



## OPTISWITCH 6500 C Handbook

Capacitance Level Switch for advanced hygienic applications

All rights reserved. It is prohibited to reproduce this documentation, or any part thereof, without the prior written authorisation of KROHNE Messtechnik GmbH.

Subject to change without notice.

Copyright 2018 by  
KROHNE Messtechnik GmbH - Ludwig-Krohne-Str. 5 - 47058 Duisburg (Germany)

<b>1</b>	<b>Safety instructions</b>	<b>5</b>
1.1	Intended use .....	5
1.2	Certifications .....	5
1.3	Safety instructions from the manufacturer .....	5
1.3.1	Copyright and data protection .....	5
1.3.2	Disclaimer .....	6
1.3.3	Product liability and warranty .....	7
1.3.4	Information concerning the documentation .....	7
1.3.5	Warnings and symbols used .....	8
1.4	Safety instructions for the operator .....	8
<b>2</b>	<b>Device description</b>	<b>9</b>
2.1	Scope of delivery .....	9
2.2	System description .....	9
2.3	Nameplate .....	10
<b>3</b>	<b>Installation</b>	<b>11</b>
3.1	General notes on installation .....	11
3.2	Installation requirements .....	11
3.3	Process connection .....	11
3.4	Mounting of 3A marked products .....	12
3.5	Installation of sliding connection .....	13
<b>4</b>	<b>Electrical connections</b>	<b>15</b>
4.1	Safety instructions .....	15
4.2	Description of electrical connection .....	15
4.3	Electrical connection diagrams .....	16
4.4	Configuration tool .....	17
4.5	Teach-In function .....	19
<b>5</b>	<b>Operation</b>	<b>21</b>
5.1	Start-up .....	21
5.2	Fault diagnosis and corrective action .....	21
<b>6</b>	<b>Service</b>	<b>22</b>
6.1	Availability of services .....	22
6.2	Returning the device to the manufacturer .....	22
6.2.1	General information .....	22
6.2.2	Form (for copying) to accompany a returned device .....	23
6.3	Disposal .....	23

7	Technical data	24
<hr/>		
7.1	Measuring principle.....	24
7.2	Technical data.....	25
7.3	Dimensions and weights .....	28
8	Appendix	29
<hr/>		
8.1	Device order code .....	29
8.2	Order code for process connections options .....	31
8.3	Order code for accessories .....	32
9	Notes	33
<hr/>		

## 1.1 Intended use

The OPTISWITCH 6500 C is a level switch for level detection and dry-run protection for liquids and solids. The device measures liquids such as water and beer and well as viscous and sticky products such as honey or toothpaste. Even dry media can be measured such as sugar or flour.

The measurement is precise and not affected by the mounting position.

Coating of the sensor or condensate is not detected.

## 1.2 Certifications

CE marking



**The device fulfils the statutory requirements of the following EU directives:**

- EMC specification acc. to EN 61326-1 (2006) when installed in enclosed metallic tank. For more data about the EU Directives and European Standards related to this device, refer to the EU Declaration of Conformity. You can find this documentation on the DVD-ROM supplied with the device or it can be downloaded free of charge from the website (Download Center).

The manufacturer certifies successful testing of the product by applying the CE marking.

## 1.3 Safety instructions from the manufacturer

### 1.3.1 Copyright and data protection

The contents of this document have been created with great care. Nevertheless, we provide no guarantee that the contents are correct, complete or up-to-date.

The contents and works in this document are subject to copyright. Contributions from third parties are identified as such. Reproduction, processing, dissemination and any type of use beyond what is permitted under copyright requires written authorisation from the respective author and/or the manufacturer.

The manufacturer tries always to observe the copyrights of others, and to draw on works created in-house or works in the public domain.

The collection of personal data (such as names, street addresses or e-mail addresses) in the manufacturer's documents is always on a voluntary basis whenever possible. Whenever feasible, it is always possible to make use of the offerings and services without providing any personal data.

We draw your attention to the fact that data transmission over the Internet (e.g. when communicating by e-mail) may involve gaps in security. It is not possible to protect such data completely against access by third parties.

We hereby expressly prohibit the use of the contact data published as part of our duty to publish an imprint for the purpose of sending us any advertising or informational materials that we have not expressly requested.

### 1.3.2 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.

### 1.3.3 Product liability and warranty

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation or operation of the devices (systems) will cause the warranty to be void. The respective "Standard Terms and Conditions" which form the basis for the sales contract shall also apply.

### 1.3.4 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of icons as shown below.

### 1.3.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.



**DANGER!**

*This warning refers to the immediate danger when working with electricity.*



**DANGER!**

*This warning refers to the immediate danger of burns caused by heat or hot surfaces.*



**DANGER!**

*This warning refers to the immediate danger when using this device in a hazardous atmosphere.*



**DANGER!**

*These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator's plant.*



**WARNING!**

*Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator's plant.*



**CAUTION!**

*Disregarding these instructions can result in damage to the device or to parts of the operator's plant.*



**INFORMATION!**

*These instructions contain important information for the handling of the device.*



**LEGAL NOTICE!**

*This note contains information on statutory directives and standards.*



• **HANDLING**

This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

➔ **RESULT**

This symbol refers to all important consequences of the previous actions.

## 1.4 Safety instructions for the operator



**WARNING!**

*In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel.  
This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.*



## 2.1 Scope of delivery

**INFORMATION!**

*Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.*

**INFORMATION!**

*Do a check of the packing list to make sure that you have all the elements given in the order.*

**INFORMATION!**

*Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.*

**The following items are supplied with the device:**

- Measuring device
- Hygienic adapter (optional)
- Product documentation

## 2.2 System description

Inputting physical quantities into an SPC or PLC or other computer and control systems requires accurate and reliably working sensors. The sensor is a detecting element that detects level (liquids/solids), identifies a liquid or a changed characteristics of a liquid and converts it into an electrical on/off signal.

## 2.3 Nameplate



### INFORMATION!

Look at the device nameplate to ensure that the device is delivered according to your order.  
Check for the correct supply voltage printed on the nameplate.

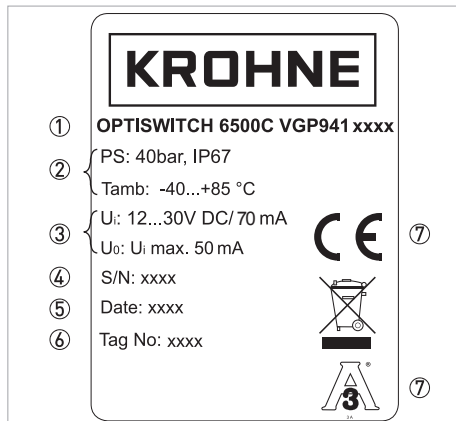


Figure 2-1: Example of a nameplate

- ① Device type
- ② Operating conditions (process pressure, process temperature and ambient temperature)
- ③ Electrical data
- ④ Serial number
- ⑤ Date of manufacture
- ⑥ Tag number if supplied by customer
- ⑦ Approvals and certifications

### 3.1 General notes on installation

**INFORMATION!**

*Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.*

**INFORMATION!**

*Do a check of the packing list to make sure that you have all the elements given in the order.*

**INFORMATION!**

*Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.*

### 3.2 Installation requirements

- Use only the original KROHNE sleeves or adapters. For more data, refer to *Order code for process connections options* on page 31. If other systems are used, no guarantee can be given for proper functionality or leak-tightness.
- The connection thread must have direct electrical contact with the threaded sleeve and the metal tank or pipe.
- Do not use Teflon or paper gaskets between switch and hygienic adapter. The PEEK sensor together with the stainless steel adapter will perform a hygienic tightening. Assumed that the requirements have been followed.
- The tightening torque for the sleeve should be 20...25 N·m / 14.75...18.44 lb<sub>f</sub>·ft (for sliding connection 25...30 N·m / 18.44...22.13 lb<sub>f</sub>·ft).
- If the tank or pipe is electrically non-conductive (e.g. plastic), the metal face of a screw-in sleeve with a diameter of at least 28 mm / 1.1" will suffice as reference ground.

### 3.3 Process connection

The hygienic ½" process sleeve is easy to weld into tanks or pipes. On a welding adapter there is an arrow or a 3A logo. This must be placed upwards when welding the adapter into a tank (horizontal position). This assures that the electrical connection will be pointing downwards. This form of assembly allows installation in conformity with standards of hygiene (to 3A, FDA EHEDG, Regulation (EC) No 1935:2004, Regulation (EC) No 2023:2006).

Various hygienic adapter sleeves are available for fitting to other process connections. For more information please refer to chapter "Order code".

The sensor can be installed in any desired position.

### 3.4 Mounting of 3A marked products

The 3A mark is valid only when the product is mounted in a 3A marked counterpart and installed acc. to the installation manual. Use also a 3A marked O-ring or gasket if relevant.

The 3A marked products conforms to the 3A sanitary standards criteria. Materials and surfaces fulfill the FDA demands.

EPDM O-rings supplied with 3A marked products are conform to sanitary standards class II (8% milk fat).

- ① Use only 3A approved counterparts.
- ② The inspection hole should be visible and drained. Face it downwards that leaking can be observed.
- ③ Mount the device in a self-drained position.
- ④ Level the inner surface of the pipe with the counterpart.
- ⑤ Weld from the inside of the tank, if possible. Welds shall be free from cracks, crevices and grooves. Weldings should be grinded to  $R_a = 0.8 \mu\text{m}$ .

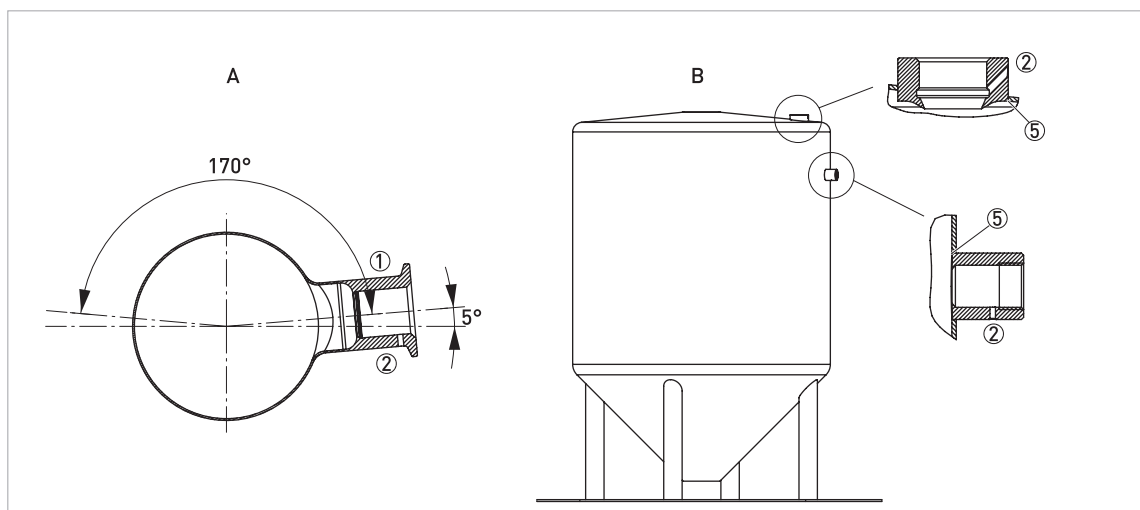


Figure 3-1: Mounting of 3A products in pipe installations (A) or tank installations (B)

### 3.5 Installation of sliding connection

The following drawing shows how the sliding connection can be used for at least 4 applications:

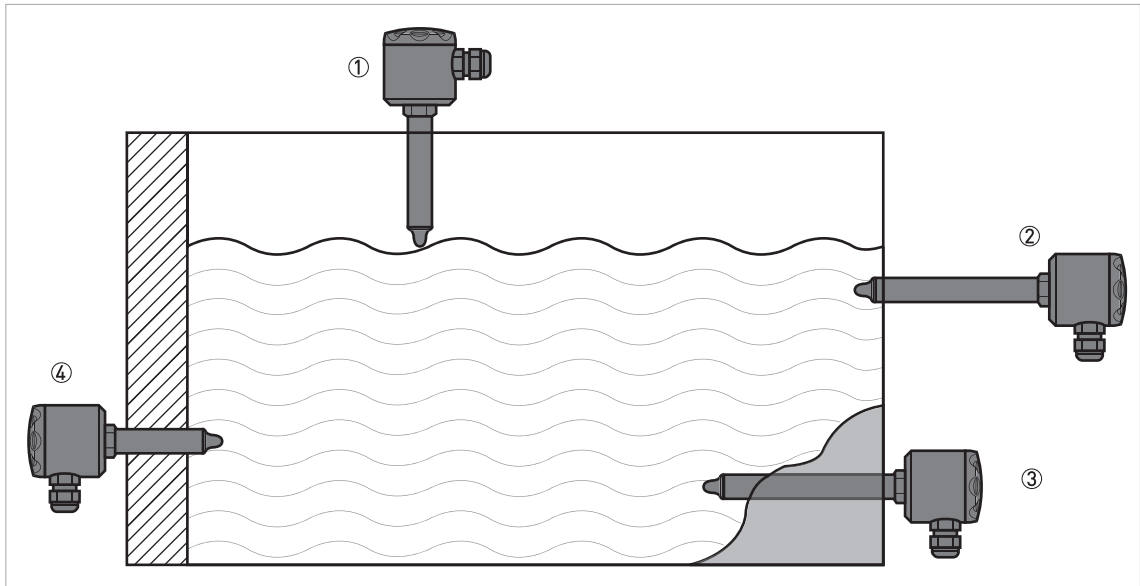


Figure 3-2: Possible applications for sliding connection

- ① Mounted at the top of a tank to adjust to a certain level.
  - Serving as a cooling neck in high media temperature applications.
  - Adjusted to place the sensor tip deeper inside the tank (for lumpy or sticky media).
  - To reach in through insulation material.



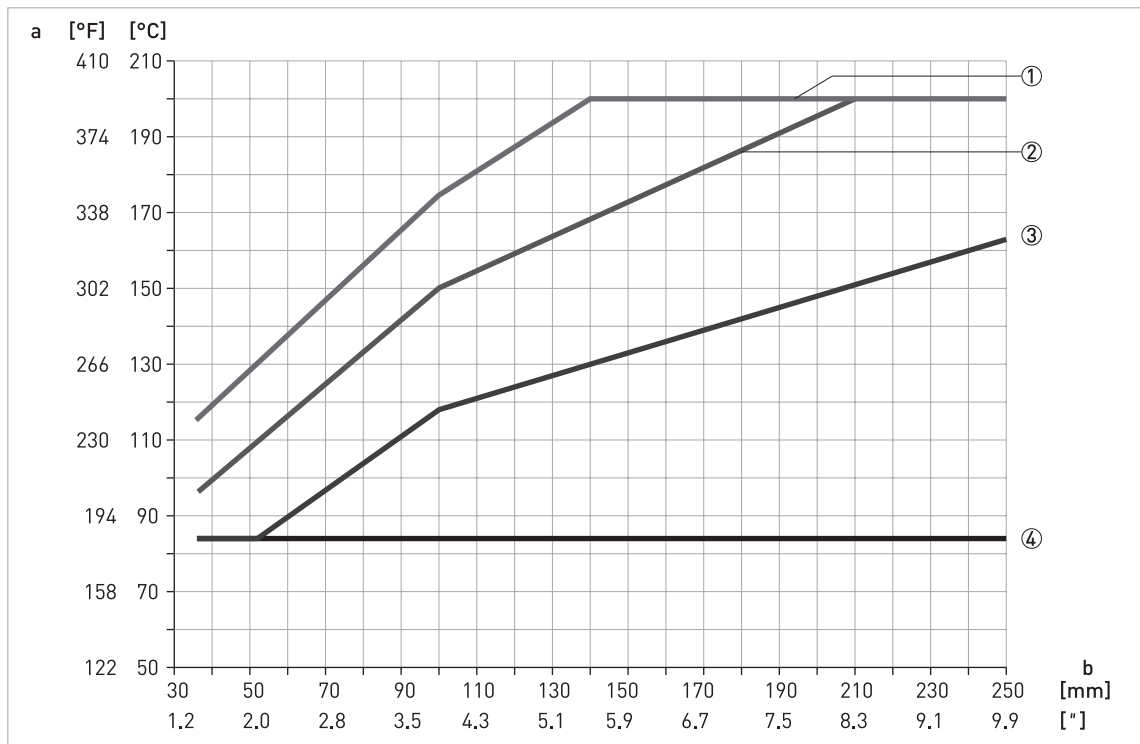
**CAUTION!**

*The OPTISWITCH 6500 C with sliding connection can be mounted with a static pressure up to 16 bar / 232 psi. To prevent personnel injuries, it is essential that the safety chain is mounted correctly and undamaged.*

**CAUTION!**

*It is essential that the max. ambient temperature for the electronics is never exceeded.*

The operating conditions for the sliding connection in different media temperatures and specified ambient temperatures can be found in the following drawing.



**Figure 3-3: Media temperature against external length of sliding connection**

a = operating temperature in [°C] or [°F]

b = external length of sliding connection in [mm] or ["]

- ① T<sub>amb</sub> = max. +40°C / +104°F
- ② T<sub>amb</sub> = max. +60°C / +140°F
- ③ T<sub>amb</sub> = max. +75°C / +167°F
- ④ T<sub>amb</sub> = max. +85°C / +185°F

**Example, how to read the drawing:**

A 250 mm / 9.9" sliding connection is mounted in a tank with a total insertion length of 150 mm / 5.9". Hence the external length of the sliding connection will be:  
 250 - 150 = 100 mm or 9.9 - 5.9 = 4".

The media temperature will be max. +175°C / +347°F.

Read the x-axis at 100 mm / 4" and the y-axis at +160°C / +320°F and find that the ambient temperature must be kept below +40°C / +104°F. In case the radiated heat from the tank will cause a higher ambient temperature at the housing efficient insulation of the tank must be established.

## 4.1 Safety instructions

**DANGER!**

All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!

**DANGER!**

Observe the national regulations for electrical installations!

**DANGER!**

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

**WARNING!**

Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

**INFORMATION!**

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

## 4.2 Description of electrical connection

Terminals 1 and 2 are used for supplying a DC voltage of 12...30 V (M12: terminal 1 and 3). According to polarity, the output will switch to active or inactive when the sensor is immersed (refer to connection diagram). The terminal wired to the negative pole is connected via an internal protective diode to the housing.

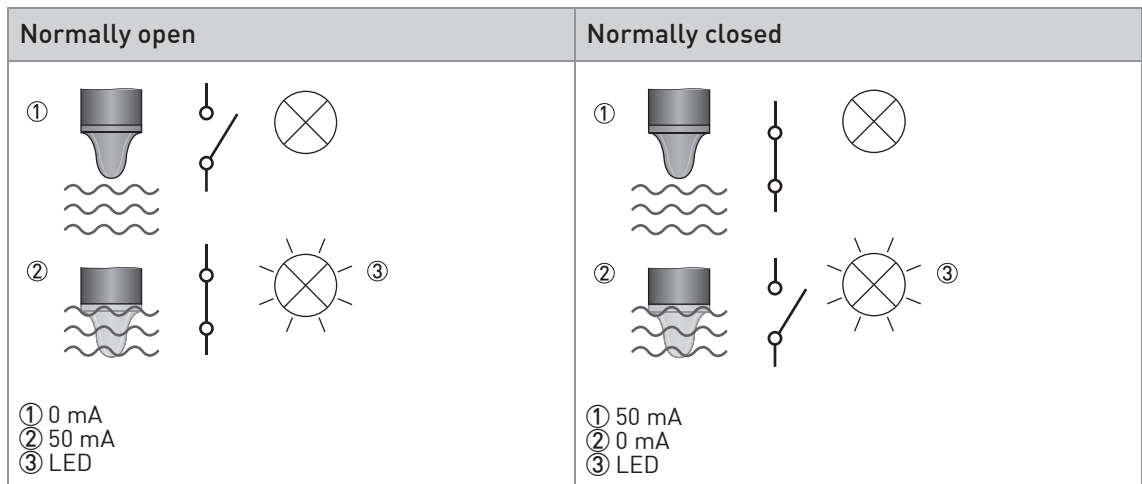
The maximum power consumption is 70 mA (excluding load switched). This value should be taken into account in connection with the recommended use of a fuse. An active switching output (PNP) is available at terminal 5 (M12: terminal 4). The switching voltage is a minimum of 1 V below the supply voltage. The maximum output current is 50 mA. At higher loads, the current is limited accordingly. Damage through shorting cannot occur.

**CAUTION!**

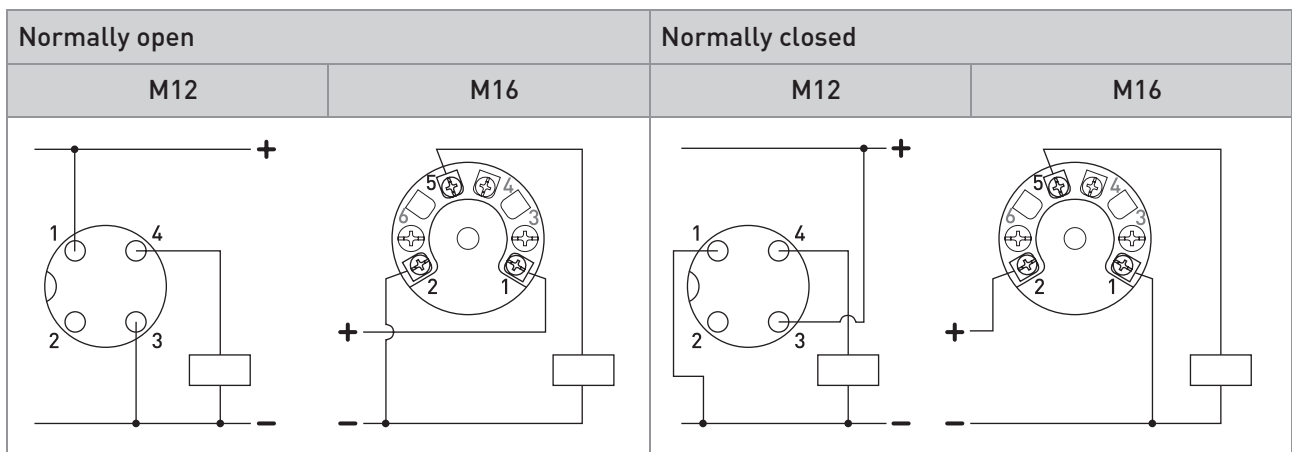
When the top cover is removed, do not look directly at the LED with unshielded eyes or damage to retina may occur!

### 4.3 Electrical connection diagrams

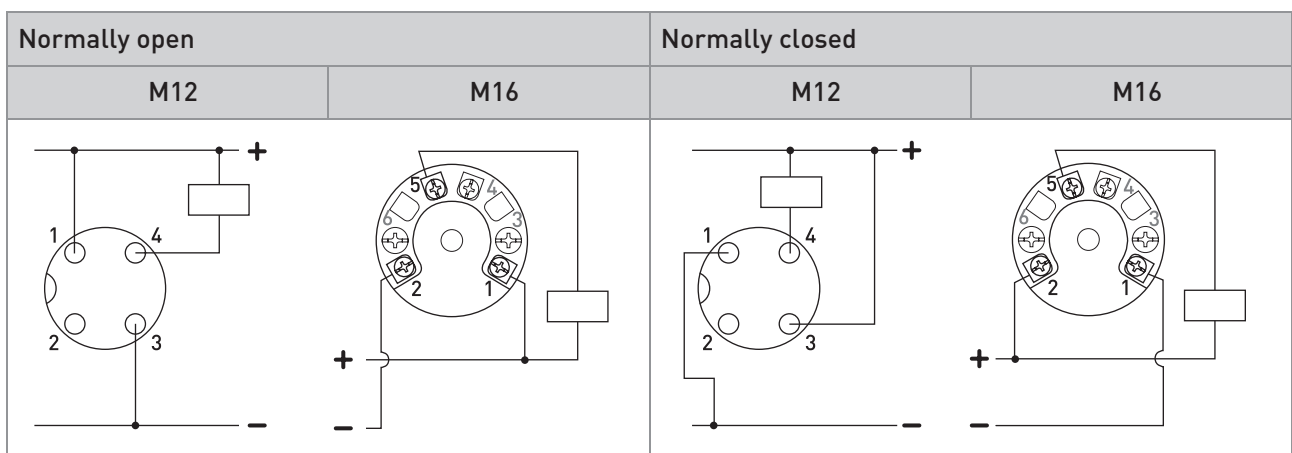
Description of normally open (NO) and normally closed (NC)



#### PNP



#### NPN

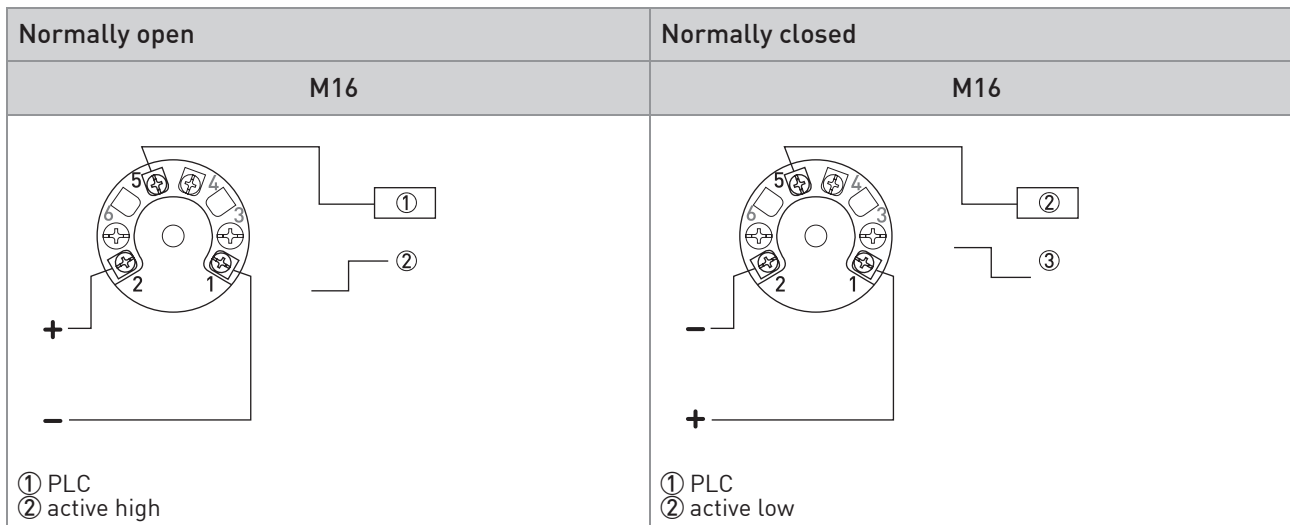


#### M12 plug

1: brown; 2: white; 3: blue; 4: black



## Digital output



## 4.4 Configuration tool

The configuration tool can be ordered optionally to configure the OPTISWITCH 6500 C.

### Scope of delivery:

- Interface unit
- CD with software and product drivers (DTM)
- USB cable
- Cable with 2 alligator clips
- M12 connection cable

The configuration tool connects the OPTISWITCH 6500 C with a computer. With the corresponding software, it is possible to get an online communication with the OPTISWITCH 6500 C.

By using this tool, device information like serial number, switching point range and tag numbers are displayed on the computer. Settings as switching point, damping, polarity and output can be changed.

Self-learning function for the contact output is possible as well as reset function to the default values of the switching point.

By fine-tuning of the switching point settings, OPTISWITCH 6500 C could differentiate between various products which are covering the sensor. In other words, the device could be set to trigger on a specific product and ignore a second product. Basis for this would be a different  $\epsilon_r$  value of these two products.

**DANGER!**

Disconnect the power supply before connecting the configuration tool to the switch!

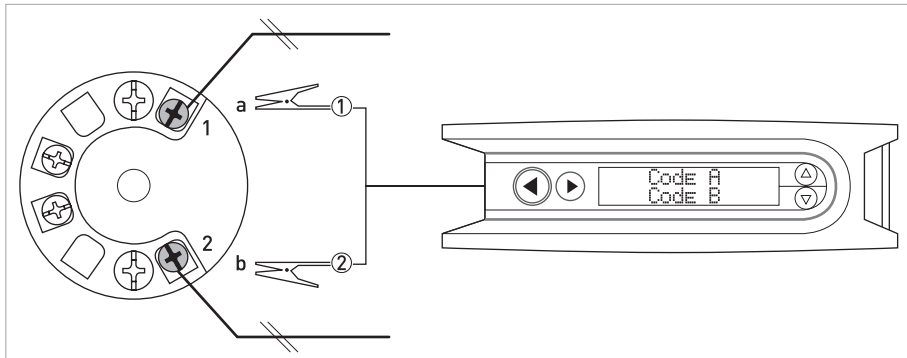


Figure 4-1: Electrical connection of configuration tool

a = red alligator clip

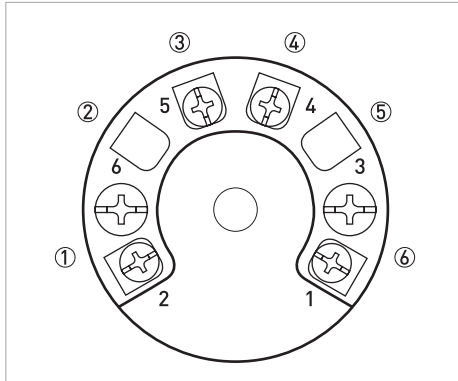
b = black alligator clip

**INFORMATION!**

Ambient temperature range is 0...+50° C / +32...+122° F.

## 4.5 Teach-In function

A Teach-In procedure may be necessary for a medium with a low dielectric constant.



- ① 12...36 VDC / - or (+)
- ② Sensor
- ③ Output
- ④ Teach-In
- ⑤ Cover
- ⑥ 12...36 VDC / + or (-)

Step	Action	LED	Result
1	Connect terminal "Teach-In" to -VDC (T1 or T2) for 3.5 s.	Flash 1 time per second.	Ready for Teach-In.
2	With "no media present" connect "Teach-In" to -VDC shortly.	Light for 2 seconds and then flash.	Register "empty" state. If the media is sticky, foamy, powdery or in other ways leaving parts of the media at the sensor tip this situation has to be established also during the Teach-In process. Otherwise a faulty calibration can be the result.
3	With "media present" connect "Teach-In" to -VDC shortly.	Light for 2 seconds.	Register "full" state, store and return to normal operation with the new settings

If the media is sticky, foamy or powdery or in other ways leaving parts of the media at the sensor tip, this situation has to be established also during the Teach-In process.

**CAUTION!**

- *Make sure that power is on before Teach-In.*
- *For best Teach-In it is important that the actual process conditions are simulated.*
- *During Teach-In mode the light intensity of the LED will decrease to protect your eyes.*

If Teach-In for some reason do not succeed, the device will enter "Error State" and reload factory settings automatically. This state is indicated by a blinking LED (3 short and 1 long blink). The error can normally be fixed by powering off and on. Alternatively remake the "Teach-In" procedure.

The factory settings can always be reloaded by connecting the terminal "Teach-In" to -VDC for more then 6.5 seconds. The reloaded factory settings will be confirmed by pulsing light intensity 3 times.

**INFORMATION!**

*Please observe that the OPTISWITCH 6500 C has been factory adjusted to measure liquids with  $\epsilon_r > 2$ , such as oil.*

*In case the media has a lower  $\epsilon_r$  value (e.g. powder) either a Teach-In procedure must be carried out for the media or alternatively a manual adjustment using the configuration tool can be done. The adjustment must be made at the medias operating temperature to avoid faulty measurements due to temperature drift.*

## 5.1 Start-up

Before connecting to power, please check that the system has been correctly installed. This includes:

- The device must be mechanically safe and mounted in compliance with the regulations.
- Check the leak-tightness at the sleeve.
- Make sure that the cable gland is tight or, as the case may be, the M12 plug is properly screwed down.
- The power connections must have been made in compliance with the regulations.
- Check that the electrical operating data of the power supply are correct.



- Switching on the power.
- ➡ Check for correct switching function.

## 5.2 Fault diagnosis and corrective action

Fault	Cause	Action / elimination
LED not "on"	Sensor cap not in contact with liquid product	-
	Supply voltage < 12 V, permittivity too low	Measure voltage at Pin 1 and 2 (M12: pin 1 and 3)
No switching output	Cable break	Check continuity of cables
	Incorrect polarity of supply	Reverse terminals 1 and 2 (M12: terminal 1 and 3)
	Short-circuit	Check wiring

## 6.1 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.

**INFORMATION!**

*For more precise information, please contact your local sales office.*

## 6.2 Returning the device to the manufacturer

### 6.2.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.

**WARNING!**

*Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:*

- *Due to statutory regulations on environmental protection and safeguarding the health and safety of the personnel, the manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.*
- *This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.*

**WARNING!**

*If the device has been operated with toxic, caustic, radioactive, flammable or water-endangering products, you are kindly requested:*

- *to check and ensure, if necessary by rinsing or neutralising, that all cavities are free from such dangerous substances,*
- *to enclose a certificate with the device confirming that it is safe to handle and stating the product used.*

## 6.2.2 Form (for copying) to accompany a returned device



### CAUTION!

To avoid any risk for our service personnel, this form has to be accessible from outside of the packaging with the returned device.

Company:		Address:	
Department:		Name:	
Tel. no.:		Fax no. and/or Email address:	
Manufacturer's order no. or serial no.:			
The device has been operated with the following medium:			
This medium is:	<input type="checkbox"/>	radioactive	
	<input type="checkbox"/>	water-hazardous	
	<input type="checkbox"/>	toxic	
	<input type="checkbox"/>	caustic	
	<input type="checkbox"/>	flammable	
	<input type="checkbox"/>	We checked that all cavities in the device are free from such substances.	
	<input type="checkbox"/>	We have flushed out and neutralized all cavities in the device.	
We hereby confirm that there is no risk to persons or the environment through any residual media contained in the device when it is returned.			
Date:		Signature:	
Stamp:			

## 6.3 Disposal



### LEGAL NOTICE!

Disposal must be carried out in accordance with legislation applicable in your country.

### Separate collection of WEEE (Waste Electrical and Electronic Equipment) in the European Union:



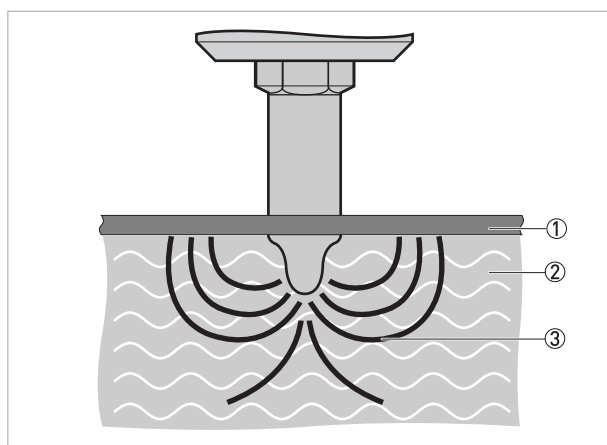
According to the directive 2012/19/EU, the monitoring and control instruments marked with the WEEE symbol and reaching their end-of-life **must not be disposed of with other waste**.

The user must dispose of the WEEE to a designated collection point for the recycling of WEEE or send them back to our local organisation or authorised representative.

## 7.1 Measuring principle

A high frequency signal sweep is radiated from the sensor tip into the tank / pipe. The medium will act as a virtual capacitor, which together with a coil in the sensor head, will form a circuit creating the switching point signal. This virtual capacity will depend of the dielectric value of the medium and it is well defined for most media.

The measurement is precise and unaffected by the mounting position.



- ① Tank wall / pipe wall
- ② Medium
- ③ Line of electric flux



## 7.2 Technical data



### INFORMATION!

- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Downloadcenter).

### Measuring system

Measuring principle	Electromagnetic wave, 100..180 MHz
Application range	Level detection, dry-run protection and media separation of liquids and solids.

### Design

Construction	The measurement system consists of a measuring sensor and the electronic unit which is available in a compact version. The switching point is signalled by a blue LED indication through the housing cover.
Accessories	Comprehensive range of adapters and process connections for hygienic installation. Please refer to the specific data sheet "Accessories".

### Measuring accuracy

Repeatability	±1 mm / ±0.04"
Hysteresis	±1 mm / ±0.04"
<b>Reference conditions acc. to EN 60770</b>	
Temperature	+20°C ±5°C / +68°F ±41°F
Pressure	1013 mbar abs. ±20 mbara / 14.69 psi abs. ±0.29 psia
Humidity (IEC 68-2-38)	60% ±15%

### Operating conditions

<b>Temperature</b>	
Ambient temperature (T <sub>amb</sub> )	Standard length: -40...+85°C / -40...+185°F
Process temperature	Standard and 3A/DN38 connection: -40...+115°C / -40...+239°F
	Sliding connection: -40...+200°C / -40...+392°F (refer to separate diagram)
	Cleaning: < 1 hour, T <sub>amb</sub> < +60°C / +140°F: -40...+140°C / -40...+284°F
<b>Pressure</b>	
Ambient pressure	Atmospheric
Process pressure (tested with water at +20°C / +68°F)	Standard G 1/2 hygienic < 10 bar / 145 psi 3A DN 38 < 40 bar / 580 psi
	Sliding connection: max. 16 bar / 232 psi
<b>Other conditions</b>	
Protection category (acc. to EN 60529)	IP67 equivalent to NEMA 4X

### Installation conditions

Installation	In any position. For detailed information refer to chapter "Installation".
Dimensions and weights	For detailed information refer to chapter "Dimensions and weights".

**Materials**

Sensor housing	Stainless steel 1.4301 / 304
Process connection	Stainless steel 1.4404 / 316L
Sensor insulation	Virgin PEEK, FDA conform
Electrical connection	Plug M12: nickel-plated brass
Surface roughness of wetted part	Ra < 0.8 µm (Ra < 0.4 µm in option)

**Process connections**

Standard	Hygienic G ½; 3A DN38
Other	For process connections options, please refer to the chapter "Order code".

**Electrical connections**

Power supply	12...36 VDC, 35 mA max.
Power consumption	1.7 W
Power-up time	< 2 s
Reaction time	Max. 0.1 s (100 ms)
Damping	0...10 s
Cable entry	M12 (4 pin Polycarbonate) or M12 (4 pin stainless steel)

**Output**

Output (active)	Max. 50 mA, short-circuit and high-temperature protected
Output type	PNP, NPN or Digital output (Push-pull)
Output polarity	See drawing in chapter "Electrical connection".
Active "Low"	NPN and digital output; (-VDC + 2.5 V) ± 0.5 V; R <sub>load</sub> = 1 kilohm
Active "High"	PNP and digital output; (VDC - 2.5 V) ± 0.5 V; R <sub>load</sub> = 1 kilohm
Factory settings	Output PNP, Measure, DC Value > 1.5, Damping 0.1 s <sub>r</sub> > 1.5; damping: 0.1 s
Off Leak Current	+/- 100 µA Max

**Approvals and certifications**

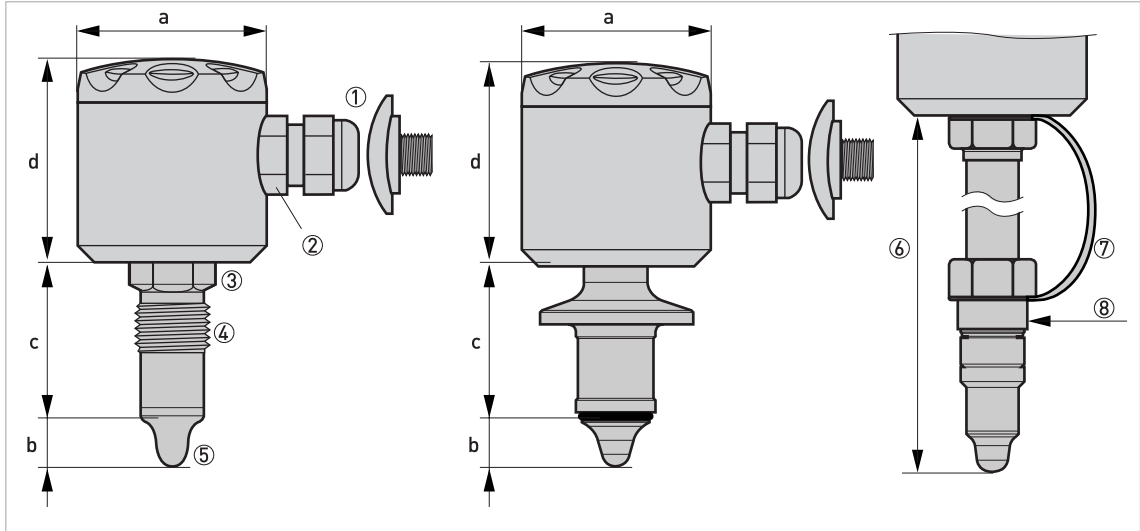
CE	This device fulfils the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE marking.
<b>Other standards and approvals</b>	
Electromagnetic compatibility (EMC)	EN 61326-1 (2006)
Vibration resistance	IEC 68-2-6, GL test 2 (standard and DN38 connection)
Hygiene	3A for G ½ and DN38. Material conform to FDA, EC 1935/2004, EC 2023/2006 and EC 10/2011

Explosion protection	<p><b>ATEX II 1 G Ex ia IIC T4/T5</b></p> <p>Maximum values (for barrier selection):  <math>U_i</math>: 30 V DC ; <math>I_i</math>: 100 mA; <math>P_i</math>: 0.75 W  Internal capacitance, <math>C_i</math>: 43 nF  Internal inductance <math>L_i</math>: 10 <math>\mu</math>H</p> <p>Temperature class:  T1...T4: <math>-40^\circ\text{C} &lt; T_{\text{amb}} &lt; +85^\circ\text{C}</math>  T1...T5: <math>-40^\circ\text{C} &lt; T_{\text{amb}} &lt; +74^\circ\text{C}</math> ①</p>
	<p><b>ATEX II 1 D Ex ta IIC T100 °C Da</b></p> <p>Voltage supply range 30 V DC max.  Temperature class T100 °C: <math>-40^\circ\text{C} &lt; T_{\text{amb}} &lt; +85^\circ\text{C}</math>  Protection class of cable accessory IP67</p>
	<p><b>ATEX II 3 G Ex nA II T4/T5</b></p> <p>Voltage supply range 30 V DC max.  Temperature class T1...T4: <math>-40^\circ\text{C} &lt; T_{\text{amb}} &lt; +85^\circ\text{C}</math>  T1...T5: <math>-40^\circ\text{C} &lt; T_{\text{amb}} &lt; +74^\circ\text{C}</math></p>

① Recommended barrier: PROFSI3-b25100-ALG-LS

### 7.3 Dimensions and weights

G ½ hygienic connection, DN38 hygienic connection and G ½ hygienic sliding connection (from left to right)



- ① M12×1 plug
- ② M16×1.5 cable gland
- ③ WS 22
- ④ G ½
- ⑤ PEEK tip
- ⑥ Sliding connection length (refer to ordering data)
- ⑦ Safety chain
- ⑧ G ½ hygienic sliding nipple

	Dimensions		Approx. weight	
	[mm]	[inches]	[kg]	[lb]
<b>G ½ hygienic connection</b>				
a	Ø55	Ø2.17	0.4	0.9
b	15	0.71		
c	44	1.73		
d	58	2.28		
<b>3A DN38 hygienic connection</b>				
a	Ø55	Ø2.17	0.4	0.9
b	31.5	1.20		
c	50.5	0.70		
d	58	2.28		

The weight for devices with sliding connection depends on the ordered length of the sliding connection (max. 0.5 kg / 1.1 lb).

## 8.1 Device order code

VGP9	4	1	OPTISWITCH 6500 C, with IP67 (equivalent to NEMA 4X), stainless steel housing – materials agree with FDA / Regulation (EC) No 1935:2004 / Regulation (EC) No 2023:2006. The use of VGP7 process connections is required for 3A / EHEDG approved switches.
			<b>Process connection</b>
			<b>For hygienic use in combination with VGP7 process connections</b>
		1	G ½ – standard sensor length 15 mm / 0.59" (for use with hygienic process connections Max +115°C / 239°F)
		4	DN38 hygienic connection incl. EPDM O-ring, 3A certified – insertion length of 18 mm / 0.7" Max. +115°C / 239°F
			<b>For non-hygienic use</b>
		2	G ½ – with rigid extended sensor 100 mm / 3.9" (sliding connection)
		3	G ½ – with rigid extended sensor 250 mm / 9.8" (sliding connection)
			<b>Electrical connection</b>
		1	M16 – polyamid cable gland included
		2	M16 – brass cable gland included
		3	M12 – 4-pin connector plug in nickel plated brass
		4	M12 – 4 pin connector plug in stainless steel
			<b>Approvals</b>
		0	Without
		4	ATEX II 1D Ex tD A20 IP67 100°C ①
			<b>Output configuration</b>
		0	Standard
		1	Customer settings – based on data from an installed device. "% of triggering, damping, hysteresis, output mode" to be specified separately.
			<b>Other Approvals</b>
		0	None
		A	Food contact (FDA rules, EC 1935/2004, EC 2023/2006 and EU 10/2011)
		B	Food contact (FDA rules, EC 1935/2004, EC 2023/2006 and EU 10/2011) + 3-A® + EHEDG – only with process connection. code 1 (G1/2 A) and in combination with hygienic adapters
		C	Food contact (FDA rules, EC 1935/2004, EC 2023/2006 and EU 10/2011) + EHED G– only with process connection code 2 and 3
			<b>Surface finish</b>
		0	Standard 0.8 µm surface roughness
		1	0.8 µm surface roughness – electro-polished
		2	0.4 µm surface roughness
VGP9	4	1	0 Order code

① Available only as LS 6500

Order code for configuration tool (incl. interface unit + USB cable + CD with driver + alligator clips + M12 connection cable)

XGP9	0	0	0	0	1	0	Order code
------	---	---	---	---	---	---	------------

## 8.2 Order code for process connections options

Code	Old code	Description	Max. pressure		Approval options
			[barg]	[psig]	
KPW3-321	HWN 200	Weld-in sleeve (outside Ø30 mm)	100	1450	3-A® / EHEDG
KPW3-322	HWN 210	Collared weld-in sleeve	40	580	3-A® / EHEDG
KPW2-327	HWN 220	Weld-in sleeve with shoulder – for DN65...150 pipes	40	580	—
KPW2-326	HWN 220	Weld-in sleeve with shoulder – for DN25...50 pipes	40	580	—
KPW2-324	HWN 250	Spherical weld-in sleeve – for angled sensor mounting	40	580	—
KPH-32CB	HGA 200	Hygienic adapter for G 1 process connection	40	580	—
KPH1-3236	HSM 251	DN51 adapter SMS 1145 ①	25	363	—
KPH3-3213	HTC 240	1½" Tri-Clamp® DN25/40 DIN 32676, 25/38 mm ISO 2852 ①	40	580	3-A® / EHEDG
KPH3-3216	HTC 250	2" Tri-Clamp® DN50 DIN 32676, 51 mm ISO 2852 ①	40	580	3-A® / EHEDG
KPH3-3221	HMT 225	DN25 conical nozzle DIN 11851 ①	40	580	3-A® / EHEDG
KPH3-3224	HMT 240	DN40 conical nozzle DIN 11851 ①	40	580	3-A® / EHEDG
KPH3-3225	HMT 250	DN50 conical nozzle DIN 11851 ①	10	145	3-A® / EHEDG
KPH3-3254	—	DN40 conical nozzle DIN 11851 Type A ①	10	145	3-A® / EHEDG
KPH3-3255	—	DN50 conical nozzle DIN 11851 Type A ①	40	580	3-A® / EHEDG
KPH3-324E	HVF 250	DN40/50 Varivent® Type N	10	145	3-A® / EHEDG
KPW2-621	—	3-A® DN38 weld in tank part ①	40	580	3-A® / EHEDG
KPW2-626	—	3-A® DN38 weld in pipe extrusion	40	580	3-A® / EHEDG
KPX5-32	HST 200	Allen screw blanking plug	100	1450	—
KPH1-32A1	—	E&H FTL – process connection code EE2, Rd 52	40	580	—
KPH1-32BA	—	E&H FTL – process connection code GQ2 (G ¾), Ø23.7 mm	40	580	—
KPH1-32BC	—	Vegaswing – process connection codes GB/GBV (G ¾), Ø21.3 mm	40	580	—
KPH1-32CD	—	Vegaswing – process connection codes GA/GAV (G 1), Ø21.3 mm	40	580	—
KPI1-A2D	—	G 1½ Cable holder for use with OPTISWITCH 6600 solids	10	145	—

① To order union nuts and gaskets, refer to "Accessories" in the section that follows



### INFORMATION!

All hygienic process connections agree with FDA regulations, Regulation (EC) No 1935:2004 and Regulation (EC) No 2023:2006.

## 8.3 Order code for accessories

Code	Description	New hygienic connection code	Old hygienic connection code	Approval options
KPX4-310	Clamp-ring AISI 304 for 1½" Tri-Clamp® DN40 DIN 32676, 38 mm ISO 2852	KPH1-3213	HTC 240	—
KPX3-7232	EPDM gasket for 1½" Tri-Clamp® DN25/40 DIN 32676 25/38 mm ISO 2852	KPH1-3213	HTC 240	FDA
KPX4-610	Clamp-ring AISI 304 for 2" Tri-Clamp® DN50 DIN 32676, 51 mm ISO 2852	KPH1-3216	HTC 250	—
KPX3-7262	EPDM gasket for 2" Tri-Clamp®, DN50 DIN 32676, 51 mm ISO 2852	KPH1-3216	HTC 250	FDA
KPX4-630	Union nut AISI 304 for DN51 adapter SMS 1145	KPH1-3236	HSM 251	—
KPX3-8160	NBR gasket for DN51 adapter SMS 1145	KPH1-3236	HSM 251	—
KPX4-140	Union nut AISI 304 for DN25 conical nozzle DIN 11851	KPH1-3221	HMT 225	—
KPX3-9110	NBR gasket for DN25 conical nozzle DIN 11851	KPH1-3221	HMT 225	—
KPX4-440	Union nut AISI 304 for DN40 conical nozzle DIN 11851	KPH1-3224	HMT 240	—
KPX3-9140	NBR gasket for DN40 conical nozzle DIN 11851	KPH1-3224	HMT 240	—
KPX2-A22	EPDM gasket for DN40 conical nozzle DIN 11864-1 from A	—	—	—
KPX2-A32	FKM gasket for DN40 conical nozzle DIN 11864- 1 from A	—	—	—
KPX4-540	Union nut AISI 304 for DN50 conical nozzle DIN 11851	KPH1-3225	HMT 250	—
KPX3-9150	NBR gasket for DN50 conical nozzle DIN 11851	KPH1-3225	HMT 250	—
KPX2-B32	FKM gasket for DN50 conical nozzle DIN 11864- 1 from A	—	—	—
KPX2-123	EPDM O-ring 3A DN38	within order code OPTISWITCH 6500	—	3-A® /FDA
KPX2-323	EPDM O-ring for DN40/50 VARIVENT® Type N	KPH1-324E	HVF 250	3-A® /FDA







## KROHNE – Process instrumentation and measurement solutions

- Flow
- Level
- Temperature
- Pressure
- Process Analysis
- Services

Head Office KROHNE Messtechnik GmbH  
Ludwig-Krohne-Str. 5  
47058 Duisburg (Germany)  
Tel.: +49 203 301 0  
Fax: +49 203 301 10389  
info@krohne.com

The current list of all KROHNE contacts and addresses can be found at:  
[www.krohne.com](http://www.krohne.com)

**KROHNE**