Technical
Information
TI 042C/07/en

Compact pH electrode system sensopac CPA 320









Sensopac pH/Redox electrode systems are suitable for process measurement at high pressures and temperatures. For measurements in hazardous areas (zone 0), the Sensopac can be equipped with Ex electrodes.
Self-monitoring is possible with all Sensopac types. A double reference electrode is immersed in the internal bridge electrolyte which is in contact with the medium via a large-area, dirt repelling diaphragm. The two reference systems of this electrode are connected to two measuring circuits of the pH/Redox measuring instrument Mycom CPM 152.

One of the two reference systems is specially protected so that only the second monitoring reference system is affected by penetration of electrode poisons. Any resulting difference in measured values is signaled by the Mycom CPM 152 instrument before the main measuring circuit is influenced.

Areas of application

- In-process applications for in-line measurement at pressures of up to 10 bar without counterpressure.
- For measurement in aggressive media (PP and PVDF options).
- For measurement in the food industry (stainless steel version).

Benefits at a glance

- Problem-free, direct application under high pressures (max. 10 bar) and temperatures (105 °C/130 °C) permits close matching to process conditions.
- High measuring accuracy in conjunction with the pH measuring transmitter such as Mycom CPM 152:
  Self-monitoring of reference system with fault signaling; an alarm isissued before the main measuring circuit is affected.
- The reference system is protected by an electrolyte bridge.
- Bridge electrolyte adaptable to the medium and easily replaceable.
- No additional protective assemblies required. Can be directly used as an immersion or flow sensor.
- Numerous mounting accessories from welding sockets to immersion assemblies.

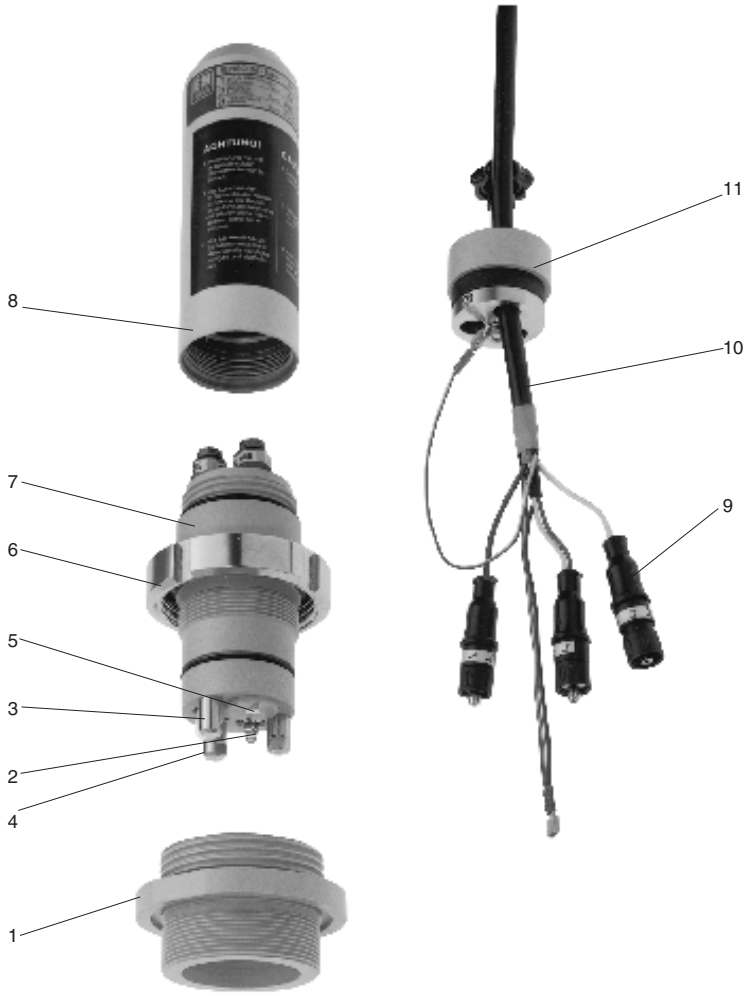
Quality made by
Endress+Hauser

ISO 9001

Endress+Hauser

Nothing beats know-how

Assembly



Assembly from
Sensopac CPA 320:

1 Type UBS built-in adapter for installing the Sensopac in threaded fitting G 2 ½"
2 pH measuring electrode
3 Pt 100 temperature sensor
4 Shock protection
5 Diaphragm cartridge
6 Union nut (part of UBS adapter)
7 Sensopac body
8 Removable protective hood
9 Electrode connector
10 Cable, ready-made with connectors
11 Cap with sealed measuring cable entry

☐ Standard material combinations:

- Polypropylene body, Hastelloy-C4 shock protection, EPDM O-rings
- Stainless steel body, stainless steel shock protection, EPDM O-rings
- PVDF body, Hastelloy-C4 shock protection, EPDM O-rings

A wide range of measuring electrodes permits close system matching.
For example, the electrode type CPS 64-1 BA 2 GSA permits pH measurements up to pH 14 and temperatures up to 130 °C.
Permits measurements in hazardous area zone 0 when equipped with Conducta Ex electrodes.

All electrodes built into the Sensopac system are equipped with a screw head and are easily replaced when maintenance is required.

The Sensopac compact pH electrode system can be installed and removed quickly and easily.
To assist this, the system is supplied with one of the following options of built-in adapters:

- UBS – a threaded adapter for quick installation and removal.
- AMS – a dairy adapter, preferably used where cleaning or sterilization is required.
-

Furthermore, a wide range of accessories, such as immersion sensors, flow sensors and a spray head for electrode cleaning, is available.

Sensopac system overview

The Sensopac CPA 320 can be installed in various built-in adapters. The type of built-in adapter is specified with the order.

Connection:
- Cable with connectors and connector sleeves, ready-made, lengths 5, 10, 15 m

Base body:
- PP
- PVDF
- stainless steel 1.4571

Electrodes:
- 1 pH electrode
- 1 double reference CPS 13-0 TD 1 GSA
- 1 temperature CTS 1-A 2 GSA

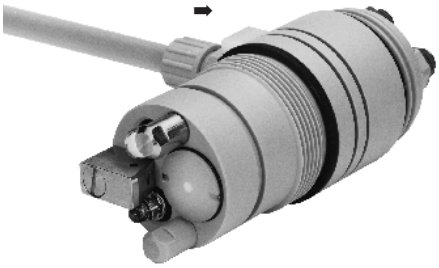
Standard built-in adapter

AMS adapter for installation in dairy fittings

UBS adapter for installation in G 2½" sockets

UBS + GS (G 2½" sockets)

Automatic cleaning

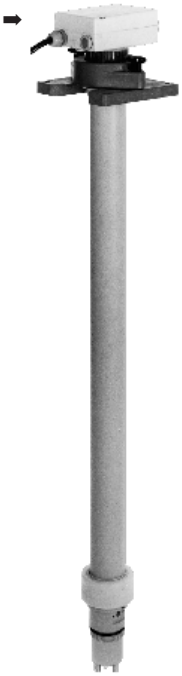


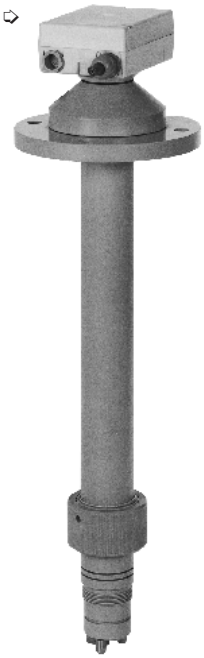
- Automatic cleaning during measuring operation with a spray cleaning system is possible.
- The type CPR 3 – 2 spray head can also be retrofitted when using the AMS, UBS, GS adapters.
- The spray head is suitable for water and for diluted cleaning chemicals.

➡ Sensopac with built-in spray head for electrode cleaning

⇨ CPA 120 with Sensopac and built-in cleaning system

Assemblies for Sensopac CPA 320





➡ For open tanks:
immersion assembly
CPA 110-S

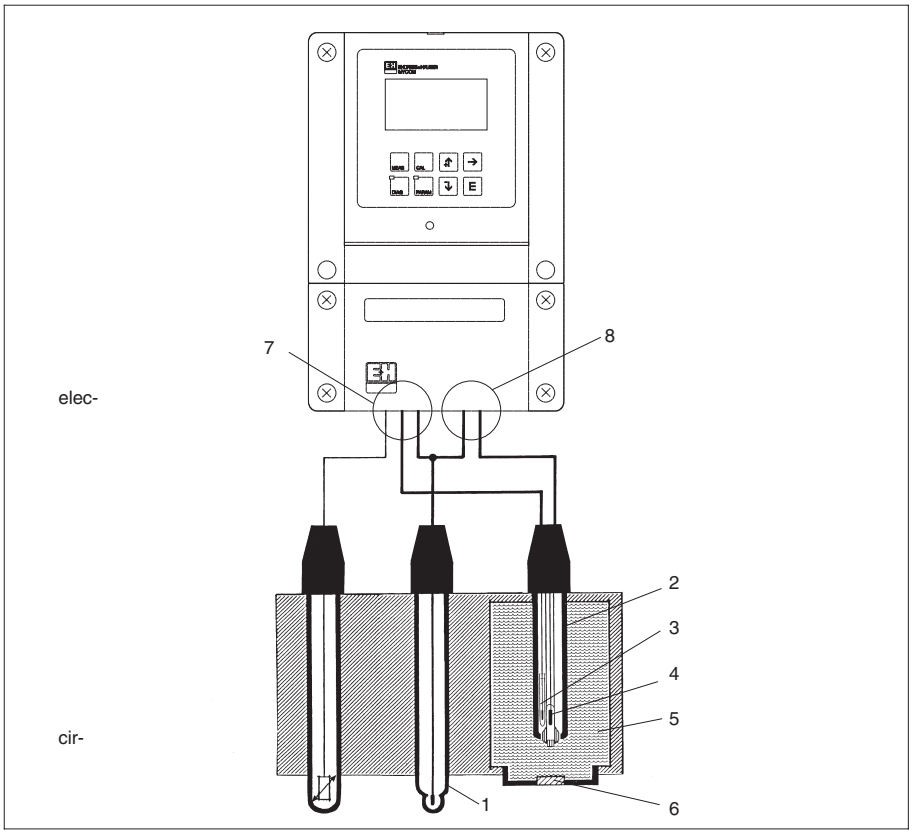
⇨ For closed tanks:
process assembly
CPA 120-S

For installation in pipes:

➾ Flow assembly
CPA 250-S
material: PP; PVDF

➙ Flow assembly
CPA 250-S
material: stainless steel

Operating principle



Sensopac with connection to Mycom CPM 152:

1 pH electrode immersed directly in the measured solution
2 Low-impedance double reference elec-
trode immersed in bridge electrolyte 5
3 Reference system for the master measuring circuit
4 Reference system for the monitor circuit
5 Bridge electrolyte in the large reference chamber
6 Diaphragm cartridge with a dirt-repellent, blocking-free PVF diaphragm
7 Master measuring cir-
cuit
8 Monitor circuit

The pH electrode (1) generates a half-cell voltage dependent on the pH of the medium. The dirt-repellent PVF diaphragm in the diaphragm cartridge prevents blocking and assures electrical contact between the medium and the bridge electrolyte (5) in which the double reference electrode (2) is immersed.
Reference system (3) of the double reference electrode supplies the constant reference voltage for the master measuring circuit.
Reference system (4) of the double reference electrode supplies the reference voltage for the monitor circuit.

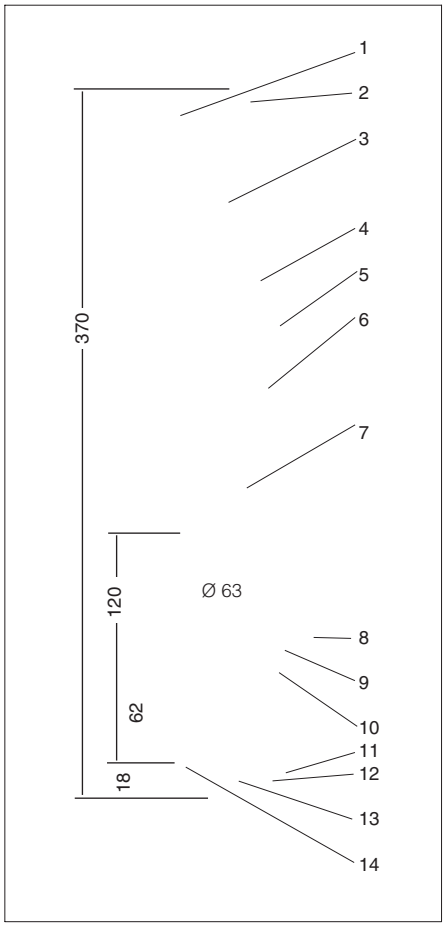
Self-checking
Both reference systems (3) and (4) are located in the bridge electrolyte (5) behind the diaphragm cartridge (6).
Both possess an additional diaphragm system.
Reference system (3) is arranged in a long capsule behind another diaphragm at the upper opening of the capsule.
Such an arrangement ensures that if any interfering ions penetrate into the bridge electrolyte (5), only reference system (4) is contaminated, while reference system (3) is seldom affected.

Any difference in the two reference potentials is detected by the pH instrument Mycom CPM 152 and results in an error message.
The most important feature of this monitoring technique is that the alarm is produced before there is any drift on the master measuring circuit itself.

Installation and dimensions

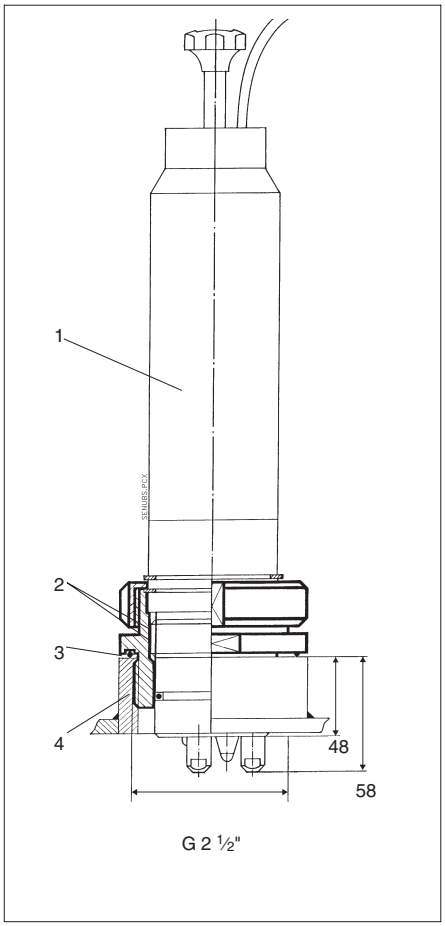
Picture left:
Construction of Sensopac

1 Measuring cable
2 Star knob for tightening and releasing the pressure seal
3 Measuring cable entry
4 PE connector
5 Protective cover
6 Potential matching connector (PMC)
7 Electrode connector
8 Union nut
9 O-ring
10 Sensopac body
11 Protective cap/ calibration cup
12 Shock protection bolt
13 Electrodes
14 Diaphragm cartridge



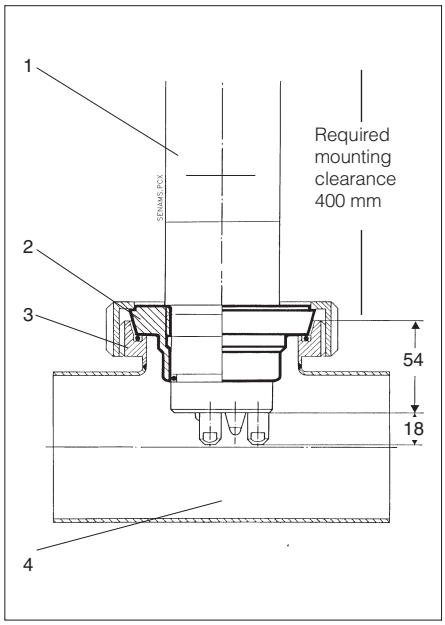
Picture right:
Sensopac with UBS adapter

1 Sensopac
2 Snap rings
3 Union nut
4 UBS adapter



Sensopac with AMS adapter (food applications)

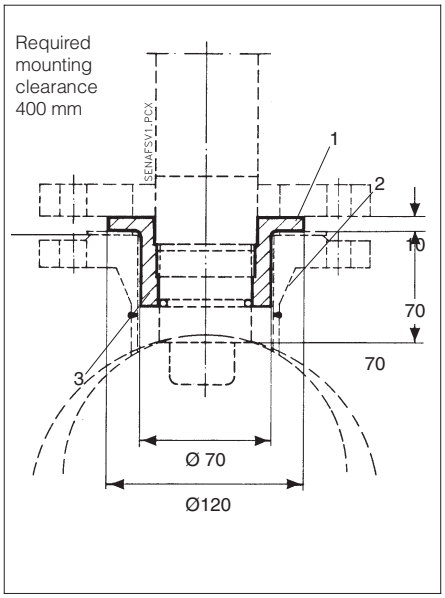
1 Sensopac
2 AMS adapter
3 DN 80 threaded socket, to DIN 11851
4 Short T-piece DN 80, DIN 11852

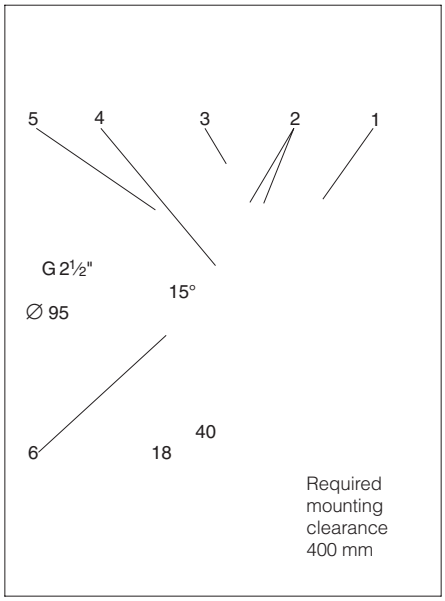


Installation and dimensions

Picture left:
Sensopac AFS-V adapter. Stainless steel 1.4571 version for flange mounting

1 NW 80 flange, ND 16, to DIN 2576 Material: PP
2 Weld-on flange NW 80, ND 16, to DIN 2633
3 AFS



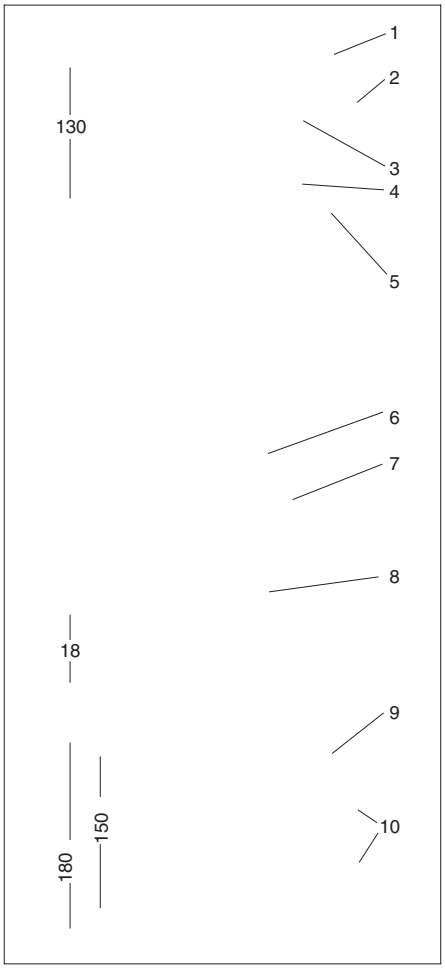


Picture right:
Threaded socket weld-on GS, GS-V for Sensopac installation

1 Sensopac
2 Snap rings
3 Union nut NW 50, to DIN 11851 Material: 1.4401
4 Width across flats SW 95
5 UBS
6 Threaded socket GS, GS-V out of PP or 1.4571

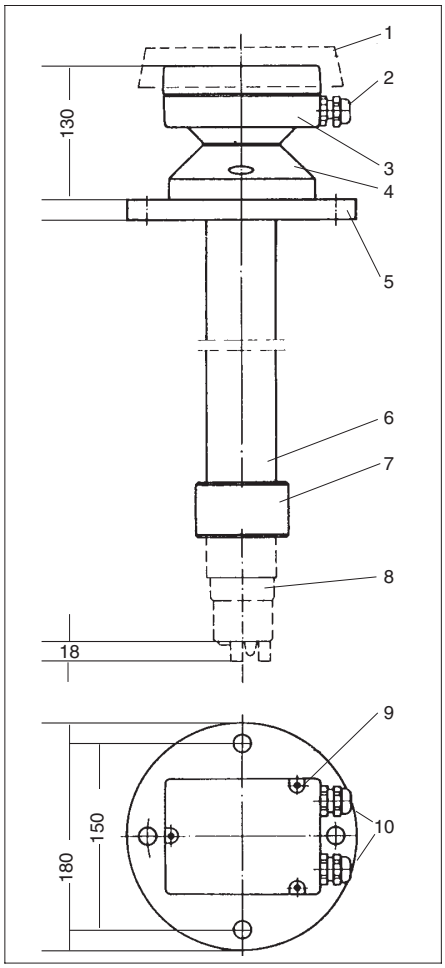
Picture left:
Immersion assembly CPA 110-S for installation of Sensopac

1 Weather protection cover SR
2 Pg 16 cable gland
3 Assembly head
4 Oval flange
5 Mounting plate
6 Immersion tube
7 Threaded connection for mounting Sensopac
8 Sensopac body
9 4 mounting holes, Ø 18
10 Pg 16

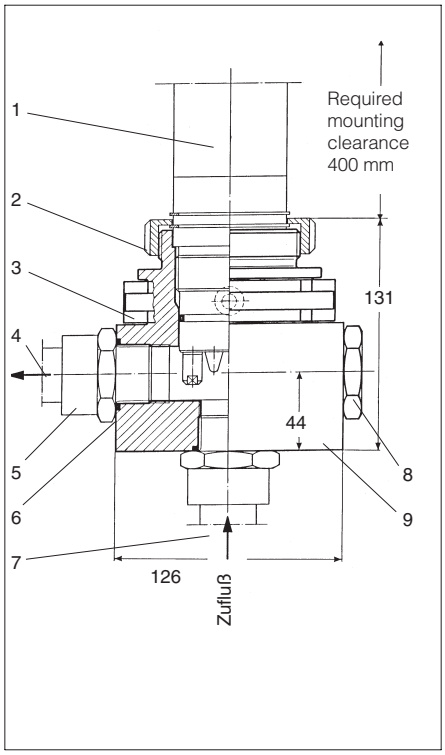


Picture right:
Immersion assembly CPA 120-S for installation of Sensopac

1 Weather protection cover SR
2 Pg 16 cable gland
3 Assembly head
4 Threaded fitting
5 Flange
6 Immersion tube
7 Threaded connection for mounting Sensopac
8 Sensopac body
9 4 mounting holes, Ø 18
10 Pg 16

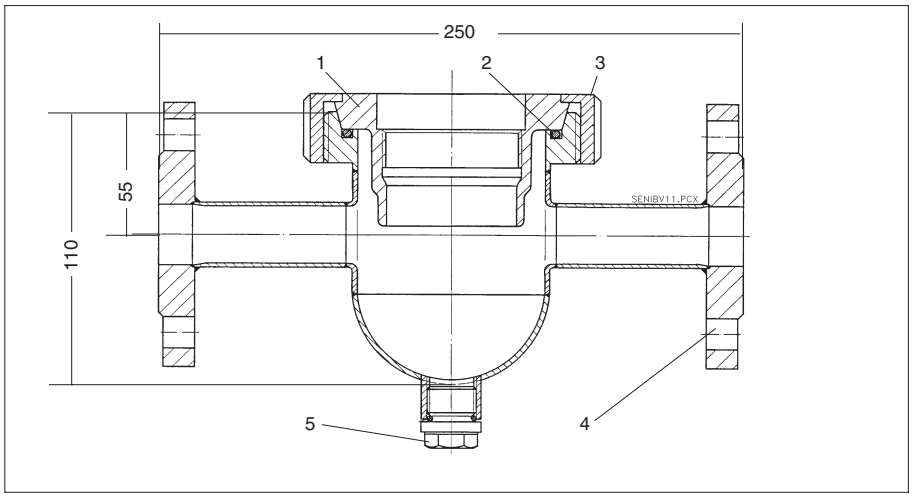


Installation and dimensions



Flow assembly
CPA 250-S for
installation of Sensopac,
Material PP, PVDF

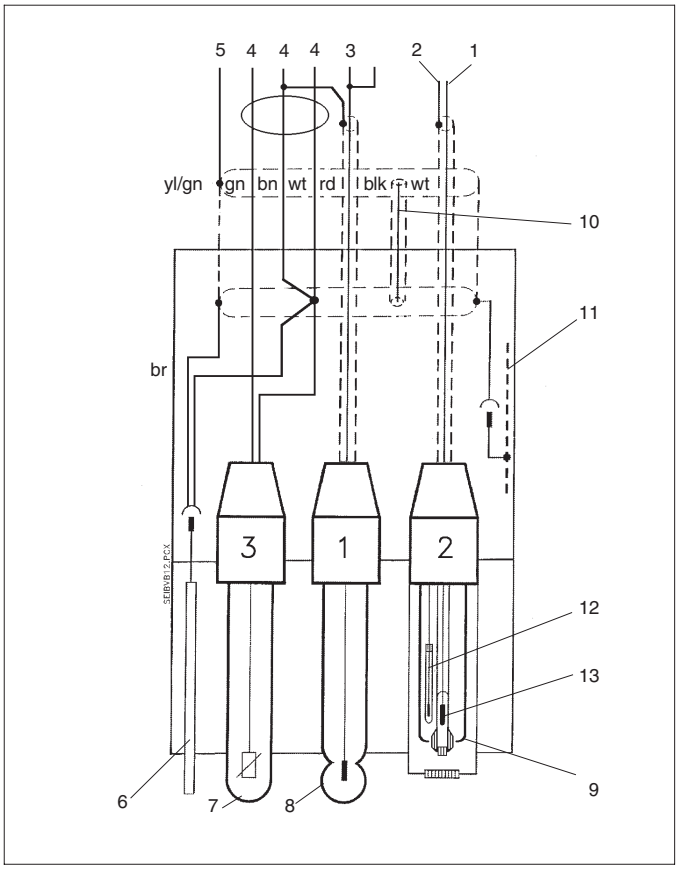
1 Sensopac electrode system
2 Union nut NW 50, to DIN 11851
Material: 1.4401
3 Pipe clamp with central installation hole
4 Pipe DA 32 DN 25
5 Screwed nipple NP, G1"
Material: PP, PVDF
6 O-ring
Material: EPDM
7 Pipe DA 32 DN 25
8 Plug G1"
Material: PP, PVDF
9 Flow assembly
CPA 250-S
out of PP or PVDF



Flow assembly CPA
250-S for installation of
Sensopac out of 1.4571

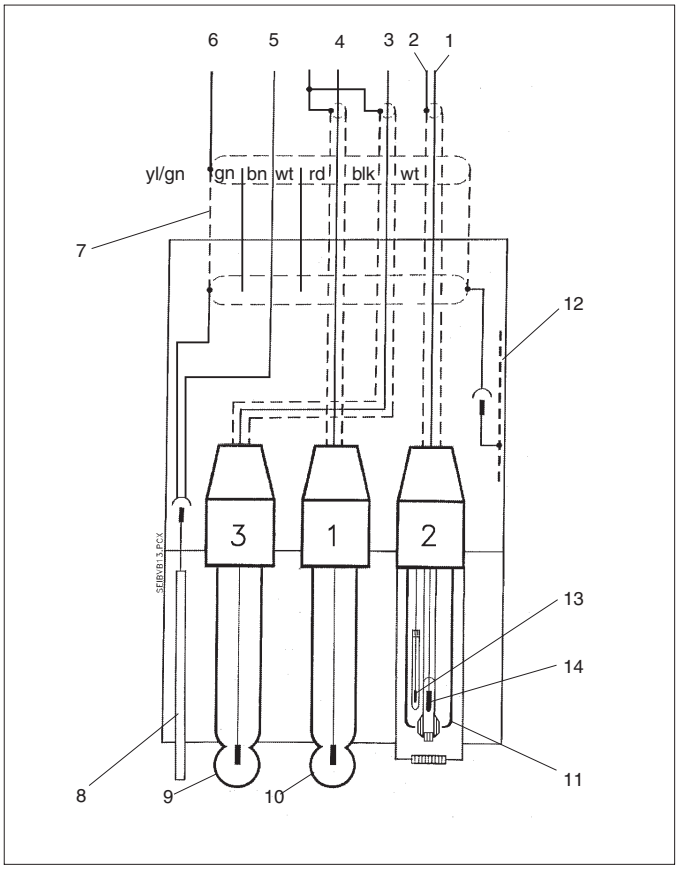
1 Adapter for Sensopac, included as standard
2 O-ring, EPDM
3 Union nut
4 Weld-on flange DN 25, PN 16, connection to DIN 2501
5 Drain plug
G ½

Electrical connections



Cable configuration for Sensopac with double reference system
Cable: CPK 6

1 Reference signal measuring circuit 2
2 Reference signal measuring circuit 1
3 pH signal
4 Pt 100 3-wire connection
5 Potential matching PE
6 Potential matching pin
7 Pt 100
8 pH electrode
9 Double reference electrode
10 Coaxial line not visible
11 Cover screen connection
12 Reference system 1
13 Reference system 2



Cable configuration for Sensopac with two pH measuring electrodes
Cable: CPK 6

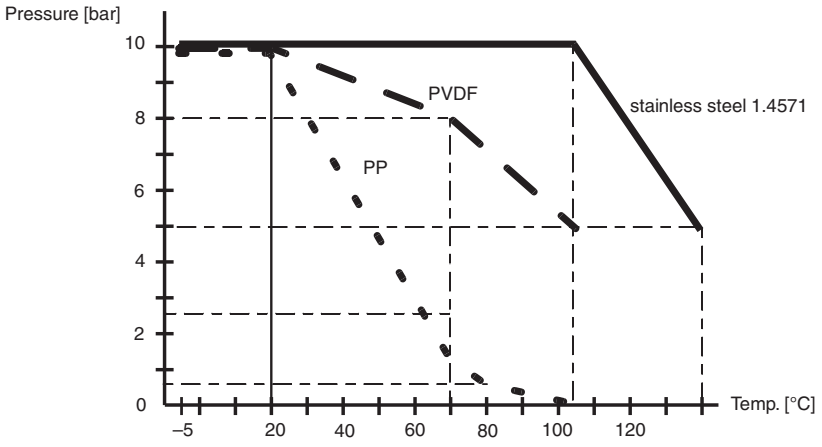
1 Reference signal measuring circuit 2
2 Reference signal measuring circuit 1
3 pH signal measuring circuit 2
4 pH signal measuring circuit 1
5 Potential matching
6 PE
7 Combination measuring cable CPK 6
8 Potential matching pin
9 pH electrode 2
10 pH electrode 1
11 Double reference electrode
12 Cover screen connection
13 Reference system 1
14 Reference system 2

Technical data

Base body	polypropylene PP
	polyvinylidene fluoride PVDF
	stainless steel 1.4571
Seals	EPDM (standard), Viton
Potential matching pin	Hastelloy C 4 (standard)
	or stainless steel 1.4571
Electrodes	glass, special types made of plastic
	CPS 64-1 BA2 GSA
Double reference electrode	CPS 13-0 TD1 GSA
Temperature sensor	CTS 1-A2 GSA
Internal thread for electrodes	Pg 13.5
Diaphragm cartridge	replaceable PVF diaphragm,
	screwed into PVDF cartridge DKV-HT
Electrode seals	EPDM (standard)
Bridge electrolyte	KCl
Socket wrench for electrodes and diaphragm	size 17/special

Subject to modifications.

Pressure and temperature operating range



Working pressure for different materials and temperatures

Maximum permissable operating pressure			
Temperature [°C]	PP [bar]	PVDF [bar]	1.4571 [bar]
-5	10	10	10
20	10	10	10
70	1,5	8	10
80	0,5	7	10
90	0	10	10
105	–	6	10
130	–	5	5

Order code and Accessories

CPA110

Version
S for use with Sensopac electrode system CPA 320

Material / Immersion depth
10 PP / 1000 mm
19 PP / 400 ... 2000 mm
30 PVDF / 1000 mm
39 PVDF / 400 ... 2000 mm
99 Special version

non- standard appliance

CPA110- ☐☐ ⇐ **Order code**

CPA120

Version
S for use with Sensopac electrode system CPA 320
T for use with Sensopac electrode system CPA 320, flanse DN 125 for Chemoclean

Materials / Immersion depth
10 PP / 1000 mm
19 PP / 400 - 2000 mm
99 Special version

non- standard appliance

CPA120- ☐☐ ⇐ **Order code**

CPA250

Version
S for use with Sensopac compact system CPA 320

Materials / Process connection
00 PP / G 1" BSP
13 1.4571 / flanse 2 x DN 25
20 PVDF / G1" BSP
99 Special version

CPA250- ☐☐ ⇐ **Order code**

Order code

Sensopac CPA 320

Assembly materials / O-rings
- P PP / EPDM
- F PVDF / EPDM
- V Stainless steel 1.4571 / EPDM
- Y Special version

Number of electrodes
- 1 For use with 1 meas. and 1 ref. electrode
- 9 Special version

Electrode type
- 2 CPS 64-1AA2 GSA
- 3 CPS 64-1BA2 GSA
- 9 Special version

Cable length / colour
- 0 5 Metre, black
- 1 10 Metre, black
- 2 15 Metre, black
- 3 5 Metre, blue (Ex)
- 4 10 Metre, blue (Ex)
- 5 15 Metre, blue (Ex)
- 9 Special version

Adaptor type
- E Adaptor for CPA 110 / CPA 120
- K Without adaptor
- U UBS out ofPP
- V UBS out of stainless steel
- W UBS out of PVDF
- Y Special version

Application
- A Standard type electrode
- Z EX-type electrode
- Y Special version

CPA320- | | | | | | | ⇐ **Order code**

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