

Conductivity measuring equipment



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Conductivity measuring equipment

Application

Characteristics

The **SIPAN 32**, **SIPAN 32X** and **SIPAN 34** measuring equipment is designed to determine the electric conductivity of aqueous or organic solutions.

The **SIPAN 32**, **SIPAN 32X** or **SIPAN 34** measuring equipment consists of a sensor and an analyzer. Special fittings are used in addition to match the sensor to the various process parameters.

The conductivity measuring range extends over 8 powers of ten:

from ultra-pure water (approx. 0.040 $\mu\text{S}/\text{cm}$) up to very high conductivities (approx. 2500 mS/cm).

This wide range is covered by three measuring procedures (see Fig. 1/1):

- The two-electrode procedure (**2EL sensor**),
- The four-electrode procedure (**4EL sensor**) and
- The inductive procedure (**IND sensor**).

The measuring ranges as well as the fields of application of the three procedures overlap to a certain extent.

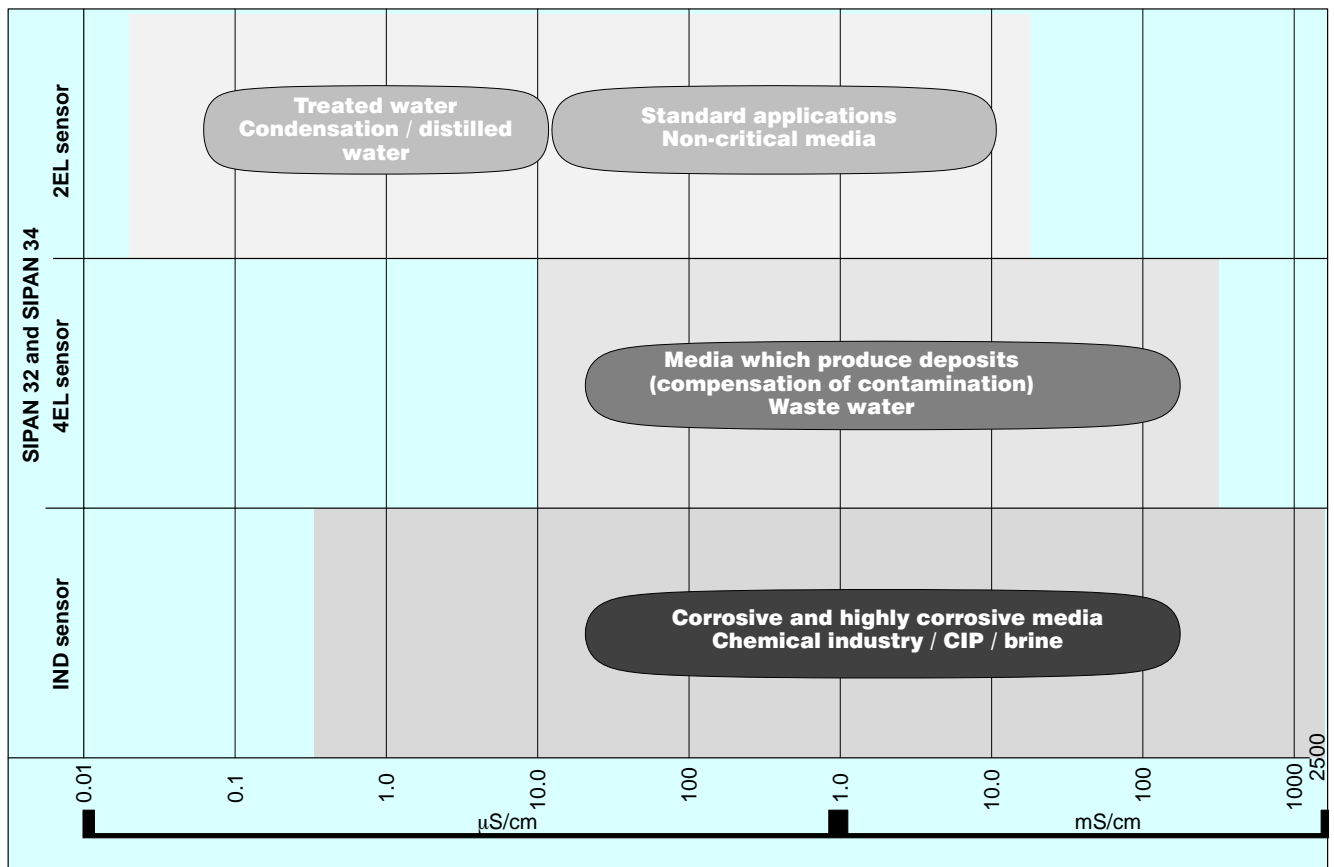


Fig. 1/1 SIPAN 32, SIPAN 32X and SIPAN 34 measuring equipment, selection table according to fields of application

Conductivity measuring equipment

Application

Characteristics

SIPAN 32, SIPAN 32X or SIPAN 34 with 2EL sensor

The two-electrode procedure (2EL sensor) is used to measure the conductivity of ultra-pure water and highly diluted aqueous solutions from

0.04 $\mu\text{S}/\text{cm}$ to 25000 $\mu\text{S}/\text{cm}$

where contamination and deposits on the electrodes extending into the measured medium are not expected (higher conductivities - above 5000 $\mu\text{S}/\text{cm}$ - lead to polarization effects and thus to errors in measurement).

Media with conductivities $< 5 \mu\text{S}/\text{cm}$ (VE water, ultra-pure water) exhibit a distinct non-linear temperature dependence. The analyzer is therefore provided with a temperature compensation function for ultra-pure water.

Examples of possible applications

- Steam generation (boiler feedwater, condensation)
- Semiconductor manufacture (ultra-pure water, chip cleaning)
- Water processing (reverse osmosis, ion exchanger)
- Leak testing of heat exchangers
- Drinking water and surface water

Special characteristics

- Measurement of very small ranges ($< 0.1 \mu\text{S}/\text{cm}$) by using stainless steel sensors resistant to pressure and corrosion with a concentric electrode arrangement, with integrated thermometer
- Calibration of measurement is unnecessary for 2EL concentric sensors (even following replacement of sensor)
- Stainless steel electrodes sealed in glass, no gasket material
- Low price for stainless steel pin electrodes with plastic shaft with or without temperature compensation for measuring ranges $\geq 2 \mu\text{S}/\text{cm}$
- Compact electrode, as combination with a pH/redox measurement in one fitting
- All versions with explosion protection for zone 1

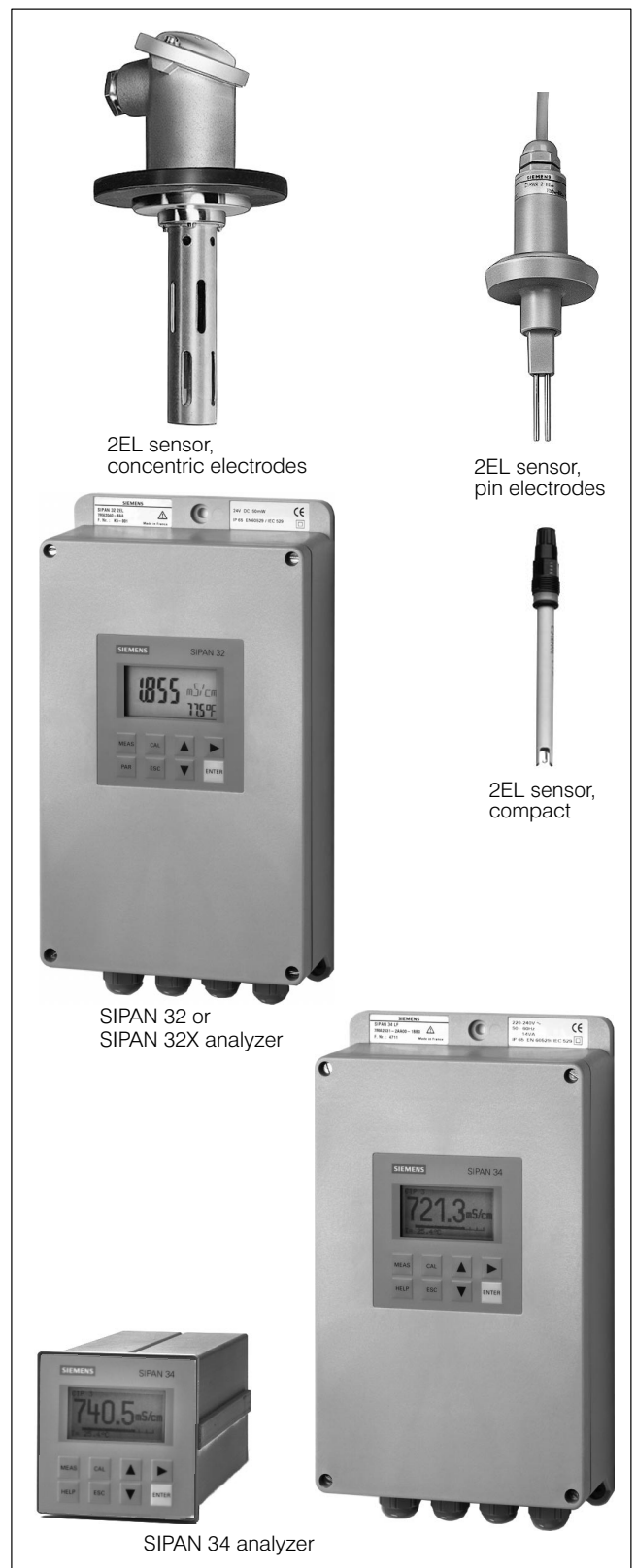


Fig. 1/2 SIPAN 32, 32X and 34 analyzers with 2EL sensors

Conductivity measuring equipment

Application

Characteristics



Fig. 1/3 SIPAN 32, 32X and 34 analyzers with 4EL sensors

SIPAN 32 or SIPAN 34 with 4EL sensors

- The four-electrode procedure is used in media of average conductivity from

0.01 mS/cm to 500 mS/cm

The advantages of this procedure are the insensitivity of the sensor towards contamination and the avoidance of polarization errors.

- The intelligent diagnostic functions of the analyzer permit extensive compensation of contamination and monitoring of the sensor status. In addition to output of the conductivity, it is also possible to output a display in percentage by weight following automatic conversion.

Examples of possible applications

- Municipal and industrial sewage treatment plants
- Service water and waste water
- Drinking water purification
- Cooling water
- Determination of concentrations of brines, alkalis and acids
- Monitoring of concentrates
- Bleaching and washing baths

Special characteristics

- Four concentric ring electrodes - potted level with the shaft - thus particularly resistant to contamination
- Automatic compensation of contamination
- Sensors with integrated thermometer for automatic temperature compensation
- Particularly compact design possible even in combination with a pH/redox measurement
- All versions with explosion protection for zone 1

Conductivity measuring equipment

Application

Characteristics

SIPAN 32 or SIPAN 34 with IND sensor

The inductive procedure can be used to measure the conductivity of small to very high values from **0.5 $\mu\text{S}/\text{cm}$ to approx. 2500 mS/cm**

This procedure is particularly suitable for the measurement of corrosive media since there is no direct contact between the electrodes and the medium.

In addition to output of the conductivity, it is also possible to output a display in percentage by weight following automatic conversion (determination of concentration).

Examples of possible applications

- Determination of concentrations of brines, alkalis and acids, in particular sulphuric acid and oleum
- Corrosive industrial waste water
- CIP control
- Regeneration of concentration
- Phase separation of product/water mixtures
- Product monitoring in filling and cleaning plants.

Special characteristics

- Extremely wide dynamic range ($> 10^6$) with one type of sensor
- Three types of sensor manufactured from the high-tech polymer PEEK with special leak tightness of sensor and thermometer since moulded from one piece. Permanent overload capacity 10 bar at $+130\text{ }^\circ\text{C}$
- FEP sensor with large wall thickness and external thermometer for measurements in highly concentrated acids and alkalis
- DURAN glass sensor absolutely resistant to diffusion. Can be used in hot, super-saturated acids (oleum), resistant to organic solvents, with integrated thermometer.
- Versions with explosion protection for zone 1

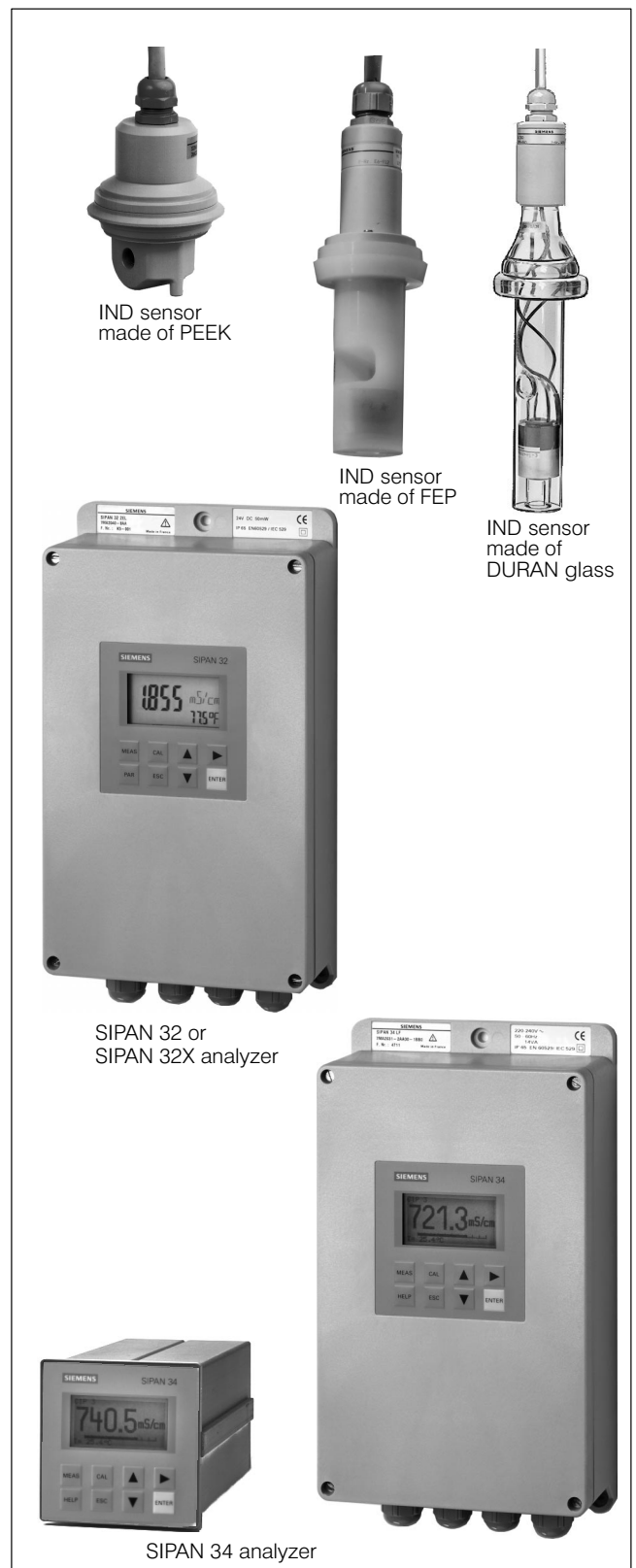


Fig. 1/4 SIPAN 32, 32X and 34 sensors with IND sensors

Conductivity measuring equipment

Application

Technical description

Measuring procedure for conductivity measurements

The conductivity of liquids is based on the electrolytic dissociation of acids, bases or salts in water into electrically charged particles (ions).

The magnitude of the electrical conductivity κ is the reciprocal value of the electric resistance of the solution.

The dimension for electric conductivity is S/m (Siemens per meter).

A differentiation is made between strong and weak electrolytes depending on the degree of dissociation.

Strong electrolytes are dissociated into ions completely or at least by more than 80% when dissolved in water. These electrolytes include many salts (NaCl, KCl), strong bases (KOH, NaOH) and strong acids (HCl, HNO₃, HClO₄).

Weak electrolytes (H₂CO₃, CH₃COOH, H₂S, NH₄OH) are only dissociated to a small percentage. Pure water is also a weak electrolyte with a basic conductivity of 0.048 μ S/cm, resulting from the self-dissociation of the H₂O molecules (H₂O + H₂O \leftrightarrow H₃O⁺ + OH⁻).

In general the electrolytic dissociation of a dissolved material increases with the dilution of the solution, the magnitude of the dielectric constant of the solvent and the temperature of the solution.

The conductivity of a dilute electrolyte solution depends on:

- The number of ions in the solution, i.e. its concentration
- The number of unit charges capable of being transported by each ion, i.e. the ion charge number
- The migration velocity or mobility of the ions.

The conductivity of an electrolyte is a linear function of the concentration at a constant temperature since the valency - and also the ion mobility in dilute aqueous solutions - remain constant.

Examples of the dependence of conductivity on the concentration are shown in Fig. 1/5 and Fig. 1/6.

The total conductivity of a solution is the sum of the conductivities of all ion pairs present in the solution and is thus usually a non-specific variable..

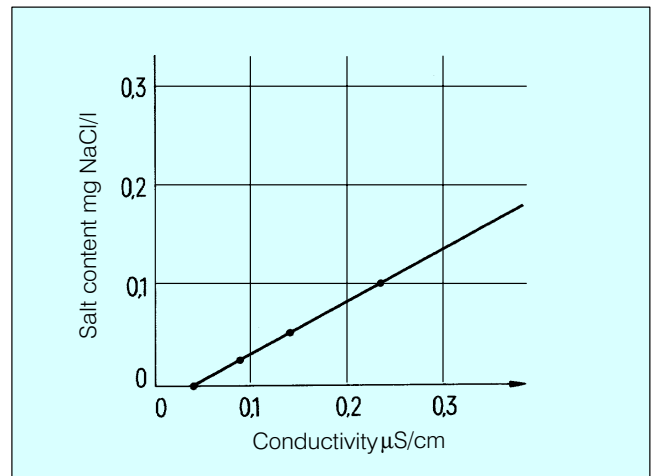


Fig. 1/5 Dependence of conductivity of water on the NaCl content

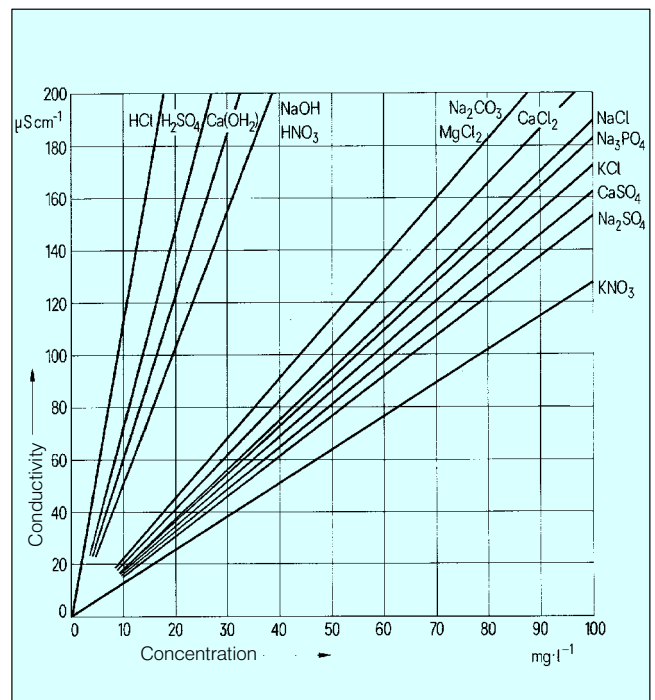


Fig. 1/6 Conductivity of dilute solutions at 18 °C

In practice, however, the concentration of a component can be determined directly from the conductivity of a solution if

- only one substance is present in the solution,
- all constituents of the solution change in approximately the same ratio and
- the variation of one constituent of the solution compared to that of the others is so predominant that it alone practically determines the conductivity.

In the case of concentrated solutions of electrolyte there is usually no linear relationship between the conductivity of the solution and the concentration of the electrolyte. The conductivity frequently decreases as the concentration increases since the degree of dissociation drops on the one hand and the ion mobility is reduced on the other because of inter-ionic interactions.

A concentration measurement can nevertheless be carried out if it is only made in a reliable range, i.e. where the conductivity either rises or falls. This assumes that the relationship between conductivity and concentration of the electrolyte is known (tables or curves, e.g. Fig. 1/7).

The conductivity of electrolytes is highly temperature-dependent since both the number of dissociated modules and the ion mobility are highly temperature-dependent. A reference temperature of 25 °C is therefore selected and the measured conductivity values are corrected accordingly using the temperature coefficient α .

The temperature coefficient α depends on

- the composition of the electrolyte solution and
- the concentration of the solution.

Values from 1 to 6 %/K are possible.

Fig. 1/8 shows that the resistance depends non-linearly on the temperature for an NaCl solution.

Three different measuring procedures enable measurement of the conductivity individually adapted to the task and the concentration of the electrolyte:

- Two-electrode procedure
- Four-electrode procedure
- Inductive procedure without electrodes..

The conductivity measuring equipment consists of the following basic components:

- Conductivity sensor
- Temperature sensor to compensate the influence of temperature
- Analyzer

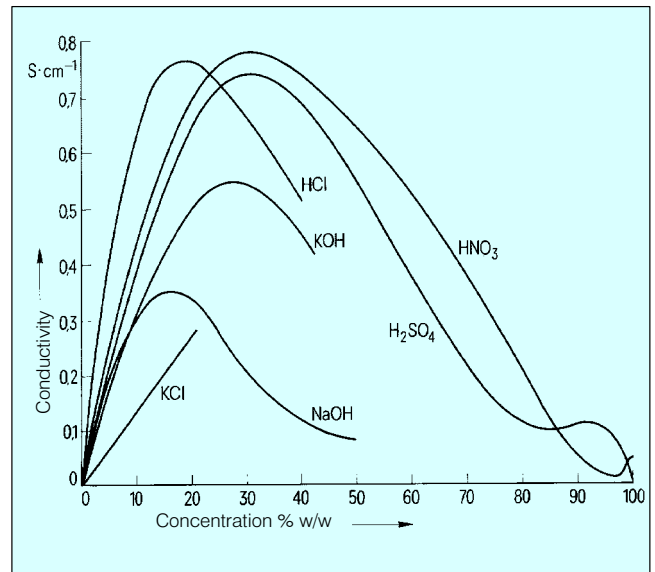


Fig. 1/7 Conductivity of concentrated solutions at 18 °C

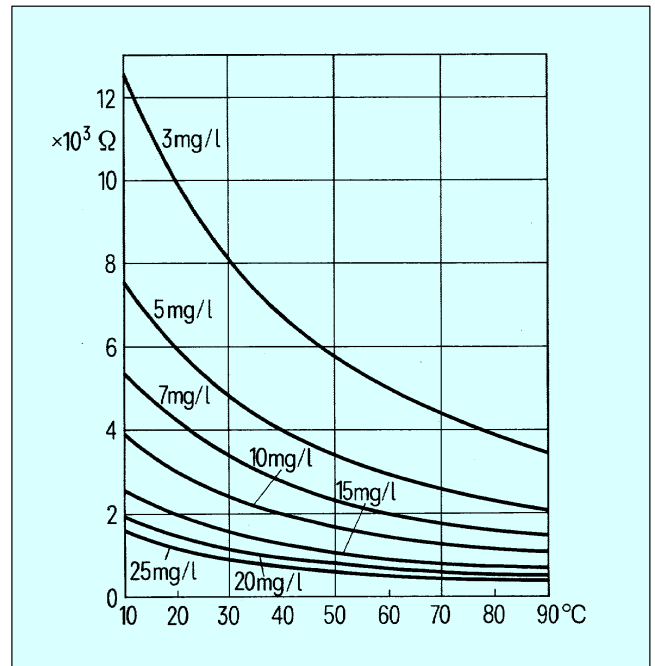


Fig. 1/8 Dependence of the resistance of an NaCl solution on the temperature at various concentrations

Conductivity measuring equipment

Mode of operation

Analyzer SIPAN 32, SIPAN 32X

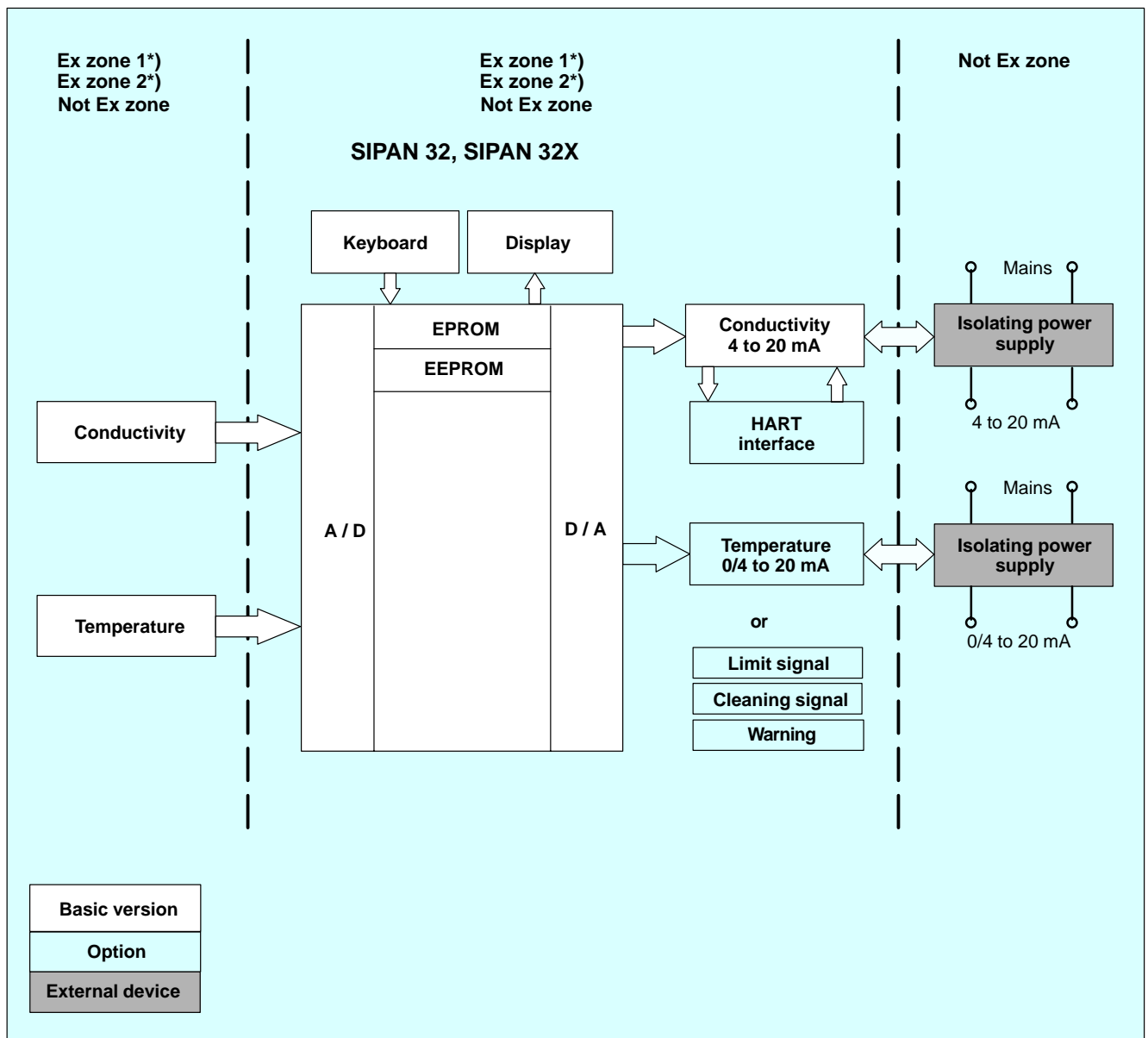


Fig. 1/9 SIPAN 32 and SIPAN 32X analyzers, mode of operation

*) Only with SIPAN 32X

Conductivity measuring equipment

Mode of operation

SIPAN 34 analyzer

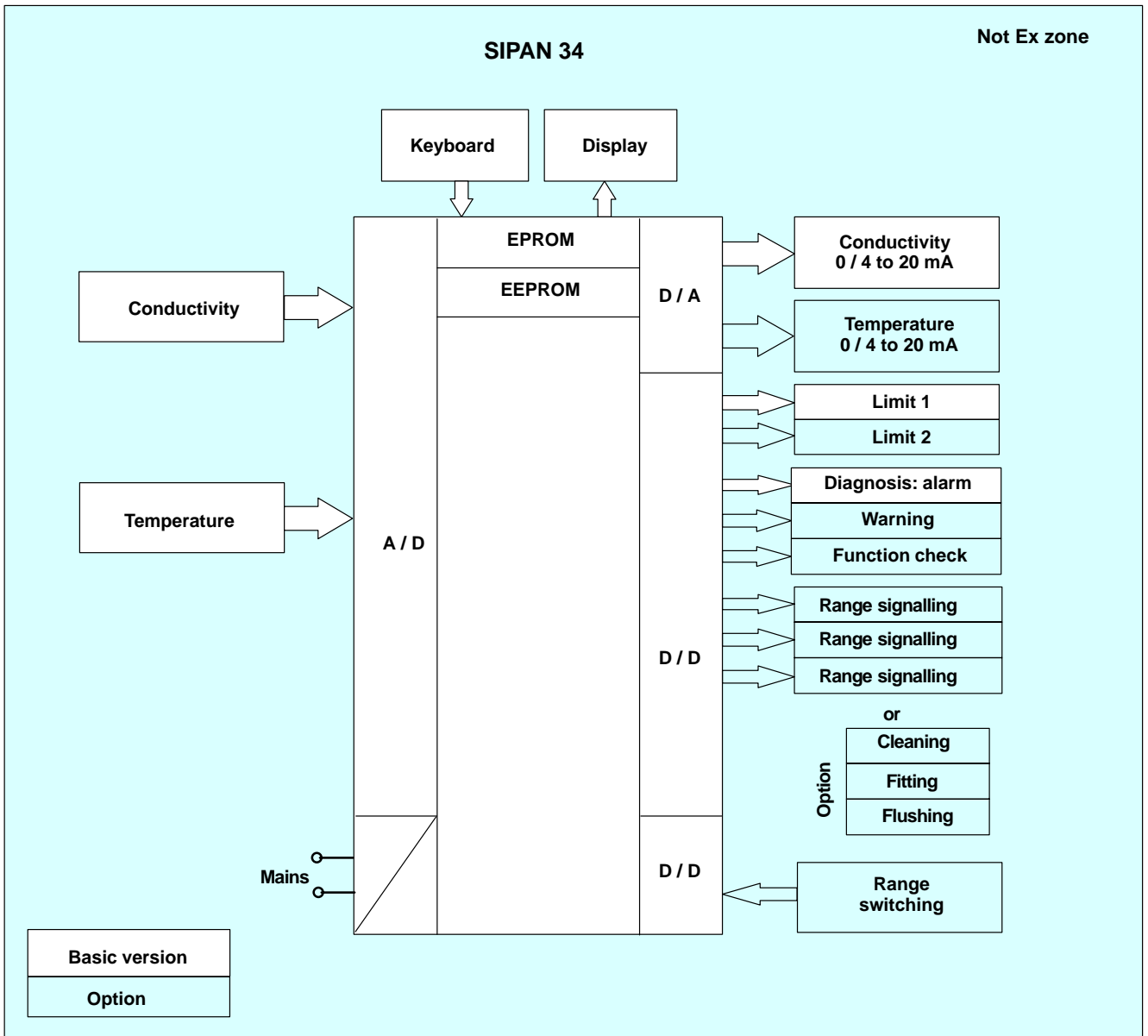


Fig. 1/10 SIPAN 34 analyzer, mode of operation

Conductivity measuring equipment

Mode of operation

Analyzer SIPAN 32, SIPAN 32X and SIPAN 34

Measured-value processing

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

Conductivity

With all three measuring procedures (2EL, 4EL and IND), a square-wave or sine-wave AC voltage is applied to the sensors. The magnitude and frequency depend on the measuring procedure. The current output by the sensor is a measure of the conductivity of the medium.

Temperature compensation

Either Pt 100 or Pt 1000 thermometers can be connected to the analyzers. The measurement is designed as a three-wire system. The type of thermometer connected is recognized automatically.

Cleaning function (option with SIPAN 34)

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

Ex protection (SIPAN 32X)

Analyzers with 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 and temperature on the display	X	X
Output of measuring range and trend on the display		X
Switching of respective parameter set onto the display		X
Conversion of measured signal into % w/w	X	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

Conductivity measuring equipment

Mode of operation

Conductivity measurements

Two-electrode procedure

A square-wave AC voltage is applied to the two current electrodes. The current flowing through the solution is inversely proportional to the electrical resistance and directly proportional to the conductivity.

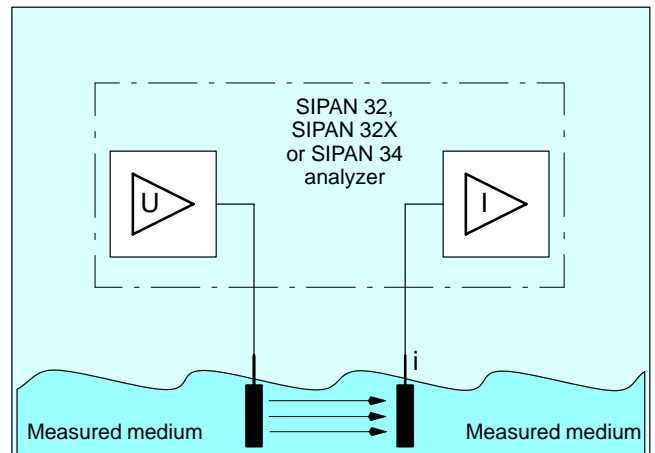


Fig. 1/11 Two-electrode procedure, mode of operation

Four-electrode procedure

The four-electrode procedure uses two current electrodes and two voltage electrodes. A square-wave AC voltage is applied to the current electrodes, and the current flowing through the solution is inversely proportional to the electrode resistance and directly proportional to the conductivity. The AC voltage is measured at the voltage electrodes and used to control the output voltage at the current electrodes. The generation of a deposit on the sensors is thus taken into account and compensated.

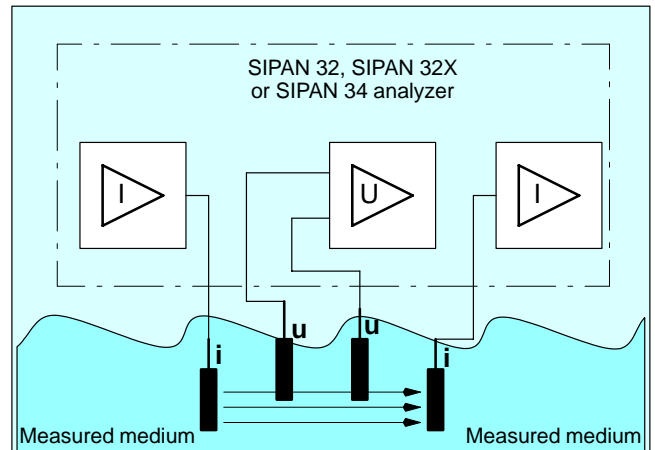


Fig. 1/12 Four-electrode procedure, mode of operation

Inductive procedure

The sensor consists of two coils which are positioned on toroidal tape cores. The primary coil is driven by a sinusoidal AC voltage. An AC voltage is induced in the liquid loop (= measured medium) which constitutes the secondary winding of this "transformer". In the case of electrically conducting liquids, a current flows which is proportional to their conductivity. The liquid loop is simultaneously the primary winding of the secondary coil which operates as a current transformer. This current is rectified in-phase and amplified.

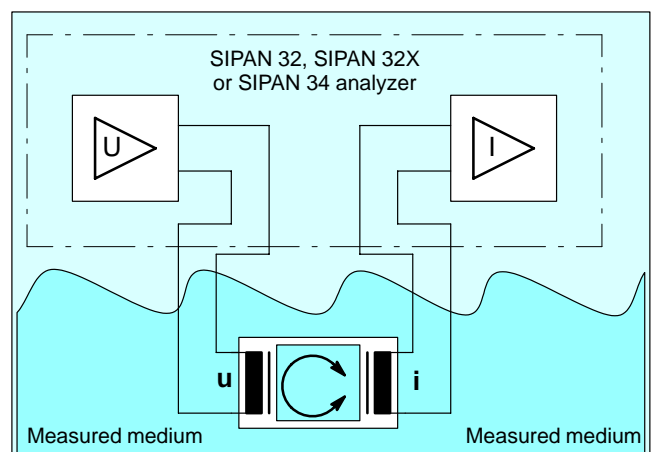


Fig. 1/13 Inductive procedure, mode of operation

Conductivity measuring equipment

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.

There are three **SIPAN 32 and SIPAN 32X** analyzers, each available for the 2EL, 4EL and IND procedures.

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 S/cm, mS/cm, $\mu\text{S}/\text{cm}$, $\mu\text{S}/\text{m}$, $\text{M}\Omega\text{cm}$, $\text{k}\Omega\text{cm}$, % w/w, H_2SO_4 , oleum, HNO_3 , HCl, HBr, NaOH, NaCl, KOH
- Direct output of concentration values instead of conductivity (19 stored material tables)
- All measuring procedures 2EL, 4EL and IND are available
- Additional permanent temperature display selectable in $^{\circ}\text{C}$ or $^{\circ}\text{F}$
- Logbook with entry of faults or calibration procedures with date and time
- Output signal 4 to 20 mA
- Fault or limit output > 20 mA
- Non-linear ultra-pure water temperature compensation for conductivity
- 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

- Second passive output, freely-parameterizable as second current output for temperature, flushing function with timer control, limit or warning (pre-alarm)
- HART communication via handheld communicator or PC
- Only available via HART interface: 4 methods with remote selection for complete parameter sets, not only for measuring ranges, e.g. also limits, physical dimensions, temperature compensation, hysteresis, calibration factors

Functions

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

Remote selection of method: example

Method number	1	2	3	4
Medium	Beer	Water	Cleaning 1 (lye)	Cleaning 2 (disinfection)
Range	800 to 1600	0.001 to 0.6	1 to 5	1 to 4
Dimension	$\mu\text{S}/\text{cm}$	mS/cm	% w/w	% w/w
Calibrated value				
	1400 $\mu\text{S}/\text{cm}$	400 $\mu\text{S}/\text{cm}$	2.5 % w/w	2.0 % w/w
Temperature coefficient fixed or temperature curve				
e.g.	Beer characteristic	Ultra-pure water characteristic	1.6 %/K	2.8 %/K
1 limit				
	1600 $\mu\text{S}/\text{cm}$ max.	600 $\mu\text{S}/\text{cm}$ max.	2.0 % w/w min.	1.5 % w/w min.

Conductivity measuring equipment

SIPAN 32 and SIPAN 32X analyzers

Display and control panel

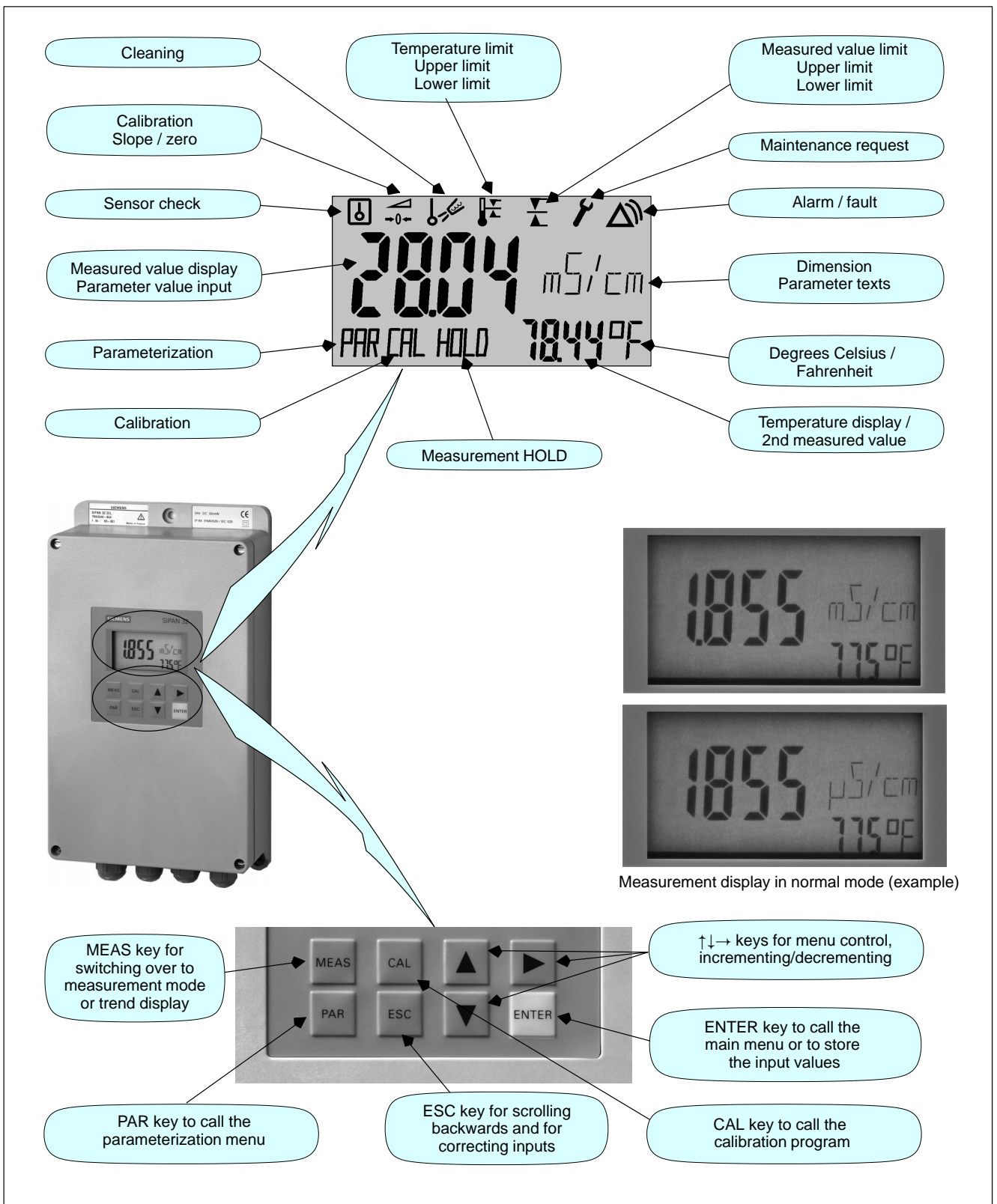


Fig. 1/14 SIPAN 32 and SIPAN 32X analyzers, display and control panel

Conductivity measuring equipment

SIPAN 32 and SIPAN 32X analyzers

Technical data (two-wire system)

1	Display		Applied harmonized standards	EN 61010 (IEC 1010) EN 55022 class B IEC 1000-3-2 IEC 1000-4-2 class 2 IEC 1000-4-3 class 3(2) IEC 1000-4-4 class 4 IEC 1000-4-5 class 3 IEC 801-6 class 3 (prIEC 1000-4-6/1995) prEN 61000-4-11 class C
	Meas. value/set value	Four 16-mm digits		
	Secondary display	Four 8-mm digits		
	Text display	Five digits		
	Others	Symbol displays		
	Input display	Symbols		
	Inputs	According to NAMUR	Radio interf. suppression	EN 55011 and EN 55022
	8 keys:	MEAS Measurement	Lightning protection	EN 61000-4-5
		PAR Parameterization	Mechanical stress	Vibration load of modules to IEC 68-2-6 Repetitive shocks to IEC 68-2-27
		CAL Calibration		
		ESC 1 step backwards in menu		
		▲ Increment the number		
		▼ Decrement the number		
		▶ 1 digit to right with numbers		
	ENTER	Acceptance of entered value		
	Coding	3 coding levels for operations (display level, user level, specialist level)	Climatic loading	IEC 721-3-3, IEC 721-3-2
	Dimension	$\mu\text{S/cm}$, mS/cm , S/cm , $\mu\text{S/m}$, mS/m , S/m , $\text{M}\Omega\text{cm}$, $\text{k}\Omega\text{cm}$, % w/w for 8 media	Transport loading	IEC 68-2-6
	Measuring range	See technical data of sensors	Electrical safety	IEC 1010, IEC 664
	Measuring span (expansion)	Any, but at least 10% of smallest measuring range	Foreign matter/water protection	IEC 529
	Output range	Optionally selectable between 0 and maximum full-scale value	Degree of protection	IP 65 to EN 60529, NEMA 4X
	Meas. range for temp.	-50 to +200 °C, -60 to +400 °F	Quality assurance system	DIN ISO 9001 / EN 29000
	Meas. span for temp.	Any, but at least 10% of meas. range	Material of field housing	Macrolon (polycarbonate + 20% glass fiber)
	Temperature compensation with conductivity measurements	Linear TC value, 0 to 10 %/K or non-linear response (max. 5 characteristics), 2 characteristics defined as standard for ultra-pure water and beer	Permissible ambient temperature	Operation (field device) -20 to +55 °C Transport and storage -25 to +85 °C
	Temperature compensation with % w/w	Conductivity tables stored for H_2SO_4 , oleum, HNO_3 , HCl , HBr , NaOH , KOH , NaCl (see Table 1, page 1/21)	Permissible relative humidity	10 to 95%, no condensation
	Error limits with conductivity measurement	< 2.0 % of measuring range (at rated conditions)	Power supply	DC 24 V (14 V to 30 V) 0.8 W Protection class II (field housing)
	Error limits with temperature compensation	< 1 % for characteristic (with conductivity) < 0.5 % of measured value (for pure liquids)	Dimensions	See Fig. 1/16
	Influencing effects	To DIN IEC 746, Part 1	Weight	2.5 kg
	Repeatability	< 0.2 % of full-scale value	Options	See page 1/12
	Linearity	< 0.5 % of full-scale value	2nd passive analog output	0/4 to 20 mA linear to temperature, or flushing function, or limit, or warning (pre-alarm)
	Ambient temperature	< 0.2 %/10 K	Communication	PC/laptop or HART communicator with SIPAN 32 and SIPAN 32X analyzers
	Power supply	< 0.1 %	Load with connection of HART modem	250 to 500 Ω
	Load	< 0.1 %/100 Ω	HART communicator	250 to 500 Ω
	Zero error	< 0.2 % of full-scale value	Line Protocol	Two-conductor, screened: ≤ 1.5 km HART, version 5.1
	Output signal	4 to 20 mA linear to measured value or bilinear to measured value (2 linear partial ranges with a knee at 12 mA, see Fig. 1/18), electrically isolated from sensor	SIPAN 32X with Ex protection	
	Max. permissible load	(power supply - 14) V/0.02 A	Explosion protection	Type of protection "Increased intrinsic safety ia" II 2G EEx ia IIC T4
	Logbook	Automatic recording of warning and failure messages with date and time, 20 entries with overflow, non-erasable	Permissible ambient temperature during operation	-20 to +50 °C
	Data storage	> 10 years (EEPROM)	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: $U_i = 30$ V, $I_i = 100$ mA, $P_i = 750$ mW, $R_i = 300$ Ω , Effective internal inductance: $L_i =$ negligible Effective internal capacitance: $C_i = 16$ nF
	Device self-test	Testing of RAM, EPROM, EEPROM, display, keyboard; data can be called on display		
	Clock	Software clock		
	Identification	CE marking		
	EMC	NAMUR NE 21		

Conductivity measuring equipment

SIPAN 32 and SIPAN 32X analyzers

Electric connections

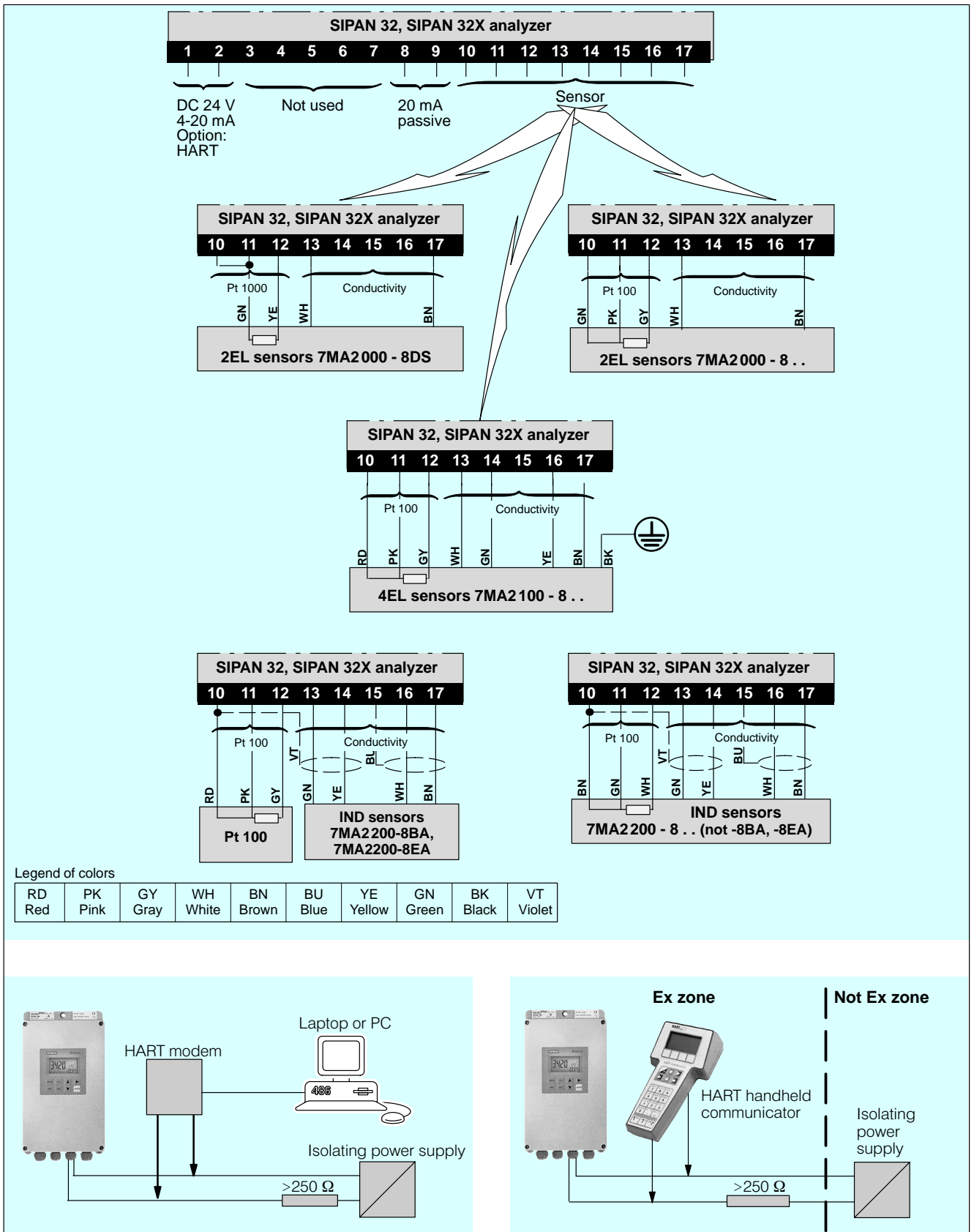


Fig. 1/15 SIPAN 32 or SIPAN 32X analyzer, electric connections; shown at bottom is communication between SIPAN 32 or SIPAN 32X and HART communicator or with HART modem and PC

Conductivity measuring equipment

SIPAN 32 and SIPAN 32X analyzers

Dimensions, design

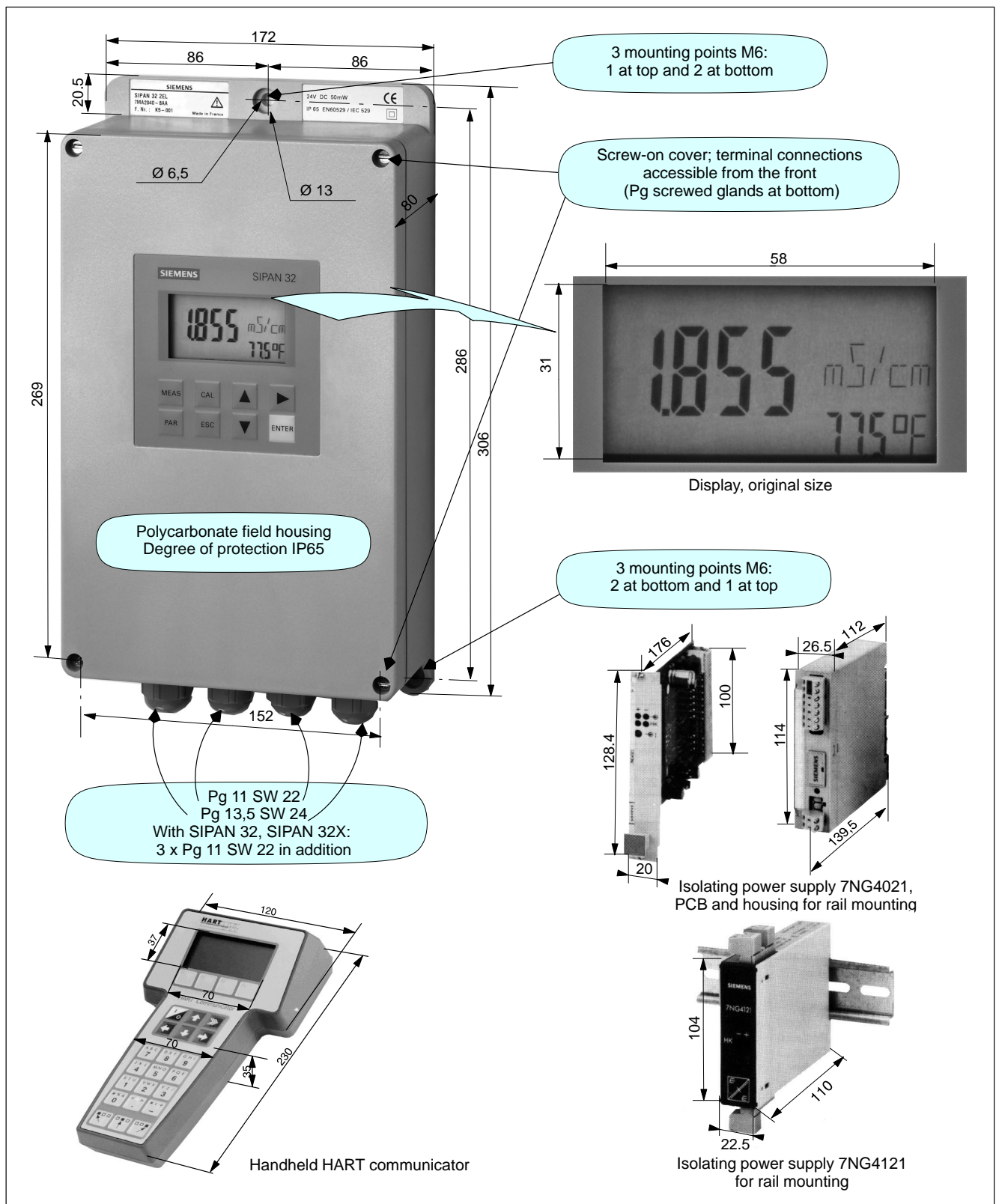


Fig. 1/16 SIPAN 32 or SIPAN 32X analyzer, isolating power supply and handheld communicator, dimensions in mm

Conductivity measuring equipment

SIPAN 32 and SIPAN 32X analyzers

Ordering data

	Order No.
SIPAN 32 analyzer Two-wire system, for conductivity measurements Measuring procedure: Two-electrode procedure (2EL) Four-electrode procedure (4EL) Inductive procedure (IND) Microprocessor-based, membrane keyboard with LCD, menu control, logbook, concentration display, temperature compensation, diagnostic software, 1 parameter set, power supply: DC 24 V, in field housing	7MA2040-8A <input type="checkbox"/> 7MA2140-8A <input type="checkbox"/> 7MA2240-8A <input type="checkbox"/>
Standard version, 1 signal output: 4 to 20 mA without interface	A
1 signal output: 4 to 20 mA, with HART interface	B
2 signal outputs with HART interface: 1st signal output: measured value 4 to 20 mA, 2nd signal output: temperature or switching contact for limit or cleaning or warning	C

	Order No.
SIPAN 32X analyzer with Ex protection, intrinsically-safe version, II 2G EEx ia IIC T4, two-wire system, for conductivity measurements Measuring procedure: Two-electrode procedure (2EL) Four-electrode procedure (4EL) Inductive procedure (IND) Microprocessor-based, membrane keyboard with LCD, menu control, logbook, concentration display, temperature compensation, diagnostic software, 1 parameter set, power supply: DC 24 V, in field housing	7MA2041-8A <input type="checkbox"/> 7MA2141-8A <input type="checkbox"/> 7MA2241-8A <input type="checkbox"/>
Standard version, 1 signal output: 4 to 20 mA without interface	A
1 signal output: 4 to 20 mA, with HART interface	B
2 signal outputs with HART interface: 1st signal output: measured value 4 to 20 mA, 2nd signal output: temperature or switching contact for limit or cleaning or warning	C

	Order No.
Calibrated reference equipment	See page 1/25

	Order No.
Isolating power supply (see MP 19, Section 5 for technical data)	
<ul style="list-style-type: none"> With AC/DC 24 V power supply, DIN rail mounting 	7NG4121-1AA00-1NN0
<ul style="list-style-type: none"> With AC/DC 24 V power supply, PCB, individual locking 	7NG4021-4CA33-0NN0
<ul style="list-style-type: none"> With AC 115 V power supply, DIN rail mounting 	7NG4021-6BA33-0NN0
<ul style="list-style-type: none"> With AC 230 V power supply, DIN rail mounting 	7NG4021-6AA33-0NN0
<ul style="list-style-type: none"> HART version with Ex protection EEx ia IIC, smart, with AC/DC 24 V power supply, compact subassembly, DIN rail mounting 	7NG4121-1AA20-1AN0
<ul style="list-style-type: none"> HART version with Ex protection EEx ia IIC, smart, with AC/DC 24 V power supply, PCB, individual locking 	7NG4021-4CA33-2NA1

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

Accessories/mounting material	Order No.
For mounting of analyzer or isolating power supply on a pipeline (see page 1/28 for dimensional drawing)	
Protective hood (mat. No. 1.4571) with base plate	C79451-A3177-D12
Pipe clamp (mat. No. 1.4571)	7MA8500-8DG
Base plate (mat. No. 1.4571)	C79451-A3177-D11
Set of screwdrivers "TORX"	C79451-A3246-D50

Available ex-stock: 7MA2040-8AA, 7MA2240-8AA, 7MA2041-8AA

Conductivity measuring equipment

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

It contains 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 of SIPAN 34










- 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 (German, English, French, Spanish, Italian), 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 S/cm, mS/cm, $\mu\text{S/cm}$, $\mu\text{S/m}$, $\text{M}\Omega\text{cm}$, $\text{k}\Omega\text{cm}$, % w/w, H_2SO_4 , oleum, HNO_3 , HCl, HBr, NaOH, NaCl, KOH
- Direct output of concentration values instead of conductivity (19 stored material tables)
- Additional permanent bargraph of measuring range
- Graphic trend display of measured value
- Additional permanent temperature display in $^{\circ}\text{C}$
- 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
- Non-linear ultra-pure water temperature compensation for conductivity
- All conductivity measuring procedures (2EL/4EL/IND) can be selected, i.e. only **one analyzer** is required for the complete conductivity range
- Program for automatic recording of user-specific temperature compensation
- 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 for SIPAN 34

- 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, physical dimensions, temperature compensation with complete characteristic (not only TC value), hysteresis
- Individual calibration of each parameter set possible
- 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)

Functions

	Basic analyzer	Options
Inputs	 Conductivity  Temperature	 Remote switching of range for 4 parameter sets, thus access to 4 complete parameter sets for complete methods including ranges, limits, physical dimensions, temperature compensation, hysteresis
Outputs	 Analog output	 2nd analog output for temperature
Contacts	 1x failure 1x limit and 2x NAMUR contacts	 or   Second limit 2 limits with controller function 3 x cleaning or 3 x range signalling contacts

Conductivity measuring equipment

SIPAN 34 analyzer

Display and control panel

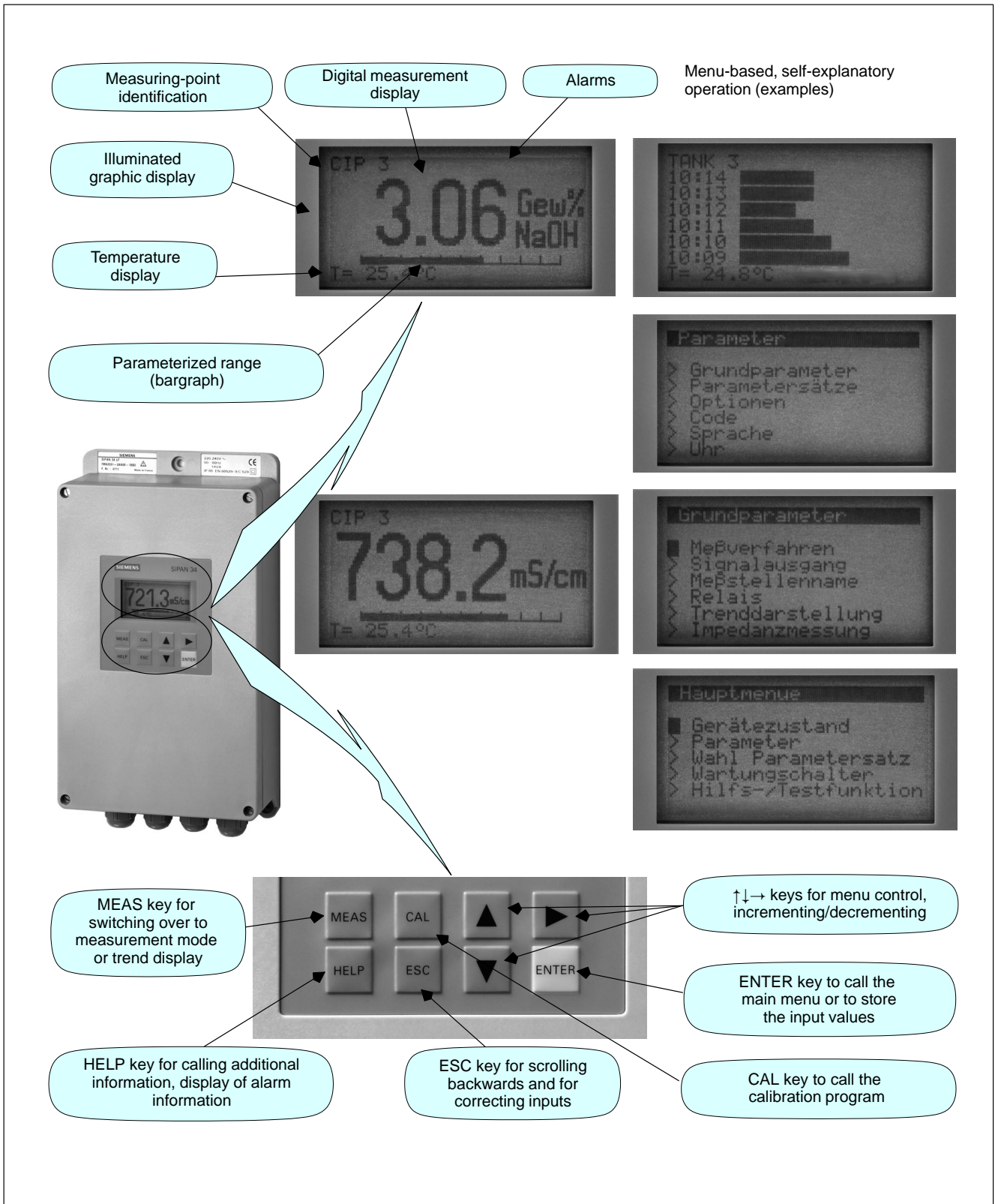


Fig. 1/17 SIPAN 34 analyzer, display and control panel

Conductivity measuring equipment

SIPAN 34 analyzer

Technical data (four-wire system)

Display	Graphic	Output signal	0/4 to 20 mA floating, linear to measured value or bilinear to measured value (2 linear partial ranges with knee at 10 or 12 mA), see Fig. 1/18	
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 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 1 heading (inverted display) and 6 text lines, letters 4 mm high	Alarm contact	1 alarm (failure)	
Illumination	LED	Relay contacts	NO contact, rating AC/DC 24 V, 1 A, floating, non-sparking	
Inputs	According to NAMUR	Logbook	Automatic recording of warning and failure messages with date and time, 20 entries with overflow, non-erasable	
8 keys:	MEAS HELP CAL ESC ▲ ▼ ▶ ENTER	Measurement/trend Help Calibration 1 step backwards in menu Increment the number / 1 line upwards Decrement the number / 1 line downwards 1 digit to right with numbers Calling a menu item / 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	μS/cm, mS/cm, S/cm, μS/m, mS/m, S/m, % w/w, MΩcm, kΩcm	Identification	CE marking	
Measuring range	See 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) EN 55022 class B IEC 1000-3-2 IEC 1000-4-2 class 2 IEC 1000-4-3 class 3(2) IEC 1000-4-4 class 4 IEC 1000-4-5 class 3 IEC 801-6 class 3 prIEC 1000-4-6/1995) prEN 61000-4-11 class C	
Output range	Optionally selectable between 0 and maximum full-scale value	Radio interference supp.	EN 55011 and EN 55022	
Measuring range for temperature	-50 to +200 °C	Lightning protection	EN 61000-4-5	
Measuring span for temperature	Any, but at least 10% of measuring range	Mechanical stress	Vibration load of modules to IEC 68-2-6 Repetitive shocks to IEC 68-2-27	
Temperature compensation with conductivity measurements	Linear TC value, 0 to 10 %/K Non-linear response (max. 9 characteristics), 2 characteristics defined as standard for ultra-pure water and beer	Climatic loading	IEC 721-3-3, IEC 721-3-2	
Temperature compensation with % w/w	Conductivity tables stored for H ₂ SO ₄ , oleum, HNO ₃ , HCl, HBr, NaOH, KOH, NaCl (see Table 1/1)	Transport loading	IEC 68-2-6	
Error limits with conductivity measurements	< 1.0 % of measuring range (at rated conditions)	Electrical safety	IEC 1010, IEC 664	
Error limits with temperature compensation	< 1 % for characteristic (with conductivity) < 0.5 % of measured value (for pure liquids)	Foreign matter/water protection	IEC 529	
Influencing effects	To DIN IEC 746, Part 1	Degree of protection	Field device Panel mounting	
Repeatability	< 0.2 % of full-scale value	Quality assurance system	DIN ISO 9001 / EN 29000	
Linearity	< 0.5 % of full-scale value	Material of field housing	Macrolon (polycarbonate + 20% glass fiber)	
Ambient temperature	< 0.2 %/10 K	Panel mounting housing	Aluminium	
Power supply	< 0.1 %	Permissible ambient temp.	Operation (field device) Operat. (panel mounting) Transport and storage	
Load	< 0.1 %/100 Ω		-20 to +55 °C -5 to +70 °C -25 to +85 °C	
Zero error	< 0.2 % of full-scale value			

Conductivity measuring equipment

SIPAN 34 analyzer

Technical data (four-wire system)

Permissible relative humidity	10 to 95 %, no condensation
Power supply	AC 120 V (94 V to 132 V), 48 to 63 Hz, 10 VA AC 230 V (187 V to 264 V), 48 to 63 Hz, 10 VA AC 24 V (20 V to 26 V), 48 to 63 Hz, 10 VA DC 24 V (20 V to 30 V), 8 W Protection class II (field housing)
Dimensions	See page 1/16
Weight	2.5 kg field housing 2.0 kg panel housing
Additional options	See page 1/18
Second output signal	0/4 to 20 mA linear to temperature
Additional limit	1 x NO or NC contact selectable, any assignment to measured value or temperature
Parameter sets	4
Diagnostic contacts	2, pre-alarm and maintenance
Range signalling contacts	Signalling of current measuring range (3 contacts)
Cleaning contacts with timer	3, fitting control, cleaning and flushing
Range switchover (if without interface)	4, parameterizable as desired using range selection; external control possible
Controller	2 floating contacts (instead of limits) as PI controller

Calibrated reference equipment

Smallest measuring range	0.1 $\mu\text{S}/\text{cm}$
Largest measuring range	5 $\mu\text{S}/\text{cm}$
Repeatability	< 0.5 % of full-scale value, but at least 0.5 nS/cm
Deviation from absolute value	< 1 % of full-scale value, but at least 1 nS/cm
Max. permissible temperature of medium	5 to 50 °C

Measured medium	Temperature range °C	Possible measuring ranges ¹⁾ % w/w
H ₂ SO ₄	-20 to +120	0 to 34 32 to 85 92 to 99.5
Oleum	+10 to +100 +10 to +60	12 to 45 60 to 70
HNO ₃	-20 to +55	0 to 30 34 to 85 92 to 95
HCl	-20 to +55	0 to 16 24 to 42
NaOH	0 to +100	0 to 26 18 to 32
NaCl	0 to +100	0 to 26
KOH	0 to +100	0 to 34 32 to 42
HBr	-20 to +55	0 to 30 39 to 52

Table 1/1: Measured media data preprogrammed in SIPAN 32, SIPAN 32X and SIPAN 34 for concentration display

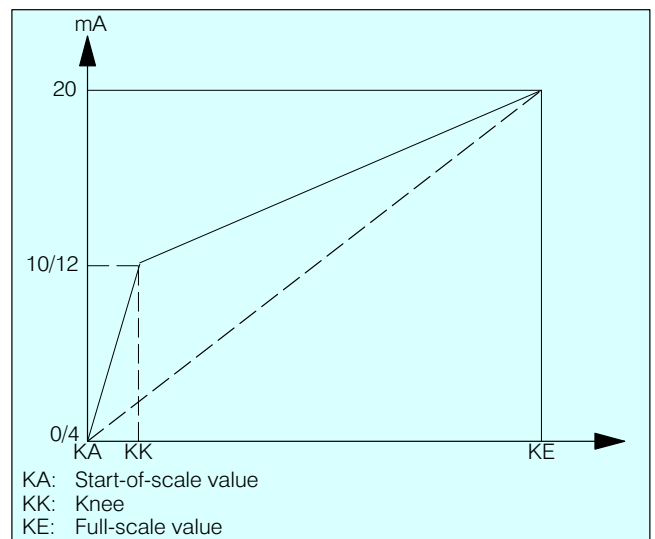


Fig. 1/18 Linear and bent characteristics in SIPAN 32, SIPAN 32X and SIPAN 34 analyzers

¹⁾ Measuring ranges are temperature-dependent, see 1/28

Conductivity measuring equipment

SIPAN 34 analyzer

Technical data (four-wire system)

Parameter sets, example

Method	1	2	3	4
Medium	Beer	Water	Cleaning 1 (alkaline solution)	Cleaning 2 (disinfection)
Conductivity range	800 to 1600	0.001 to 0.6	1 to 5	1 to 4
Dimension	μS/cm	mS/cm	% w/w	% w/w
Calibrated value	1400 μS/cm	0.400 mS/cm	2.5 % w/w	2.0 % w/w
Fixed temperature coefficient	Beer characteristic	Ultra-pure water characteristic	e.g. 1.6 %/K	e.g. 2.8 %/K
Temperature curve if applicable	Predefined or customer-specific			
Physical dimension	μS/cm		% w/w	
Special calibrated value	10	0.5		
Two special limits each with freely selectable hysteresis for:				
Measured value	Min. e.g. 800 μS/cm to max. e.g. 1000 μS/cm	Min. 0.001 mS/cm to max. 0.6 mS/cm	Min. 2.0 % w/w to max. 2.5 % w/w	Min. 1.5 % w/w to max. 2.0 % w/w
or temperature	Min. e.g. -10 °C to max. e.g. 15 °C	Min. e.g. 20 °C to max. e.g. 50 °C	Min. e.g. -10 °C to max. e.g. 15 °C	Min. e.g. 20 °C to max. e.g. 50 °C
Two diagnostic contacts (pre-alarm, maintenance)	Yes			
Range signalling:				
Contact 1	Off	On		
Contact 2	Off		On	
Contact 3	Off			On

Conductivity measuring equipment

SIPAN 34 analyzer

Electric connections

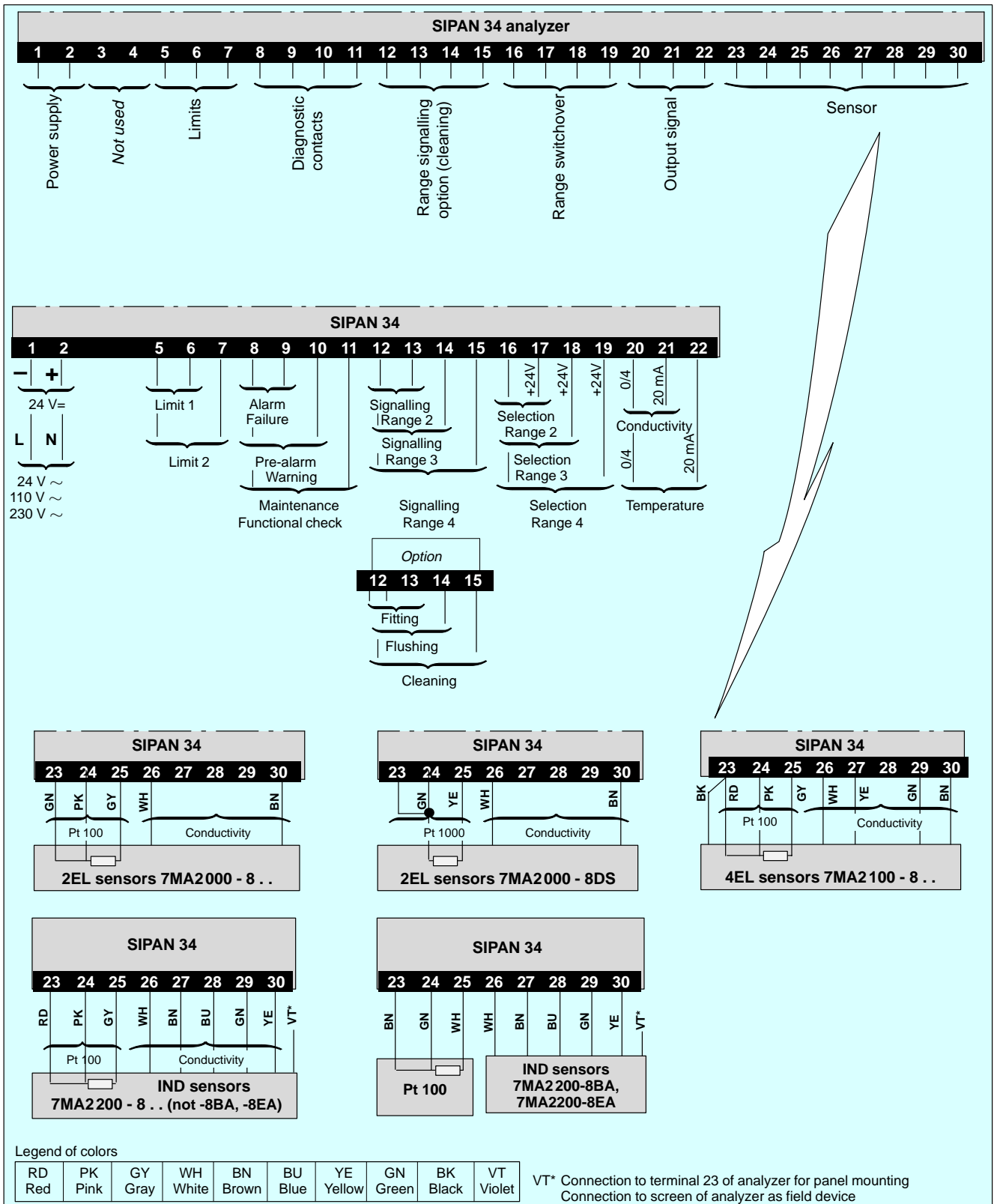


Fig. 1/19 SIPAN 34 analyzer, electric connections

Conductivity measuring equipment

SIPAN 34 analyzer

Dimensions, design

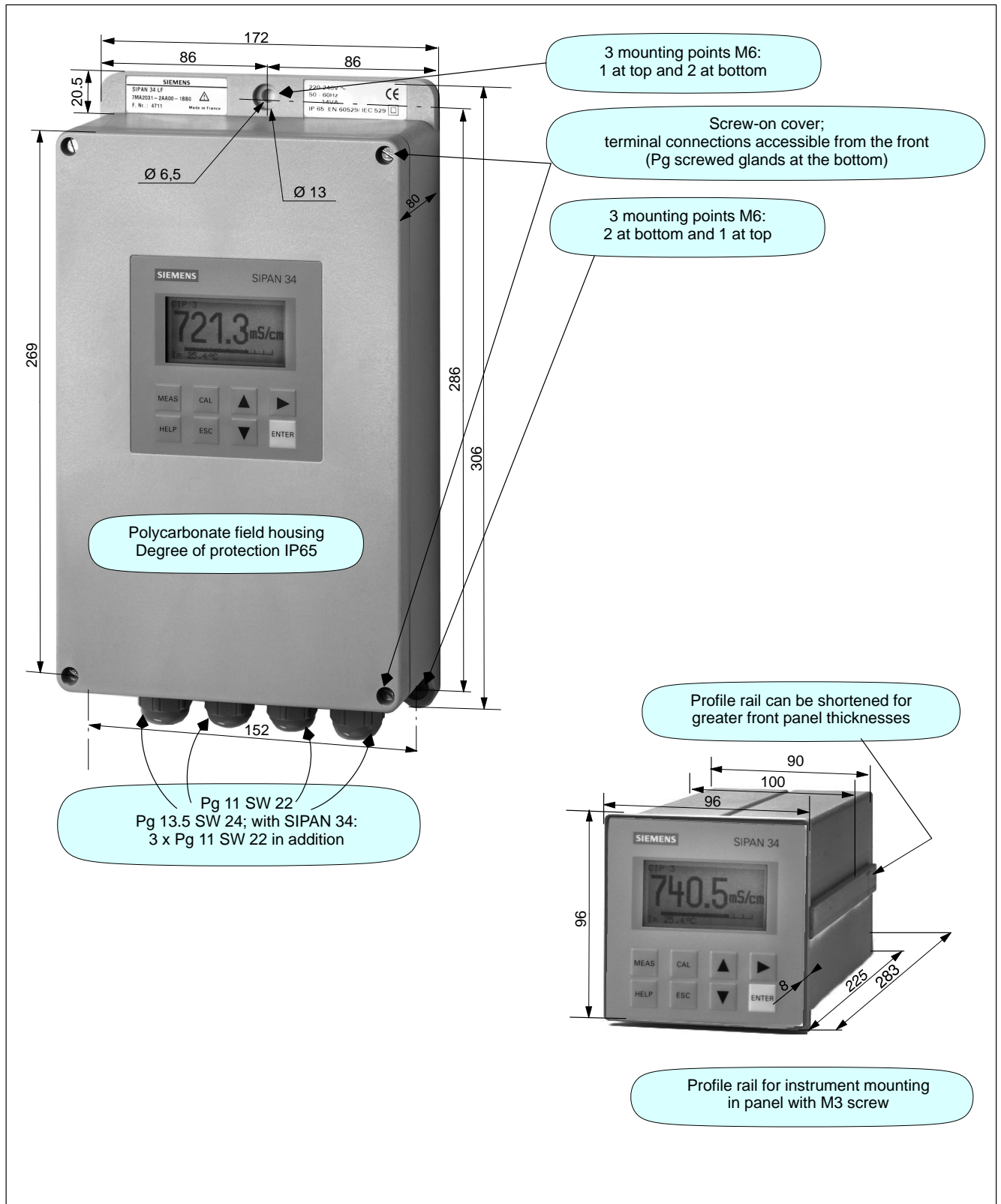


Fig. 1/20 SIPAN 34 analyzer, shown at top as field housing and at bottom as panel housing, dimensions in mm

Conductivity measuring equipment

SIPAN 34 analyzer

Ordering data

	Order No.								
SIPAN 34 analyzer Four-wire system, for conductivity measurements Process version, microprocessor-based with illuminated graphic display, membrane keyboard, menu-based operation (5 languages), diagnostic software, trend display, concentration display, logbook, temperature compensation 1 parameter set 1 signal output 0/4 to 20 mA, 1 alarm contact, 1 limit contact and 2 diagnostic contacts	7MA2034- - <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px; text-align: center;">0</td> </tr> </table> - <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; height: 20px; text-align: center;">0</td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table>					0	0		
				0					
0									
Power supply DC 24 V/AC 24 V, 48 to 63 Hz AC 120 V, 48 to 63 Hz AC 230 V, 48 to 63 Hz	0 1 2								
Measuring procedure: Two-electrode procedure (2EL) (standard setting) Four-electrode procedure (4EL) Inductive procedure (IND)	A B C								
Instrument design Field housing Panel housing 96 x 96	A B								
Options • Without • With second signal output 0/4 to 20 mA and second limit contact • With 4 selectable parameter sets and 3 range signalling contacts • With second signal output 0/4 to 20 mA, second limit contact, 4 selectable parameter sets and 3 range signalling contacts	0 1 2 3								
Limits with controller function Without With	A B								
Automatic cleaning/flushing (3 contacts + timer for fitting, cleaning, flushing) Without With	A B								

	Order No.
Calibrated reference equipment for measuring conductivity in ultra-pure water with factory certificate to DIN 50 049 Part 2.2 and EN 10 204 Part 2.2, comprising: Analyzer 7MA2031-2AA30-0AA0 Sensor 7MA2000-8AB Flow fitting C74451-A1789-A1 mounted on supporting rack, smallest meas. range: 0.1 µS/cm largest meas. range: 5 µS/cm (annual factory check recommended)	7MA5503-0AA00

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

Available ex-stock: 7MA2031-0AA00-0AA0, 7MA2031-2AA00-0AA0, 7MA2031-2CA30-0AA0

Conductivity measuring equipment

2EL sensors, fittings, accessories

Dimensions of 2 EL sensors for very low to medium concs., power plants, ultra-pure water

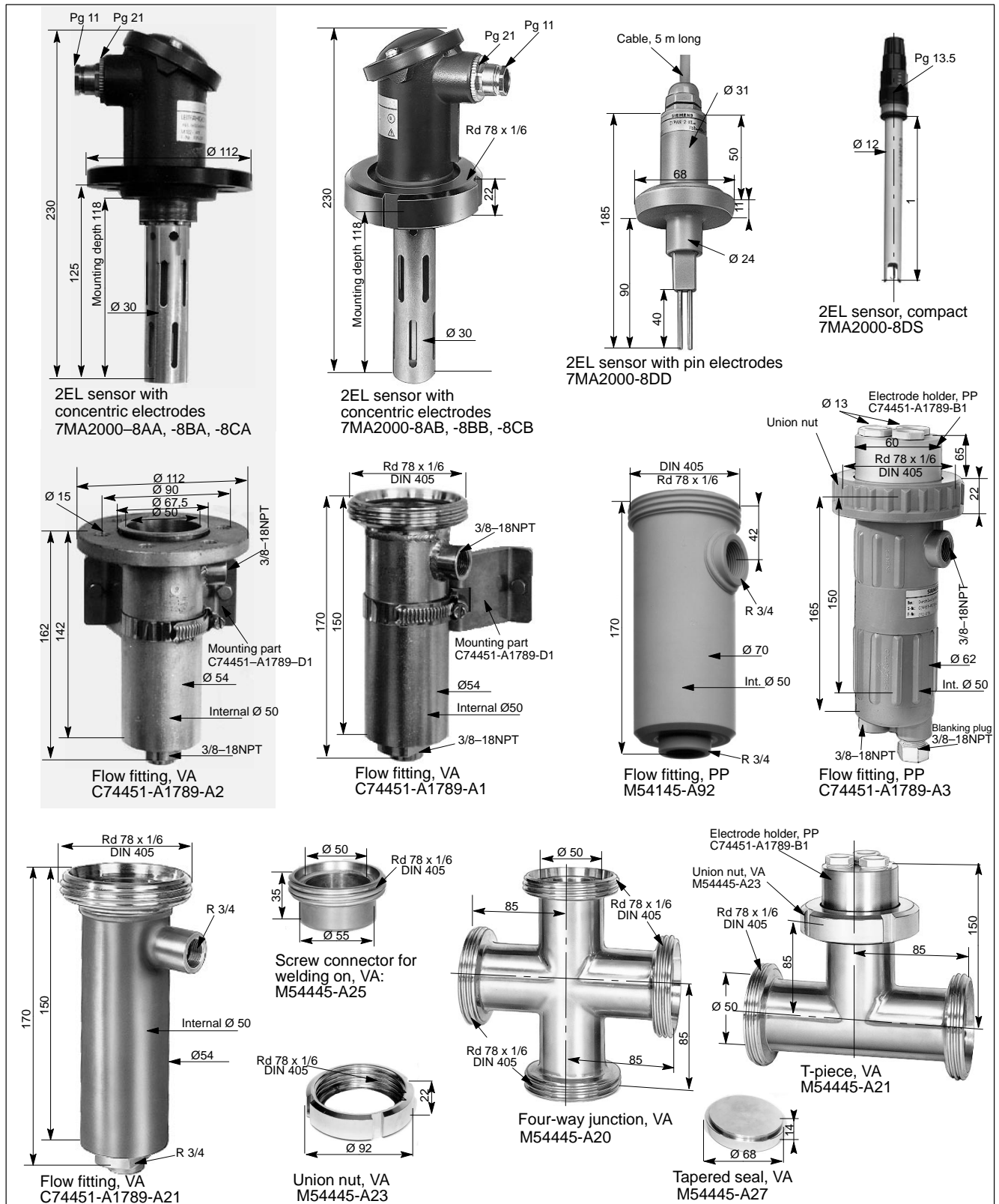


Fig. 1/21 2EL sensors, fittings and accessories, dimensions in mm

Conductivity measuring equipment

2EL sensors, fittings, accessories

Ordering data for 2EL sensors for very low to medium concs., power plants, ultra-pure water

	Order No.
2EL sensor for conduct. measurements Six-hole flange version, concentric stainless steel (VA) electrodes and built-in Pt 100 compensation thermometer	
Measuring ranges 0 ... 0.1 $\mu\text{S/cm}$ to 0 ... 25 $\mu\text{S/cm}^1$ 0 ... 1 $\mu\text{S/cm}$ to 0 ... 250 $\mu\text{S/cm}^1$ 0 ... 20 $\mu\text{S/cm}$ to 0 ... 5000 $\mu\text{S/cm}^1$	7MA2000-8AA 7MA2000-8BA 7MA2000-8CA
Cable, 10 m long Cable, 30 m long	C79451-A3298-N100 C79451-A3298-N300
2EL sensor for conduct. measurements with union nut, concentric stainless steel electrodes and built-in Pt 100 compensation thermometer	
Measuring ranges 0 ... 0.1 $\mu\text{S/cm}$ to 0 ... 25 $\mu\text{S/cm}^1$ 0 ... 1 $\mu\text{S/cm}$ to 0 ... 250 $\mu\text{S/cm}^1$ 0 ... 20 $\mu\text{S/cm}$ to 0 ... 5000 $\mu\text{S/cm}^1$	7MA2000-8AB 7MA2000-8BB 7MA2000-8CB
Cable, 10 m long Cable, 30 m long	C79451-A3298-N100 C79451-A3298-N300
2EL sensor for conduct. measurements Mounting flange DN 50, fixed cable 5 m, stainless steel pin electrodes, PES shaft, measuring range 0 ... 2 $\mu\text{S/cm}$ to 0 ... 500 $\mu\text{S/cm}^1$ With built-in Pt 100 compensation thermometer	7MA2000-8DD
Cable, 10 m long Cable, 30 m long	C79451-A3298-N100 C79451-A3298-N300
2EL sensor for conduct. measurements Compact with Pg 13.5 screw plug connector, with Pt 1000 compensation thermometer, stainless steel pin electrodes, meas. range 0 ... 10 $\mu\text{S/cm}$ to 0 ... 2500 $\mu\text{S/cm}^1$	7MA2000-8DS
Cable with plug, 3 m long Cable with plug, 3 m long	7MA8500-8DJ 7MA8500-8DK

	Order No.
Flow fitting , stainless steel, for bypass applications, sensor mounting using six-hole flange, connection $3/8$ -18 NPT	C74451-A1789-A2
Flow fitting , stainless steel, for bypass applications, sensor mounting using union nut (union nut not included in delivery) Connection $3/8$ -18 NPT Connection R $3/4$	C74451-A1789-A1 C74451-A1789-A21
Flow fitting , polypropylene, for bypass applications, sensor mounting using union nut (union nut not included in delivery) Connection R $3/4$ With union nut, connection $3/8$ -18 NPT	M54145-A92 C74451-A1789-A3
Fittings , stainless steel, for installation in DN 50 pipelines, sensor mounting using union nut (union nut not included in delivery) T-piece with 3 gaskets (Viton) Screw connector for welding on , stainless steel, with 1 gasket (Viton)	M54445-A21 M54445-A25
Immersion fitting (see Fig. 1/23), PP, for tanks or open vessels, with immersion tube and protective cage Immersion length 600 mm Immersion length 1000 mm Immersion length 1400 mm Immersion length 1800 mm	C74451-A1789-A10 C74451-A1789-A12 C74451-A1789-A14 C74451-A1789-A16
Immersion fitting (see Fig. 1/23), PP, for tanks or open vessels, with immersion tube and protective cage Immersion length up to 1000 mm Immersion length up to 1500 mm Immersion length up to 2000 mm	7MA8500-8FU 7MA8500-8FV 7MA8500-8FW
Gasket for DN 50 Six-hole flange gasket (set of 5) Standard gasket, Viton (set of 5) for union nut Special gasket, EPDM (set of 25) for union nut Special gasket, Teflon (set of 15) for union nut	M54445-A31 M54445-A24 M54445-A34 M54445-A35
Accessories Electrode holder , PP Union nut DN 50, PP Union nut DN 50 (mat. No. 1.4301) Set of mounting parts (all fittings) Mounting set for sensors with six-hole flange Tapered seal DN 50 (mat. No. 1.4301) Hook key spanner (mat. No. 1.4301) for union nut M54445-A23 Adjustable-height flange for immersion fittings 7MA8500-8FU, -FV, -FW	C74451-A1789-B1 C74451-A1789-C2 M54445-A23 C74451-A1789-D1 M54445-A32 M54445-A27 M54445-A33 7MA8500-8FY

2EL sensors	Fittings	C74451-A1789-A2	C74451-A1789-A1	C74451-A1789-A21	M54145-A92	C74451-A1789-A3	M54445-A20	M54445-A21	M54445-A25	7MA8500-8BR	C74451-A1789-A10, -A16	7MA8500-8FU, -8FV, -8FW
7MA2000-8AA	✓											
7MA2000-8BA	✓											
7MA2000-8CA	✓											
7MA2000-8AB		✓	✓	✗	✗	✓	✓	✓				
7MA2000-8BB		✓	✓	✗	✗	✓	✓	✓				
7MA2000-8CB		✓	✓	✗	✗	✓	✓	✓				
7MA2000-8DD		✗	✗	✗	✓	✓	✓	✓			✗	
7MA2000-8DS												✓
7MA2000-8DS + C74451-A1789-B1		✗	✗	✗	✓	✗	✗	✗	✗	✗		

Fig. 1/22 Selection of flow fittings for sensors;
✓ recommended, ✗ possible

	Order No.
SIPAN 32 and SIPAN 32X analyzers SIPAN 34 analyzer Calibrated reference equipment	See page 1/17 See page 1/17 See page 1/25

¹⁾ 5 times the full-scale value possible (with reduced measuring accuracy)
Available ex-stock

Conductivity measuring equipment

4EL sensors, fittings, accessories

Dimensions of 4EL sensors for high concs., drinking water and waste water applications

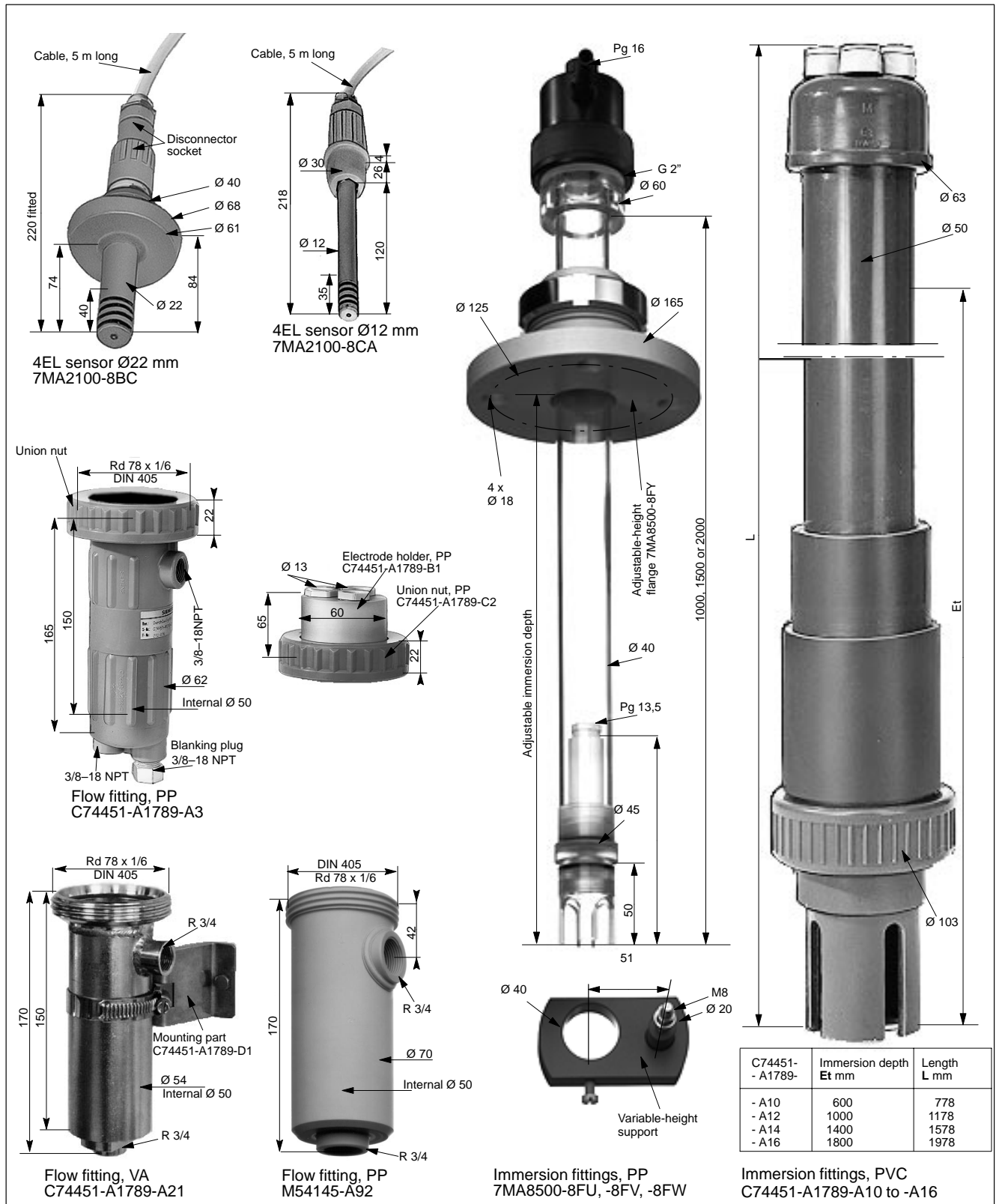


Fig. 1/23 4EL sensors, fittings and accessories, dimensions in mm

Conductivity measuring equipment

4EL sensors, fittings, accessories

Ordering data for 4EL sensors for high concs., drinking water and waste water application

	Order No.
4EL sensor for cond. measurements with 4 ring electrodes, with Pt 100 compensation thermometer Measuring range 0 ... 0.1 mS/cm to 0 ... 500 mS/cm Diameter 22 mm, including plug-on cable, 5 m long Diameter 12 mm, for Pg 13.5, fixed cable, 5 m long	7MA2100-8BC 7MA2100-8CA
Extension cable 10 m long, with plug	C79195-A3453-N100
Extension cable 10 m long, with plug	C79195-A3453-N300
Junction box for extension cable	7MA8500-8BS

	Order No.
Flow fitting, polypropylene, for bypass applications, sensor mounting using union nut (union nut not included in delivery) Connection R 3/4 With union nut, connection 3/8-18 NPT	M54145-A92 C74451-A1789-A3
Flow fitting, stainless steel, for bypass applications, sensor mounting using union nut (union nut not included in delivery) Connection R 3/4	C74451-A1789-A21
Fittings, stainless steel (mat. No. 1.4301), for installation in DN 50 pipelines (page 1/21), sensor mounting using union nut (union nut not included in delivery) Four-way junction with 4 gaskets (Viton) T-piece with 3 gaskets (Viton) Screw connector for welding on, steel, with 1 gasket (Viton)	M54445-A20 M54445-A21 M54445-A25
Immersion fitting, PP, for tanks or open vessels, with immersion tube and protective cage Max. immersion length 600 mm Max. immersion length 1000 mm Max. immersion length 1400 mm Max. immersion length 1800 mm	C74451-A1789-A10 C74451-A1789-A12 C74451-A1789-A14 C74451-A1789-A16
Immersion fitting, PP, complete, for tanks or open vessels, with immersion tube and protective cage, adjustable-height holder Immersion length up to 1000 mm Immersion length up to 1500 mm Immersion length up to 2000 mm	7MA8500-8FU 7MA8500-8FV 7MA8500-8FW
Gasket DN 50 for union nut Standard gasket, Viton (set of 5) Special gasket, EPDM (set of 25) Special gasket, Teflon (set of 15)	M54445-A24 M54445-A34 M54445-A35

	Fittings	M54145-A92	C74451-A1789-A3	C74451-A1789-A21	M54445-A20	M54445-A21	M54445-A25	C74451-A1789-A10, -A16	7MA8500-8FU, -8FV, -8FW
4EL sensors									
7MA2100-8BC		✓	✗	✗	✗	✗	✗	✓	
7MA2100-8CA									✓
7MA2100-8CA and C74451-A1789-B1		✓	✗	✗	✗	✗	✗	✓	

Fig. 1/24 Selection of flow fittings for sensors;
✓ recommended, ✗ possible

Accessories	Order No.
Electrode holder, PP	C74451-A1789-B1
Union nut, PP, DN 50	C74451-A1789-C2
Set of mounting parts for flow fitting (mat. No. 1.4301)	C74451-A1789-D1
Union nut DN 50 (mat. No. 1.4301)	M54445-A23
Tapered seal DN 50 (mat. No. 1.4301)	M54445-A27
Hook key spanner (mat. No. 1.4301) for union nut M54445-A23	M54445-A33
Mounting stand (mat. No. 1.4301)	7MA8500-8CG
Wall mount (mat. No. 1.4301)	7MA8500-8BP
Support (mat. No. 1.4301) for immersion fittings, for fitting to mounting stand 7MA8500-8CG or to wall mount 7MA8500-8BP	7MA8500-8CJ
Adjustable-height flange for immersion fittings 7MA8500-8FU, -8FV, -8FW	7MA8500-8FY
Calibration solution for conductivity sensors, 1.413 mS/cm, 460 ml	7MA8500-8DU

Accessories	Order No.
SIPAN 32 and SIPAN 32X analyzers	See page 1/17
SIPAN 34 analyzer	See page 1/25
Calibrated reference equipment	See page 1/25

Available ex-stock

Conductivity measuring equipment

IND sensors, fittings, accessories

Dimensions of IND sensors for medium to very high concs., chemical and food industries

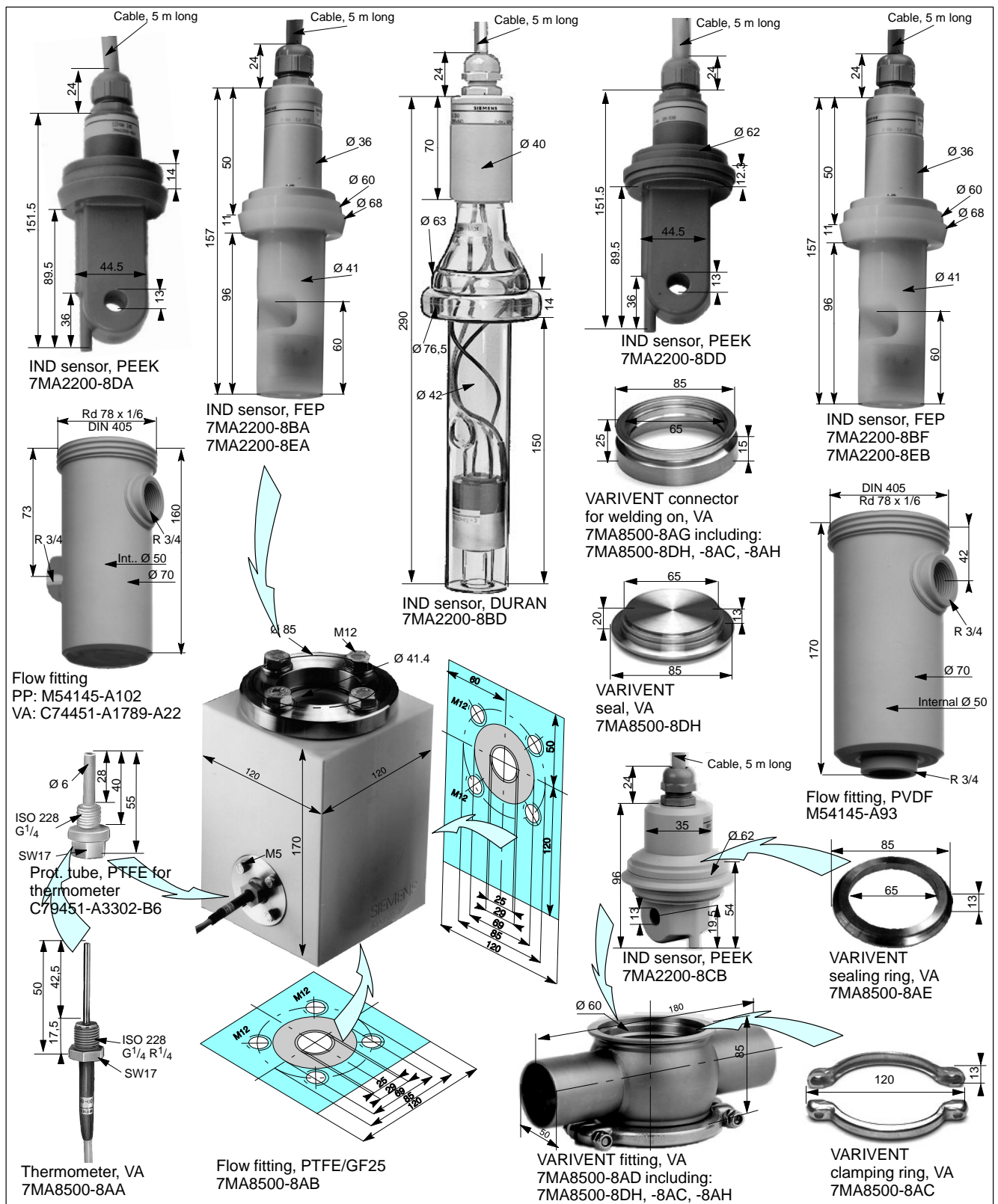


Fig. 1/25 IND sensors, fittings and accessories, dimensions

Conductivity measuring equipment

IND sensors, fittings, accessories

Ordering data of IND sensors for medium to very high concs., chemical and food industries

	Order No.
IND sensor for conductivity measurements Made of FEP, with 5 m long fixed cable Measuring range: 0 ... 0.1 mS/cm to 0 ... 2500 mS/cm With Pt 100 compensation thermometer Made of PEEK, with Pt 100 compensation thermometer Made of glass (DURAN), with Pt 100 compensation thermometer	7MA2200-8BA 7MA2200-8BF 7MA2200-8DA 7MA2200-8BD
Pt 100 compensation thermometer for IND sensor 7MA2200-8BA	7MA8500-8AA
IND sensor for conductivity measurements Made of PEEK, with special flange matching the VARIVENT fittings, measuring range 0 ... 0,1 mS/cm to 0 ... 2500 mS/cm with Pt 100 compensation thermometer and O-ring made of EPDM, including 5 m long fixed cable For flow fitting 7MA8500-8AD For screw conn. for welding on 7MA8500-8AG	7MA2200-8CB 7MA2200-8DD
IND sensor Ex for cond. measurements in explosive atmospheres , made of FEP, type of protection: intrinsic safety EEx ib IIC T4 for T _{amb} < 80 °C and liquid temperature T _{med} < 130 °C, incl. 5 m long fixed cable, Measuring range 0 ... 0.1 to 0 ... 2500 mS/cm With Pt 100 compensation thermometer	7MA2200-8EA 7MA2200-8EB
Pt 100 compensation thermometer for IND sensor 7MA2200-8EA	7MA8500-8AA
Extension cable , 10 m long Extension cable , 10 m long Junction box , for extension cable	C79451-A3300-N100 C79451-A3300-N300 7MA8500-8BS

	Order No.
Flow fitting , PTFE/GF 25, for bypass applications, sensor mounting using flange, with gasket and flange screwed gland	7MA8500-8AB
Flow fitting , PVDF, for bypass applications, connection R 3/4 sensor mounting using union nut (union nut not included in delivery)	M54145-A93
Flow fitting , VA (see Fig. 1/23), for bypass applications, connection R 3/4 sensor mounting using union nut (union nut not included in delivery)	C74451-A1789-A21
Flow fitting , VA, side connection R 3/4, for bypass applications, sensor mounting using union nut (union nut not included in delivery)	C74451-A1789-A22
Flow fitting , PP, side connection R 3/4, for bypass applications, sensor mounting using union nut (union nut not included in delivery)	M54145-A102
Fittings , VA (mat. No. 1.4301), for installation in DN 50 pipelines (see Fig. 1/21), sensor mounting using union nut (union nut not included in delivery) T-piece with three gaskets (Viton) Screw connector for welding on , with 1 gasket (Viton)	M54445-A21 M54445-A25
VARIVENT fitting , VA As flow fitting for DN 50 pipelines, with 1 seal, 2 clamping rings and 2 EPDM gaskets As connector for welding on for mounting on tanks, DN 50, with 1 seal, 1 clamping ring and 1 EPDM gasket	7MA8500-8AD 7MA8500-8AG
VARIVENT gasket Standard gasket, EPDM (set of 5) Special gasket, Viton (set of 25)	7MA8500-8AH 7MA8500-8AJ
Gasket DN 50 for union nut Standard gasket, Viton (set of 5) Special gasket, EPDM (set of 25) Special gasket, Teflon (set of 15)	M54445-A24 M54445-A34 M54445-A35

IND sensors	Fittings	7MA8500-8AB	M54145-A93	C74451-A1789-A21	M54145-A102	M54445-A20	M54445-A21	M54445-A25	C74451-A1789-A22	7MA8500-8AD	7MA8500-8AG
7MA2200-8BA		✓	✗	✗		✗	✗	✗			
7MA2200-8BF			✓	✓		✗	☞	✓			
7MA2200-8DA					✓	✗	☞	✓	✓		
7MA2200-8BD											
7MA2200-8CB										✓	✗
7MA2200-8DD											✓
7MA2200-8EA		✓	✗	✗		✗	✗	✗			
7MA2200-8EB			✓	✓		✗	☞	✓			

Fig. 1/26 Selection of flow fittings for sensors;
✓ recommended, ✗ possible, ☞ observe installation guidelines

Accessories	Order No.
Set of mounting parts for flow fittings Union nut DN 50 (mat. No. 1.4301) Union nut DN 50, PP Tapered seal (mat. No. 1.4301) DN 50 Hook key spanner (st. steel) for M54445-A23 VARIVENT sealing ring (mat. No. 1.4404) for 7MA8500-8AD and -8AG VARIVENT seal (mat. No. 1.4404) VARIVENT clamping ring (mat. No. 1.4404) Thermometer protective tube , PTFE (Teflon) for 7MA8500-8AA Adjustment set for inductive conductivity sensors 7MA2200-8BA, -8BD, -8BF, -8CB, -8DA, -8DD, -8EA and -8EB	C74451-A1789-D1 M54445-A23 C74451-A1789-C2 M54445-A27 M54445-A33 7MA8500-8AE 7MA8500-8DH 7MA8500-8AC C79451-A3302-B6 7MA2200-8FA
SIPAN 32 , SIPAN 32X analyzer SIPAN 34 analyzer Calibrated reference equipment	See page 1/17 See page 1/25 See page 1/25

Conductivity measuring equipment

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

Dimensions, installation

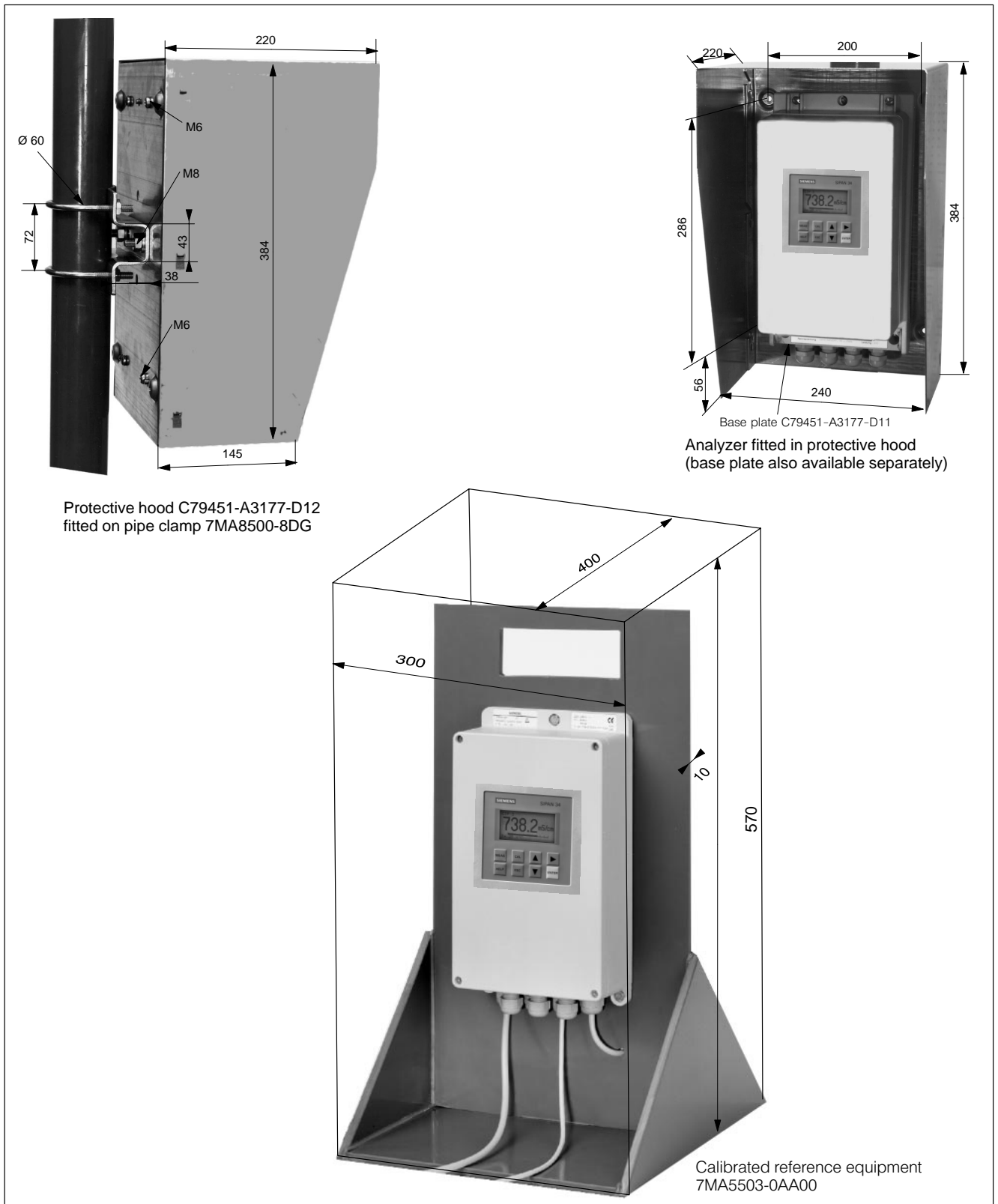


Fig. 1/27 Accessories for SIPAN 32, SIPAN 32X and SIPAN 34 analyzers, dimensions in mm

Conductivity measuring equipment

Technical data

2 EL sensors, 4 EL sensors

2EL sensor 7MA2000 - . .	-8AA	-8AB	-8BA	-8BB	-8CA	-8CB	-8DD	-8DS
Cell constant cm ⁻¹	0.00580		0.0580		1.160		0.10	0.50
Min. measuring range/ max. measuring range μS/cm	0 to 0.1 / 0 to 25 0 to 125 ³⁾		0 to 1 / 0 to 250 0 to 1250 ³⁾		0 to 20 / 0 to 5000 0 to 25000 ³⁾		0 to 2 / 0 to 500 0 to 2500 ³⁾	0 to 10 / 0 to 2500 0 to 12500 ³⁾
Resistance thermometer 90% time	60 s						3 s	20 s
Wetted parts material	Stainless steel (1.4571) + glass				Electr. carbon + glass Stainl. steel (1.4571)		PES ¹⁾ + stainl. steel (1.4571)	PPO ²⁾ + stainl. steel (1.4571)
Mounting	6-hole flange	Union nut	6-hole flange	Union nut	6-hole flange	Union nut	Union nut	Pg 13.5
Type of connection	Conical flange DN 50							Pg 13.5
Permissible oper. pressure P _B at T _B	16 bar						6 bar	2 bar
Permissible oper. temperature T _B	130 °C						60 °C	80 °C
Permissible storage temperature	-25 to +85 °C							
Cable	-						5 m fixed	5 m plugged LIYCY 4 x 0.14
Type of cable	3 x 2 x 0.2 LIYCY							-
Max. recommended cable length (with max. measuring range)	≤ 50 m							
Ex protection DIN 50014/EN 50020	In conjunction with SIPAN 32X, all sensors are approved for use in Ex zone 1							
Max. cable length with Ex protection	Siemens cable C79451-A3298-N100, max. 5 m long							
Degree of protection to DIN 40050	IP 54						IP 65	
Weight	Approx. 1.5 kg						Appr. 0.5 kg	Appr. 0.2 kg
Dimensions	See Fig. 1/21							

4EL sensor 7MA2100 - . .	-8BC	-8CA
Cell constant cm ⁻¹	0.0471	0.0828
Min. measuring range/ max. measuring range in mS/cm	0 to 0.1 / 0 to 500	
Resistance thermometer 90% time	100 s	40 s
Wetted parts material	Epoxy resin with graphite	
Conical flange DN 50	Yes	No
Mounting	Union nut	Pg 13.5
Permissible oper. pressure P _B at T _B	6 bar	
Permissible oper. temperature T _B		
Continuous	100 °C	70 °C
Short-term	110 °C	110 °C
Permissible storage temperature	-25 to +85 °C	
Fixed cable	-	5 m
Plug-type cable	5 m	-
Max. recommended cable length (with max. measuring range)	≤ 50 m	≤ 50 m
Type of cable	4 x 2 x 0.2 LIYCY	
Ex protection DIN 50014/EN 50020	In conjunction with SIPAN 32X, all sensors are approved for use in Ex zone 1	
Max. cable length with Ex protection	Siemens cable C79195-A3453-N100, max. 5 m long	
Degree of protection to DIN 40050	IP 54	IP 65
Weight	Appr. 1 kg	Appr. 0.5 kg
Dimensions	See Fig. 1/23	

1) PES: polyethersulfone;
2) PPO: polyphenylene oxide
3) Reduced measuring accuracy

Conductivity measuring equipment

Technical data

IND sensors

IND sensor 7MA2 200 - . .	-8BA	-8BF	-8CB	-8DA	-8DD	-8BD	-8EA	-8EB	
Cell constant cm^{-1}	3.82		3.16		3.00	5	3.82	3.82	
Min. measuring range/ max. measuring range	0 to 0.1 mS/cm/ 0 to 2500 mS/cm ¹⁾								
Built-in thermometer	No	Yes					No	Yes	
Resistance thermometer 90% time	-	100 s	50 s			100 s	-	100 s	
Wetted parts material	FEP ²⁾		PEEK ³⁾			DURAN ⁴⁾	FEP ²⁾		
Type of connection	Conical flange DN 50		VARIVENT	Con. flange DN 50	VARIVENT	Flange ISO 3587	Conical flange DN 50		
Permissible oper. pressure P_B at T_B	10 bar					4 bar	10 bar		
Permissible oper. temperature T_B for immersion part	130 °C								
Permissible storage temperature	-25 to +85 °C								
Fixed cable	5 m								
Max. recommended cable length (with max. measuring range)	≤ 50 m								
Type of cable	3 x 2 x 0.25 LIYCY-CY								
Ex protection to DIN 50014/EN 50020							II 2G EEx ib IIC T4 ⁵⁾ zone 1		
Max. cable length with Ex protection							Siemens cable C79451-A3300-N100, max. 5 m long		
Degree of protection to DIN 40050						IP 65	IP 67		
Weight	Approx. 1.2 kg								
Dimensions	See Fig. 1/25								

1) When using the panel housing, smallest measuring range 0 to 2 mS/cm

2) FEP: perfluoroethylene propylene

3) PEEK: polyetheretherketone

4) DURAN: special glass

5) When using SIPAN 32 Ex analyzer

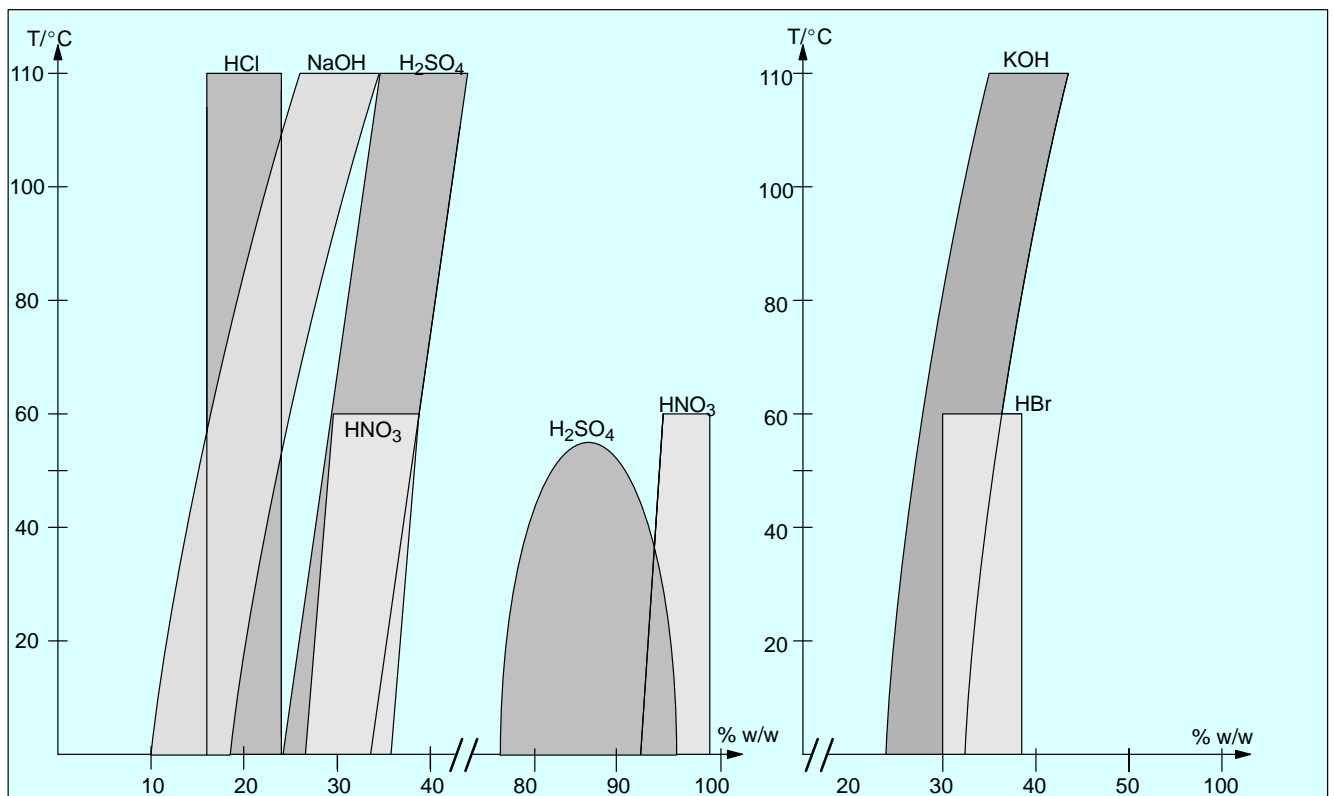


Fig. 1/28 SIPAN 32, SIPAN 32X and SIPAN 34 analyzers, ranges in which conversion into % w/w is not physically possible

Conductivity measuring equipment

Technical data

Fittings

Fitting	Flow fitting C74451-A1789-A2	Flow fitting C74451-A1789-A1	Flow fitting C74451-A1789-A21	Flow fitting C74451-A1789-A22	Flow fitting C74451-A1789-A3
Screw sample connection	$\frac{3}{8}$ -18 NPT		$R^{\frac{3}{4}}$		$\frac{3}{8}$ -18 NPT
Material	Stainless steel (1.4404)				PP ¹⁾
Permissible oper. temperature T_B	160 °C				90 °C
Permissible oper. pressure P_B at T_B	16 bar				1.5 bar at 20 °C 0.2 bar at 90 °C
Weight	Approx. 2 kg	Approx. 1.5 kg			
Dimensions	See Fig. 1/21				
Flow	Recommended 0.1 to 0.5 l/min. (max. 10 l/min)				

Fitting	Flow fitting M54145-A92	Flow fitting M54145-A102	Flow fitting M54145-A93	Flow fitting 7MA8500-8AB
Screw sample connection	$R^{\frac{3}{4}}$			Four-hole flange DN 25
Material	PP ¹⁾		PVDF ³⁾	PTFE/GF25 ²⁾
Permissible oper. temperature T_B	90 °C		130 °C	120 °C
Permissible oper. pressure P_B at T_B	6 bar at 20 °C 0.2 bar at 90 °C		6 bar at 20 °C 1 bar at 130 °C	4 bar at 120 °C 6 bar at 20 °C
Weight	Approx. 0.25 kg	Approx. 2 kg	Approx. 0.3 kg	Approx. 2 kg
Dimensions	See Fig. 1/21	See Fig. 1/25		
Flow	Recommended 0.1 to 0.5 l/min. (max. 10 l/min)			

Fitting	Flow fitting M54445-A20	Flow fitting M54445-A21	Screw connector for welding on M54445-A25	Screw connector 7MA8500-8BR
Screw sample connection	Rd 78 x $\frac{1}{6}$		For welding on	
Material	Stainless steel (1.4301)			PP ¹⁾
Permissible oper. temperature T_B	160 °C			90 °C
Permissible oper. pressure P_B at T_B	16 bar			6 bar at 20 °C 0.2 bar at 90 °C
Weight	Approx. 1 kg	Approx. 1 kg	Approx. 0.25 kg	Approx. 0.1 kg
Dimensions	See Fig. 1/21			
Flow	Recommended 0.1 to 0.5 l/min. (max. 10 l/min)			

Fitting	VARIVENT flow fitting 7MA8500-8AD	VARIVENT connector for welding on 7MA8500-8AG	Immersion fitting C74451-A1789-A10, -A12, -A14, -A16	Immersion fitting 7MA8500-8FU, -8FV, -8FW
Screw sample connection	DN 50 for welding on (DN 40 to DN 125 possible)	For welding on	-	-
Material	Stainless steel (1.4404)		PVC ²⁾	PP ¹⁾
Permissible oper. temperature T_B	135 °C with EPDM gaskets ⁴⁾ 200 °C with Viton gaskets ⁵⁾		60 °C	90 °C
Permissible oper. pressure P_B at T_B	25 bar		0.2 bar	0.5 bar
Weight	Approx. 0.85 kg	Approx. 2 kg	Approx. 1.8...3 kg	Approx. 2 kg
Dimensions	See Fig. 1/25		See Fig. 1/23	
Flow	Recommended 0.1 to 0.5 l/min. (max. 10 l/min)		-	

- 1) PP: polypropylene
 2) PTFE/GF25: polytetrafluor ethylene with 25 % glass-fiber
 3) PVDF: polyvinylidene fluoride
 4) EPDM: ethylene propylene caoutchouc
 5) Viton: fluor caoutchouc

Conductivity measuring equipment

Standard combinations

1

1 Conductivity measurements in ultra-pure water, boiler feedwater, chip production Measuring range < 0.5 µS/cm, installation in bypass (after cooler and pressure reduction, e.g. Thiedig table):

- 2EL sensor with Pt 100, stainless steel, mounting using union nut
Order No.: **7MA2000-8AB**
- Stainless steel flow fitting
Order No.: **C74451-A1789-A1**
- Analyzer
Order No.: **7MA2040-8AA** (SIPAN 32)
or
7MA2034-0AA00-0AA00 (SIPAN 34)
- Option:
 - Set of mounting parts for flow fitting
Order No.: **C74451-A1789-D1**
 - Cable per 10 m
Order No.: **C79451-A3298-N100**

2 Conductivity measurements in ultra-pure water, inline installation:

- 2EL sensor with Pt 100, stainless steel, mounting using six-hole flange
Order No.: **7MA2000-8AA**
- Analyzer
Order No.: **7MA2040-8AA** (SIPAN 32)
or
7MA2034-0AA00-0AA00 (SIPAN 34)
or with explosion protection
Order No.: **7MA2041-8AA** (SIPAN 32X)
- Option:
 - Cable per 10 m
Order No.: **C79451-A3298-N100**

3 Simple conductivity measurements, for checking of deionized water, installation in bypass (after cooler and pressure reduction, or after ion exchanger):

- 2EL sensor made of PES, with Pt 100, with stainless steel pin electrodes, mounting using union nut, 5 m fixed cable
Order No.: **7MA2000-8DD**
- Polypropylene flow fitting, with union nut 3/8"-NPT
Order No.: **C74451-A1789-A3**
- Analyzer
Order No.: **7MA2040-8AA** (SIPAN 32)
or
7MA2034-2AA00-0AA00 (SIPAN 34)
- Option:
 - Set of mounting parts for flow fitting
Order No.: **C74451-A1789-D1**

4 Conductivity measurements for drinking water/waste water in bypass:

- 4EL sensor, with Pt 100, 5 m cable with plug, mounting using union nut
Order No.: **7MA2100-8BC**
- Polypropylene fitting, for bypass
Order No.: **M54145-A92**
- Polypropylene union nut
Order No.: **C74451-A1789-C2**
- Analyzer
Order No.: **7MA2140-8AA** (SIPAN 32)
or
7MA2034-2BA00-0AA00 (SIPAN 34)
or with explosion protection
Order No.: **7MA2141-8AA** (SIPAN 32X)
- Option:
 - Mounting parts for flow fitting
Order No.: **C74451-A1789-D1**

5 Conductivity measurements for waste water in basins or canals:

- 4EL sensor, with Pt 100, 5 m fixed cable, Pg 13.5 mounting
Order No.: **7MA2100-8CA**
- Polypropylene electrode holder
Order No.: **C74451-A1789-B1**
- PVC immersion fitting, with union nut
Order No.: **C74451-A1789-A10**
- Analyzer
Order No.: **7MA2140-8AA** (SIPAN 32)
or
7MA2034-2BA00-0AA00 (SIPAN 34)
or with explosion protection
Order No.: **7MA2141-8AA** (SIPAN 32X)
- Option:
 - Stainless steel mounting stand
Order No.: **7MA8500-8CG**
 - Freely suspended rod made of stainless steel
Order No.: **7MA8500-8CJ**
 - Stainless steel protective hood
Order No.: **C79451-A3177-D12**
 - Stainless steel pipe clamp
Order No.: **7MA8500-8DG**
 - Extension cable with plug for 4EL sensor
Order No.: **C79195-A3453-N100**

6 Conductivity measurements in the food industry (CIP plants, breweries, dairies) Inline installation "VARIVENT®":

- IND sensor made of PEEK, with Pt 100, 5 m fixed cable
Mounting using VARIVENT® clamping ring
Order No.: **7MA2200-8CB**
- VARIVENT flow fitting made of stainless steel
Order No.: **7MA8500-8AD**
- VARIVENT clamping ring made of stainless steel
Order No.: **7MA8500-8AE**
- Analyzer
Order No.: **7MA2240-8AA** (SIPAN 32)
or
7MA2034-2CA00-0AA00 (SIPAN 34)
- Option:
 - Extension cable for IND sensor
Order No.: **C79451-A3300-N100**
 - Junction box for extension cable
Order No.: **7MA8500-8BS**
 - Calibration set for inductive conductivity sensors
Order No.: **7MA2200-8FA**

Conductivity measuring equipment

Standard combinations, documentation

7 Conductivity measurements in the food industry (CIP plants, breweries, dairies) Conventional connection system (milk pipe):

- IND sensor made of PEEK, with Pt 100, mounting using conical flange DN 50, 5 m fixed cable
Order No.: **7MA2200-8DA**
- Stainless steel screw connector for welding on, DN 50
Order No.: **M54445-A25**
- Stainless steel union nut
Order No.: **M54445-A23**
- Analyzer
Order No.: **7MA2240-8AA** (SIPAN 32)
or **7MA2034-2CA00-0AA0** (SIPAN 34)
- Option:
- Calibration set for inductive conductivity sensors
Order No.: **7MA2200-8FA**

8 Conductivity measurements in concentrated sulphuric acid (sulphuric acid production):

- IND sensor made of FEP, Mounting using conical flange DN 50, 5 m fixed cable
Order No.: **7MA2200-8BA**
- Pt 100 compensation thermometer with 5 m fixed cable
Order No.: **7MA8500-8AA**
- Thermometer protective tube made of PTFE
Order No.: **C79451-A3302-B6**
- Flow fitting made of reinforced PTFE for IND sensor and Pt 100 thermometer, mounting using DN 50 flange
Order No.: **7MA8500-8AB**
- Analyzer
Order No.: **7MA2240-8AA** (SIPAN 32)
or **7MA2034-2CA00-0AA0** (SIPAN 34)
- Option:
- Calibration set for inductive conductivity sensors
Order No.: **7MA2200-8FA**

9 Conductivity measurements in the chemical industry: with explosion protection

- IND Ex sensor made of FEP with Pt 100, mounted using conical flange DN 50, 5 m fixed cable
Order No.: **7MA2200-8EB**
- Flow fitting made of PVDF
Order No.: **M54145-A93**
- Stainless steel union nut
Order No.: **M54445-A23**
- Analyzer with explosion protection
Order No.: **7MA2241-8AA** (SIPAN 32X)
- Option:
- Mounting parts for flow fitting
Order No.: **C74451-A1789-A10**
- Extension cable for IND sensor
Order No.: **C79451-A3300-N100**
- Junction box for extension cable
Order No.: **7MA8500-8BS**
- Calibration set for inductive conductivity sensors
Order No.: **7MA2200-8FA**

Catalog PA 20

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

Manual

	Order No.
Printed version of Manual (each language separately) SIPAN 32 Leitfähigkeits-Meßeinrichtungen (German)	C79000-B5400-C45
SIPAN 32 Conductivity Measuring Equipment (English)	C79000-B5476-C45
SIPAN 32 Dispositif de mesure de conductivité (French)	C79000-B5477-C45
SIPAN 32 Equipo de medición de la conductividad (Spanish)	C79000-B5478-C45
SIPAN 32 Dispositivo per la misura della conductività (Italian)	C79000-B5472-C45
----- SIPAN 32 (5 languages on CD ¹) Leitfähigkeits-Meßeinrichtungen (German) Conductivity Measuring Equipment (English) Dispositif de mesure de conductivité (French) Equipo de medición de la conductividad (Spanish) Dispositivo per la misura della conductività (Italian)	C79000-G5464-C048
Printed version of Manual (each language separately) SIPAN 34 Leitfähigkeits-Meßeinrichtungen (German)	C79000-G5400-C41
SIPAN 34 Conductivity Measuring Equipment (English)	C79000-G5476-C41
SIPAN 34 Dispositif de mesure de conductivité (French)	C79000-G5477-C41
SIPAN 34 Equipo de medición de la conductividad (Spanish)	C79000-G5478-C41
SIPAN 34 Dispositivo per la misura della conductività (Italian)	C79000-G5472-C41
----- SIPAN 34 (5 languages on CD ¹) Leitfähigkeits-Meßeinrichtungen (German) Conductivity Measuring Equipment (English) Dispositif de mesure de conductivité (French) Equipo de medición de la conductividad (Spanish) Dispositivo per la misura della conductività (Italian)	C79000-G5464-C50

¹) Included in delivery of analyzer (free-of-charge)

Conductivity measuring equipment



1