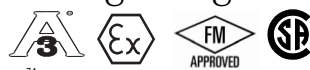


Technical Information

Tophit CPS441 and CPS441D

ISFET sensor with liquid KCl reference electrode for pH measurement in blocking media

Analog or digital sensors with Memosens technology



Application

Special applications for:

- Maximum measuring accuracy
- Blocking media (pressurized)
- High organic solvent contents
- Low conductivities

With ATEX, FM and CSA approval for application in hazardous areas

Your benefits

- Resistant to breaking
 - Sensor body made completely of PEEK (FDA compliant)
 - Direct installation into the process, reduces effort and costs for sampling and laboratory analysis
- Re-fillable liquid KCl reference electrolyte
- Application possible at low temperatures
 - Short response time
 - Constantly high accuracy
- Sterilisable
- Longer calibration intervals than glass electrodes
 - Lower hysteresis with alternating temperatures
 - Low measuring error after high-temperature loading
 - Almost no acid and alkaline errors
- With built-in temperature sensor for effective temperature compensation
- Ideal for CIP processes when combined with an automatic retractable assembly

Further benefits offered by Memosens technology

- Maximum process safety through contactless inductive signal transmission
- Data safety through digital data transmission
- Easy handling due to storage of sensor-specific data
- Predictive maintenance possible thanks to registration of sensor load data

Function and system design

Measuring principle

Ion-**selective**, or more generally ion-**sensitive** field effect transistors (ISFET) were developed in the 1970s as an alternative to the glass electrode for pH measurement.

Basics

Ion-selective field effect transistors use an MOS¹⁾ transistor arrangement (→ Fig. 1) where the metallic *gate* (pos. 1) is not a control electrode. Instead, the medium (→ Fig. 2, pos. 3) in the ISFET is in direct contact with the gate isolator layer (pos. 2). Two strongly N-conducting areas are diffused in P-conducting substrate (→ Fig. 2, pos. 5) of the semiconductor material (Si). These N-conducting areas are current supplying ("Source", S) and current accepting ("Drain", D) electrodes. The metallic gate electrode (in case of the MOSFET) resp. the medium (in case of the ISFET) forms a capacitor with the substrate below. A potential difference between gate and substrate (U_{GS}) causes a higher electron density between "Source" and "Drain". A N-conducting *channel* (pos. 2) is formed, i.e. a drain current (I_D) is induced.

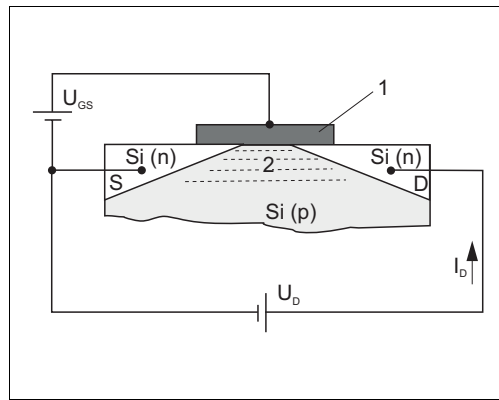


Fig. 1: Principle MOSFET

- 1 Metallic gate
- 2 N-conducting channel

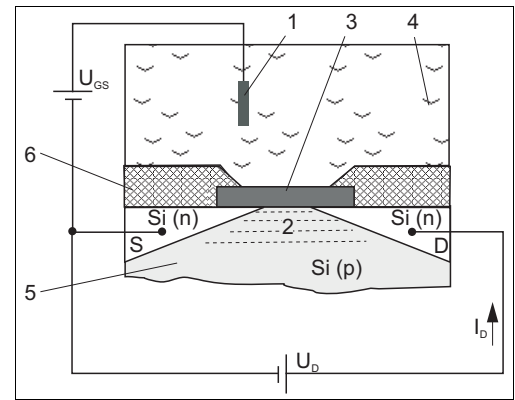


Fig. 2: Principle ISFET

- 1 Reference electrode
- 2 N-conducting channel
- 3 Gate isolator layer
- 4 Medium
- 5 P-doped silicon substrate
- 6 Sensor shaft

With the ISFET, the medium is in direct contact with the gate isolator layer. Therefore, H^+ ions available in the medium, which are located in the medium / gate isolator boundary layer, create the electric field (*gate potential*). Depending on the effect described above, a N-conducting channel is formed and a current between "Source" and "Drain" is induced. Suitable sensor circuits use the dependence on the ion-selective gate potential to create an output signal proportional to the concentration of the ion type.

pH selective IsFET

The gate isolator serves as an ion-selective layer for H^+ ions. The gate isolator is impermeable to the ions as well (isolator effect) but allows reversible surface reactions with the H^+ ions. Depending on the acidic or alkaline character of the measurement solutions, functional groups in the isolator surface accept or reject H^+ ions (amphoteric character of the functional groups). This leads to a *positive* (H^+ acceptance in the acidic medium) or *negative* (H^+ rejection in the alkaline medium) charging of the isolator surface. Depending on the pH value, a defined surface charge can be used to control the field effect in the channel between "Source" and "Drain". The processes which lead to the creation of a charge potential and therefore to a control voltage U_{GS} between "Gate" and "Source" are described with the Nernst equation:

$$U_{GS} = U_0 + \frac{2.3 \cdot RT}{nF} \cdot \lg a_{ion}$$

U_{GS} ... Potential between gate and source

U_0 ... Offset voltage

R ... Gas constant (8.3143 J/molK)

T ... Temperature [K]

n ... electrochemical valueability (1/mol)

F ... Faraday constant (26.803 Ah)

a_{ion} ... Activity of ion kind (H^+)

$\frac{2.3 \cdot RT}{nF}$ Nernst factor

At 25 °C (77 °F), the Nernst factor is -59.16 mV/pH.

1) Metal Oxide Semiconductor

Important characteristics of Tophit CPS 441

■ Resistance to breaking

This is the most obvious feature of the sensor. The complete sensor technology is embedded in a PEEK shaft. Only the highly resistant isolator layer and the reference have direct contact with the medium.

■ Acid or alkaline errors

A further, important benefit compared with the glass electrode is the considerably reduced number of acid or alkaline errors in extreme pH ranges. In contrast to glass electrodes, practically no foreign ions can build up at the ISFET gate. The measuring error of < 0.01 pH (between pH 1 and 13) at 25°C (77 °F) is near by the detection limit.

The figure below shows the acid or alkaline error of the ISFET between pH 1 and 13 and the comparison to the glass electrode (two different pH glasses) at pH values 0.09 and 13.86.

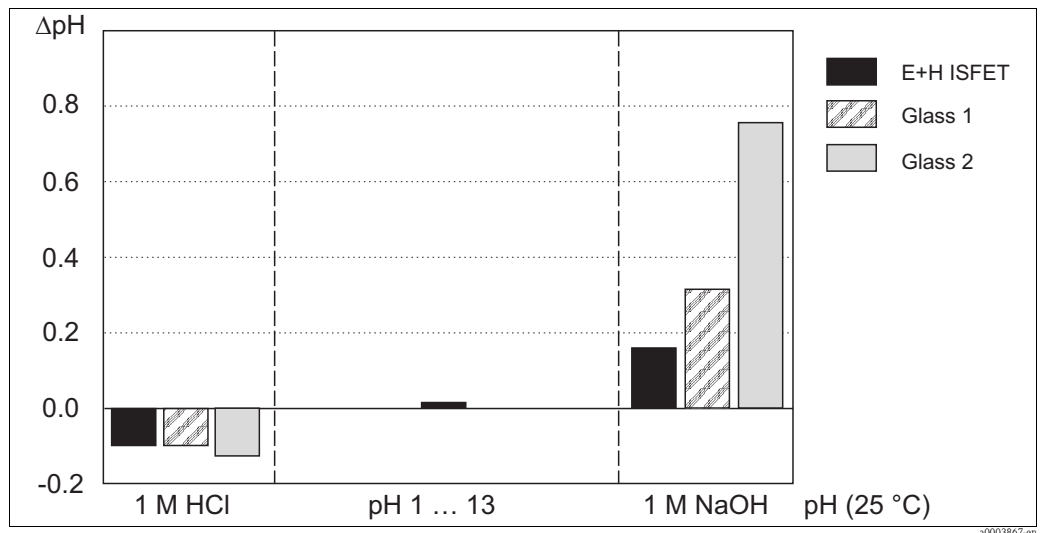


Fig. 3: Comparison of acid and alkaline errors

■ Measurement stability and sensor response time

The ISFET response times are very short over the whole temperature range.

With the ISFET sensor, there is no (temperature-dependent) equilibrium setting as in the source layer of a pH glass of a glass electrode. They can also be used at low temperatures without a deceleration in response time. Large and fast temperature and pH value fluctuations have a smaller effect on the measuring error (hysteresis) than with a glass electrode, as there is no stress exerted on the pH glass.

■ Reference system

The integrated reference electrode of the sensor is a double-chamber reference system with a bridge electrolyte. The benefits are an efficient and stable contact between the diaphragm and the reference lead, and the extremely long poisoning path. The bridge electrolyte is highly resistant to temperature and pressure changes.

■ Isothermic curves

- The Nernst equation defines the dependence of the measuring voltage on the hydrogen ion content (pH value) and the temperature. It is the basis of pH measuring technology and for ISFET sensors too. A temperature-dependent value for the potential change per pH value can be worked out from this equation (isothermic curve, potential change per pH value at a defined temperature).
- The isothermic curves of the ISFET sensor are very close to the theoretical values (→  4). This is further proof for the high pH measurement precision of the sensor.

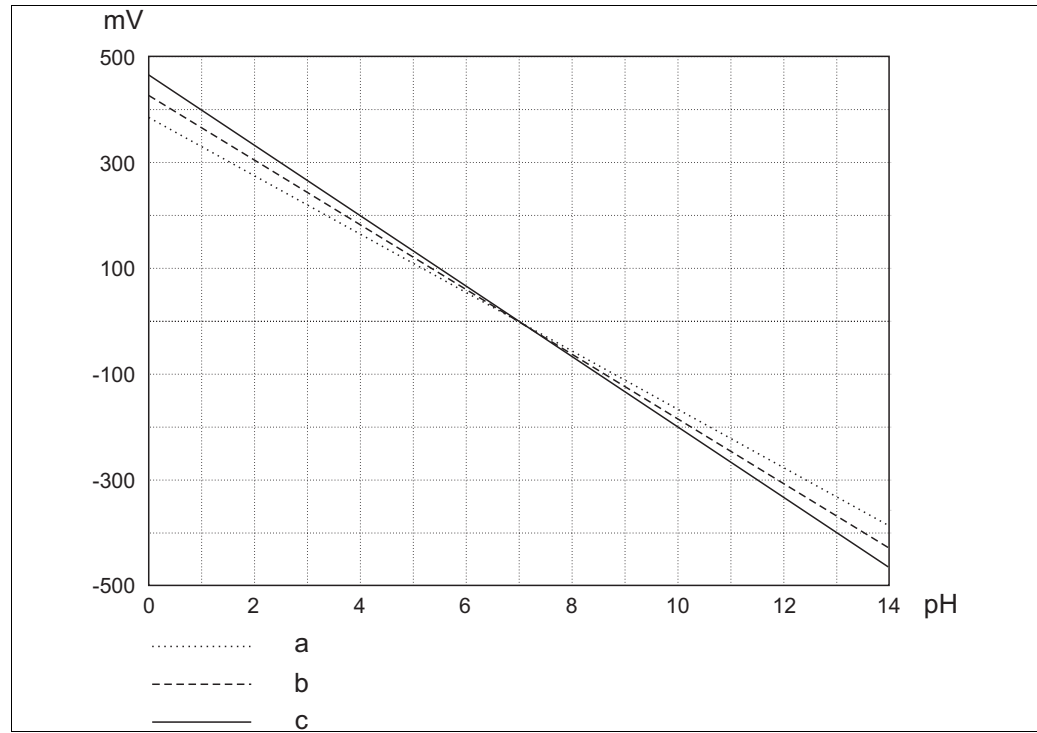


Fig. 4: Isothermic curves

- a Isothermic curve at 8 °C (46 °F), slope -55.8 mV/pH
 b Isothermic curve at 37 °C (99 °F), slope -61.5 mV/pH
 c Isothermic curve at 61 °C (142 °F), slope -66.3 mV/pH

Memosens (CPS441D)**Maximum process safety**

The inductive and non-contacting measured value transmission of Memosens guarantees maximum process safety and offers the following benefits:

- All problems caused by moisture are eliminated.
 - The plug-in connection is free from corrosion.
 - Measured value distortion from moisture is not possible.
 - The plug-in system can even be connected under water.
- The transmitter is galvanically decoupled from the medium. The result: No more need to ask about "symmetrically high-impedance" or "unsymmetrical" (for pH/ORP measurement) or an impedance converter.
- EMC safety is guaranteed by screening measures for the digital measured value transmission.

Data safety through digital data transfer

The Memosens technology digitalizes the measured value in the sensor and transfers it to the transmitter via a contactless connection. The result:

- An automatic error message is generated if the sensor fails or the connection between sensor and transmitter is interrupted.
- The availability of the measuring point is dramatically increased by immediate error detection.
- The digital signals are suitable for application in hazardous areas; the integrated electronics are intrinsically safe.

Easy handling

Sensors with Memosens technology have integrated electronics that allow for saving calibration data and further information such as total hours of operation and operating hours under extreme measuring conditions. When the sensor is mounted, the calibration data are automatically transferred to the transmitter and used to calculate the current measured value. Storing the calibration data in the sensor allows for calibration and adjustment away from the measuring point. The result:

- Sensors can be calibrated under optimum external conditions in the measuring lab. Wind and weather do neither affect the calibration quality nor the operator.
- The measuring point availability is dramatically increased by the quick and easy replacement of precalibrated sensors.
- The transmitter does not need to be installed close to the measuring point but can be placed in the control room.
- Maintenance intervals can be defined based on all stored sensor load and calibration data and predictive maintenance is possible.
- The sensor history can be documented on external data carriers and evaluation programs at any time. Thus, the current application of the sensors can be made to depend on their previous history.

Communication with the transmitter

Always connect digital sensors with Memosens technology to a transmitter with Memosens technology. Data transmission to a transmitter for analog sensors is not possible.

The sensor is connected to the cable connection (CYK10) without contact. The power and data are transferred inductively

Once connected to the transmitter, the data saved in the sensor are read digitally. You can call up these data using the corresponding DIAG menu.

Data that digital sensors save include the following:

- Manufacturer data
 - Serial number
 - Order code
 - Date of manufacture
- Calibration data
 - Calibration date
 - Calibration values
 - Number of calibrations
 - Serial number of the transmitter used to perform the last calibration
- Operational data
 - Date of commissioning
 - Hours of operation under extreme conditions
 - Number of sterilizations
 - Data for sensor monitoring.

Measuring system

The complete measuring system comprises at least:

- ISFET sensor Tophit
- Measuring cable CPK12 (analog, with TOP68 connection) or CYK10 (digital, with Memosens)
- Transmitter, e.g. Liquiline M CM4x, Liquisys M CPM223 (for panel mounting) or Liquisys M CPM253 (field instrument) or Mycom S CPM153.
- Assembly
 - Immersion assembly, e.g. Dipfit W CPA111
 - Flow assembly, e.g. Flowfit P CPA250
 - Retractable assembly, e.g. Cleanfit P CPA471
 - Fixed installation assembly, e.g. Unifit H CPA442

There are additional accessories available depending on the application:

- Topclean S CPC30 or Topcal S CPC310 automatic cleaning system
- Extension cable, VBA, VBM or RM junction box

Food industry

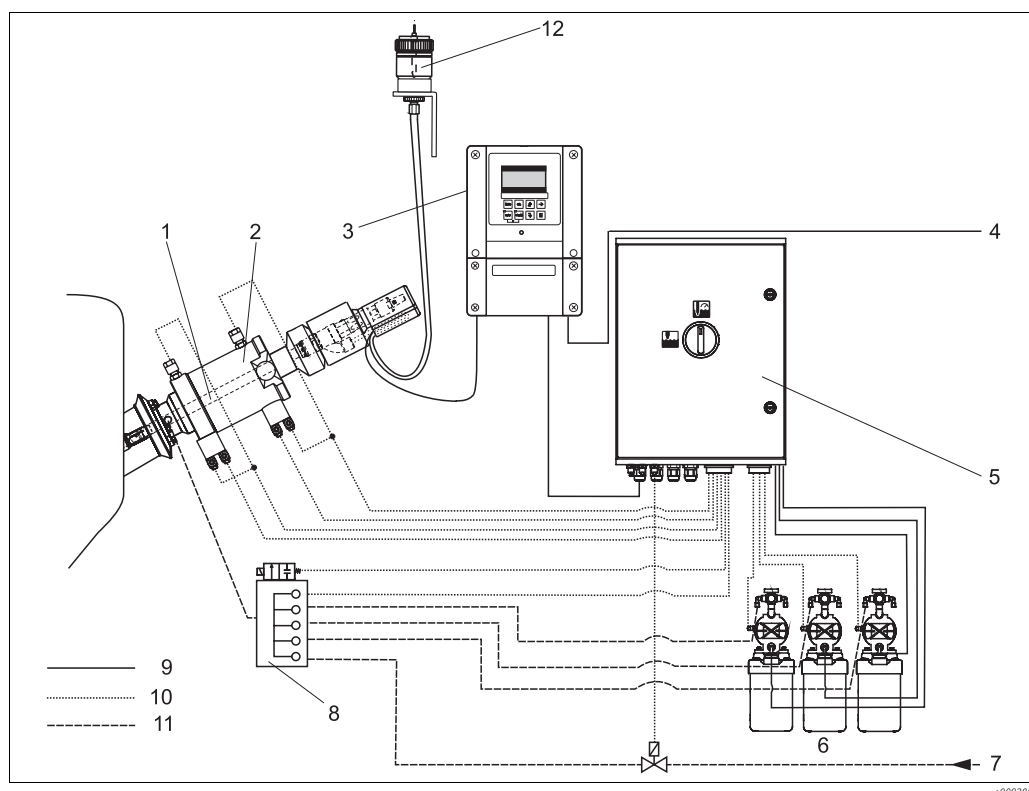


Fig. 5: Measuring system with Topcal S fully automatic measuring, cleaning and calibration system

1	Tophit	6	Cleaner, buffer solutions	10	Compressed air
2	Cleanfit H CPA475	7	Steam, water, cleaner	11	Liquids / cleaner
3	Mycom S CPM153	8	Rinse block	12	CPY7 KCl electrolyte vessel
4	Power supply	9	Power cable		
5	Control unit CPG310				

Process sterilizability is no problem due to the wide range of applications for the ISFET pH sensor, not only relating to temperature but also to pH. There is only a small range of high pH values connected with high temperatures where the sensor is not constantly stable (see "Process"). Media with these characteristics remove the isolator oxide from the ISFET chip. As this is the pH and temperature range of CIP cleaning media, the ISFET pH sensor should only be used in combination with an automatic retractable assembly.

Benefits of the Topcal fully automatic measurement, cleaning and calibration system:

- CIP cleaning
The sensor built into the retractable assembly is automatically "moved" out of the medium before cleaning. In the rinse chamber of the retractable assembly the sensor is cleaned with suitable cleaning solutions.
- Calibration cycles can individually be set.
- Low maintenance costs due to fully automatic cleaning and calibration functions.
- Measuring results are optimally reproducible and the individual value tolerances are very low due to the automatic calibration.

Biotechnology

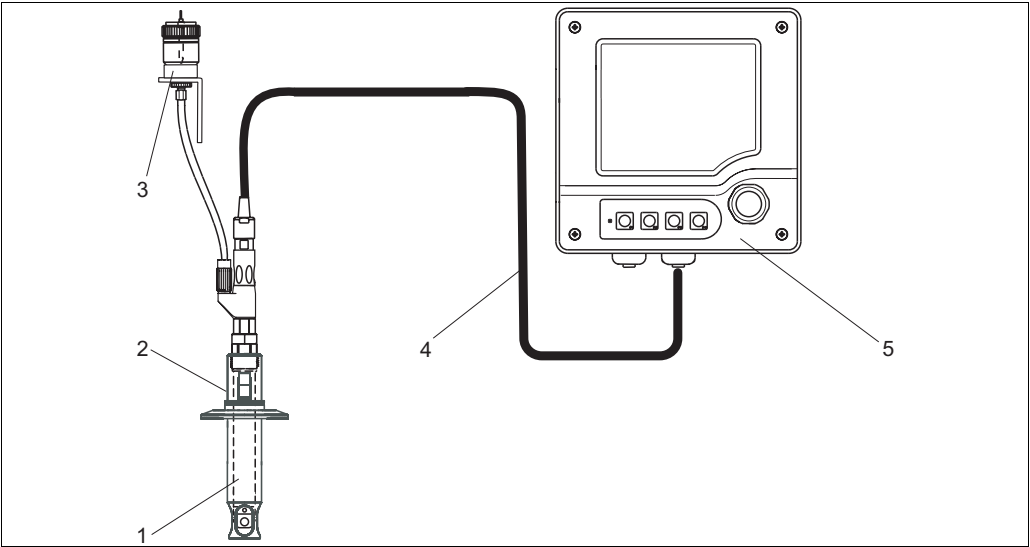


Fig. 6: Measuring system for pharmaceutical and biotechnology applications

- 1 ISFET sensor
- 2 Installation assembly Unifit H CPA442
- 3 KCl electrolyte vessel
- 4 Special measuring cable CPK12 or CYK10
- 5 Transmitter Liquiline CM42

Input

Measured values	pH value Temperature
Measuring range	0 to 14 pH -15 to 135 °C (5 to 275 °F)
	 Caution! Note the process operating conditions.

Power supply

Electrical connection CPS441 The sensor is connected to the measuring transmitter using the special measuring cable CPK12.

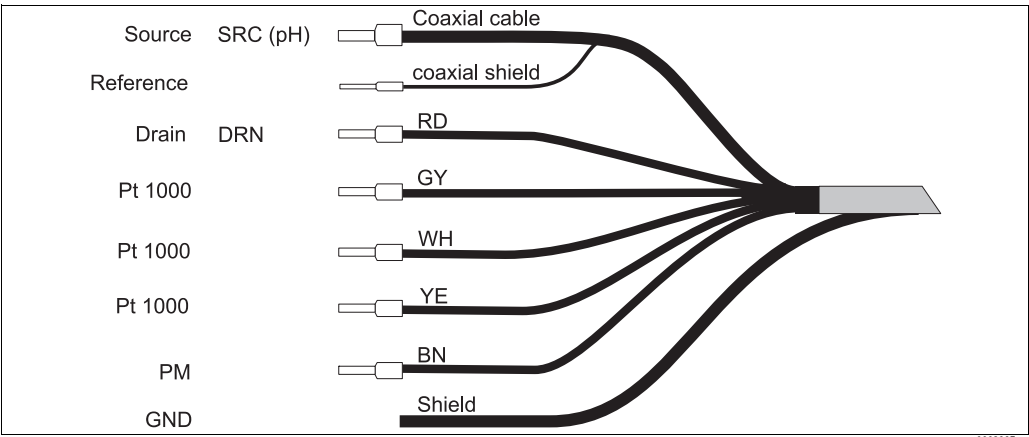
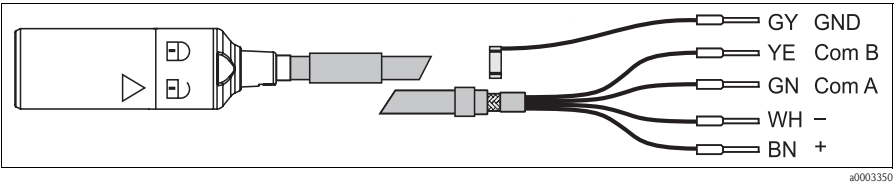


Fig. 7: Special measuring cable CPK12



- Note!**
- The cable cors Yellow and White are connected on the sensor side.
 - Make sure you comply with the instructions for connecting the sensor (wiring diagram) in the Operating Instructions of the transmitter. The transmitter has to be appropriate for the use of ISFET sensors (e.g. Liquiline M CM42, Mycom S CPM153 or Liquisys M CPM223/253-IS).
- A transmitter with only a standard pH input is inappropriate.

Electrical connection CPS441D The sensor is electrically connected to the transmitter by means of the special measuring cable CYK10.



Special measuring cable CYK10

Performance characteristics

Response time	< 5 s	
	for buffer change from pH 4 to pH 7 under reference operating conditions	
	Note!	
	The response of the integrated temperature sensor can be slower with extreme temperature changes.	
Reference operating conditions	Reference temperature:	25 °C (77 °F)
	Reference pressure:	1013 mbar (15 psi)
Maximum measured error	pH:	± 0.2 % of measuring range
	Temperature:	Class B acc. to DIN / IEC 751
Repeatability	± 0.1 % of measuring range	
Start-up drift	Everytime when switching on the measuring device a control loop is set up. During this time the measured value moves to the true value.	
	The settling time depends on the kind of interruption and the interruption time:	
	■ Supply voltage interruption, sensor left in medium: approx. 3 to 5 minutes	
	■ Interruption of the fluid film between pH sensitive ISFET and reference lead: approx. 5 to 8 minutes	
	■ Longer dry storage of the sensor: up to 30 minutes	

Installation

Installation angle	ISFET sensors can be installed in any position, as there is no liquid internal lead. However, in case of an overhead installation, a possible air cushion ²⁾ in the reference system might interrupt the electrical contact between the medium and the diaphragm.
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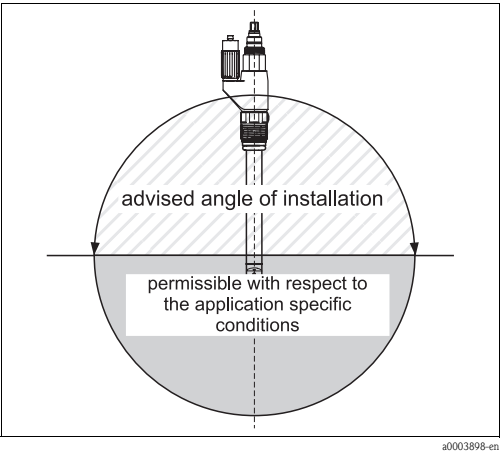


Fig. 8: Angle of installation



- Note!
- Especially in case of overhead installation, make sure you connect the KCl electrolyte vessel without air cushions!
 - The installed sensor may be held under dry conditions for maximum 6 hours (also applies to overhead installation).
 - Make sure you comply with the instructions in the Operating Instructions for the assembly used.

2) The sensor is delivered without air cushions. Air cushion formation is possible in case of working with vacuum, e.g. cleaning out of tanks.

Sensor orientation

When installing the sensor, note the flow-past direction of the medium. The ISFET chip should be fixed at an angle of approx 45° to the flow-past direction ($\rightarrow$  10). Fixing at the correct angle is very easy because of the rotatable plug-in head.

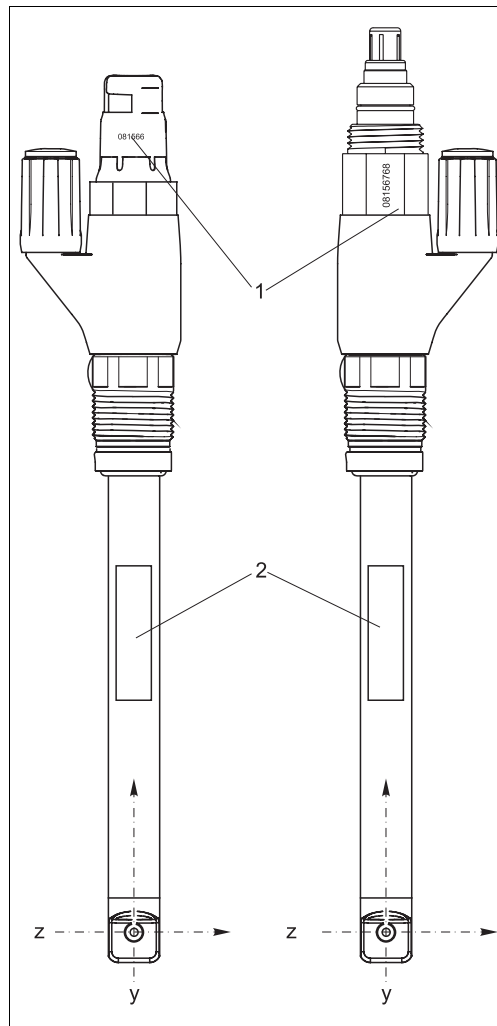


Fig. 9: Sensor orientation, front view

- 1 Serial number
- 2 Nameplate

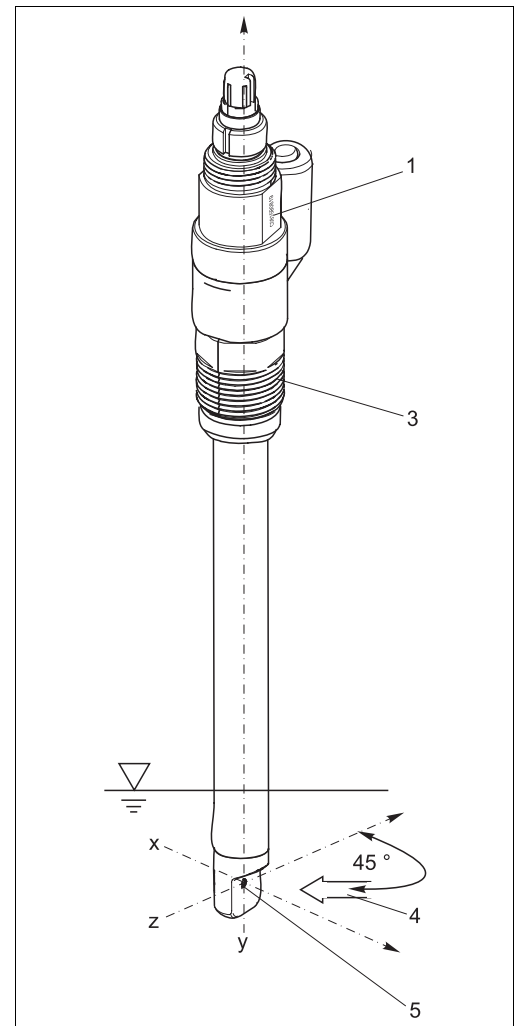


Fig. 10: Sensor orientation, 3d view

- 1 Serial number
- 3 Rotable part of the connection head
- 4 Medium flow-past direction
- 5 ISFET chip

When installing the sensor in an assembly, use the engraved serial number on the connection head for correct sensor orientation. The serial number is always located in the same plane as the ISFET chip and the nameplate (z-y-direction, $\rightarrow$  9).

Environment

Ambient temperature range



Caution!
Danger of frost damage
Do not operate the sensor at temperatures below -15°C (5°F).

Storage temperature

0 to 50°C (32 to 120°F)

Ingress protection

TOP68:
■ IP 68 [1 m (3.3 ft) water column, 50°C (122°F), 168 h], autoclavable up to 135°C (275°F)
Memosens:
■ IP 68 (10 m (32.8) ft water column, 25°C (77°F), 45 d, 1M KCl), autoclavable up to 135°C (275°F)

Sensitivity to light

As every semiconductor the ISFET is light-sensitive (fluctuations of measured value). Avoid direct sunlight during calibration and operation!
Normal environment light does not influence the measurement.

Process

Medium temperature depending on pH

At high temperatures over a long period of time, alkalis irreversibly destroy the gate isolator oxide. The sensor can only be used in the indicated range ($\rightarrow$  11) at a cost to its life span. If it is constantly subjected to the effects of a 2% sodium hydroxide solution at 80°C (176°F), the sensor life span drops to approx. 10-15 hours.

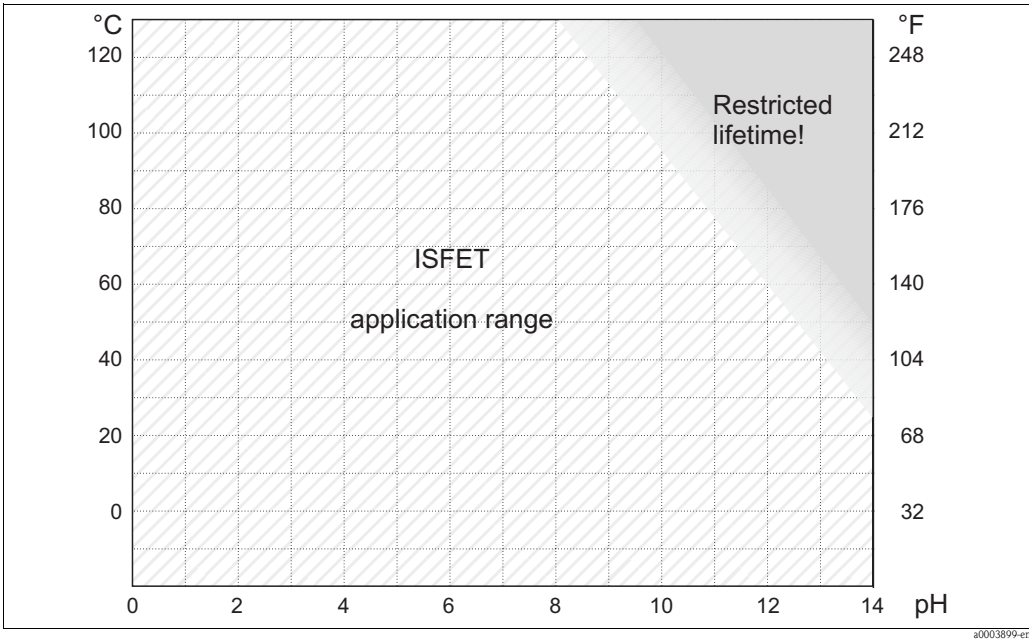


Fig. 11: Temperature and pH

Application at low temperatures

Application range of the sensor according to the order code (see ordering information, product structure)

Pressure-temperature diagram

The process pressure must not be higher than the back pressure to the KCl electrolyte vessel. Otherwise the process pressure effects medium penetration into the KCl electrolyte vessel.

Using the CPY7 electrolyte vessel, the maximum permitted pressure is 10 bar at 20 °C (150 psi at 68 °F). This means, the process pressure has to be lower than 10 bar (150 psi)!

Please, refer to the corresponding chapters in the Operating Instructions of your electrolyte vessel.

Max. 10 bar / 100 °C (145 psi / 212 °F)

Sterilizable: 3 bar / 135 °C (44 psi / 275 °F), 1 h

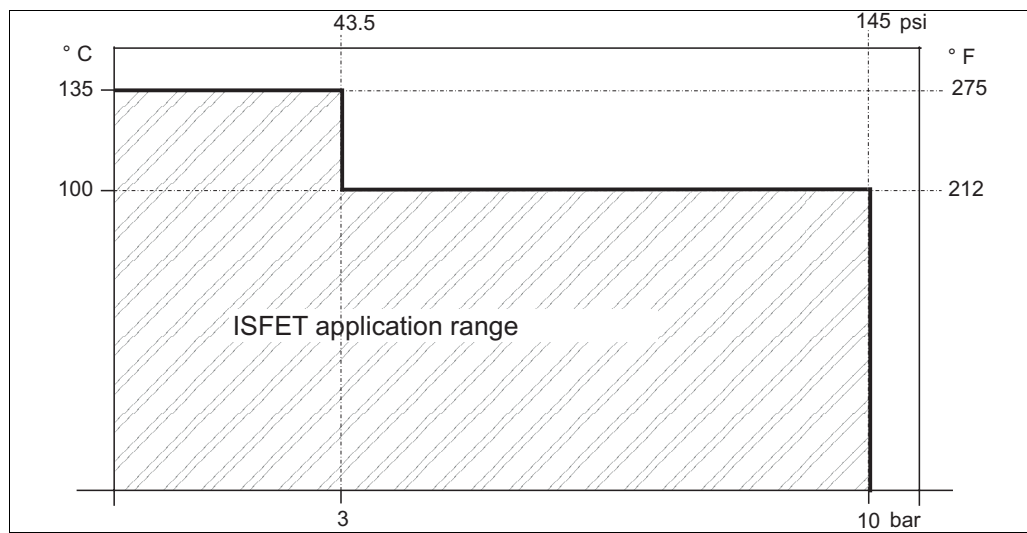


Fig. 12: Pressure and temperature



Caution!

Danger of damage to the sensor

Never use the Tophit for applications outside the given specifications!

Recommended cleaning

Depending on the degree of pollution:

- Hot water / soap (to be preferred)
- Isopropanole
- Chlorine cleaner
- Storing in KCl solution

Mechanical construction

Design, dimensions

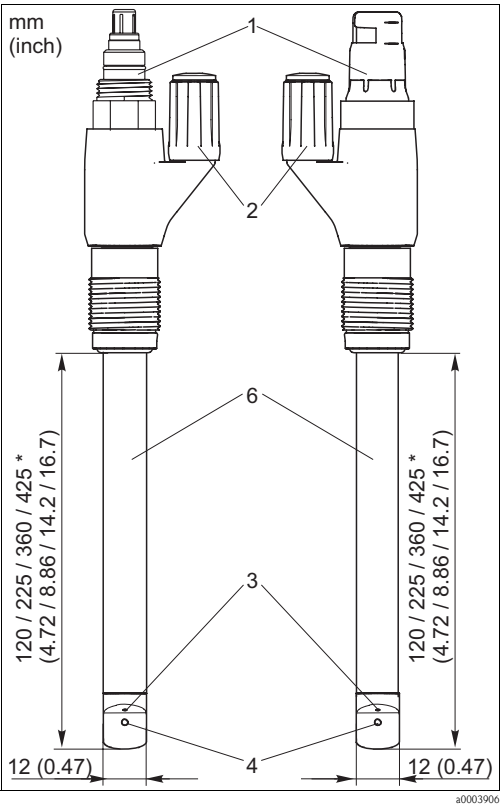


Fig. 13: Tophit CPS441
* depending on the sensor version

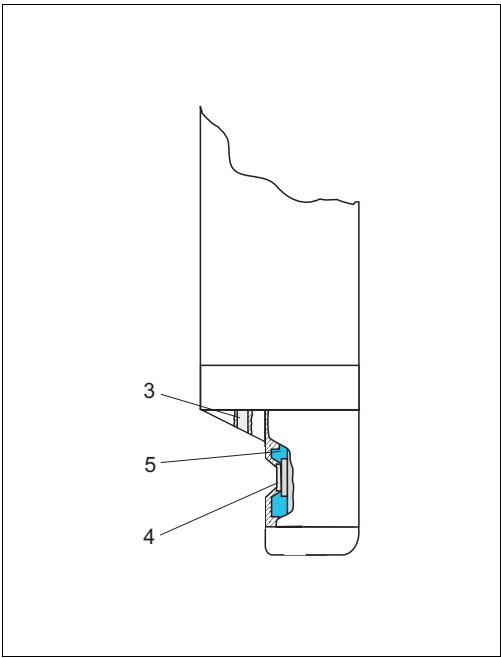


Fig. 14: Sensor head
1 KCl electrolyte connection
2 Plug-in head
3 Reference electrode
4 ISFET chip
5 Seal (EPDM or perfluoro elastomer)
6 Sensor shaft

Weight	0.1 to 0.5 kg (0.2 to 1.1 lbs), depending on the sensor version	
Material	Sensor shaft Seals Diaphragm	PEEK (FDA, 3-A) EPDM (FDA, 3-A) / Perfluoro elastomer Ceramics
Process connection	Pg 13.5	
Surface roughness	R _a < 0.8 µm (31.5 µin)	
Temperature sensor	Pt 1000 (class B acc. to DIN IEC 751)	
Plug-in head	CPS441: ■ ESS; TOP68, rotatable CPS441D: ■ Memosens, rotatable	
Diaphragm	Ceramics, sterilizable	

Ordering information

PEEK ISFET sensor for glass free pH measurement

- For blocking media
- Integrated Pt 1000 temperature sensor
- With liquid KCl electrolyte reference system and ceramics diaphragm
- Application range: pH 0 to 14, -15 to 135 °C (5 to 275 °F)
- For Ex and Non-Ex applications

Product structure CPS 441

Shaft length			
2	120 mm (4.72 in)		
4	225 mm (8.86 in)		
5	360 mm (14.2 in)		
6	425 mm (16.7 in)		
Plug-in head			
ESS	Threaded plug-in head, Pg 13.5, TOP68 rotatable		
Options			
1	Chip sealing: EPDM, hygienic		
2	Chip sealing: Perfluoro elastomer		
CPS441-			complete order code

Product structure CPS 441D

Version			
7	Basic version		
Shaft length			
2	120 mm (4.72 in)		
4	225 mm (8.86 in)		
5	360 mm (14.2 in)		
6	425 mm (16.7 in)		
Electrolyte supply			
A	Shaft hole for KCl refilling, CPA441		
B	KCl hose connection, CPY7		
Additional option			
1	EPDM, hygienic version		
2	Perfluoro elastomer		
Approval			
G	ATEX II 2G EEx ia IIC T3/T4/T6		
1	Non-hazardous location		
CPS441D-			complete order code

Certificates and approvals

Ex approval FM/CSA	■ FM Cl. I, Div. 1, Groups A, B, C, D, associated apparatus Mycom S 153-O/-P or Liquiline M CM42-NP/-PP ■ CSA Cl. I, Div. 1, Groups A, B, C, D, associated apparatus Mycom S 153-S or Liquiline M CM42-NS/-PS
Ex approval ATEX	Device group II, Category 2G Explosion protection EEx ia IIC T3/T4/T6
Sanitary compatibility	Sterilisability validated acc. to EHEDG test criteria (TNO Report V3640 RE) Original of report summary <i>"At the request of Endress+Hauser Conducta, Postfach 100154, D-70826 Gerlingen, Germany the in-place cleanability of the ISFET-Sensor TopHit CPS 471 was assessed according to the test procedure of the European Hygienic Engineering & Design Group (EHEDG). The test results show that the ISFET-Sensor TopHit CPS 471, including the seals, is cleanable in-place at least as well as the reference pipe. The tests were conducted five times on one test object. The results of the tests are comparable with each other. The ISFET-Sensor TopHit CPS 471 complies with the hygienic criteria of the Machinery Directive 98/37/EC, annex 1 (additional essential health and safety requirements for certain categories of machinery) section 2.1 (agri-foodstuffs machinery), the hygienic requirements of EN 1672 – part 2 and with the hygienic equipment design criteria of the EHEDG. The test results obtained are representative of the ISFET-Sensor TopHit type CPS 471 and type CPS 441."</i> ■ Only sensor version with EPDM chip sealing is hygienic ■ Materials in contact with medium are FDA certified ■ Certified acc. to the 3-A standard no. 74-

Accessories



Note!

In the following sections, you find the accessories available at the time of issue of this documentation. For information on accessories that are not listed here, please contact your responsible service.

Transmitters	Liquiline M CM42 ■ Modular two-wire transmitter for Ex and non-Ex areas ■ Hart®, PROFIBUS or FOUNDATION Fieldbus available ■ Ordering acc. to product structure, Technical Information TI381C/07/en Liquisys M CPM223/253 ■ Transmitter for pH and redox, field or panel-mounted housing ■ HART or PROFIBUS available ■ Ordering acc. to product structure, Technical Information TI194C/07/en Mycom S CPM153 ■ Transmitter for pH and redox, one or two channel version, Ex or Non-Ex ■ HART or PROFIBUS available ■ Ordering acc. to product structure, Technical Information TI233C/07/en
Fully automatic measuring systems	Topcal S CPC310 ■ Fully automatic measuring, cleaning and calibration system; Ex or non-Ex ■ In-situ cleaning and calibration, automatic sensor monitoring ■ Ordering acc. to product structure, Technical Information TI404C/07/en Topclean S CPC30 ■ Fully automatic measuring and cleaning system; Ex or non-Ex ■ In-situ cleaning, automatic sensor monitoring ■ Ordering acc. to product structure, see Technical Information TI235C/07/en
Service tool	Memocheck Plus CYP01D, Memocheck CYP02D ■ Tool for the qualification of measuring chains ■ Service tool for quick, on-site checks of measuring systems with Memosens technology ■ Verification of data transmission ■ Ordering acc. to product structure, KA399C/07/a2

Buffer solutions**High quality buffer solutions of Endress+Hauser**

The secondary buffer solutions have been referenced to primary reference material of the PTB (German Federal Physico-technical Institute) and to standard reference material of NIST (National Institute of Standards and Technology) according to DIN 19266 by a DKD (German Calibration Service) accredited laboratory.

pH value			
A	pH 2.00 (accuracy ± 0.02 pH)		
C	pH 4.00 (accuracy ± 0.02 pH)		
E	pH 7.00 (accuracy ± 0.02 pH)		
G	pH 9.00 (accuracy ± 0.02 pH)		
I	pH 9.20 (accuracy ± 0.02 pH)		
K	pH 10.00 (accuracy ± 0.05 pH)		
M	pH 12.00 (accuracy ± 0.05 pH)		
Quantity			
01	20 x 18 ml (0.68 fl.oz) only buffer solutions pH 4.00 and 7.00		
02	250 ml (8.45 fl.oz)		
10	1000 ml (0.26 US gal)		
50	5000 ml (1.32 US gal) canister for Topcal S		
Certificates			
A	buffer analysis certificate		
Version			
1	standard		
CPY20-			complete order code

Assemblies (selection)**Dipfit W CPA111**

- Immersion and installation assembly for open and closed tanks
- Technical Information TI112C/07/en

Flowfit W CPA250

- Flow assembly for installation in pipework
- Technical Information TI041C/07/en

Cleanfit P CPA471

- Retractable assembly for tank and pipe installation
- Technical Information TI217C/07/en

Cleanfit H CPA475

- Retractable assembly for installation in tanks and pipework under sterile conditions
- Technical Information TI240C/07/en

Unifit H CPA442

- Installation assembly for food, biotechnology and pharmaceuticals, with EHEDG and 3A certificate
- Technical Information TI306C/07/en

**Note!**

Ordering of assemblies is acc. to product structure. Please refer to the corresponding Technical Information.

Cables

CPK12 (TOP68)

Cable length			
HA	Cable length: 5 m (16.41 ft), TPE sheath, max. 130 °C (266 °F)		
HB	Cable length: 10 m (32.82 ft), TPE sheath, max. 130 °C (266 °F)		
HC	Cable length: 15 m (49.23 ft), TPE sheath, max. 130 °C (266 °F)		
HD	Cable length: 20 m (65.64 ft), TPE sheath, max. 130 °C (266 °F)		
HF	Cable length: 5 to 20 m (16.41 to 65.64 ft), TPE sheath, max. 130 °C (266 °F)		
HG	Cable length: 16 - 160 ft, TPE sheath, max. 130 °C (266 °F)		
Version			
A	Standard version		
Termination			
1	End sleeve on device side, braided cable screening		
Potential matching			
A	External potential matching with flat plug		
CPK12-			complete order code

CYK10 (Memosens)

Certificates			
A	Standard, non Ex		
G	ATEX II 1G EEx ia IIC T6/T4		
L	Non-hazardous area, silicone free		
O	FM CL.I Div. 1 AEx ia IIC T6/T4		
S	CSA IS CL.I Ex ia IIC T6/T4		
Cable length			
03	Cable length: 3 m / 9.84 ft		
05	Cable length: 5 m / 16.41 ft		
10	Cable length: 10 m / 32.81 ft		
15	Cable length: 15 m / 49.22 ft		
20	Cable length: 20 m / 65.62 ft		
25	Cable length: 25 m / 82.03 ft		
88	... m length		
89	... ft length		
Ready-made			
1	Wire terminals		
CYK10-			complete order code



Note!

Ex versions of CYK10 are indicated by an orange-red coupling end.

Cable extension

CYK12

CYK12 measuring cable

- Non-terminated cable for extension of sensor cables, used in combination with CPK1, CPK9 and CPK12
- Coax and 5 pilot wires
- Sold by the meter:
 - Non-Ex version, black: order no. 51506598
 - Ex-version, blue: order no. 51506616

CYK81

CYK81 measuring cable

- non-terminated measuring cable for extension of sensor cables of e.g. Memosens, CUS31/CUS41
- 2 wires, twisted pair with shield and PVC-sheath (2 x 2 x 0.5 mm² + shield)
- Sold by the meter, order no. 51502543

Junction boxes

Junction box VBA

- For cable extension of pH/ORP sensors, with 10 high-impedance terminals, protection class: IP 65 (≅ NEMA 4X)
- Material: polycarbonate
- Order no. 50005276

Junction box RM

- To lengthen the cable for Memosens or CUS31/CUS41
- With 2 x Pg 13.5
- IP 65 (≅ NEMA 4X)
- Order no. 51500832

Junction box VBM

- For cable extension, with 10 terminals
- IP 65 (≅ NEMA 4X)
- Material: aluminum
- Order numbers:
 - cable entry Pg 13.5: 50003987
 - cable entry NPT ½": 51500177

For more Endress+Hauser product please visit: www.ainstru.com

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