure water in a bypass

### Dimensions

2

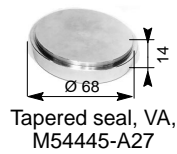
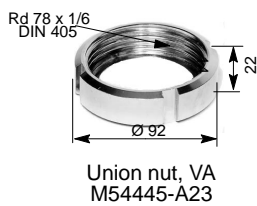
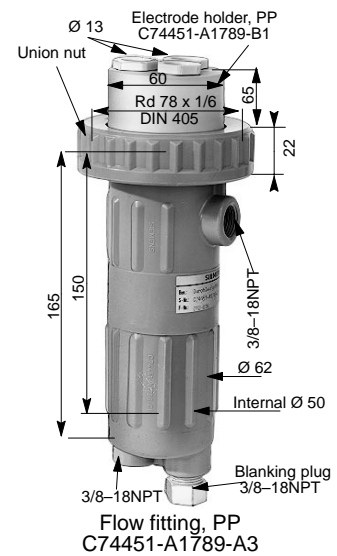
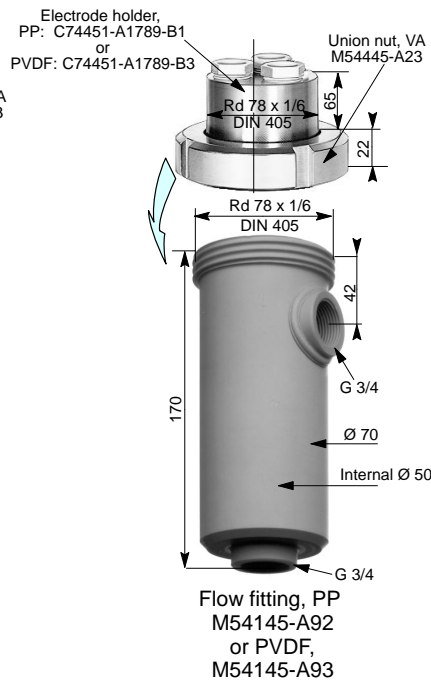
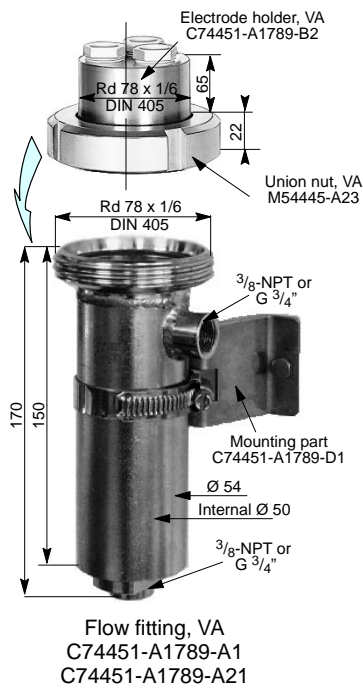
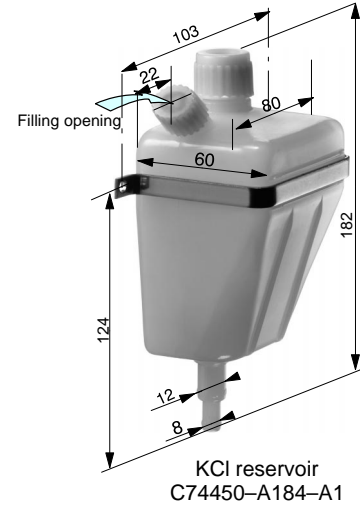
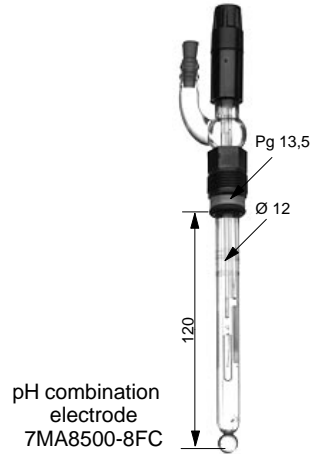
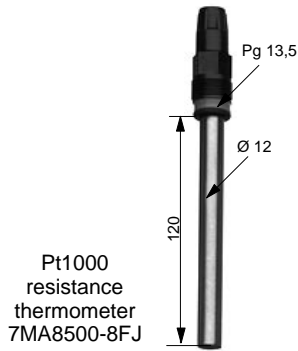


Fig. 2/21 Sensors and fittings for pH and ORP measurements for ultra-pure water, dimensions in mm

# Measuring equipment for pH value and redox potential

## Sensors and fittings for ultra-pure water in a bypass

Ordering data

|  | Order No.   |
|--|---|
| <b>pH combination electrode</b><br>for critical media, boiler feedwater and ultra-pure water with conductivities <100 µS/cm, with Pg 13.5 screw plug connector, with liquid electrolyte <sup>1)</sup> , refillable, triple ceramic diaphragm, mounting length 120 mm | <b>7MA8500-8FC</b>  |
| <b>Pt1000 resistance thermometer</b><br>for combination with pH combination electrodes: 7MA8500-8FA, -8FB, -8FC, -8FD and -8FE, all applications, with stainless steel sheath, with Pg 13.5 screw plug connector   | <b>7MA8500-8FJ</b>  |
| <b>Plug/cable combination</b><br>for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ <ul style="list-style-type: none"> <li>• Cable, 3 m long</li> <li>• Cable, 5 m long</li> <li>• Cable, 10 m long</li> <li>• Cable, 20 m long</li> </ul>                | <b>M54145-A15-A11</b><br><b>M54145-A15-A6</b><br><b>7MA8500-8GC</b><br><b>7MA8500-8DN</b> |
| <b>Special plug/cable combination</b><br>for pH sensor monitoring and for double pH measurements for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ <ul style="list-style-type: none"> <li>• Cable, 3 m long</li> <li>• Cable, 5 m long</li> </ul>        | <b>7MA8500-8GD</b><br><b>7MA8500-8DP</b>  |
| <b>KCl supply reservoir</b><br>for connection to refillable combination electrodes (e.g. 7MA8500-8FC), reference electrodes  | <b>C74450-A184-A1</b>   |
| <b>Hose</b><br>to connect the KCl supply reservoir to the reference electrode/combination electrode, 2 m long  | <b>C74450-A184-D1</b>   |
| <b>KCl</b><br>in plastic bottle (1 kg)   | <b>C71451-Z500-L2</b>   |
| <b>Washbottle</b><br>(0.5 l) for simple refilling of KCl   | <b>C71165-Z358-P1</b>   |

|   | Order No.  |
|---|--|
| <b>Set of mounting parts</b><br>for flow fittings M54145-A92, and -A93, C74451-A1789-A1, -A3 and -A21   | <b>C74451-A1789-D1</b>   |
| <b>Accessories</b> <ul style="list-style-type: none"> <li>• Hook key spanner (mat. No. 1.4301) for union nut M54445-A23</li> <li>• Gasket for DN 50                             <ul style="list-style-type: none"> <li>Standard gasket made of Viton (set of 5) for union nuts</li> <li>Special gasket made of EPDM (set of 25) for union nuts</li> <li>Special gasket made of Teflon (set of 15) for union nuts</li> </ul> </li> </ul> | <b>M54445-A33</b><br><b>M54445-A24</b><br><b>M54445-A34</b><br><b>M54445-A35</b> |

|   | Order No.   |
|---|---|
| <b>Electrode holder</b><br>for installation of 3 sensors, Pg 13.5 <ul style="list-style-type: none"> <li>• Made of polypropylene (PP)</li> <li>• Made of stainless steel (mat. No. 1.4401) with stainless steel union nut</li> <li>• Made of polyvinylidene fluoride (PVDF) with stainless steel union nut</li> </ul>   | <b>C74451-A1789-B1</b><br><b>C74451-A1789-B2</b><br><b>C74451-A1789-B3</b>  |
| <b>Flow fitting</b><br>for bypass installation, mounting of electrode holder with union nut, Viton gasket (union nut not included in delivery) <ul style="list-style-type: none"> <li>• Connection: thread <math>\frac{3}{8}</math>-18NPT made of stainless steel (mat. No. 1.4401)</li> <li>• Connection: thread G <math>\frac{3}{4}</math>", made of stainless steel (mat. No. 1.4401)</li> <li>• Connection: thread G <math>\frac{3}{4}</math>", made of polypropylene (PP)</li> <li>• Connection: thread G <math>\frac{3}{4}</math>", made of polyvinylidene fluoride (PVDF)</li> <li>• Connection: thread <math>\frac{3}{8}</math>-18NPT with union nut and gasket made of polypropylene (PP)</li> </ul> | <b>C74451-A1789-A1</b><br><b>C74451-A1789-A21</b><br><b>M54145-A92</b><br><b>M54145-A93</b><br><b>C74451-A1789-A3</b> |
| <b>Accessories</b> <ul style="list-style-type: none"> <li>• Union nut DN 50 (mat. No. 1.4301)</li> <li>• Tapered seal DN 50 (mat. No. 1.4301)</li> </ul>  | <b>M54445-A23</b><br><b>M54445-A27</b>  |
| <b>Buffer solution set</b><br>Standard buffers sterilized with superheated steam to DIN 19266 and NIST <sup>2)</sup> with 20 ampoules of each value for one calibration each pH = 4.01, pH = 6.87, pH = 9.18  | <b>7MA8500-8AS</b>  |

|   | Order No.                      |
|---|--------------------------------|
| Analyzer<br><b>SIPAN 32, SIPAN 32X</b><br><b>SIPAN 34</b> | See page 2/17<br>See page 2/25 |

1) KCl consumption: 2 to 3 liters KCl/year

2) NIST: National Institute of Standards and Technology

5 year storage guarantee

Available ex-stock

# Measuring equipment for pH value and redox potential

## Sensors and fittings for standard applications

### Dimensions

2

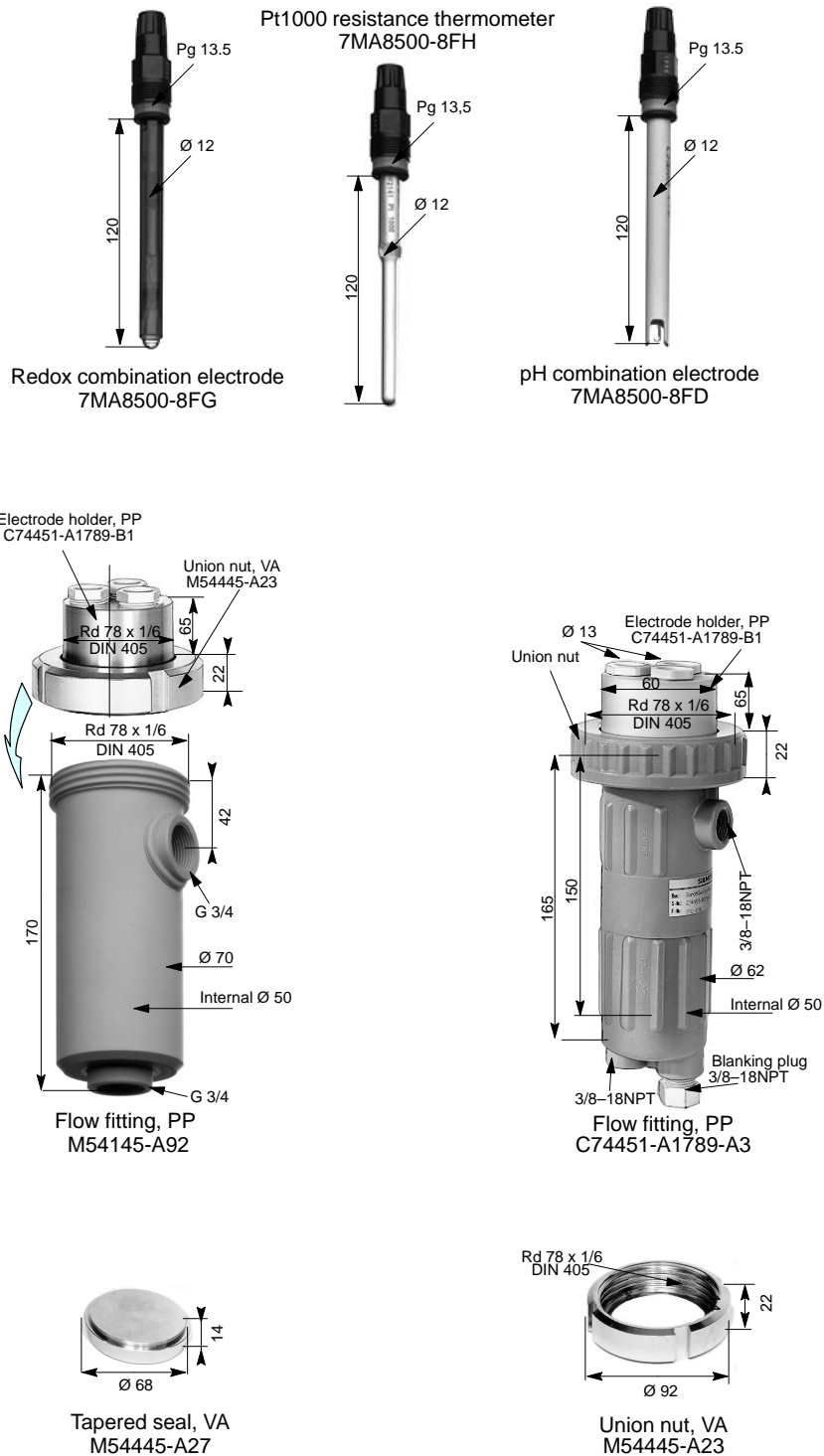


Fig. 2/22 Sensors and fittings for pH and ORP measurements, for standard applications, dimensions in mm

# Measuring equipment for pH value and redox potential

## Sensors and fittings for standard applications

Ordering data

|  | Order No.   |
|--|---|
| <b>pH combination electrode</b><br>for drinking water, liquids not containing solids, non-critical media, with Pg 13.5 screw plug connector, with plastic shaft, with gel electrolyte, non-refillable, fiber diaphragm, mounting length 120 mm               | <b>7MA8500-8FD</b>  |
| <b>Pt1000 resistance thermometer</b><br>for combination with pH combination electrodes: 7 MA8500-8FA, -8FB, -8FC, -8FD and -8FE, all applications, with glass sheath, with Pg 13.5 screw plug connector  | <b>7MA8500-8FH</b>  |
| <b>Redox combination electrode</b> for ORP measurements, all applications, with Pg 13.5 screw plug conn., gel electrol., non-refillable, with platinum ring and capillary precision glass diaphragm, mounting length 120 mm                                  | <b>7MA8500-8FG</b>  |
| <b>Plug/cable combination</b><br>for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ <ul style="list-style-type: none"> <li>• Cable, 3 m long</li> <li>• Cable, 5 m long</li> <li>• Cable, 10 m long</li> <li>• Cable, 20 m long</li> </ul>        | <b>M54145-A15-A11</b><br><b>M54145-A15-A6</b><br><b>7MA8500-8GC</b><br><b>7MA8500-8DN</b> |
| <b>Special plug/cable combination</b><br>for pH sensor monitoring and double pH measurements<br>for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ <ul style="list-style-type: none"> <li>• Cable, 3 m long</li> <li>• Cable, 5 m long</li> </ul> | <b>7MA8500-8GD</b><br><b>7MA8500-8DP</b>  |

|   | Order No.   |
|---|---|
| <b>Set of mounting parts</b><br>for flow fittings M54145-A92, and -A93, C74451-A1789-A1, -A3 and -A21   | <b>C74451-A1789-D1</b>  |
| <b>Accessories</b> <ul style="list-style-type: none"> <li>• Hook key spanner (mat. No. 1.4301) for union nut M54445-A23</li> <li>• Gasket for DN 50 6-hole flange gasket (set of 5)<br/>Standard gasket made of Viton (set of 5) for union nut</li> <li>• Special gasket made of EPDM (set of 25) for union nut</li> <li>• Special gasket made of Teflon (set of 15) for union nut</li> </ul> | <b>M54445-A33</b><br><b>M54445-A31</b><br><b>M54445-A24</b><br><b>M54445-A34</b><br><b>M54445-A35</b> |

|  | Order No.                                   |
|--|---|
| <b>Flow fitting</b><br>Mounting of electrode holder with union nut and gasket (Viton) (union nut not included in delivery) <ul style="list-style-type: none"> <li>• Made of polypropylene (PP), connection: thread G 3/4"</li> <li>• Made of polyvinylidene fluoride (PVDF), connection: thread 3/8-18NPT with union nut and gasket</li> </ul> | <b>M54145-A92</b><br><b>C74451-A1789-A3</b> |
| <b>Accessories</b> <ul style="list-style-type: none"> <li>• Union nut DN 50 (mat. No. 1.4301)</li> <li>• Tapered seal DN 50 (mat. No. 1.4301)</li> </ul>   | <b>M54445-A23</b><br><b>M54445-A27</b>      |
| <b>Electrode holder</b><br>for installation of 3 sensors, Pg 13.5 with stainless steel union nut <ul style="list-style-type: none"> <li>• Electrode holder made of polypropylene (PP)</li> </ul>   | <b>C74451-A1789-B1</b>                      |
| <b>Buffer solution set</b><br>Standard buffers sterilized with superheated steam to DIN 19266 and NIST <sup>1)</sup> with 20 ampoules of each value for one calibration each pH = 4.01, pH = 6.87, pH = 9.18   | <b>7MA8500-8AS</b>                          |

|  | Order No.                      |
|--|--------------------------------|
| Analyzer<br><b>SIPAN 32 and SIPAN 32X</b><br><b>SIPAN 34</b> | See page 2/17<br>See page 2/25 |

1) NIST: National Institute of Standards and Technology  
 5 year storage guarantee  
 Available ex-stock

# Measuring equipment for pH value and redox potential

## Sensors and fittings for special applications

### Dimensions

2

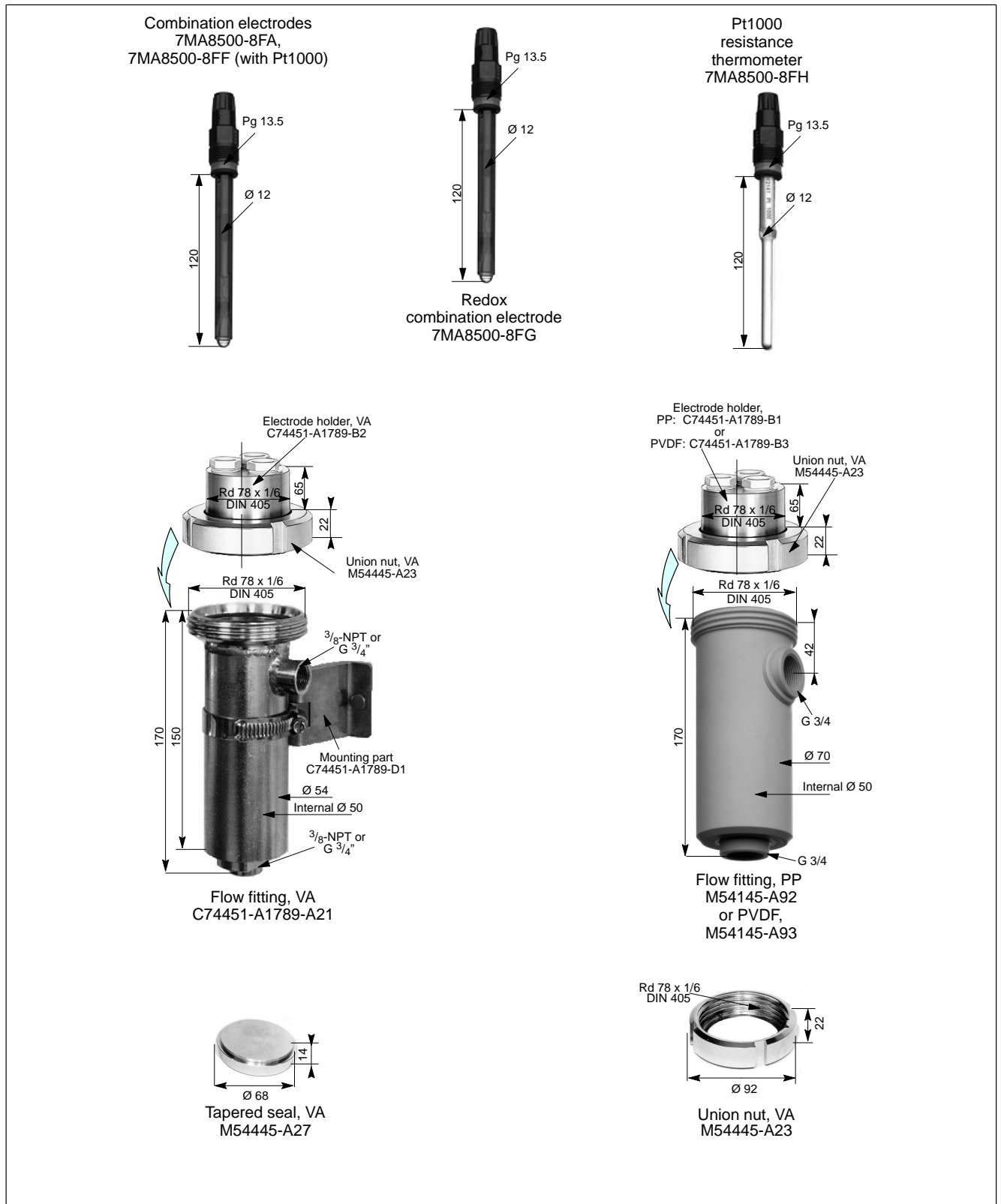


Fig. 2/23 Sensors and fittings for pH and ORP measurements, for special applications, dimensions in mm

# Measuring equipment for pH value and redox potential

## Sensors and fittings for special applications

Ordering data

|   | Order No.   |
|---|---|
| <b>pH combination electrode</b><br>for service water, waste water, suspensions, food processing, organic solvents, hot acids and alkalis, with Pg 13.5 screw plug connector, with polymer electrolyte, non-refillable, capillary precision glass diaphragm, mounting length 120 mm  | <b>7MA8500-8FA</b>  |
| <b>pH combination electrode</b><br>for service water, suspensions, food processing, organic solvents, hot acids and alkalis, with Pg 13.5 screw plug connector, integrated Pt1000 resistance thermometer, with polymer electrolyte, non-refillable, hole diaphragm <ul style="list-style-type: none"> <li>• Mounting length 120 mm</li> </ul> | <b>7MA8500-8FF</b>  |
| <b>Plug/cable combination</b><br>for 7MA8500-8FF and -8BV, 5 m long   | <b>7MA8500-8DQ</b>  |
| <b>Pt1000 resistance thermometer</b><br>for combination with pH combination electrodes: 7MA8500-8FA, -8FB, -8FC, -8FD and -8FE, all applications, with glass sheath, with Pg 13.5 screw plug connector  | <b>7MA8500-8FH</b>  |
| <b>Redox combination electrode</b><br>for ORP measurements, with Pg 13.5 screw plug connector, gel electrolyte, non-refillable, with platinum ring and capillary precision glass diaphragm, mounting length 120 mm  | <b>7MA8500-8FG</b>  |
| <b>Plug/cable combination</b><br>for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ <ul style="list-style-type: none"> <li>• Cable, 3 m long</li> <li>• Cable, 5 m long</li> <li>• Cable, 10 m long</li> <li>• Cable, 20 m long</li> </ul>   | <b>M54145-A15-A11</b><br><b>M54145-A15-A6</b><br><b>7MA8500-8GC</b><br><b>7MA8500-8DN</b> |
| <b>Special plug/cable combination</b><br>for pH sensor monitoring and double pH measurements<br>for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ <ul style="list-style-type: none"> <li>• Cable, 3 m long</li> <li>• Cable, 5 m long</li> </ul>  | <b>7MA8500-8GD</b><br><b>7MA8500-8DP</b>  |
| <b>Set of mounting parts</b><br>for flow fittings M54145-A92, and -A93, C74451-A1789-A1, -A3 and -A21   | <b>C74451-A1789-D1</b>  |

|  | Order No.   |
|--|---|
| <b>Accessories</b> <ul style="list-style-type: none"> <li>• <b>Hook key spanner</b> (mat. No. 1.4301) for union nut M54445-A23</li> <li>• <b>Gasket</b> for DN 50 6-hole flange gasket (set of 5)<br/>Standard gasket made of Viton (set of 5) for union nut<br/>Special gasket made of EPDM (set of 25) for union nut<br/>Special gasket made of Teflon (set of 15) for union nut</li> </ul>  | <b>M54445-A33</b><br><br><b>M54445-A31</b><br><b>M54445-A24</b><br><br><b>M54445-A34</b><br><b>M54445-A35</b> |
| <b>Flow fitting</b><br>Mounting of electrode holder with union nut and gasket (Viton) (union nut not included in delivery) <ul style="list-style-type: none"> <li>• Made of stainless steel, connection: thread G <math>\frac{3}{4}</math>"</li> <li>• Made of polypropylene (PP), connection: thread G <math>\frac{3}{4}</math>"</li> <li>• Made of polyvinylidene fluoride (PVDF), connection: thread G <math>\frac{3}{4}</math>"</li> </ul> | <b>C74451-A1789-A21</b><br><br><b>M54145-A92</b><br><b>M54145-A93</b>   |
| <b>Accessories</b> <ul style="list-style-type: none"> <li>• Union nut DN 50 (mat. No. 1.4301)</li> <li>• Tapered seal DN 50 (mat. No. 1.4301)</li> </ul>   | <b>M54445-A23</b><br><b>M54445-A27</b>  |
| <b>Electrode holder</b><br>for installation of 3 sensors, Pg 13.5 with stainless steel union nut <ul style="list-style-type: none"> <li>• Electrode holder made of polypropylene (PP)</li> <li>• Electrode holder made of stainless steel</li> <li>• Electrode holder made of polyvinylidene fluoride (PVDF)</li> </ul>  | <b>C74451-A1789-B1</b><br><b>C74451-A1789-B2</b><br><br><b>C74451-A1789-B3</b>                                |
| <b>Buffer solution set</b><br>Standard buffers sterilized with superheated steam to DIN 19266 and NIST <sup>1)</sup> with 20 ampoules of each value for one calibration each pH = 4.01, pH = 6.87, pH = 9.18   | <b>7MA8500-8AS</b>  |

|   | Order No.                      |
|---|--------------------------------|
| Analyzer<br><b>SIPAN 32, SIPAN 32X</b><br><b>SIPAN 34</b> | See page 2/17<br>See page 2/25 |

1) NIST: National Institute of Standards and Technology  
5 year storage guarantee

Available ex-stock

# Measuring equipment for pH value and redox potential

## Sterilizable sensors and fittings for the food industry

Inline applications, dimensions

2

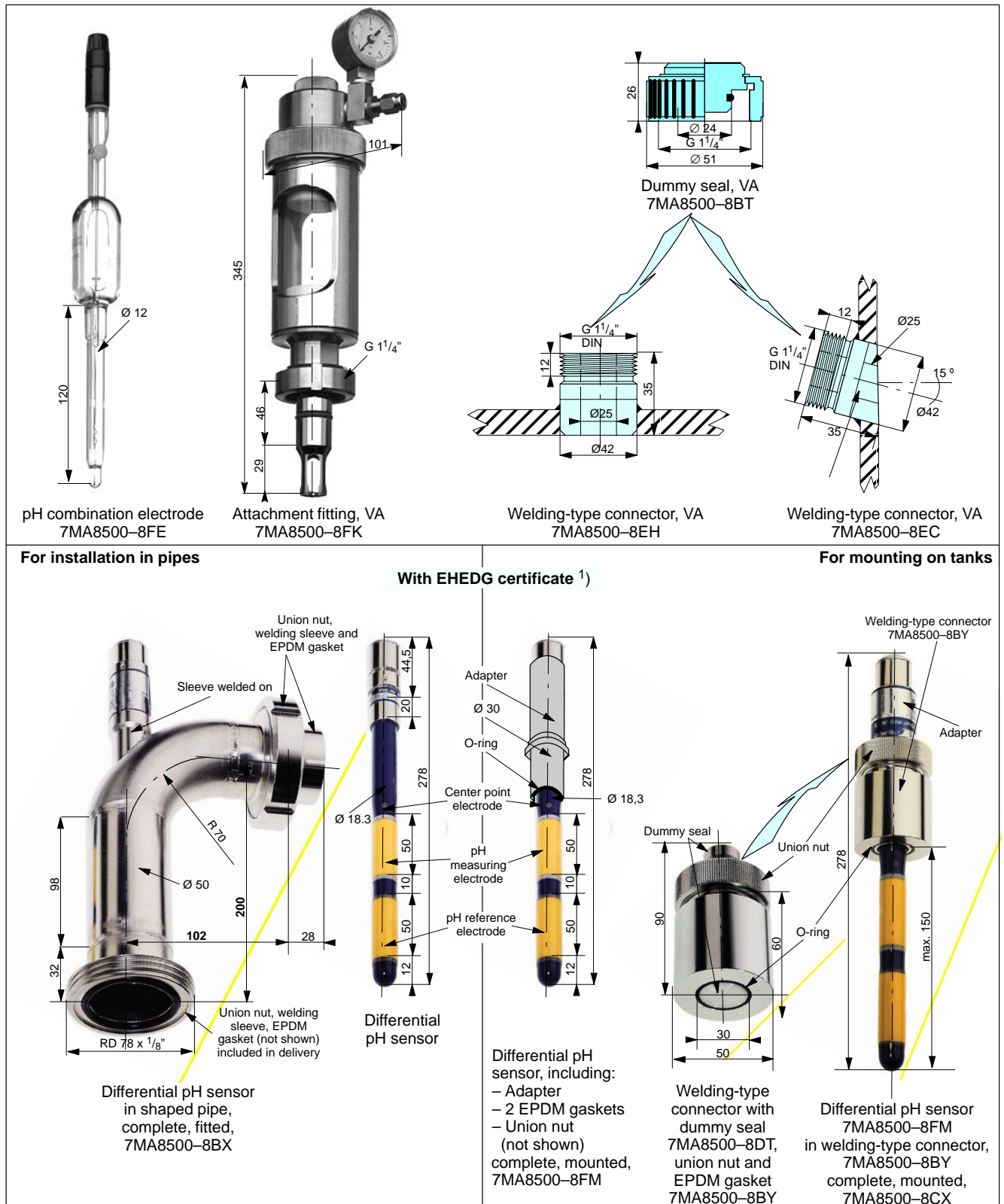


Fig. 2/24 Sterilizable sensors and fittings for the food industry, at bottom in aseptic design (European Hygienic Equipment Design Group), dimensions in mm

1) EHEDG: European Hygienic Equipment Design Group



# Measuring equipment for pH value and redox potential

## Sterilizable sensors and fittings for the food industry

Inline applications, ordering data

|  | Order No.   |
|--|---|
| <b>pH combination electrode</b> , sterilizable, for biotechnology and the food industry, with Pg 13.5 screw plug connector, with liquid electrolyte of increased viscosity, refillable, with ceramic diaphragm, mounting length 120 mm (separate installation of Pt 1000 resistance thermometer) | <b>7MA8500-8FE</b>  |
| <b>Plug/cable combination</b><br>for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ<br><ul style="list-style-type: none"> <li>• Cable, 3 m long</li> <li>• Cable, 5 m long</li> <li>• Cable, 10 m long</li> <li>• Cable, 20 m long</li> </ul>   | <b>M54145-A15-A11</b><br><b>M54145-A15-A6</b><br><b>7MA8500-8GC</b><br><b>7MA8500-8DN</b> |
| <b>Special plug/cable combination</b><br>for pH sensor monitoring and double pH measurements<br>for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ<br><ul style="list-style-type: none"> <li>• Cable, 3 m long</li> <li>• Cable, 5 m long</li> </ul>                                  | <b>7MA8500-8GD</b><br><b>7MA8500-8DP</b>  |
| <b>Attachment fitting</b><br>with pressure connection for inline installation and for mounting on vessels, made of stainless steel (mat. No. 1.4434), installation with union nut G 1 1/4" for special sensor 7MA8500-8FE with liquid electrolyte  | <b>7MA8500-8FK</b>  |
| <b>Dummy screw seal</b> (stainless steel), with union nut G 1 1/4" for tight sealing of welding-type connectors<br>7MA8500-8EC and 7MA8500-8EH   | <b>7MA8500-8BT</b>  |
| <b>Welding-type connector</b><br>angled 15°, made of stainless steel (mat. No. 1.4571), connection G 1 1/4"  | <b>7MA8500-8EC</b>  |
| <b>Welding-type connector</b><br>straight, made of stainless steel (mat. No. 1.4571), connection G 1 1/4"  | <b>7MA8500-8EH</b>  |
| <b>KCl electrolyte solution</b><br>1 liter, for sterilizable combination electrode 7MA8500-8FE   | <b>7MA8500-8GE</b>  |
| <b>Washbottle</b><br>(0.5 l) for simple refilling of KCl   | <b>C71165-Z358-P1</b>   |
| <b>Buffer solution set</b><br>Standard buffers sterilized with superheated steam to DIN 19266 and NIST <sup>1)</sup> with 20 ampoules of each value for one calibration each pH = 4.01, pH = 6.87, pH = 9.18   | <b>7MA8500-8AS</b>  |

|   | Order No.          |
|---|--------------------|
| <b>Differential pH sensor</b> 7MA8500-8FM <sup>2)</sup> with plug/cable combination, 5 m long, 7MA8500-8DR fitted in <b>welding-type connector</b> 7MA8500-8DR for aseptic measurements, including dummy seal 7MA8500-8DT, stainless steel union nuts, and EPDM gaskets | <b>7MA8500-8CX</b> |
| <b>Differential pH sensor</b> <sup>2)</sup> Integrated Pt 100, with 2 ion-sensitive enamel surfaces, without diaphragm, for installation in aseptic connectors  | <b>7MA8500-8FM</b> |
| <b>Plug/cable combination</b><br>5 m long, for differential pH sensor   | <b>7MA8500-8DR</b> |
| <b>Welding-type connector</b> made of stainless steel, for aseptic measurements, with:<br>– Union nut<br>– EPDM gaskets   | <b>7MA8500-8BY</b> |
| <b>Dummy seal</b><br>for aseptic welding-type connectors  | <b>7MA8500-8DT</b> |
| <b>Differential pH sensor</b><br>fitted in <b>shaped pipe</b> , DN 50, with:<br>– Plug/cable combination, 5 m long, 7MA8500-8DR<br>– 2 union nuts made of stainless steel<br>– 2 welding-type connectors made of stainless steel<br>– 2 gaskets made of EPDM, complete  | <b>7MA8500-8BX</b> |

|  | Order No.                      |
|--|--------------------------------|
| Analyzer<br><b>SIPAN 32 and SIPAN 32X</b><br><b>SIPAN 34</b> | See page 2/17<br>See page 2/25 |

1) NIST: National Institute of Standards and Technology  
5 year storage guarantee

2) Can only be used with analyzer with option: 2 x pH inputs  
7MA1031-xBxxx-xxxx,  
7MA1140-8AB,  
7MA1140-8AC,  
7MA1141-8AB,  
7MA1141-8AC,

Available ex-stock

# Measuring equipment for pH value and redox potential

## Sensors and fittings for the food and chemical industries

Inline applications, dimensions

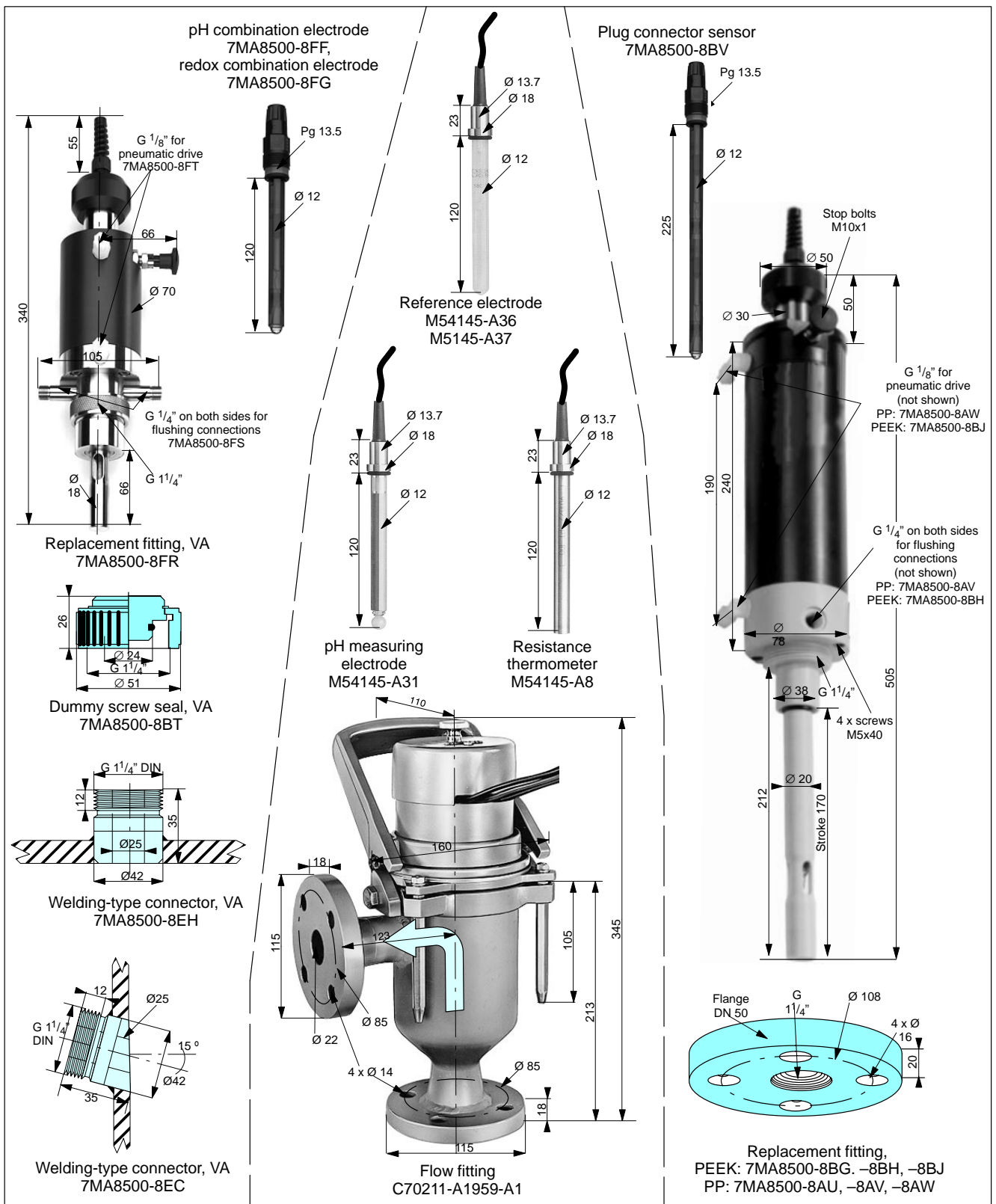


Fig. 2/25 Sensors and fittings for inline applications in the food and chemical industries, dimensions in mm

# Measuring equipment for pH value and redox potential

## Sensors and fittings for the food and chemical industries

Inline applications, ordering data

|   | Order No.   |
|---|---|
| <p><b>pH combination electrode</b><br/>for service water, suspensions, food processing, organic solvents, hot acids and alkalis, with Pg 13.5 screw plug connector, integrated Pt1000 resistance thermometer, with polymer electrolyte, non-refillable, hole diaphragm</p> <ul style="list-style-type: none"> <li>Mounting length 120 mm</li> <li>Mounting length 225 mm</li> </ul>   | <p><b>7MA8500-8FF</b><br/><b>7MA8500-8BV</b></p>  |
| <p><b>Special plug/cable combination</b><br/>for 7MA8500-8FF and -8BV, 5 m long</p>   | <b>7MA8500-8DQ</b>  |
| <p><b>Redox combination electrode</b><br/>for ORP measurements, with Pg 13.5 screw plug connector, gel electrolyte, non-refillable, with platinum ring and capillary precision glass diaphragm, mounting length 120 mm</p>  | <b>7MA8500-8FG</b>  |
| <p><b>Plug/cable combination</b><br/>for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ</p> <ul style="list-style-type: none"> <li>Cable, 3 m long</li> <li>Cable, 5 m long</li> <li>Cable, 10 m long</li> <li>Cable, 20 m long</li> </ul>   | <p><b>M54145-A15-A11</b><br/><b>M54145-A15-A6</b><br/><b>7MA8500-8GC</b><br/><b>7MA8500-8DN</b></p> |
| <p><b>Replacement fitting</b><br/>for inline installation and for mounting on vessels, made of stainless steel/Viton (FPM), mounting with thread G1<sup>1</sup>/<sub>4</sub>", for <b>120-mm plug connector sensors</b> 7MA8500-8FA, -8FF and -8FG, with polymer electrolyte</p> <ul style="list-style-type: none"> <li>Standard version (without flushing connections or pneumatic drive)</li> <li>With 2 flushing connections</li> <li>With 2 flushing connections and pneumatic drive</li> </ul> | <p><b>7MA8500-8FR</b><br/><b>7MA8500-8FS</b><br/><b>7MA8500-8FT</b></p>                             |
| <p><b>Replacement fitting</b><br/>for inline installation and for mounting on vessels, made of polyetheretherketone (PEEK)/Viton (FPM), with DN 50 flange, for <b>plug connector sensor 7MA8500-8BV, length 225 mm</b> with polymer electrolyte</p> <ul style="list-style-type: none"> <li>Standard version (without flushing connections or pneumatic drive)</li> <li>With 2 flushing connections</li> <li>With 2 flushing connections and pneumatic drive</li> </ul>                              | <p><b>7MA8500-8BG</b><br/><b>7MA8500-8BH</b><br/><b>7MA8500-8BJ</b></p>                             |
| <p><b>Replacement fitting</b><br/>for inline installation and for mounting on vessels, made of polypropylene (PP)/Viton (FPM), with DN 50 flange, for <b>plug connector sensor 7MA8500-8BV, length 225 mm</b> with polymer electrolyte</p> <ul style="list-style-type: none"> <li>Standard version (without flushing connections or pneumatic drive)</li> <li>With 2 flushing connections</li> <li>With 2 flushing connections and pneumatic drive <sup>2)</sup></li> </ul>                         | <p><b>7MA8500-8AU</b><br/><b>7MA8500-8AV</b><br/><b>7MA8500-8AW</b></p>                             |
| <p><b>Replacement fitting</b><br/>in other materials or with different connections and lengths</p>  | <b>On request</b>   |

|   | Order No.          |
|---|--------------------|
| <p><b>Dummy screw seal</b> (stainless steel), with union nut G 1<sup>1</sup>/<sub>4</sub>" for tight sealing of welding-type connectors<br/>7MA8500-8EC and 7MA8500-8EH</p> | <b>7MA8500-8BT</b> |
| <p><b>Welding-type connector</b><br/>angled 15°, made of stainless steel (mat. No. 1.4571), connection G 1<sup>1</sup>/<sub>4</sub>"</p>                                    | <b>7MA8500-8EC</b> |
| <p><b>Welding-type connector</b><br/>straight, made of stainless steel (mat. No. 1.4571), connection G 1<sup>1</sup>/<sub>4</sub>"</p>                                      | <b>7MA8500-8EH</b> |

|   | Order No.              |
|---|------------------------|
| <p><b>Measuring electrode</b><br/>for the sugar industry, with flange cover and fixed 2-m long cable, with shockproof spherical membrane, mounting length 120 mm, for installation only in flow fitting C70211-A1959-A1</p>                       | <b>M54145-A31</b>      |
| <p><b>Reference electrode</b><br/>for the sugar industry, with flange cover and fixed 2-m long cable, mounting length 120 mm, <b>refillable</b>, with ceramic diaphragm, installation only in flow fitting C70211-A1959-A1</p>                    | <b>M54145-A36</b>      |
| <p><b>Reference electrode</b><br/>for the sugar industry, with flange cover and fixed 2-m long cable, mounting length 120 mm, <b>non-refillable</b>, with ceramic diaphragm, installation only in flow fitting C70211-A1959-A1</p>                | <b>M54145-A37</b>      |
| <p><b>Flow fitting</b><br/>for the sugar industry, with flange connection, made of stainless steel (mat. No. 1.4571), with internal rubber coating resistant to acids, chlorine and alkalis, for sensors M54145-A8, -A31, -A32, -A36 and -A37</p> | <b>C70211-A1959-A1</b> |

|  | Order No.          |
|--|--------------------|
| <p><b>Buffer solution set</b><br/>Standard buffers sterilized with superheated steam to DIN 19266 and NIST <sup>1)</sup> with 20 ampoules of each value for one calibration each pH = 4.01, pH = 6.87, pH = 9.18</p> | <b>7MA8500-8AS</b> |

|  | Order No.                              |
|--|--|
| <p>Analyzer<br/><b>SIPAN 32, SIPAN 32X</b><br/><b>SIPAN 34</b></p> | <p>See page 2/17<br/>See page 2/25</p> |

<sup>1)</sup> NIST: National Institute of Standards and Technology  
5 year storage guarantee

<sup>2)</sup> Pneumatic drive recommended with process pressure > 3 bar.

Available ex-stock

# Measuring equipment for pH value and redox potential

## Sensors and fittings for measurements in basins or open vessels

Waste water applications, dimensions

2

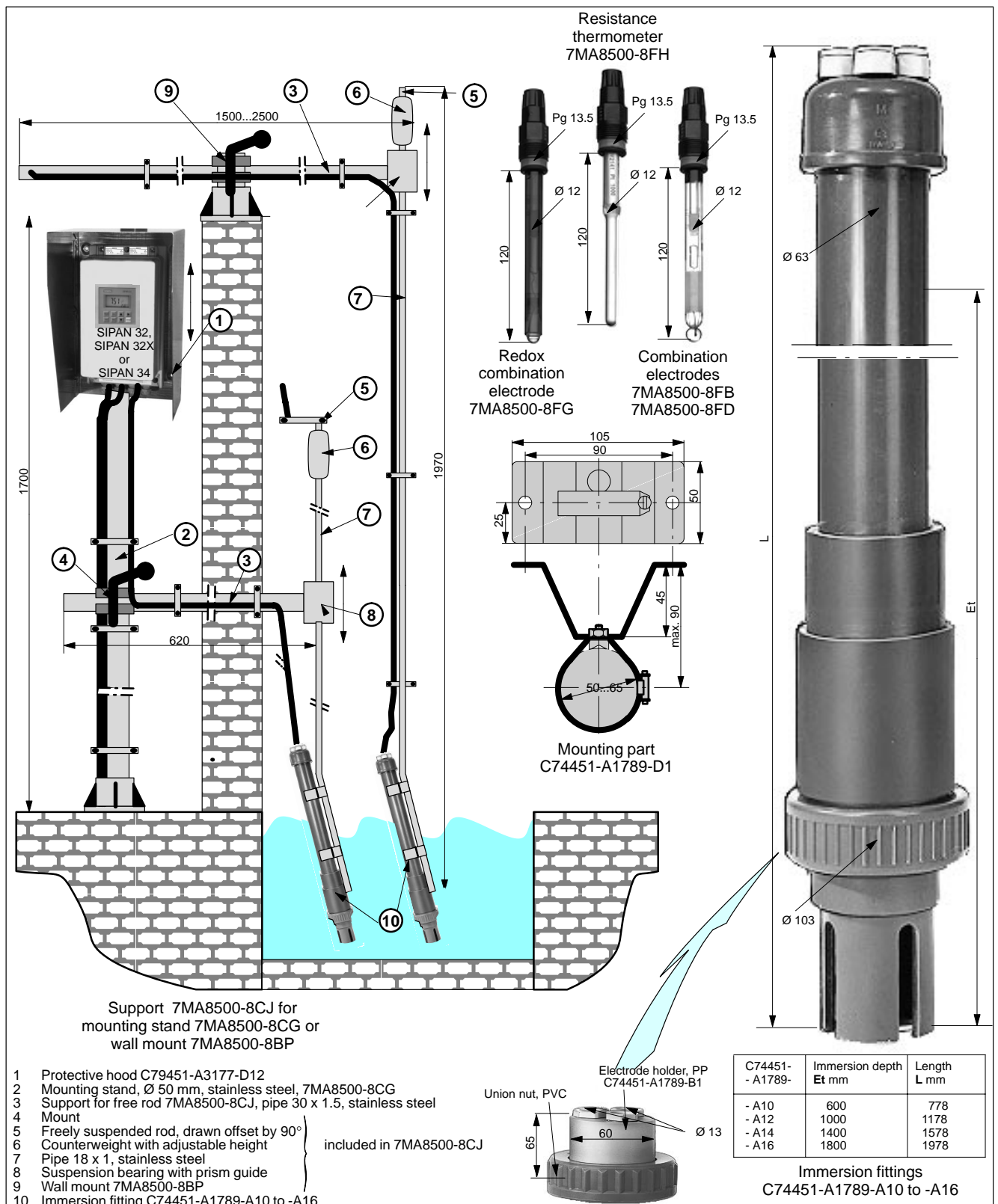


Fig. 2/26 Sensors and fittings for pH and ORP measurements in basins or open vessels, dimensions in mm

# Measuring equipment for pH value and redox potential

## Sensors and fittings for measurements in basins or open vessels

Waste water applications, ordering data

|  | Order No.  |
|--|--|
| <b>pH combination electrode</b><br>for drinking water, liquids not containing solids, non-critical media,<br>with Pg 13.5 screw plug connector,<br>with plastic shaft, with gel electrolyte,<br>non-refillable, fiber diaphragm,<br>mounting length 120 mm                 | <b>7MA8500-8FD</b>   |
| <b>pH combination electrode</b><br>for contaminated liquids containing solids,<br>with Pg 13.5 screw plug connector,<br>with gel electrolyte,<br>non-refillable,<br>ceramic diaphragm,<br>mounting length 120 mm   | <b>7MA8500-8FB</b>   |
| <b>Pt1000 resistance thermometer</b><br>for combination with pH combination electrodes: 7MA8500-8FA, -8FB, -8FC, -8FD and -8FE, all applications,<br>with glass sheath,<br>with Pg 13.5 screw plug connector   | <b>7MA8500-8FH</b>   |
| <b>Redox combination electrode</b> for ORP measurements, all applications, with Pg 13.5 screw plug connector, gel electrolyte, non-refillable, with platinum ring and cap. precision glass diaphragm, mounting length 120 mm   | <b>7MA8500-8FG</b>   |
| <b>Plug/cable combination</b><br>for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ<br><ul style="list-style-type: none"> <li>• Cable, 3 m long</li> <li>• Cable, 5 m long</li> <li>• Cable, 10 m long</li> <li>• Cable, 20 m long</li> </ul>                   | <b>M54145-A15-A11</b><br><b>M54145-A15-A6</b><br><b>7MA8500-8GC</b><br><b>7MA8500-8DN</b>                |
| <b>Special plug/cable combination</b><br>for pH sensor monitoring and double pH measurements<br>for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ<br><ul style="list-style-type: none"> <li>• Cable, 3 m long</li> <li>• Cable, 5 m long</li> </ul>            | <b>7MA8500-8GD</b><br><b>7MA8500-8DP</b>   |
| <b>Mounting stand</b><br>made of stainless steel (mat. No. 1.4301)   | <b>7MA8500-8CG</b>   |
| <b>Wall mount</b><br>made of stainless steel (mat. No. 1.4301)   | <b>7MA8500-8BP</b>   |
| <b>Support for free rod</b> comprising items 4 to 8, see Fig. 2/26,<br>made of stainless steel (mat. No. 1.4301)<br>for fitting on mounting stand 7MA8500-8CG or wall mount 7MA8500-8BP  | <b>7MA8500-8CJ</b>   |
| <b>Immersion fitting</b><br>made of polyvinyl chloride (PVC),<br>for basins or open vessels,<br>with immersion tube and protective cage<br>Max. immersion length 600 mm<br>Max. immersion length 1000 mm<br>Max. immersion length 1400 mm<br>Max. immersion length 1800 mm | <b>C74451-A1789-A10</b><br><b>C74451-A1789-A12</b><br><b>C74451-A1789-A14</b><br><b>C74451-A1789-A16</b> |
| <b>Electrode holder</b><br>made of polypropylene (PP),<br>for installation of 3 sensors, Pg 13.5   | <b>C74451-A1789-B1</b>   |

|   | Order No.  |
|---|--|
| <b>Set of mounting parts</b><br>for flow fittings M54145-A92, and -A93, C74451-A1789-A1, -A3 and -A21, and immersion fittings C74451-A1789-A10 to -A16  | <b>C74451-A1789-D1</b>   |
| <b>Accessories</b> <ul style="list-style-type: none"> <li>• Hook key spanner (mat. No. 1.4301) for union nut M54445-A23</li> <li>• Gasket for DN 50<br/>Standard gasket made of Viton (set of 5) for union nut<br/>Special gasket made of EPDM (set of 25) for union nut<br/>Special gasket made of Teflon (set of 15) for union nut</li> </ul> | <b>M54445-A33</b><br><b>M54445-A24</b><br><b>M54445-A34</b><br><b>M54445-A35</b> |

|  | Order No.          |
|--|--------------------|
| <b>Buffer solution set</b><br>Standard buffers sterilized with superheated steam to DIN 19266 and NIST <sup>1)</sup> with 20 ampoules of each value for one calibration each pH = 4.01, pH = 6.87, pH = 9.18 | <b>7MA8500-8AS</b> |

|  | Order No.                      |
|--|--------------------------------|
| Analyzer<br><b>SIPAN 32 and SIPAN 32X</b><br><b>SIPAN 34</b> | See page 2/17<br>See page 2/25 |

1) NIST: National Institute of Standards and Technology  
5 year storage guarantee

Available ex-stock

# Measuring equipment for pH value and redox potential Sensors and fittings for measurements in tanks or open vessels

Waste water applications, dimensions

2

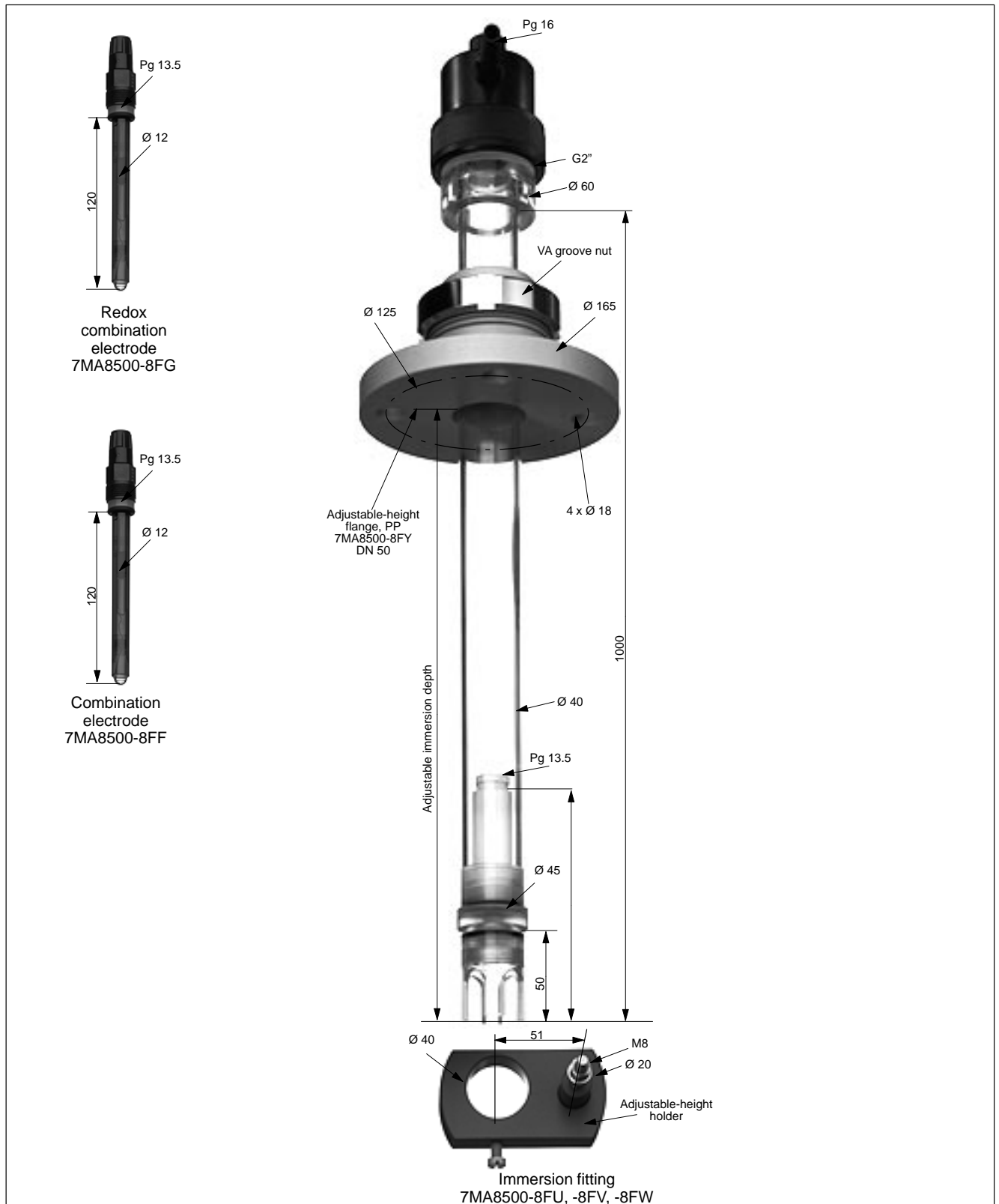


Fig. 2/27 Sensors for pH and ORP measurements in tanks or open vessels, dimensions in mm

# Measuring equipment for pH value and redox potential

## Sensors and fittings for measurements in tanks or open vessels

### Waste water applications, ordering data

|  | Order No.   |
|--|---|
| <b>pH combination electrode</b><br>for service water, suspensions, food processing, organic solvents, hot acids and alkalis, with Pg 13.5 screw plug connector, integrated Pt1000 resistance thermometer, with polymer electrolyte, non-refillable, hole diaphragm<br>● Mounting length 120 mm | <b>7MA8500-8FF</b>  |
| <b>Plug/cable combination</b><br>for 7MA8500-8FF and -8BV, 5 m long  | <b>7MA8500-8DQ</b>  |
| <b>Redox combination electrode</b> for ORP measurements, all applications, with Pg 13.5 screw plug conn., gel electrolyte, non-refillable, with platinum ring and cap. precision glass diaphragm, mounting length 120 mm   | <b>7MA8500-8FG</b>  |
| <b>Plug/cable combination</b><br>for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ<br>● Cable, 3 m long<br>● Cable, 5 m long<br>● Cable, 10 m long<br>● Cable, 20 m long   | <b>M54145-A15-A11</b><br><b>M54145-A15-A6</b><br><b>7MA8500-8GC</b><br><b>7MA8500-8DN</b> |
| <b>Special plug/cable combination</b><br>for pH sensor monitoring and double pH measurements<br>for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ<br>● Cable, 3 m long<br>● Cable, 5 m long  | <b>7MA8500-8GD</b><br><b>7MA8500-8DP</b>  |

|  | Order No.  |
|--|--|
| <b>Immersion fitting</b><br>made of polypropylene (PP), for installation of a pH sensor with Pg 13.5 screw plug connector, complete, for tanks or open vessels, with immersion tube and protective cage, adjustable-height holder<br>Max. immersion length 1000 mm<br>Max. immersion length 1500 mm<br>Max. immersion length 2000 mm | <b>7MA8500-8FU</b><br><b>7MA8500-8FV</b><br><b>7MA8500-8FW</b> |
| <b>Adjustable-height flange</b><br>made of PP, for immersion fittings 7MA8500-8FU, -8FV and -8FW, DN 50  | <b>7MA8500-8FY</b>   |
| <b>Immersion fitting</b><br>As 7MA8500-8FU, -8FV and -8FW but made of PVDF, plexiglas  | On request   |
|  | Order No.  |
| <b>Buffer solution set</b><br>Standard buffers sterilized with superheated steam to DIN 19266 and NIST <sup>1)</sup> with 20 ampoules of each value for one calibration each pH = 4.01, pH = 6.87, pH = 9.18   | <b>7MA8500-8AS</b>   |
|  | Order No.  |
| Analyzer<br><b>SIPAN 32, SIPAN 32X</b><br><b>SIPAN 34</b>  | See page 2/17<br>See page 2/25                                 |

1) NIST: National Institute of Standards and Technology  
5 year storage guarantee

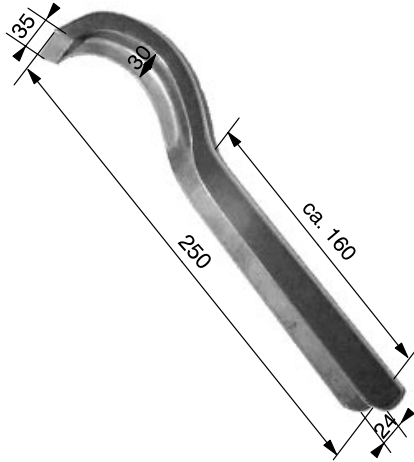
Available ex-stock

# Measuring equipment for pH value and redox potential

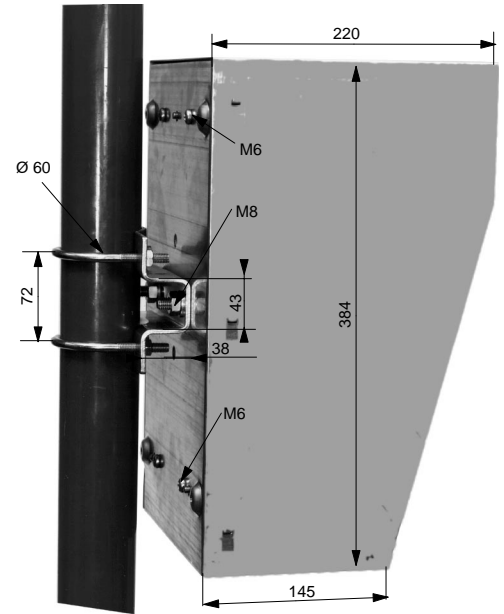
## Accessories for SIPAN 32, SIPAN 32X and SIPAN 34 analyzers

### Dimensions

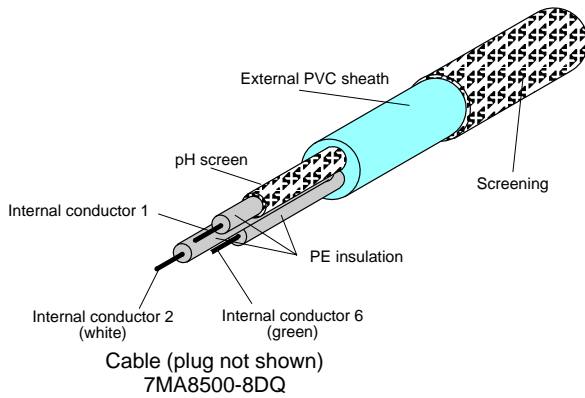
2



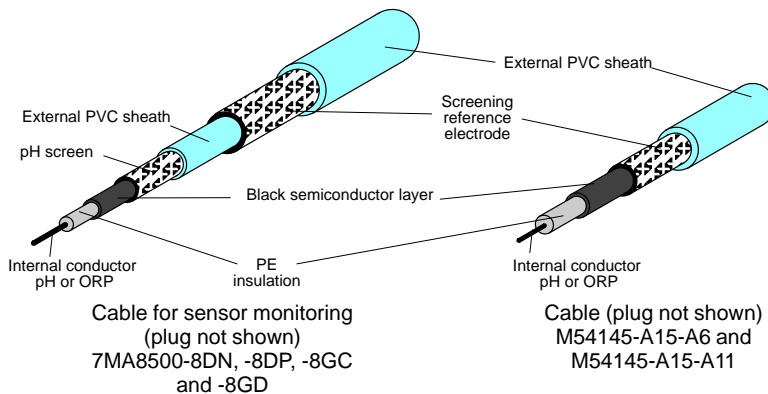
Hook key spanner  
M54445-A33



Protective hood with base plate  
C79451-A3177-D12 fitted  
on pipe clamp 7MA8500-8DG

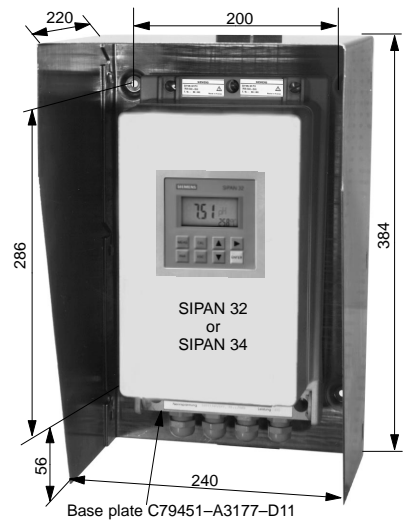


Cable (plug not shown)  
7MA8500-8DQ



Cable for sensor monitoring  
(plug not shown)  
7MA8500-8DN, -8DP, -8GC  
and -8GD

Cable (plug not shown)  
M54145-A15-A6 and  
M54145-A15-A11



Analyzer fitted on base plate and  
integrated in protective hood  
(base plate also available separately)

Fig. 2/28 SIPAN 32 and SIPAN 34, accessories for pH and ORP measurements, dimensions in mm



# Measuring equipment for pH value and redox potential

## Accessories for SIPAN 32, SIPAN 32X and SIPAN 34 analyzers

Ordering data

|   | Order No.   |
|---|---|
| For mounting of analyzer on a pipeline<br><b>Protective hood</b> (mat. No. 1.4571) with base plate C79451-A3177-D11<br><b>Pipe clamp</b> (mat. No. 1.4571)<br><b>Base plate</b> (mat. No. 1.4571)   | <b>C79451-A3177-D12</b><br><b>7MA8500-8DG</b><br><b>C79451-A3177-D11</b>                  |
| <b>Hose</b><br>to connect the KCl supply reservoir to the reference electrode/combination electrode, 2 m long   | <b>C74450-A184-D1</b>   |
| <b>Set of mounting parts</b><br>for flow fittings M54145-A92, and -A93, C74451-A1789-A1, -A3 and -A21, as well as immersion fittings C74451-A1789-A10 to -A16   | <b>C74451-A1789-D1</b>  |
| <b>Hook key spanner</b><br>made of stainless steel (mat. No. 1.4301) to tighten union nut M54445-A23  | <b>M54445-A33</b>   |
| <b>Set of gaskets</b><br>made of Viton (set of 5) for union nuts C74451-A1789-C2 and M54445-A23   | <b>M54445-A24</b>   |
| <b>Special gaskets</b><br>made of EPDM (set of 25) for union nuts C74451-A1789-C2 and M54445-A23  | <b>M54445-A34</b>   |
| <b>Special gaskets</b><br>made of Teflon (set of 15) for union nuts C74451-A1789-C2 and M54445-A23  | <b>M54445-A35</b>   |
| <b>Plug/cable combination</b><br>for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ<br><ul style="list-style-type: none"> <li>● Cable, 3 m long</li> <li>● Cable, 5 m long</li> <li>● Cable, 10 m long</li> <li>● Cable, 20 m long</li> </ul>            | <b>M54145-A15-A11</b><br><b>M54145-A15-A6</b><br><b>7MA8500-8GC</b><br><b>7MA8500-8DN</b> |
| <b>Special plug/cable combination</b><br>for pH sensor monitoring and for double pH measurements<br>for: 7MA8500-8FA, -8FB, -8FC, -8FD, -8FE, -8FG, -8FH and -8FJ<br><ul style="list-style-type: none"> <li>● Cable, 3 m long</li> <li>● Cable, 5 m long</li> </ul> | <b>7MA8500-8GD</b><br><b>7MA8500-8DP</b>  |
| <b>Plug/cable combination</b><br>for 7MA8500-8FF and -8BV, 5 m long   | <b>7MA8500-8DQ</b>  |

|  | Order No.             |
|--|-----------------------|
| <b>KCl</b><br>in plastic bottle (1 kg) for making up the electrolyte solution for refillable combination electrodes and reference electrodes (e.g. 7MA8500-8FC)  | <b>C71451-Z500-L2</b> |
| <b>Washbottle</b><br>(0.5 l) for simple refilling of KCl   | <b>C71165-Z358-P1</b> |
| <b>KCl electrolyte solution</b><br>1 liter, for sterilizable combination electrode 7MA8500-8FE   | <b>7MA8500-8GE</b>    |
| <b>Buffer solution set</b><br>Standard buffers sterilized with superheated steam to DIN 19266 and NIST <sup>1)</sup> with 20 ampoules of each value for one calibration each pH = 4.01, pH = 6.87, pH = 9.18 | <b>7MA8500-8AS</b>    |

|   | Order No.                      |
|---|--------------------------------|
| Analyzer<br><b>SIPAN 32, SIPAN 32X</b><br><b>SIPAN 34</b> | See page 2/17<br>See page 2/25 |

<sup>1)</sup> NIST: National Institute of Standards and Technology  
5 year storage guarantee

Available ex-stock

# Measuring equipment for pH value and redox potential

## Technical data

### Sensors 1)

2

|   | pH combination electrode<br>7MA8500-8FA  | pH combination electrode<br>7MA8500-8FB | pH combination electrode<br>7MA8500-8FC   | pH combination electrode<br>7MA8500-8FD                    | pH combination electrode<br>7MA8500-8FE |
|---|--|---|---|--|---|
| Application   | Service water, waste water, suspensions, food processing, organic solvents, hot acids and alkalis  | Contaminated liquids                    | Boiler feedwater and ultra-pure water with conductivities < 100 µS/cm, critical media | Non-critical media, drinking water, liquids without solids | Biotechnology, food industry            |
| Measuring range   | pH=2 to pH=13  |   | pH=0 to pH=14   |  | pH=2 to pH=14                           |
| Permissible oper. temperature T <sub>B</sub>                | 0 °C to +60 °C   | -5 °C to +50 °C                         | -30 °C to +80 °C  | -5 °C to +80 °C  | +10 °C to +135 °C                       |
| Permissible oper. pressure P <sub>B</sub> at T <sub>B</sub> | 10 bar   | 0.5 bar                                 | 6 bar   | 0.5 bar  | 6 bar                                   |
| Tapping electrode material                                  | Ag/AgCl  |   |   |  |   |
| Electrode shaft material                                    | Glass (DURAN)  |   |   | PPO <sup>2)</sup> unbreakable                              | Glass (DURAN)                           |
| Plug/cable combination                                      | 5 m long: M54145-A15-A6, 3 m long: M54145-A15-A11, 10 m long: 7MA8500-8GC or 20 m long: 7MA8500-8DN<br>Special cable for pH sensor monitoring, 3 m long: 7MA8500-8GD, or 5 m long: 7MA8500-8DP |   |   |  |   |
| Dimensions  | See Fig. 2/23  | See Fig. 2/26                           | See Fig. 2/21   | See Fig. 2/22  | See Fig. 2/24                           |
| Weight  | Approx. 0.15 kg  |   |   |  |   |

|   | pH combination electrode with Pt 1000<br>7MA8500-8FF<br>7MA8500-8BV                               | ORP combination electrode<br>7MA8500-8FG   | Pt 1000 thermometer<br>7MA8500-8FH | Pt 1000 thermometer<br>7MA8500-8FJ | Pt 100 thermometer<br>M54145-A8  |
|---|---|--|------------------------------------|------------------------------------|----------------------------------|
| Application   | Service water, waste water, suspensions, food processing, organic solvents, hot acids and alkalis | All  |                                    |                                    | Only for fitting C70211-A1959-A1 |
| Measuring range   | pH=2 to pH=13   | -2000 to +2000 mV  | -30 °C to +135 °C                  |                                    | -30 °C to +135 °C                |
| Permissible oper. temperature T <sub>B</sub>                | 0 °C to +100 °C   | 0 °C to +100 °C  |                                    |                                    |                                  |
| Permissible oper. pressure P <sub>B</sub> at T <sub>B</sub> | 10 bar  | 6 bar  | 10 bar                             |                                    | 10 bar                           |
| Tapping electrode material                                  | Ag/AgCl   | Ag/AgCl  | -                                  |                                    | -                                |
| Electrode shaft material                                    | Glass (DURAN)   | Glass (DURAN)  |                                    | Stainless steel 1.4571             | Glass                            |
| Plug/cable combination                                      | Cable 5 m long<br>7MA8500-8DQ   | Cable 5 m long: M54145-A15-A6, cable 3 m long: M54145-A15-A11<br>cable 10 m long: 7MA8500-8GC, cable 20 m long 7MA8500-8DN |                                    |                                    | 2 m fixed cable                  |
| Dimensions  | See Fig. 2/23   |  | See Fig. 2/22                      | See Fig. 2/23                      | -                                |
| Weight  | Approx. 0.15 kg   | Approx. 0.15 kg  |                                    | Approx. 0.15 kg                    |                                  |

|   | Differential pH sensor<br>7MA8500-8FM<br>7MA8500-8BX   | pH measuring electrode<br>M54145-A31  | pH reference electrode<br>M54145-A36 | pH reference electrode<br>M54145-A37 |
|---|--|---|--------------------------------------|--------------------------------------|
| Application   | Measurements such as: milk, cheese, yogurt industry, chemical industry, cosmetics (creams)<br>Maintenance-free | Only for installation in flow fitting C70211-A1959-A1, special for sugar industry |                                      |                                      |
| Measuring range   | pH=3 to pH=12  | pH=1 to pH=14   | -                                    | -                                    |
| Permissible oper. temperature T <sub>B</sub>                | 0 °C to +140 °C  | 0 °C to +135 °C   | 5 °C to +130 °C                      | 0 °C to +50 °C                       |
| Permissible oper. pressure P <sub>B</sub> at T <sub>B</sub> | 16 bar   | 10 bar  |                                      |                                      |
| Tapping electrode material                                  | Metallic (Ag)  | Ag/AgCl   |                                      |                                      |
| Electrode shaft material                                    | Enamelled steel tube   | Glass (DURAN)   |                                      |                                      |
| Plug/cable combination                                      | Plug/cable 5 m long, screw-on  | 2 m fixed cable   |                                      |                                      |
| Dimensions  | See Fig. 2/24  | 120 mm mounting length  |                                      |                                      |
| Weight  | Approx. 3 kg   | Approx. 0.15 kg   |                                      |                                      |

1) Ex protection DIN 50014/EN 50020; in conjunction with SIPAN 32X, all pH sensors (electrodes) are approved for use in Ex zone 1

2) PPO: polyphenylene oxide

# Measuring equipment for pH value and redox potential

## Technical data

### Fittings

|   | Electrode holder<br>C74451-A1789-B1                           | Electrode holder<br>C74451-A1789-B2                                      | Electrode holder<br>C74451-A1789-B3 |
|---|---|--|-------------------------------------|
| Connection gland                              | Conical flange  |  |                                     |
| Material                                      | Polypropylene (PP)  | Stainless steel (mat. No. 1.4571)  | Polyvinylidene fluoride (PVDF)      |
| Resistance, suitable for:                     | Alkalis, acids, brines, petroleum spirit, oils, alcohol       | Alkalis, dilute acids, oils, petroleum spirit, alcohol, organic solvents | Largely resistant to all chemicals  |
| Resistance, not suitable for:                 | Aromatic and chlorinated hydrocarbons of higher concentration | Strong acids, high chloride concentrations                               | -                                   |
| Permissible operating temperature $T_B$       | 90 °C   | 140 °C   | 100 °C                              |
| Permissible operating pressure $P_B$ at $T_B$ | 6 bar at 20 °C<br>4 bar at 90 °C                              | 10 bar   | 6 bar at 20 °C<br>4 bar at 90 °C    |
| Dimensions                                    | See Fig. 2/23   |  |                                     |
| Weight  | Approx. 0.1 kg  | Approx. 1.0 kg   | Approx. 0.1 kg                      |

|   | Flow fitting<br>M54145-A92                                    | Flow fitting<br>M54145-A93         | Flow fitting<br>C70211-A1959-A1 |
|---|---|------------------------------------|---------------------------------|
| Connection gland                              | G <sup>3/4</sup> "  |                                    | Flange                          |
| Material                                      | Polypropylene (PP)  | Polyvinylidene fluoride (PVDF)     | Internal rubber coating         |
| Resistance, suitable for:                     | Alkalis, acids, brines, petroleum spirit, oils, alcohol       | Largely resistant to all chemicals | Alkalis, acids, chlorine        |
| Resistance, not suitable for:                 | Aromatic and chlorinated hydrocarbons of higher concentration | -                                  | Organic solvents                |
| Permissible operating temperature $T_B$       | 90 °C   | 130 °C                             | 100 °C                          |
| Permissible operating pressure $P_B$ at $T_B$ | 6 bar at 20 °C<br>0.2 bar at 90 °C                            | 6 bar at 20 °C<br>1 bar at 90 °C   | 6 bar                           |
| Dimensions                                    | See Fig. 2/23   |                                    | See KEIN MERKER                 |
| Weight  | Approx. 0.25 kg   | Approx. 0.3 kg                     | Approx. 3.5 kg                  |
| Flow  | Recommended 0.1 to 0.5 l/min. (max. 10 l/min)                 |                                    |                                 |

|   | Flow fitting<br>C74451-A1789-A1  | Flow fitting<br>C74451-A1789-A21 | Flow fitting<br>C74451-A1789-A3                                |
|---|--|----------------------------------|--|
| Connection gland                              | <sup>3</sup> / <sub>8</sub> -18NPT                                       | G <sup>3</sup> / <sub>4</sub> "  | <sup>3</sup> / <sub>8</sub> -18NPT                             |
| Wetted parts material                         | Stainless steel mat. No. 1.4404  |                                  | Polypropylene (PP)   |
| Resistance, suitable for:                     | Alkalis, dilute acids, oils, petroleum spirit, alcohol, organic solvents |                                  | Alkalis, dilute acids, brines, oils, petroleum spirit, alcohol |
| Resistance, not suitable for:                 | Strong acids, high chloride concentrations                               |                                  | Aromatic and chlorinated hydrocarbons of higher concentration  |
| Permissible operating temperature $T_B$       | 160 °C   |                                  | 90 °C  |
| Permissible operating pressure $P_B$ at $T_B$ | 16 bar   |                                  | 1.5 bar at 20 °C<br>0.2 bar at 90 °C                           |
| Dimensions                                    | See Fig. 2/23  |                                  | See Fig. 2/22  |
| Weight  | Approx. 1.5 kg   |                                  |  |
| Flow  | Recommended 0.1 to 0.5 l/min. (max. 10 l/min)                            |                                  |  |

# Measuring equipment for pH value and redox potential

## Technical data

### Fittings

|  | <b>Immersion fittings<br/>C74451-A1789-A10 to<br/>C74451-A1789-A16</b> | <b>Immersion fittings<br/>7MA8500-8FU, -8FV,<br/>and -8FW</b>       | <b>Welding-type connectors<br/>7MA8500-8EC,<br/>and -8EH</b>                | <b>Fittings for differential<br/>sensors,<br/>7MA8500-8BX<br/>7MA8500-8BY</b> |
|--|--|---|---|---|
| Connection gland   | -  |   | Internal thread<br>G1 <sup>1</sup> / <sub>4</sub> "                         |   |
| Wetted parts material  | Polyvinyl chloride (PVC)   | Polypropylene (PP)<br>(PVDF: on request)                            | Stainless steel 1.4571  | Stainless steel 1.4404  |
| Resistance,<br>suitable for  | Alkalis, acids, brines   | Alkalis, acids, brines,<br>petroleum spirit, oils, alcohol          | Alkalis, dilute acids, oils, petroleum spirit, alcohol,<br>organic solvents |   |
| Resistance,<br>not suitable for:                                   | Organic solvents   | Aromatic and chlorinated<br>hydrocarbons of higher<br>concentration | Strong acids,<br>high chloride concentrations                               |   |
| Permissible operating<br>temperature T <sub>B</sub>                | 60 °C  | 90 °C   | 140 °C  |   |
| Permissible operating<br>pressure P <sub>B</sub> at T <sub>B</sub> | 0.2 bar  | 2 bar   | 16 bar  |   |
| Dimensions   | See Fig. 2/26  | See Fig. 2/27   | See Fig. 2/24   |   |
| Weight   | Approx. 1.8 to 3 kg  | Approx. 2 kg  | Approx. 0.5 kg  | Approx. 2 kg  |

|  | <b>Attachment fitting<br/>7MA8500-8FK</b>                                   | <b>Replacement fitting<br/>7MA8500-8FR/-8FS/-8FT</b> | <b>Replacement fitting<br/>7MA8500-8AU/-8AV/-8AW</b>          | <b>Replacement fitting<br/>7MA85 500-8BG/-8BH/-8BJ</b>  |
|--|---|--|---|---|
| Connection gland   | Internal thread<br>G1 <sup>1</sup> / <sub>4</sub> "                         |  | Flange DN 50  |   |
| Wetted parts material  | Stainless steel 1.4435 / FPM <sup>1)</sup>                                  | Stainless steel 1.4571 / FPM <sup>1)</sup>           | Polypropylene / FPM <sup>1)</sup>                             | Polyetheretherketone/FPM<br>(PEEK / FPM <sup>1)</sup> ) |
| Resistance,<br>suitable for  | Alkalis, dilute acids, oils, petroleum spirit, alcohol,<br>organic solvents |  | Alkalis, acids, brines, petroleum spirit, oils, alcohol       |   |
| Resistance,<br>not suitable for:                                   | Strong acids,<br>high chloride concentrations                               |  | Aromatic and chlorinated hydrocarbons of higher concentration |   |
| Permissible operating<br>temperature T <sub>B</sub>                | 135 °C  | 130 °C   | 90 °C   | 130 °C  |
| Permissible operating<br>pressure P <sub>B</sub> at T <sub>B</sub> | 6 bar   | 6 bar  | 6 bar   | 6 bar   |
| Dimensions   | See Fig. 2/24   | See Fig. 2/25  |   |   |
| Weight   | Approx. 3 kg  | Approx. 3 kg   | Approx. 2.5 kg  | Approx. 3.5 kg  |

<sup>1)</sup> Gasket made of FPM (Viton)

# Measuring equipment for pH value and redox potential

## Standard combinations

### 1 pH value measurements in ultra-pure water, conductivity <100 µS/cm, boiler feedwater, chip production Installation in bypass (following cooler and pressure reduction)

- pH combination electrode with liquid electrolyte, refillable, 120 mm, with triple ceramic diaphragm  
Order No.: **7MA8500-8FC**
- KCl reservoir for connection to pH combination electrode  
Order No.: **C74450-A184-A1**
- Hose  
Order No.: **C74450-A184-D1**
- Pt 1000 resistance thermometer with stainless steel sheath  
Order No.: **7MA8500-8FJ**
- 2 x matching plug/cable combination, 3 m long  
Order No.: **M54145-A15-A11**
- PVDF electrode holder with stainless steel union nut  
Order No.: **C74451-A1789-B3**  
Alternative: PP electrode holder  
Order No.: **C74451-A1789-B1**
- Stainless steel flow fitting, DN 50 <sup>3</sup>/<sub>8</sub>-NPT  
Order No.: **C74451-A1789-A1**  
Alternative: PP flow fitting, DN 50 <sup>3</sup>/<sub>8</sub>-NPT  
Order No.: **C74451-A1789-A3**
- Analyzer in field housing  
Order No.: **7MA1040-8AA** (SIPAN 32)  
or **7MA1034-0AA00-0AA0** (SIPAN 34)
- Option:  
Set of mounting parts for flow fitting  
Order No.: **C74451-A1789-D1**
- Option:  
1 kg KCl  
Order No.: **C71451-Z500-L2**
- Option:  
Washbottle  
Order No.: **C71165-Z358-P1**
- Option:  
Set of buffer solutions  
Order No.: **7MA8500-8AS**

### 2 pH value measurements for standard applications

- pH combination electrode with gel electrolyte, 120 mm, non-refillable, with fiber diaphragm  
Order No.: **7MA8500-8FD**
- Plug/cable combination, 3 m long  
Order No.: **M54145-A15-A11**
- Analyzer in field housing  
Order No.: **7MA1040-8AA** (SIPAN 32)  
or **7MA1034-2AA00-0AA0** (SIPAN 34)  
or with explosion protection  
Order No.: **7MA1041-8AA** (SIPAN 32X)

Options:

- Glass resistance thermometer  
Order No.: **7MA8500-8FH**
- Plug/cable combination, 3 m long  
Order No.: **M54145-A15-A11**
- Polypropylene electrode holder  
Order No.: **C74451-A1789-B1**
- Polypropylene flow fitting  
Order No.: **C74451-A1789-A3**
- Set of mounting parts for flow fitting  
Order No.: **C74451-A1789-D1**
- Set of buffer solutions  
Order No.: **7MA8500-8AS**

### 3 pH value measurements in tank, inline installation with immersion fitting

- pH combination electrode with polymer electrolyte, 120 mm, non-refillable, with capillary precision glass diaphragm, with integrated Pt 1000  
Order No.: **7MA8500-8FF**
- Special plug/cable combination, 5 m long  
Order No.: **7MA8500-8DQ**
- Polypropylene immersion fitting with electrode holder for pH combination electrode with adjustable-height holder, mounting depth 1000 mm  
Order No.: **7MA8500-8FU**
- Analyzer in field housing  
Order No.: **7MA1040-8AA** (SIPAN 32)  
or **7MA1034-2AA00-0AA0** (SIPAN 34)  
or with explosion protection  
Order No.: **7MA1041-8AA** (SIPAN 32X)
- Options:  
Adjustable-height polypropylene flange for immersion fitting  
Order No.: **7MA8500-8FY**
- Set of buffer solutions  
Order No.: **7MA8500-8AS**

# Measuring equipment for pH value and redox potential

## Standard combinations

2

### 4 pH value measurements in the chemical industry, inline installation in reaction vessel

- pH combination electrode with polymer electrolyte, 120 mm, non-refillable, with capillary precision glass diaphragm, with integrated Pt 1000  
Order No.: **7MA8500-8FF**
- Special plug/cable combination, 5 m long  
Order No.: **7MA8500-8DQ**
- Replacement fitting for inline installation and plug connector electrodes 120 mm  
Order No.: **7MA8500-8FR**
- Stainless steel welding-type connector, angled 15° for mounting of replacement fitting  
Order No.: **7MA8500-8EC**
- Analyzer in field housing, power supply AC 230 V  
Order No.: **7MA1040-8AB** (SIPAN 32)  
or **7MA1034-2AA10-0AA0** (SIPAN 34)  
or with explosion protection  
Order No.: **7MA1041-8AA** (SIPAN 32X)
- Option: (if SIPAN 34 analyzer is used)  
- Replacement fitting with 2 flushing connections  
Order No.: **7MA8500-8FS**
- Option: (if SIPAN 34 analyzer is used)  
- Replacement fitting with pneumatic drive and 2 flushing connections  
Order No.: **7MA8500-8FT**
- Option:  
Set of buffer solutions  
Order No.: **7MA8500-8AS**

### 5 pH value measurements in the pharmaceutical industry: creams, washing lotions (fully sterilizable, no glass breakages)

- Special differential pH measuring electrode made of enamel in aseptic welding-type connectors, completely assembled  
Order No.: **7MA8500-8CX**
- Analyzer in field housing, power supply AC 230 V  
Order No.: **7MA1140-8AB** (SIPAN 32)  
or **7MA1034-2BA10-0AA0** (SIPAN 34)  
or with explosion protection  
Order No.: **7MA1141-8AB** (SIPAN 32X)

### 6 pH value measurements in the sugar industry, installation in bypass

- pH measuring electrode with flange cover and 2 m fixed cable  
Order No.: **M54145-A32**
- Reference electrode with flange cover and 2 m fixed cable, non-refillable  
Order No.: **M54145-A37**
- Pt 100 resistance thermometer with flange cover and 2 m fixed cable  
Order No.: **M54145-A8**
- Flow fitting, cast with internal rubber coating resistant to acids, alkalis and chlorine  
Order No.: **C70211-A1959-A1**
- Analyzer in field housing, power supply AC 230 V  
Order No.: **7MA1040-8AA** (SIPAN 32)  
or **7MA1034-2AA10-0AA0** (SIPAN 34)  
or with explosion protection  
Order No.: **7MA1041-8AA** (SIPAN 32X)
- Option:  
Set of buffer solutions  
Order No.: **7MA8500-8AS**

### 7 pH value measurements in waste water purification plants, inflow to sewage treatment plant; installation in basin or canal with immersion fitting

- pH combination electrode with polymer electrolyte, 120 mm, non-refillable, with capillary precision glass diaphragm  
Order No.: **7MA8500-8FA**
- Plug/cable combination, 3 m long  
Order No.: **M54145-A15-A11**
- Pt 1000 resistance thermometer with glass sheath  
Order No.: **7MA8500-8FH**
- Plug/cable combination, 3 m long  
Order No.: **M54145-A15-A11**
- Polypropylene electrode holder with three Pg 13.5 mounting locations for sensors  
Order No.: **C74451-A1789-B1**
- PVC immersion fitting, 600 mm long  
Order No.: **C74451-A1789-A10**
- Analyzer in field housing, power supply AC 230 V  
Order No.: **7MA1040-8AA** (SIPAN 32)  
or **7MA1034-2AA10-0AA0** (SIPAN 34)  
or with explosion protection  
Order No.: **7MA1041-8AA** (SIPAN 32X)
- Option:  
- Stainless steel mounting stand  
Order No.: **7MA8500-8CG**  
- Freely suspended rod for connection of immersion fitting to mounting stand  
Order No.: **7MA8500-8CJ**  
- Protective hood with base plate for mounting of analyzer on mounting stand  
Order No.: **C79451-A3177-D12**  
- Pipe clamp  
Order No.: **7MA8500-8DG**  
- Set of buffer solutions  
Order No.: **7MA8500-8AS**

# Measuring equipment for pH value and redox potential

## Standard combinations

### 8 Redundant pH value measurements in the same vessel, for critical process measurements and for approval by authorities;

output of two pH current signals (0/4 to 20 mA) or an averaged pH signal with additional temperature output

- 2 x pH combination electrodes with polymer electrolyte, 120 mm, non-refillable, with capillary precision glass diaphragm  
Order No.: **7MA8500-8FA**
- 2 x special cable combination, cable length 3 m  
Order No.: **7MA8500-8GD**
- Pt 1000 resistance thermometer with glass sheath  
Order No.: **7MA8500-8FH**
- 1 x plug/cable combination, cable length 5 m  
Order No.: **M54145-A15-A11**
- Polypropylene flow fitting for bypass installation  
Order No.: **M54145-A92**
- Polypropylene electrode holder, for installation of 3 sensors  
Order No.: **C74451-A1789-B1**
- Polypropylene union nut  
Order No.: **C74451-A1789-C2**
- Analyzer in field housing  
Order No.: **7MA1140-8AB** (SIPAN 32)  
or **7MA1034-2BA10-0AA0** (SIPAN 34)  
or with explosion protection  
Order No.: **7MA1141-8AB** (SIPAN 32X)
- Option:  
Set of buffer solutions  
Order No.: **7MA8500-8AS**

### 9) Redundant redox measurements in the same vessel

Output: two separate current signals (0/4 to 20 mA) for redox potential

- 2 x redox combination electrode with gel electrolyte, 120 mm, non-refillable, with capillary precision glass diaphragm  
Order No.: **7MA8500-8FG**
- 2 x plug/cable combination, cable length 3 m  
Order No.: **M54145-A15-A11**
- Polypropylene flow fitting for bypass installation  
Order No.: **M54145-A92**
- Polypropylene electrode holder, for installation of 3 sensors  
Order No.: **C74451-A1789-B1**
- Polypropylene union nut  
Order No.: **C74451-A1789-C2**
- Analyzer in field housing  
Order No.: **7MA1140-8AB** (SIPAN 32)  
or **7MA1034-2BA10-0AA0** (SIPAN 34)  
or with explosion protection  
Order No.: **7MA1141-8AB** (SIPAN 32X)

### 10 Simultaneous pH value and redox measurements in biological sewage treatment plants, electroplating plants, drinking water monitoring;

output of two separate current signals (0/4 to 20 mA) for pH value and redox potential

- pH combination electrode with polymer electrolyte, 120 mm, non-refillable, with capillary precision glass diaphragm  
Order No.: **7MA8500-8FA**
- Redox combination electrode with polymer electrolyte, 120 mm, non-refillable, with capillary precision glass diaphragm, with platinum ring  
Order No.: **7MA8500-8FG**
- 2 x special cable combination, cable length 5 m  
Order No.: **7MA8500-8DQ**
- Pt 1000 resistance thermometer with glass sheath  
Order No.: **7MA8500-8FH**
- Plug/cable combination, 5 m long  
Order No.: **M54145-A15-A6**
- Polypropylene electrode holder with three Pg 13.5 mounting locations for sensors  
Order No.: **C74451-A1789-B1**
- PVC immersion fitting, 600 mm long  
Order No.: **C74451-A1789-A10**
- Analyzer in field housing  
Order No.: **7MA1140-8AB** (SIPAN 32)  
or **7MA1034-2CA10-0AA0** (SIPAN 34)  
or with explosion protection  
Order No.: **7MA1141-8AB** (SIPAN 32X)
- Option:
  - Stainless steel mounting stand  
Order No.: **7MA8500-8CG**
  - Freely suspended rod for connection of immersion fitting to mounting stand  
Order No.: **7MA8500-8CJ**
  - Protective hood with base plate for mounting of analyzer on mounting stand  
Order No.: **C79451-A3177-D12**
  - Pipe clamp  
Order No.: **7MA8500-8DG**
  - Set of buffer solutions  
Order No.: **7MA8500-8AS**

# Measuring equipment for pH value and redox potential

## Documentation

### Ordering data

#### Catalog PA 20

|   | Order No.                        |
|---|----------------------------------|
| <b>Flüssigkeitsanalytik</b><br>( <i>German</i> )  | <b>E86060-K3520-A101-A1</b>      |
| <b>Liquid analysis</b><br>( <i>English</i> )      | <b>E86060-K3520-A101-A1-7600</b> |
| <b>Analyse de liquide</b><br>( <i>French</i> )    | <b>E86060-K3520-A101-A1-7700</b> |
| <b>Análisis de líquidos</b><br>( <i>Spanish</i> ) | <b>E86060-K3520-A101-A1-7800</b> |
| <b>Analisi de liquidi</b><br>( <i>Italian</i> )   | <b>E86060-K3520-A101-A1-7200</b> |

#### Manual

|  | Order No.               |
|--|-------------------------|
| Printed version of Manual<br>(each language separately)  |                         |
| <b>SIPAN 32</b> Meßeinrichtung für pH-Wert und Redoxpotential ( <i>German</i> )  | <b>C79000-B5400-C46</b> |
| <b>SIPAN 32</b> Measuring Equipment for pH Value and Redox Potential ( <i>English</i> )  | <b>C79000-B5476-C46</b> |
| <b>SIPAN 32</b> Dispositif de mesure pour valeur de pH et de potentiel Redox ( <i>French</i> )   | <b>C79000-B5477-C46</b> |
| <b>SIPAN 32</b> Equipo de medición de pH y de potencial de oxido-reducción ( <i>Spanish</i> )  | <b>C79000-B5478-C46</b> |
| <b>SIPAN 32</b> Dispositivo per la misura del valore di pH e del potenziale redox ( <i>Italian</i> )   | <b>C79000-B5472-C46</b> |
| <b>SIPAN 32</b> (5 languages on CD <sup>1</sup> )<br>– Meßeinrichtung für pH-Wert und Redoxpotential ( <i>German</i> )<br>– Measuring Equipment for pH Value and Redox Potential ( <i>English</i> )<br>– Dispositif de mesure pour valeur de pH et de potentiel Redox ( <i>French</i> )<br>– Equipo de medición de pH y de potencial de oxido-reducción ( <i>Spanish</i> )<br>– Dispositivo per la misura del valore di pH e del potenziale redox ( <i>Italian</i> ) | <b>C79000-G5464-C48</b> |
| Printed version of Manual<br>(each language separately)  |                         |
| <b>SIPAN 34</b> Meßeinrichtung für pH-Wert und Redoxpotential ( <i>German</i> )  | <b>C79000-G5400-C42</b> |
| <b>SIPAN 34</b> Measuring Equipment for pH Value and Redox Potential ( <i>English</i> )  | <b>C79000-G5476-C42</b> |
| <b>SIPAN 34</b> Dispositif de mesure pour valeur de pH et de potentiel Redox ( <i>French</i> )   | <b>C79000-G5477-C42</b> |
| <b>SIPAN 34</b> Equipo de medición de pH y de potencial de oxido-reducción ( <i>Spanish</i> )  | <b>C79000-G5478-C42</b> |
| <b>SIPAN 34</b> Dispositivo per la misura del valore di pH e del potenziale redox ( <i>Italian</i> )   | <b>C79000-G5472-C42</b> |
| <b>SIPAN 34</b> (5 languages on CD <sup>1</sup> )<br>– Meßeinrichtung für pH-Wert und Redoxpotential ( <i>German</i> )<br>– Measuring Equipment for pH Value and Redox Potential ( <i>English</i> )<br>Dispositif de mesure pour valeur de pH et de potentiel Redox ( <i>French</i> )<br>– Equipo de medición de pH y de potencial de oxido-reducción ( <i>Spanish</i> )<br>– Dispositivo per la misura del valore di pH e del potenziale redox ( <i>Italian</i> )   | <b>C79000-G5464-C50</b> |

<sup>1</sup>) Included in delivery of analyzer (free-of-charge)

Available ex-stock