



## OPTISYS IND 8100 Technical Datasheet

### Conductivity measuring system

- Quick response time
- 14 selectable measuring ranges
- Indication of concentration ranges



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## 1.1 Inductive conductivity system for liquid analysis

The inductive conductivity system OPTISYS IND 8100 is a compact device designed for the food and cosmetic industry. With its extremely fast response time it is particularly suitable for applications in the field of product separation or CIP plants.

The system offers two 4...20 mA outputs for conductivity and temperature. Instead of conductivity, the system offers also alternatively a concentration output.

The display features different selectable display modes and warnings which can be configured over the touch screen of the display. The background colour can be set in three colours, white green and red; steady or flashing and controlled by the alarm settings. Further there are 2 switch outputs available for alarm or control.

### Highlights

- Compact design for pipes with small diameters (> DN40, 1 1/2")
- Various hygienic process adapters available like Tri Clamp, DIN 11851, SMS or Varivent
- Extended sensor possible
- Insensitive to fouling and polarisation

### Industries

- Food & Beverages
- Pharmaceutical
- Cosmetics

### Applications

- Media separations
- Phase separation of cleaning products, shortening the transition phase of CIP systems
- Control of desalination processes

## 1.2 Design and options



The OPTISYS IND 8100 uses a state of the art touch display. Without opening the cover, a communication with the device is possible.

- measuring ranges
- temperature compensation
- output mode
- relay setup
- display colour
- display setup are adjustable

The same is possible by using the configuration tool.



The OPTISYS IND 8100 has a very fast acting temperature sensor. Within 15 seconds a new temperature value is being detected and the corresponding conductivity is indicated. This makes the identification of the various CIP agents quicker and saves costs for chemicals.



Instead of indicating the conductivity, OPTISYS IND 8100 can display the concentration of caustic soda and nitric acid. A special concentration curve can be programmed by a 30 point linearisation.



Instead of programming the unit over the touch screen, the device can be configured over the configuration tool. All parameters, like conductivity ranges, concentration type, output mode, diagnostic etc. can be programmed via the software and PC. Integrated HELP menu will give detailed information.

## 1.3 Measuring principle

### 1.3.1 Conductivity measurement - inductive

The inductive measurement method enables largely maintenance-free acquisition of conductivity, even in the toughest media conditions. In the principle of inductive measurement, the sensor consists of a sender-recipient-coil. This principle is used here to determine conductivity at solutions with higher values, where direct contact measurement is not well suited. A magnetic field is generated by an electrical coil and a second electrical coil is placed next to it, a certain amount of electric energy will be transferred to it. With an inductive conductivity sensor, the process media flows directly through the middle of the sensor. As the voltage in the first coil is constant, the amount of energy transferred to the second coil is directly proportional to the electrical resistance of the solution. Due to said voltage and the cell constant the conductivity can be measured. Also built into the PEEK body is a Pt100 sensor placed in the tip of the sensor. This is measuring the actual media temperature to enable fast temperature compensation of the conductivity signal, which is very temperature dependent. The OPTISYS IND 8100 also features an analogue 4...20 mA output signal.

The whole sensor is encapsulated in a PEEK sensor body, which has a surface with surface roughness (Ra) <0.8 µm. It is therefore well suited for use in hygienic processes or direct in concentrated acids or alkalis.

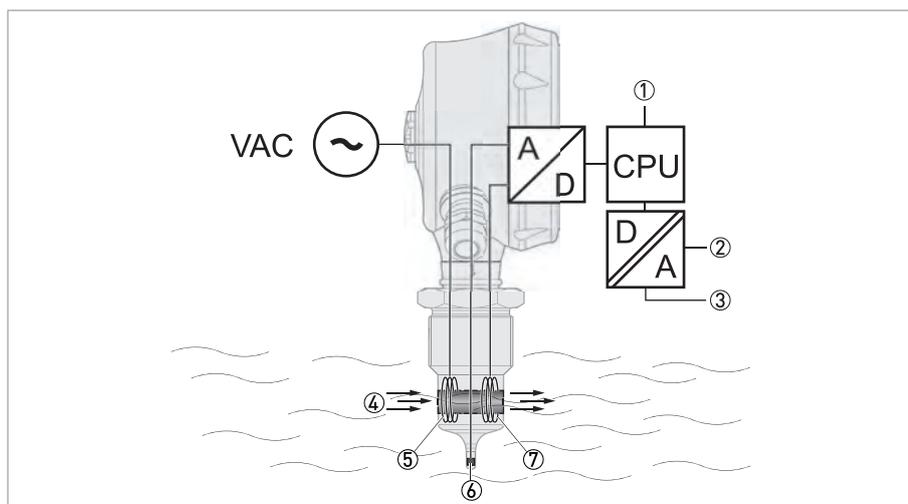


Figure 1-1: Working principle

- ① Range setting over input R1 and R2
- ② Conductivity / concentration 4...20 mA output
- ③ 4...20 mA output temperature
- ④ Flow direction
- ⑤ Primary coil
- ⑥ Pt100 sensor
- ⑦ Secondary coil

## 2.1 Technical data

- *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	Inductive, 2 toroidal core transformers
Measuring range	Conductivity: 0...500 µS/cm up to 1 S/cm, 14 selectable ranges
	Detection limit ≥ 50 µS/cm
	Concentration: 4 factory set media/ranges, 1 customer defined media/ranges
	Temperature: -30...+150°C, free programmable range

### Design

Temperature sensor	Pt100
LED display	Conductivity, temperature, concentration, relay status

### Measuring accuracy

Accuracy (conductivity measuring system incl. transmitter at +25°C/77°F ambient)	Conductivity: <ul style="list-style-type: none"> <li>• ≤1.5% at 0...500 µS/cm</li> <li>• ≤1.0% at 0...1 mS/cm - 0...500 mS/cm</li> <li>• ≤1.5% at 0...1 S/cm</li> </ul> Temperature: <ul style="list-style-type: none"> <li>• ≤0.4% selected range</li> </ul>
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### Operating conditions

Process pressure	≤ 10 bar / 145 psi
Temperature range	-30...+140°C / -22...+285°F (150°C / 302°F < 1 hour)
Ambient temperature with display	-30...+80°C / -22...+176°F
Ambient temperature without display	-40...+85°C / -40...+185°F
Relative humidity (IEC 68.2.38)	98% condensing

### Materials

Housing	Ø 80 mm, stainless steel 1.4301, AISI 304
M16 cable gland	Plastic or stainless steel
M12 plug	Stainless steel
Sensor	37 mm virgin PEEK, 83 mm virgin PEEK 1.4404 (316L)

### Installation conditions

Ingress protection	IP67 / IP69 K
Process connection	G1 hygienic, rotating
Vibrations 1.0 mm (2...13.2 Hz) 0.7g (13.2...100 Hz)	IEC 60068.2.6 - test Fc

**Power supply**

Power	15...35 VDC, 150 mA
Response time conductivity	T <sub>90</sub> < 2 seconds
Response time temperature	T <sub>90</sub> < 15 seconds

**Input and output**

<b>Output, conductivity</b>	
Temperature compensation	0...5% / K, adjustable
Compensation range	-20...+150°C / -4...+302°F
Start-up time	≤ 15 seconds
Output	4...20 mA or 4...20 mA (HART®)
Overrange	21.6 mA
Reference temperature	+25°C / +77°F (adjustable)
<b>Output, temperature</b>	
Measuring range (free programmable)	-30°C...+150°C / -22°F...+302°F
Accuracy	≤ 0.4% of selectable range
Output	4...20 mA
Overrange	21.6 mA
<b>Output, concentration selectable</b>	
NaOH (caustic soda)	0...15% by weight (0...+90°C / +32...+194°F) 25...50% by weight (0...+90°C / +32...+194°F)
HNO <sub>3</sub> (nitric acid)	0...25% by weight (0...+80°C / +32...+176°F) 36...82% by weight (0...+80°C / +32...+194°F)
Customer specific	The customer can define the measuring range (30 point linearisation)
<b>Relay output</b>	
Contacts	2 x solid state relays in the display
Load current	75 mA
Voltage	60 V <sub>p</sub>
<b>Input</b>	
Contact input	R1 and R2, to select one of the 4 measuring ranges

**Approvals**

CE	This device fulfils the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE mark.
	Shock resistance: IEC 60068-2-31, Environmental testing – Part 2: Test Fc
	Electromagnetic compatibility: acc. to EN 61326, NAMUR NE 21
	Low voltage directive: Safety requirements for electrical equipment for measurement, control, and laboratory use in accordance with EN 61010-1:2001
Immunity (EMC)	EN 61000-6-2
Emission (EMC)	EN 50081-1
Hygienic	FDA, 1935 / 2004, 2023 / 2006
	3A

## 2.2 Dimensions

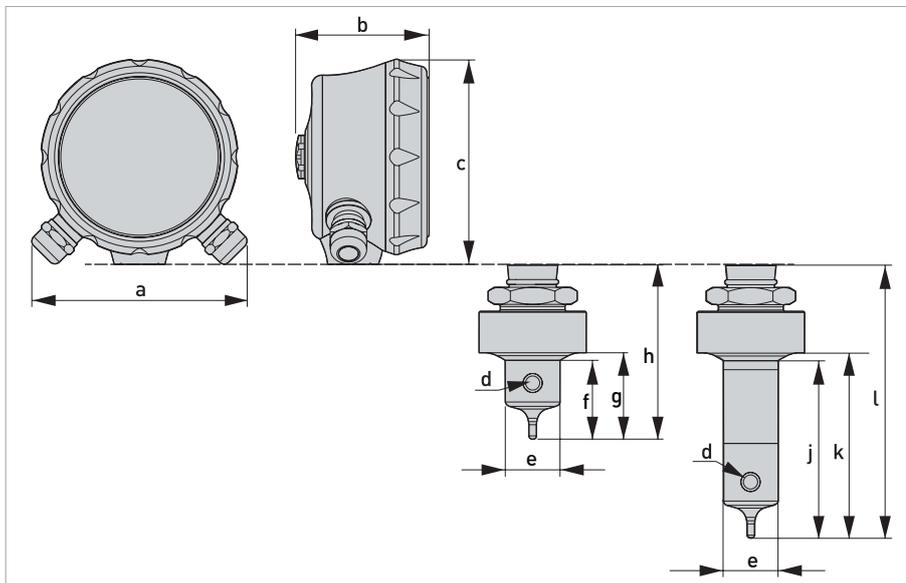


Figure 2-1: Dimensions

	Dimensions [mm]	Dimensions [inch]
a	100	3.94
b	62	2.44
c	95	3.74
d	6.6	0.26
e	25.5	1.01
f	37	1.46
g	40,5	1.6
h	82	3.23
j	83	3.27
k	87	3.43
l	128	5.04

### 3.1 General notes on installation

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

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

*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 Intended use

*Responsibility for the use of the measuring devices with regard to suitability, intended use and corrosion resistance of the used materials against the measured fluid lies solely with the operator.*

*The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose.*

The OPTISYS IND 8100 consists of a conductivity sensor and a transmitter built into one compact unit. The output from the transmitter are two 4...20 mA, which is available for both conductivity, concentration and temperature. The display features more user selectable modes and user specified "product labels" and warnings. Further there are two switch outputs for alarms or control. The background colour can be set in three colours, white, green or red - steady or flashing, controlled by the alarm settings. The transmitter and display can be programmed by either the touch screen on the display or by the configuration tool programming unit and software.

### 3.3 Installation requirements

- For the hygienic version, use only the recommended sleeves or adapters. 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.
- At the hygienic connection G1 do not use Teflon or paper gaskets between the conductivity measuring system 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 25...30 Nm.
- To avoid turbulence problems the conductivity measuring system is recommended to be mounted in a distance of >1 meter from a bend.

### 3.4 Process connection

The hygienic G1 process sleeve is easy to weld into tanks or pipes. This kind of assembly allows installation in conformity with standards of hygiene (to 3A, FDA). The G1 connection can be mounted in any counter thread acc. to ISO 228.

Various hygienic adapter sleeves are available for fitting to other process connections. For more information please look into the data sheet "Accessories for hygienic measuring instruments".

The conductivity measuring system can be installed in any desired position.

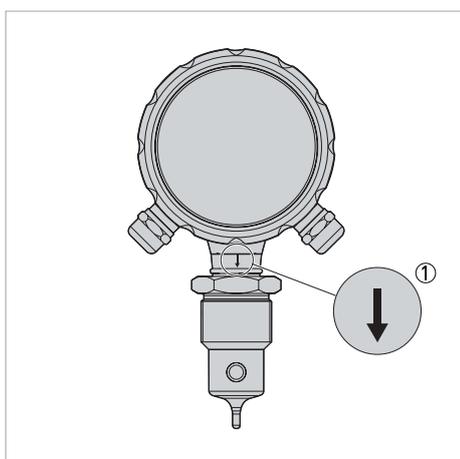


Figure 3-1: Arrow for the flow direction

The arrow on the sensor must be in the flow direction. There must be media flowing without air bubbles through the hole to ensure a correct measurement.

## 4.1 Safety instructions

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

*Observe the national regulations for electrical installations!*

*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.*

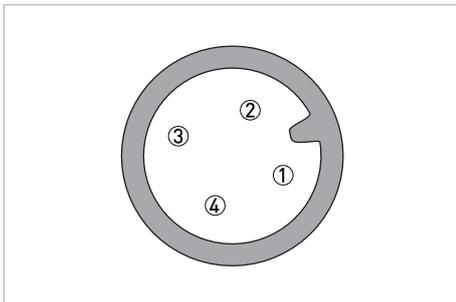
*Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.*

## 4.2 Electrical connection M12

*Moisture on the sensor connector must be avoided! Moisture may cause a short-circuit and a malfunction of the sensor!*

*If moisture has entered the connector dry it with air (e.g. hot air gun).*

A device without display is equipped with two 4 pin connector (left and right side)



**Figure 4-1: 4 pin connector (left side)**

- ① 15...35 VDC (+) / Brown
- ② Conductivity (-) / White / 4...20 mA
- ③ 15...35 VDC (-) / Blue
- ④ Conductivity (+) / Black / 4...20 mA

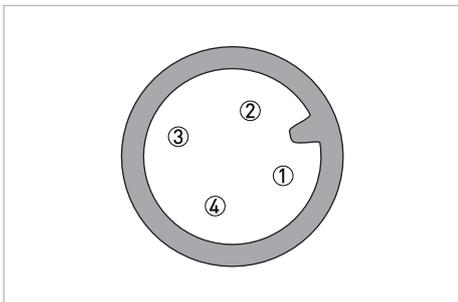


Figure 4-2: 4 pin connector (right side)

- ① R1 / Brown / external input
- ② Temperature (-) / White / 4...20 mA
- ③ R2 / Blue / external input
- ④ Temperature (+) / Black / 4...20 mA

A device with display is equipped with a 4 pin connector (left side) and a 8 pin connector (right side)

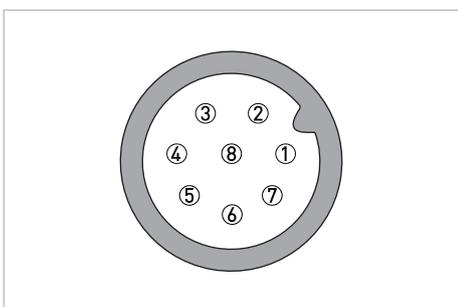


Figure 4-3: 8 pin connector (right side)

- ① R1 (external input) / White
- ② Temp. (+) (4...20 mA) / Brown
- ③ Relay 2 / Green
- ④ Relay 2 / Yellow
- ⑤ Relay 1 / Grey
- ⑥ Relay 1 / Light red
- ⑦ Temp. (-) (4...20 mA) / Blue
- ⑧ R2 (external input) / Red

### 4.3 Electrical connection cable glands

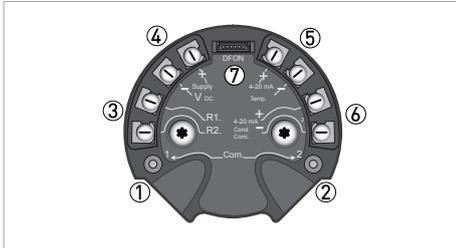


Figure 4-4: Connection overview transmitter

- ① COM 1
- ② COM 2
- ③ R1 and R2 (contact input)
- ④ Supply+ and Supply-
- ⑤ Temp+ and Temp- (output)
- ⑥ Cond.+ and Cond.- (output)
- ⑦ UnitCom (ribbon cable to display)

Range	R1 (contact input)	R2 (contact input)
1 (0...200 mS/cm)	Not connected	Not connected
2 (0...20 mS/cm)	24 VDC	Not connected
3 (0...2 mS/cm)	Not connected	24 VDC
4 (0...500 $\mu$ S/cm)	24 VDC	24 VDC

*The end value for conductivity can be freely chosen to the customer requirement.*

*The table of the conductivity ranges above shows the default settings from the factory and can be changed over the menu.*



Figure 4-5: Overview display

- ① Not connected
- ② Not connected
- ③ Relay 2 / Green
- ④ Relay 2 / Yellow
- ⑤ Relay 1 / Grey
- ⑥ Relay 1 / Light red
- ⑦ COM 1
- ⑧ COM 2
- ⑨ UnitCom (ribbon cable to transmitter)

#### To connect the configuration tool

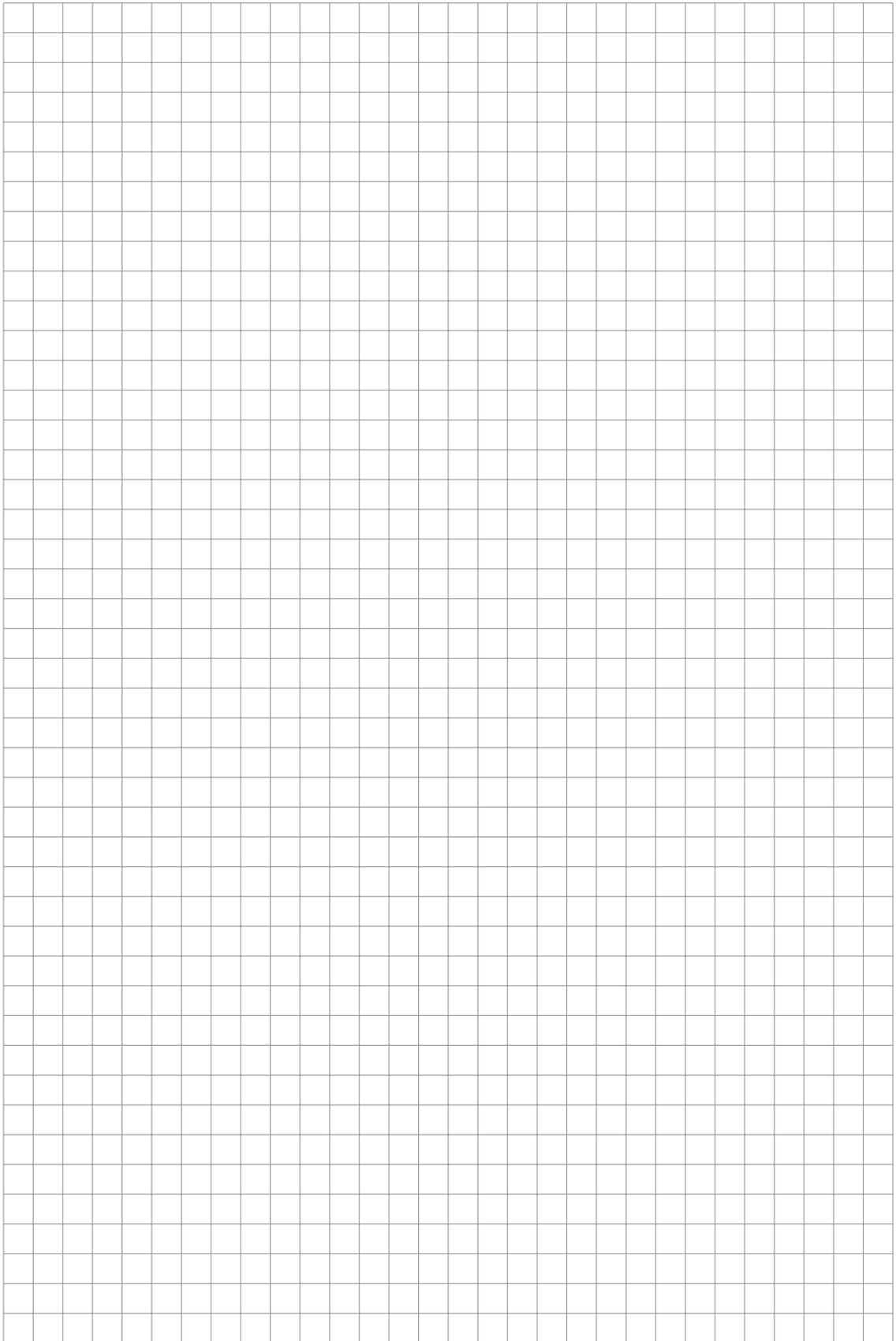
COM 1	Red clip
COM 2	Black clip



## 5.2 Order code process connection

The characters of the order code highlighted in light grey describe the standard.

VGP7	4	0	0	Type
				Process connection G1 (hygienic)
				1 Weld in sleeve HWN 500
				8 DIN 11851 conical nozzle DN50 HMM 550
				B DIN 11851 conical nozzle incl. rotating nut and gasket DN 50 HMT 550
				C Varivent flange type N HVF 550
				D Tri clamp 2", DN50 DIN 32676, ISO 25/33 7/38 mm, HTC 540
				U DIN 11851 conical nozzle incl. rotating nut and gasket DN 40 HMT 540
				V Tri clamp 1 1/2", DN25/40 DIN 32676, ISO 25/33 7/38 mm, HTC 540
				W SMS adapter 51 mm HSM 551
				Z Allen screws blanking plug HST 500
				<b>Surfaces</b>
				0 Standard
				1 Electro-polished inside
				Material test / certification
				0 Without
				1 Confirmation on wetted, pressure exposed material APZ 3.1 B- EN 10204
VGP7	4	0	0	





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