



## OPTIBAR PSM 1010 Handbook

Electronic pressure switch with recessed diaphragm for general application

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## 1.1 Intended use

**CAUTION!**

*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.*

**INFORMATION!**

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

The **OPTIBAR PSM 1010** pressure transmitter is designed to measure the absolute pressure and gauge pressure in gases and liquids.

## 1.2 Technical limits

The device was constructed solely for use within the technical limits indicated on the nameplate and in the technical data. Applications outside of these limits are not permitted and could lead to significant risk of accident. For this reason, observe the following limits:

- Do not exceed the maximum working pressure (MWP).
- Do not exceed the indicated permissible operating temperature range.
- The permissible ambient temperatures given may not be exceeded or undershot.
- Check the materials used for the wetted parts (e.g. gasket, process connection, separating diaphragm etc.) for suitability as regards process compatibility.

## 1.3 Certification

### CE marking

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

- EMC Directive 2014/30/EU
- EMC specification acc. to EN 61326-1:2013
- RoHS Directive 2011/65/EU

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

### Pressure equipment directive (PED)

Devices with a permissible pressure  $PS \leq 200$  bar (20 MPa) comply with Pressure equipment directive (PED) 2014/68/EU Article 4 Section (3) and are not subject to a conformity assessment. These devices were designed and manufactured in accordance with sound engineering practice (SEP).

The CE marking on the device does not apply to the Pressure Equipment Directive.

**DANGER!**

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

## 1.4 Safety instructions from the manufacturer

### 1.4.1 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.

### 1.4.2 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.

### 1.4.3 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.

### 1.4.4 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 cannot 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.

### 1.4.5 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.

## 1.5 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 in ordered version
- For mechanical connections DIN 3852: O-ring (pre-assembled)
- Product documentation



**INFORMATION!**

*Assembly materials and tools are not part of the delivery. Use the assembly materials and tools in compliance with the applicable occupational health and safety directives.*

## 2.2 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.

The device can be identified by its nameplate. It provides the most important data.

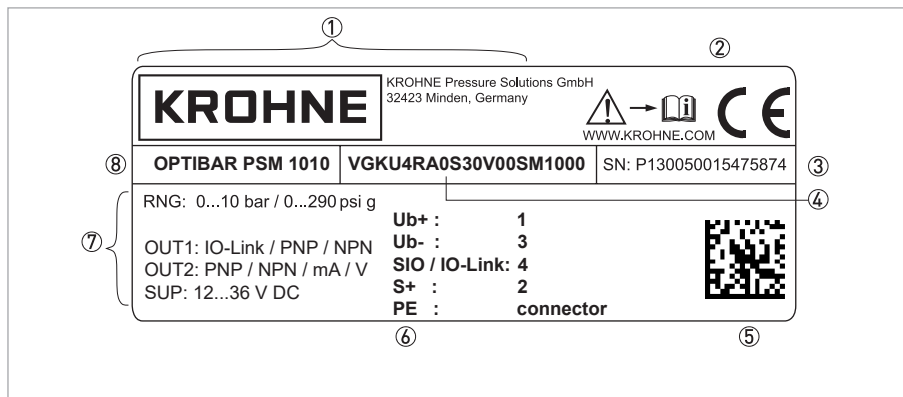


Figure 2-1: Example for a nameplate

- ① Manufacturer logo and address
- ② CE marking and other approvals (e.g. ATEX, PED,...)
- ③ Serial number
- ④ Type code
- ⑤ Barcode
- ⑥ Electrical connection diagram
- ⑦ Specifications for process conditions (measuring range, MWP (= Maximum Working Pressure) and electrical data (signal output and power supply))
- ⑧ Product name

### 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 specifications

**WARNING!**

*Install the device only when depressurised and without power!*

**DANGER!**

*For installation the respective regulations for explosion protection have to be fulfilled.*

**INFORMATION!**

*For installations outdoor and in damp areas, the following points must be observed:*

- To ensure that no moisture can get into the connector, the device should be connected electrically immediately after installation. Otherwise a moisture admission has to be prevented e.g. by using a suitable protection cap.*
- Select an installation if possible, where a mounting position allows draining of spray and condensate. Sealing surfaces should not be submerged!*
- When using devices with cable glands or output, the cable should be looped facing down so that any liquid that collects on the cable can drip off.*
- Install the device so it is protected from direct sunlight. In the worst case scenario, the permissible operating temperature will be exceeded in the presence of direct sunlight. This can negatively affect or damage the functionality of the device. In addition, it can lead to temporary measuring errors if the internal pressure of the device increases due to the sunlight.*
- When installing outside where the risk of lightning or overvoltage may exist and damage the device, we recommend installing suitable overvoltage protection between the supply device or control cabinet and the device.*

**INFORMATION!**

- Handle this highly sensitive electronic measuring device with care, both in and out of the packaging!
- Only remove the packaging and any protection cap from the device immediately before installing to prevent damage to the diaphragm! Keep the supplied protection cap! Remove the protection cap slowly and carefully to avoid any negative pressure on the diaphragm.
- Handle the unprotected diaphragm with extreme care; it is very easily damaged.
- A device with a gauge reference in the housing (small hole next to the electrical connection) must be installed so that the gauge reference necessary for measurement is protected from dirt and moisture. Should the pressure transmitter be exposed to fluid admission, the air pressure compensation is blocked by the gauge reference. Accurate measurement in this state is not possible. It can also result in damage to the pressure transmitter.
- Ensure that no mechanical stress is applied to the pressure port during installation as this may result in a shift in the characteristic curve. This applies in particular to very small pressure ranges as well as to devices with plastic pressure ports.
- With hydraulic systems, arrange the device so that the pressure port faces up (venting).

### 3.3 Mounting

**WARNING!**

Do not screw in using the housing! Tightening this way can cause damage to the rotary mechanism on the housing.

**CAUTION!**

- Prior to installing the transmitter, it is essential to verify whether the version of the device on hand completely fulfils the technical and safety requirements of the measuring point. This applies in particular to the measuring range, overpressure resistance, temperature, explosion protection and operating voltage.
- Check the materials used for the wetted parts (e.g. gasket, process connection, separating diaphragm etc.) for suitability as regards process compatibility.
- The device must not be heated by radiated heat (e.g. exposure to the sun) to an electronics housing surface temperature above the maximum permissible ambient temperature. If it is necessary to prevent damage from heat sources, a heat protection (e.g. sun shade) has to be installed.

#### 3.3.1 Installation steps for connections acc. to DIN 3852



- Make sure that the O-ring fits properly in the intended groove.
- Ensure that the raised face of the receiving part has a smooth surface.
- Screw the device into the thread by hand.
- Devices with wrench flats must be tightened with a wrench. For information on tightening torque refer to the following table.

Wrench size	Tightening torque [Nm]
<b>Wrench size of steel</b>	
G1/4	approx. 5
G1/2	approx. 10
G3/4	approx. 15
G1	approx. 20
G1 1/2	approx. 25

Wrench size	Tightening torque [Nm]
<b>Wrench size of plastic</b>	
All sizes	max. 3

Table 3-1: Tightening torques for devices with wrench flats

### 3.3.2 Installation steps for connections acc. to EN 837



- When sealing, use a suitable gasket that corresponds to the product and pressure to be measured (e.g. a copper gasket).
- Ensure that the raised face of the receiving part has a smooth surface.
- Screw the device into the thread by hand.
- Then tighten the device with the wrench.

Wrench size	Tightening torque [Nm]
G1/4	approx. 20
G1/2	approx. 50

Table 3-2: Tightening torques

### 3.3.3 Installation steps for NPT connections



- When sealing, use a suitable sealing agent that is compatible with the product (e.g. PTFE tape).
- Screw the device into the thread by hand.
- Then tighten the device with the wrench.

Wrench size	Tightening torque [Nm]
1/4 NPT	approx. 30
1/2 NPT	approx. 70

Table 3-3: Tightening torques

## 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 Terminal assignment



**WARNING!**

Install the device only when depressurised and without power!

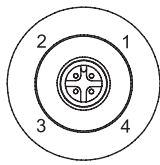
		
Electrical connections	Description	M12x1 (4-pin)
Supply +		1
Supply -		3
Signal 1	IO-Link / PNP / NPN switchable (SIO)	4
Signal 2	PNP / NPN / mA / V switchable	2
Shielding		Pressure-port

Table 4-1: Terminal assignment

## 4.3 Electrical connection diagrams

### Configuration of switching output

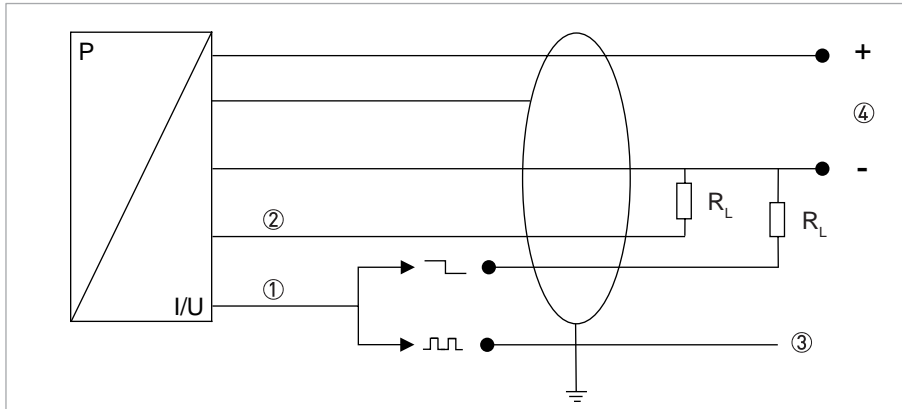


Figure 4-1: Electrical connection diagram 3-wire, switching output

- ① Signal 1
- ② Signal 2
- ③ IO-Link Master
- ④ Power supply

### Configuration of analogue output

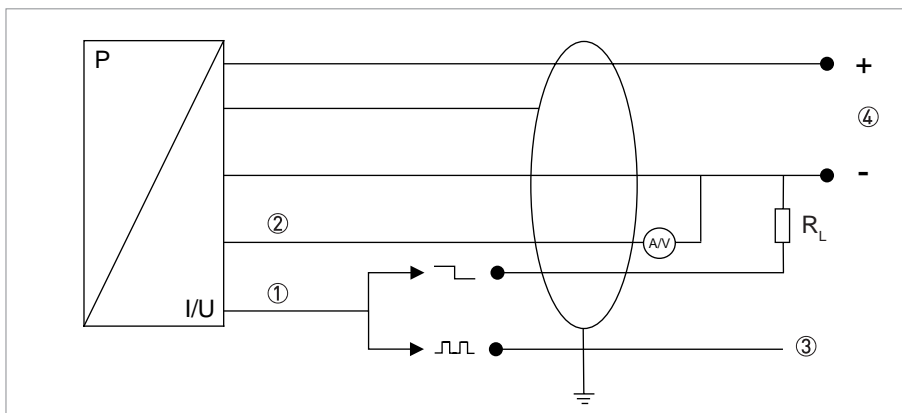


Figure 4-2: Electrical connection diagram 3-wire, analogue output

- ① Signal 1
- ② Signal 2
- ③ IO-Link Master
- ④ Power supply

## 4.4 Switching output signals

The output for the switching signals can be configured with two different function, both for normally open and normally closed actuators.

### Window function

When the window function is activated, the output signal is set when the applied pressure is within the upper (FH) and lower (FL) pressure threshold:

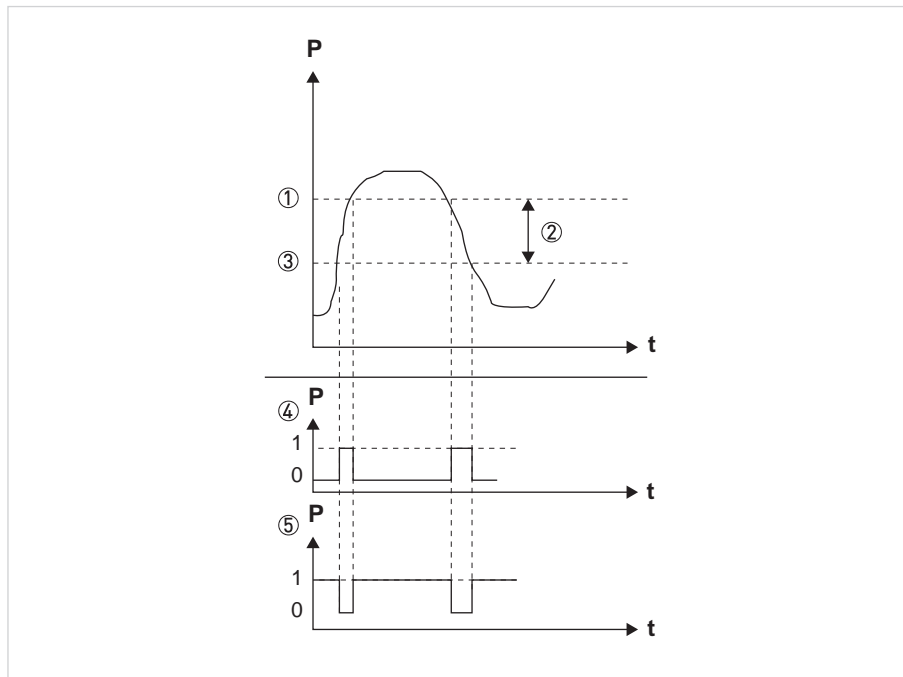


Figure 4-3: Switching output signals (window function)

- ① FH (window high)
- ② Pressure range
- ③ FL (window low)
- ④ Hno (normally open)
- ⑤ Hnc (normally closed)



### Hysteresis-function

When the hysteresis-function is activated, the output signal is activated when the pressure reaches the switching pressure (SP) and deactivated when the release pressure (rP) is applied:

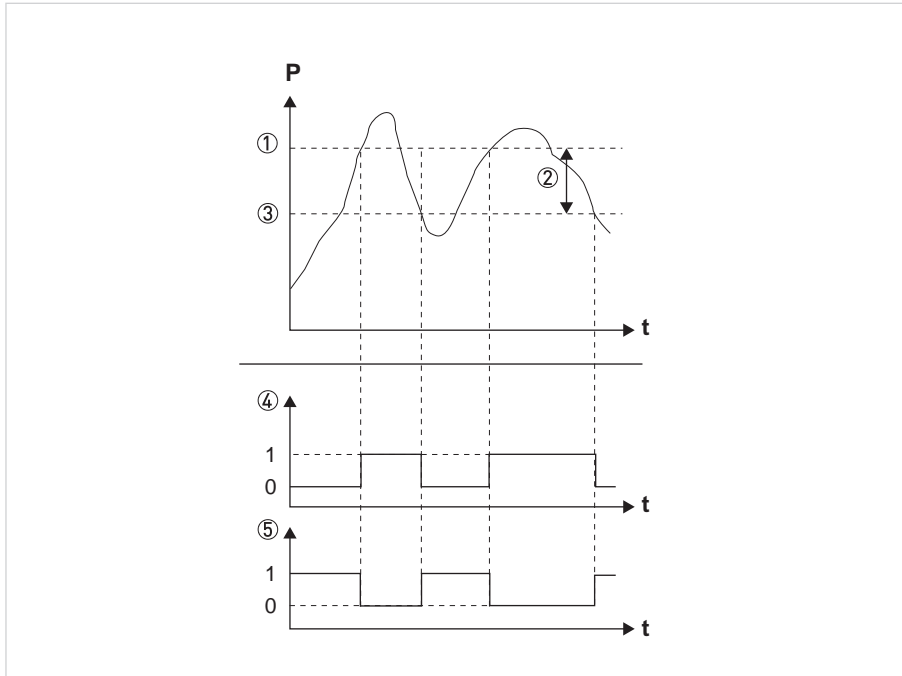


Figure 4-4: Switching output signals (hysteresis-function)

- ① SP (switch-on point)
- ② Hysteresis
- ③ rP (release point)
- ④ Hno (normally open)
- ⑤ Hnc (normally closed)

### Hysteresis-function

To eliminate an unintended switching signal caused by pressure spikes, a damping-constant (dr, dS) can be configured for both switching-functions:

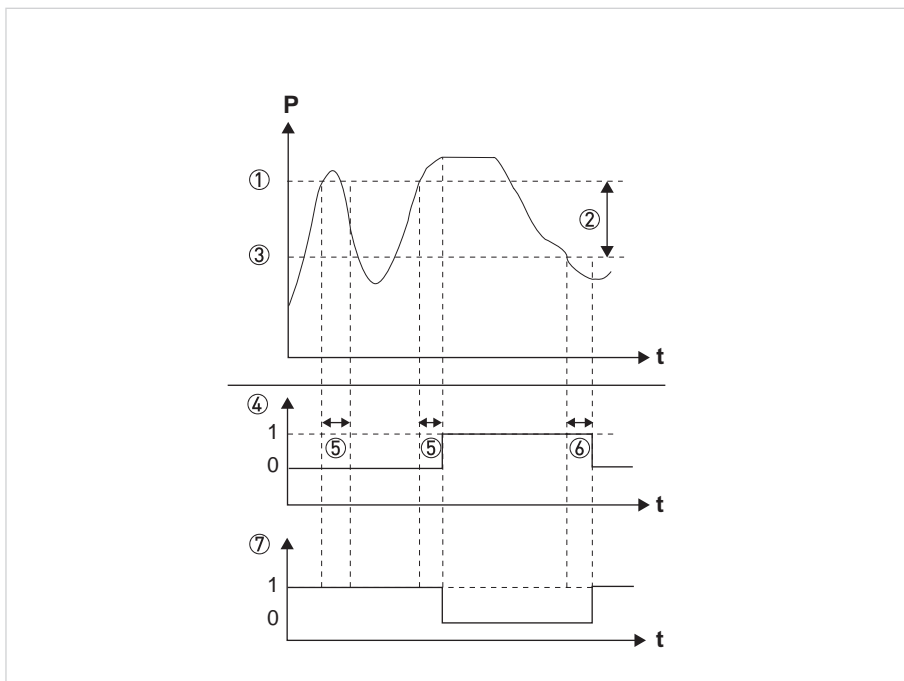


Figure 4-5: Switching output signals (hysteresis-function with damping)

- ① SP (switch-on point)
- ② Hysteresis
- ③ rP (release point)
- ④ Hnc (normally closed)
- ⑤ dS (delay switch-on)
- ⑥ dr (delay release)
- ⑦ Hno (normally open)

## 5.1 Commissioning

The signal converter may only be started up after it has been completely installed and checked by appropriately qualified personnel. Switch on the operating voltage for start-up.

### Prior to applying the operating voltage check that

- the pressure transmitter is completely installed
- the process connection fits properly
- the signal and, if necessary, supply lines are properly connected
- the impulse lines are completely filled with the process medium

## 5.2 Keypad functions

The display and adjustment module is used for indication of measuring values and adjustment.

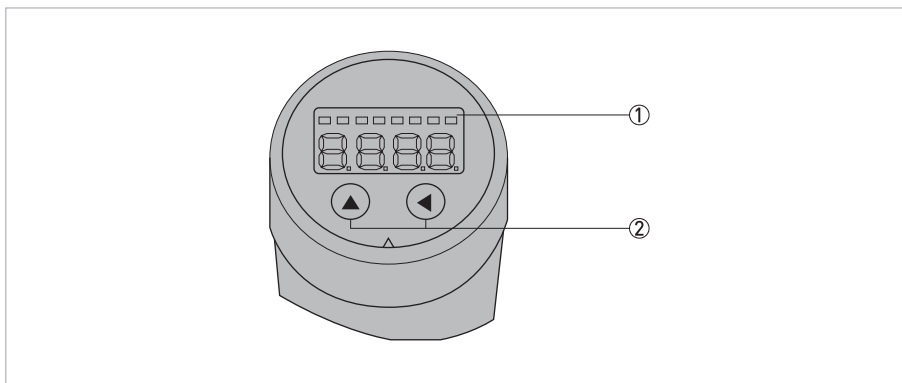


Figure 5-1: Keypad

- ① LED Display
- ② Function buttons

The device is operated via the two keys ② on the display and adjustment module. The LED-Display ① indicates the individual menu items.

Key	Description	Function
▲	Short press	Skip through menu 1 – 5
	Long press	Count up parameter values quickly
◀	Short press	Select option within one menu
	Long press	Save adjusted value and jump pack to current menu
▲ + ◀	Press both simultaneously	Jump back to indication

Table 5-1: Keypad functions

## 5.3 Menu structure

Function	Description	
Operating mode		
SP1   FH1	Adjustment of switch-on point 1 Set value from where switching point 1 should be activated (SP1). If the window function is activated, the value is the upper pressure limit of the window (FH1).	
rP1   FL1	Adjustment of switch-off point 1 Set value from where switching point 1 should be deactivated (rP1). If the window function is activated, the value is the lower pressure limit of the window (FL1).	
SP2   FH2	Adjustment of switch-on point 2 Set value from where switching point 2 should be activated (SP2). If the window function is activated, the value is the upper pressure limit of the window (FH2).	
rP2   FL2	Adjustment of switch-off point 2 Set value from where switching point 2 should be deactivated (rP2). If the window function is activated, the value is the lower pressure limit of the window (FL2).	
Additional menu ASt2   AEn2 (Only if Output-Signal 2 is activated)	Adjustment of output-signal 2 Analog-output 2. Change possibilities: 5% at zero (ASt2), 90-100% at span (AEn2)	
EF - (Extended function)	rES	Factory-reset
	dS1	Adjustment of switch-on delay 1 Set value for switch-on delay after reaching switch-on point 1 (Adjustable from 0.0...50.0 s)
	dr1	Adjustment of switch-off delay 1 Set value for switch-off delay after reaching switch-off point 1 (Adjustable from 0.0...50.0 s)
	dS2	Adjustment of switch-on delay 2 Set value for switch-on delay after reaching switch-on point 2 (Adjustable from 0.0...50.0 s)
	dr2	Adjustment of switch-off delay 2 Set value for switch-off delay after reaching switch-off point 2 (Adjustable from 0.0...50.0 s)
	ou1	Adjustment of switch-output 1 Switching functions for switch-output: - Hno: Hysteresis function, normally open - Hnc: Hysteresis function, normally closed - Fno: Window function, normally open - Fnc: Window function, normally closed
	ou2	Adjustment of switch-output 2 See "ou1"
	Uni	Change Units Select unit for indicated and adjusted pressure value bAr = bar nnBa = mbar Psi = PSI IIPA = MPa

Function		Description
EF - (Extended function)	FLIP	Rotate indication by 180°
	Lo	Min-Value Show minimal applied pressure during measurement. In case of interruption of power supply the value is lost
	Hi	Max-Value Show maximal applied pressure during measurement. In case of interruption of power supply the value is lost
	----	Reset "Min-Value" and "Max-Value"
	SEt0	Adjustment of Zero-Point Adjustment/Correction of zero-point of indicated value and analog-output signal by up to 3% of nominal pressure
	dAP	Damping of measurement Set value of damping (0...1000 ms in 10 ms steps)
	codE	Access protection Set password for access protection 0000 = no password (deactivated) 1000...9999 adjustable (activated)
	o1	Output-Signal 1 Switch between PNP- and NPN-functions
	o2	Output-Signal 2 Switch between PNP- and NPN-functions, 4...20 mA and 0...10 V
	hent	Operating time in [h]
Pent	Number of pressure spikes	

Table 5-2: Menu structure

## 6.1 Maintenance

In principal, the device is maintenance free. If necessary, clean the device housing when switched off using a damp cloth and a non-aggressive cleaning solution.

Depending on the product, deposits or contamination can still occur on the diaphragm. If the product has a known affinity, the operator must determine the cleaning intervals accordingly. Once the device has been properly taken out of commission, the diaphragm can generally be carefully cleaned using a non-aggressive cleaning solution and a soft brush or sponge. If the diaphragm is calcified, decalcification by the manufacturer is recommended.



### **INFORMATION!**

*Improper cleaning can result in irreparable damage to the measuring cell. For this reason, never use sharp objects or compressed air to clean the diaphragm.*

## 6.2 Recalibration

During the life cycle of the device, the offset or full-scale of the device may shift. If this occurs, note that the signal value output will deviate based on the set start or end value of the measuring range. If one of these phenomena does occur following prolonged use, recalibration is recommended to ensure continued high accuracy.

## 6.3 Spare parts availability

The manufacturer adheres to the basic principle that functionally adequate spare parts for each device or each important accessory part will be kept available for a period of 3 years after delivery of the last production run for the device.

This regulation only applies to spare parts which are subject to wear and tear under normal operating conditions.

## 6.4 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.*

## 6.5 Repairs

Repairs must be carried out exclusively by the manufacturer or the manufacturer authorised specialist companies.

## 6.6 Returning the device to the manufacturer

### 6.6.1 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.*

### 6.6.2 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:	
Telephone number:		Email address:	
Fax number:			
Manufacturer order number or serial number:			
The device has been operated with the following medium:			
This medium is:	radioactive		
	water-hazardous		
	toxic		
	caustic		
	flammable		
	We checked that all cavities in the device are free from such substances.		
	We have flushed out and neutralized all cavities in the device.		
We hereby confirm that there is no risk to persons or the environment caused by any residual media contained in this device when it is returned.			
Date:		Signature:	
Stamp:			

### 6.7 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 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	Piezoresistive measuring cell
Application range	Measurement of gauge and absolute pressure in gases and liquids
Measuring range	0.1...40 bar / 1.5...580 psi; refer also to chapter "Measuring ranges" Adjustment (in relation to the nominal range): Zero: $\pm 5\%$ Span: 90...100%

### Display and user interface

Display on signal converter	4-digit, 7-segment LED-Display 22.5 x 10.5 mm / 0.89 x 0.41" 4 LED's for indication of unit (bar, mbar, PSI, Mpa) Status LED for IO-Link and switching-outputs Display infinitely rotatable up to $-210^\circ$ and $+100^\circ$ Ambient temperatures below $-20^\circ\text{C}$ may affect the readability of the display
Display function	Display of measured value All parameters are accessible via the operating menu
Operating	Local operation via 2 softkeys on the display and adjustment module
Remote control	IODD (e.g. PACTware™ via USB IO-Link interface)

### Measuring accuracy

Reference conditions	Medium: air
	Temperature: ambient temperature
	Ambient pressure: 1013 mbar / 14.7 psi
	Nominal position: vertical, pressure port down
	Power supply: 24 VDC
Pressure type	Gauge pressure / absolute pressure
Measuring accuracy according to IEC 60770 (terminal based) (Hysteresis, non-linearity, non-repeatability)	Nominal pressure ( $P_N$ ) < 0.4 bar / 5.8 psi: $\leq \pm 0.5\%$ of URL
	Nominal pressure ( $P_N$ ) $\geq 0.4$ bar / 5.8 psi: $\leq \pm 0.35\%$ of URL (URL = Upper Range Limit)
Ambient temperature effect on zero and span	$\leq \pm 0.3\%$ of URL per 10K in compensated range of $-25...85^\circ\text{C}$ / $-13...185^\circ\text{F}$
Long-term stability	$\leq \pm 0.3\%$ of URL within one year under reference conditions
Step response time	$\leq 12$ ms (T90)
Vacuum resistance	$P_N \geq 1$ bar / 14.5 psi: vacuum resistant
	$P_N < 1$ bar / 14.5 psi: on request

### Operating conditions

Temperature	
Nominal temperature	-20...+85°C / -4...+185°F
Ambient temperature	-40...+85°C / -40...+185°F
Process temperature	-40...+100°C / -40...+212°F

### Installation conditions

Mounting position	Any - factory calibration carried out with pressure port down.
Dimensions	For detailed information refer to chapter "Dimensions and weights".
Weight	Min. 230 g / 0.51 lb (depending on pressure port)

### Materials

Housing	Stainless steel 1.4404 / AISI 316L
Fill fluid	Silicone oil
Wetted parts	
Pressure port	Stainless steel 1.4404 / AISI 316L
Separating diaphragm	Stainless steel 1.4435 / AISI 316L
Sealing	FKM, EPDM ( $P_N \leq 160$ bar)

### Process connections

Thread	Thread ANSI 1/2 NPT-Male, Thread ANSI 1/4 NPT-Male
	Thread ISO 228 G1/2"; DIN 3852, Thread ISO 228 G1/2"; EN 837-1, Thread ISO 228 G1/2" 10 mm bore; DIN 3852, Thread ISO 228 G1/4"; EN 837-1, Thread ISO 228 G1/4"; DIN 3852

### Electrical connection

Output signal 1	IO-Link / SIO (PNP/NPN) switchable
Output signal 2	4...20 mA / 0...10 V (3-wire) / with PNP / NPN switchable
Power supply	$U_b = 18...30$ VDC
Load	4...20 mA / 3-wire: $R_{lmax} \leq (U_b - U_{bmin}) / 0.036$ A [Ohm] 0...10 V / 3-wire: $R_{lmin} \geq U_b / 0.0012$ A [Ohm]
Short circuit protection	Continuously
Reverse polarity protection	In the event of reversed connections there is no damage but also no function.
Ripple	Supply: 0.05% URL Load: $\leq 0.1\%$ URL
Electrical connection	Connector M12x1, 4-pin

**Properties switching signal**

Switch point accuracy	≤ +/- 0.5% URL
Repeatability	≤ +/- 0.1% URL
Max. switching current	150 mA
Switching frequency	max. 170 Hz
Delay	0...50 seconds

**IO-Link**

Interface	IO-Link 1.1; Slave
Data transmission	38.4 kbit/s (COM2)
Mode	SIO / IO-Link
Standard	IEC 61132-2, IEC 61161-9

**Approvals and certificates**

CE	The device fulfils the statutory requirements of the EU directives. The manufacturer certifies that these requirements have been met by applying the CE marking.
Electromagnetic compatibility (EMC) acc. to EN 61326-1:2013	EMC Directive: 2014/30/EU
	For more information consult the relevant declaration of conformity.
Pressure equipment directive	2014/68/EU
<b>Other standards and approvals</b>	
Protection category according to IEC 529 / EN 60529	IP67, NEMA 6
Vibration resistance acc. to EN 60068-2-6	10g RMS (25...2000 Hz)
Shock resistant (impact) according to EN 60068-2-27	500g / 11 ms (P <sub>N</sub> ≥ 60 bar / 870 psi)

## 7.2 Dimensions

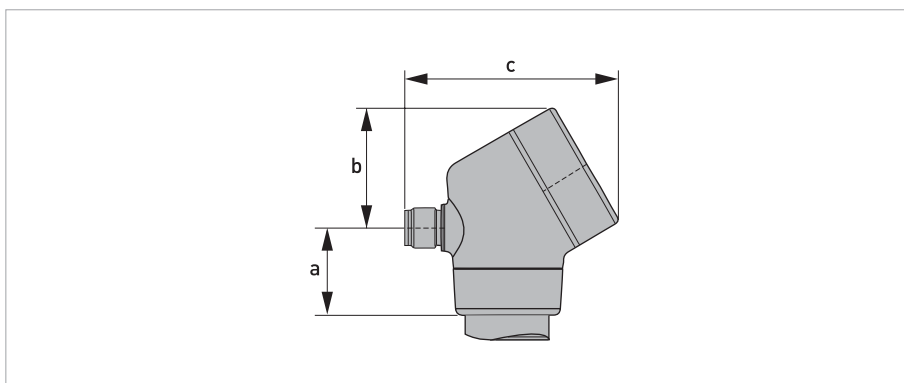


Figure 7-1: Dimensions

Dimensions					
a		b		c	
[mm]	["]	[mm]	["]	[mm]	["]
26	1.02	35.5	1.40	64	2.52

Table 7-1: Dimensions in mm and inch

## Pressure transmitter with threaded connection (ISO 228)

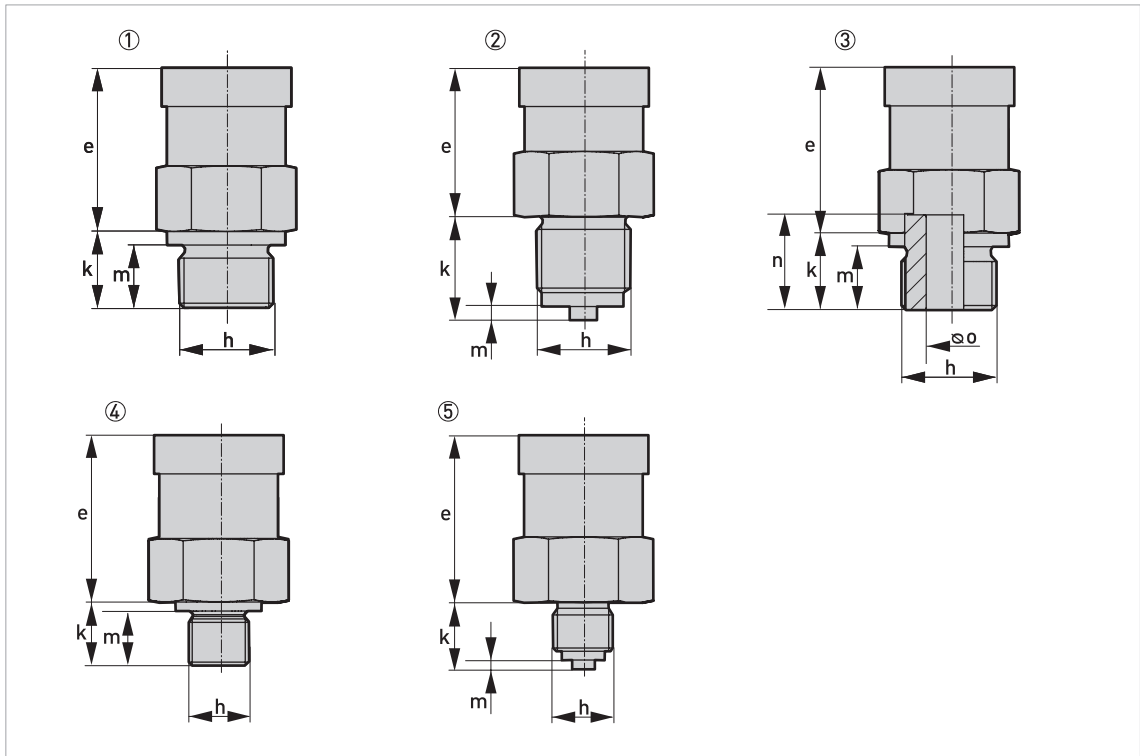


Figure 7-2: Dimensions for pressure transmitter with threaded connection (ISO 228)

- ① G1/2 DIN 3852
- ② G1/2 EN 837
- ③ G1/2 open connection (10 mm / 0.39" bore)
- ④ G1/4 DIN 3852
- ⑤ G1/4 EN 837

	Dimensions									
	①		②		③		④		⑤	
	[mm]	["]	[mm]	["]	[mm]	["]	[mm]	["]	[mm]	["]
e*	50	2	50	2	50	2	50	2	50	2
h	G1/2		G1/2		G1/2		G1/4		G1/4	
k	17	0.67	23	0.9	17	0.67	14	0.55	15	0.59
m	14	0.55	3	0.12	14	0.55	12	0.47	2	0.08
n	-	-	-	-	21	0.83	-	-	-	-
o	-	-	-	-	Ø10	Ø0.39	-	-	-	-

Table 7-2: Dimensions for pressure transmitter with threaded connection (ISO 228)

\* PN ≥ 60 bar: The length of the device increases by 9 mm

The total length of the device consists of the electrical connection (a), the transmitter housing (e) and the process connection (k).

Pressure transmitter with threaded connection (ANSI)

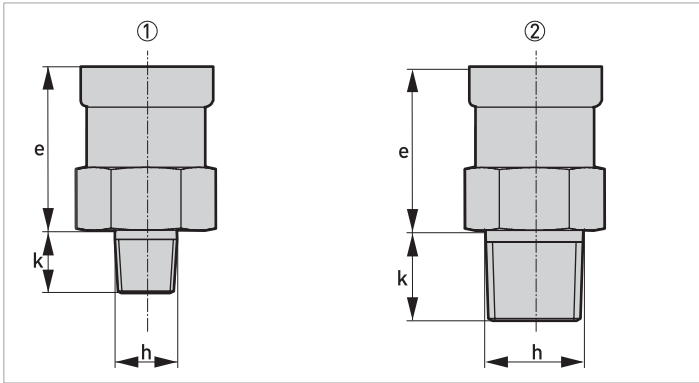


Figure 7-3: Dimensions for pressure transmitter with threaded connection (ANSI)

- ① Thread ANSI 1/4 NPT-M
- ② Thread ANSI 1/2 NPT-M

	Dimensions			
	①		②	
	[mm]	[""]	[mm]	[""]
e*	50	2	50	2
h	1/4 NPT		1/2 NPT	
k	14	0.55	20	0.79

Table 7-3: Dimensions for pressure transmitter with threaded connection (ANSI)

\* PN ≥ 60 bar: The length of the device increases by 9 mm

The total length of the device consists of the electrical connection (a), the transmitter housing (e) and the process connection (k).

## 7.3 Measuring ranges

### Pressure in bar

Nominal pressure (gauge/abs.)	0.10	0.16	0.25	0.40	0.50	0.60	1	1.6
Max. working pressure (MWP)	0.5	1	1	2	2	5	5	10
Burst pressure (OPL)	1.5	1.5	1.5	3	3	7.5	7.5	15

Nominal pressure (gauge/abs.)	2	2.5	4	5	6	10	16	25	40
Max. working pressure (MWP)	10	10	20	20	40	40	80	80	105
Burst pressure (OPL)	15	15	25	25	50	50	120	120	210

Nominal pressure (gauge/abs.)	60	100	160	250	400	600
Max. working pressure (MWP)	210	600	600	1000	1000	1000
Burst pressure (OPL)	420	1000	1000	1250	1250	1800

### Pressure in psi

Nominal pressure (gauge/abs.)	1.45	2.32	3.63	5.80	7.5	8.70	14.5	23.2
Max. working pressure (MWP)	7.3	14.5	14.5	29	29	72.5	72.5	145
Burst pressure (OPL)	21.8	21.8	21.8	43.5	43.5	108.8	108.8	217.6

Nominal pressure (gauge/abs.)	29	36.3	58.0	72.5	87.0	145	232.1	362.6	580
Max. working pressure (MWP)	145	145	290	290	580	580	1160	1160	1523
Burst pressure (OPL)	217.6	217.6	362.6	362.6	725	725	1740	1740	3046

Nominal pressure (gauge/abs.)	870	1450	2321	3626	5800	8700
Max. working pressure (MWP)	3046	8702	8702	14500	14500	14500
Burst pressure (OPL)	6092	14500	14500	18130	18130	26107

## 8.1 General description

The PSM 1010 is equipped with an IO-Link interface as standard in order to exchange process data, diagnostic reports and status messages with a superordinate control level.

IO-Link is the first standardized IO technology worldwide (IEC 61131-9) for the communication with sensors and actuators. The powerful point-to-point communication is based on the long established 3-wire sensor and actuator connection without additional requirements regarding the cable material. IO-Link is no fieldbus but the further development of the existing, tried-and-tested connection technology for sensors and actuators.

Vendor ID	0x0485 1157d
Baud rate	COM 2 (38,4 kBaud)
Input process data length	2 Byte
Minimum cycle time	5 ms
IO-Link version	V 1.1 (backward compatible V 1.0)
SIO-Modus	Yes
Block parametrization	Yes
Data storage	Yes
Supported profiles	Smart Sensor Profile V1.0
	Device Identification
	Process Data Variable

Table 8-1: General IO-Link information

## 8.2 Device IDs

Vendor ID (dec)	Device ID (dec)	Vendor ID (hex)	Device ID (hex)	Product family	Product variant	Configuration
1157	1062	0x0485	0x000426	OPTIBAR Pressure Switch	5 - 400mbar / 40kPa / 5.8psi - A - Absolute	VGKU4A15
1157	1063	0x0485	0x000427	OPTIBAR Pressure Switch	6 - 500mbar / 50kPa / 7.5psi - A - Absolute	VGKU4A16
1157	1064	0x0485	0x000428	OPTIBAR Pressure Switch	7 - 600mbar / 60kPa / 8.7psi - A - Absolute	VGKU4A17
1157	1065	0x0485	0x000429	OPTIBAR Pressure Switch	A - 1.0bar / 100kPa / 14.5psi - A - Absolute	VGKU4A1A
1157	1066	0x0485	0x00042A	OPTIBAR Pressure Switch	B - 1.6bar / 160kPa / 23psi - A - Absolute	VGKU4A1B
1157	1067	0x0485	0x00042B	OPTIBAR Pressure Switch	C - 2.0bar / 200kPa / 29psi - A - Absolute	VGKU4A1C
1157	1068	0x0485	0x00042C	OPTIBAR Pressure Switch	D - 2.5bar / 250kPa / 36psi - A - Absolute	VGKU4A1D
1157	1069	0x0485	0x00042D	OPTIBAR Pressure Switch	E - 4.0bar / 400kPa / 58psi - A - Absolute	VGKU4A1E



Vendor ID (dec)	Device ID (dec)	Vendor ID (hex)	Device ID (hex)	Product family	Product variant	Configuration
1157	1070	0x0485	0x00042E	OPTIBAR Pressure Switch	F - 5.0bar / 500kPa / 72.5psi - A - Absolute	VGKU4A1F
1157	1071	0x0485	0x00042F	OPTIBAR Pressure Switch	G - 6.0bar / 600kPa / 87psi - A - Absolute	VGKU4A1G
1157	1072	0x0485	0x000430	OPTIBAR Pressure Switch	H - 10bar / 1MPa / 145psi - A - Absolute	VGKU4A1H
1157	1073	0x0485	0x000431	OPTIBAR Pressure Switch	K - 16bar / 1.6MPa / 232psi - A - Absolute	VGKU4A1K
1157	1074	0x0485	0x000432	OPTIBAR Pressure Switch	M - 25bar / 2.5MPa / 363psi - A - Absolute	VGKU4A1M
1157	1075	0x0485	0x000433	OPTIBAR Pressure Switch	N - 40bar / 4MPa / 580psi - A - Absolute	VGKU4A1N
1157	1076	0x0485	0x000434	OPTIBAR Pressure Switch	R - 60bar / 6MPa / 870psi - A - Absolute	VGKU4A1R
1157	1077	0x0485	0x000435	OPTIBAR Pressure Switch	S - 100bar / 10MPa / 1450psi - A - Absolute	VGKU4A1S
1157	1078	0x0485	0x000436	OPTIBAR Pressure Switch	T - 160bar / 16MPa / 2321psi - A - Absolute	VGKU4A1T
1157	1079	0x0485	0x000437	OPTIBAR Pressure Switch	U - 250bar / 25MPa / 3626psi - A - Absolute	VGKU4A1U
1157	1080	0x0485	0x000438	OPTIBAR Pressure Switch	V - 400bar / 40MPa / 5802psi - A - Absolute	VGKU4A1V
1157	1081	0x0485	0x000439	OPTIBAR Pressure Switch	W - 600bar / 60MPa / 8702psi - A - Absolute	VGKU4A1W
1157	1082	0x0485	0x00043A	OPTIBAR Pressure Switch	1 - 100mbar / 10kPa / 1.5psi - R Gauge	VGKU4R11
1157	1083	0x0485	0x00043B	OPTIBAR Pressure Switch	2 - 160mbar / 16kPa / 2.3psi - R Gauge	VGKU4R12
1157	1084	0x0485	0x00043C	OPTIBAR Pressure Switch	4 - 250mbar / 25kPa / 3.6psi - R Gauge	VGKU4R14
1157	1085	0x0485	0x00043D	OPTIBAR Pressure Switch	5 - 400mbar / 40kPa / 5.8psi - R Gauge	VGKU4R15
1157	1086	0x0485	0x00043E	OPTIBAR Pressure Switch	6 - 500mbar / 50kPa / 7.5psi - R Gauge	VGKU4R16
1157	1087	0x0485	0x00043F	OPTIBAR Pressure Switch	7 - 600mbar / 60kPa / 8.7psi - R Gauge	VGKU4R17
1157	1088	0x0485	0x000440	OPTIBAR Pressure Switch	A - 1.0bar / 100kPa / 14.5psi - R Gauge	VGKU4R1A

Vendor ID (dec)	Device ID (dec)	Vendor ID (hex)	Device ID (hex)	Product family	Product variant	Configuration
1157	1089	0x0485	0x000441	OPTIBAR Pressure Switch	B - 1.6bar / 160kPa / 23psi - R Gauge	VGKU4R1B
1157	1090	0x0485	0x000442	OPTIBAR Pressure Switch	C - 2.0bar / 200kPa / 29psi - R Gauge	VGKU4R1C
1157	1091	0x0485	0x000443	OPTIBAR Pressure Switch	D - 2.5bar / 250kPa / 36psi - R Gauge	VGKU4R1D
1157	1092	0x0485	0x000444	OPTIBAR Pressure Switch	E - 4.0bar / 400kPa / 58psi - R Gauge	VGKU4R1E
1157	1093	0x0485	0x000445	OPTIBAR Pressure Switch	F - 5.0bar / 500kPa / 72.5psi - R Gauge	VGKU4R1F
1157	1094	0x0485	0x000446	OPTIBAR Pressure Switch	G - 6.0bar / 600kPa / 87psi - R Gauge	VGKU4R1G
1157	1095	0x0485	0x000447	OPTIBAR Pressure Switch	H - 10bar / 1MPa / 145psi - R Gauge	VGKU4R1H
1157	1096	0x0485	0x000448	OPTIBAR Pressure Switch	K - 16bar / 1.6MPa / 232psi - R Gauge	VGKU4R1K
1157	1097	0x0485	0x000449	OPTIBAR Pressure Switch	M - 25bar / 2.5MPa / 363psi - R Gauge	VGKU4R1M
1157	1098	0x0485	0x00044A	OPTIBAR Pressure Switch	N - 40bar / 4MPa / 580psi - R Gauge	VGKU4R1N
1157	1099	0x0485	0x00044B	OPTIBAR Pressure Switch	R - 60bar / 6MPa / 870psi - R Gauge	VGKU4R1R
1157	1100	0x0485	0x00044C	OPTIBAR Pressure Switch	S - 100bar / 10MPa / 1450psi - R Gauge	VGKU4R1S
1157	1101	0x0485	0x00044D	OPTIBAR Pressure Switch	T - 160bar / 16MPa / 2321psi - R Gauge	VGKU4R1T
1157	1102	0x0485	0x00044E	OPTIBAR Pressure Switch	U - 250bar / 25MPa / 3626psi - R Gauge	VGKU4R1U
1157	1103	0x0485	0x00044F	OPTIBAR Pressure Switch	V - 400bar / 40MPa / 5802psi - R Gauge	VGKU4R1V
1157	1104	0x0485	0x000450	OPTIBAR Pressure Switch	W - 600bar / 60MPa / 8702psi - R Gauge	VGKU4R1W
1157	1105	0x0485	0x000451	OPTIBAR Pressure Switch	1 - 100mbar / 10kPa / 1.5psi - N - Gauge Neg.	VGKU4N11
1157	1106	0x0485	0x000452	OPTIBAR Pressure Switch	2 - 160mbar / 16kPa / 2.3psi - N - Gauge Neg.	VGKU4N12
1157	1107	0x0485	0x000453	OPTIBAR Pressure Switch	4 - 250mbar / 25kPa / 3.6psi - N - Gauge Neg.	VGKU4N14

Vendor ID (dec)	Device ID (dec)	Vendor ID (hex)	Device ID (hex)	Product family	Product variant	Configuration
1157	1108	0x0485	0x000454	OPTIBAR Pressure Switch	5 - 400mbar / 40kPa / 5.8psi - N - Gauge Neg.	VGKU4N15
1157	1109	0x0485	0x000455	OPTIBAR Pressure Switch	6 - 500mbar / 50kPa / 7.5psi - N - Gauge Neg.	VGKU4N16
1157	1110	0x0485	0x000456	OPTIBAR Pressure Switch	7 - 600mbar / 60kPa / 8.7psi - N - Gauge Neg.	VGKU4N17
1157	1111	0x0485	0x000457	OPTIBAR Pressure Switch	A - 1.0bar / 100kPa / 14.5psi - N - Gauge Neg.	VGKU4N1A
1157	1112	0x0485	0x000458	OPTIBAR Pressure Switch	B - 1.6bar / 160kPa / 23psi - N - Gauge Neg.	VGKU4N1B
1157	1113	0x0485	0x000459	OPTIBAR Pressure Switch	C - 2.0bar / 200kPa / 29psi - N - Gauge Neg.	VGKU4N1C
1157	1114	0x0485	0x00045A	OPTIBAR Pressure Switch	D - 2.5bar / 250kPa / 36psi - N - Gauge Neg.	VGKU4N1D
1157	1115	0x0485	0x00045B	OPTIBAR Pressure Switch	E - 4.0bar / 400kPa / 58psi - N - Gauge Neg.	VGKU4N1E
1157	1116	0x0485	0x00045C	OPTIBAR Pressure Switch	F - 5.0bar / 500kPa / 72.5psi - N - Gauge Neg.	VGKU4N1F
1157	1117	0x0485	0x00045D	OPTIBAR Pressure Switch	G - 6.0bar / 600kPa / 87psi - N - Gauge Neg.	VGKU4N1G
1157	1118	0x0485	0x00045E	OPTIBAR Pressure Switch	H - 10bar / 1MPa / 145psi - N - Gauge Neg.	VGKU4N1H
1157	1119	0x0485	0x00045F	OPTIBAR Pressure Switch	K - 16bar / 1.6MPa / 232psi - N - Gauge Neg.	VGKU4N1K
1157	1120	0x0485	0x000460	OPTIBAR Pressure Switch	M - 25bar / 2.5MPa / 363psi - N - Gauge Neg.	VGKU4N1M
1157	1121	0x0485	0x000461	OPTIBAR Pressure Switch	N - 40bar / 4MPa / 580psi - N - Gauge Neg.	VGKU4N1N
1157	1122	0x0485	0x000462	OPTIBAR Pressure Switch	R - 60bar / 6MPa / 870psi - N - Gauge Neg.	VGKU4N1R
1157	1123	0x0485	0x000463	OPTIBAR Pressure Switch	S - 100bar / 10MPa / 1450psi - N - Gauge Neg.	VGKU4N1S
1157	1124	0x0485	0x000464	OPTIBAR Pressure Switch	T - 160bar / 16MPa / 2321psi - N - Gauge Neg.	VGKU4N1T
1157	1125	0x0485	0x000465	OPTIBAR Pressure Switch	U - 250bar / 25MPa / 3626psi - N - Gauge Neg.	VGKU4N1U
1157	1126	0x0485	0x000466	OPTIBAR Pressure Switch	V - 400bar / 40MPa / 5802psi - N - Gauge Neg.	VGKU4N1V

Vendor ID (dec)	Device ID (dec)	Vendor ID (hex)	Device ID (hex)	Product family	Product variant	Configuration
1157	1127	0x0485	0x000467	OPTIBAR Pressure Switch	W - 600bar / 60MPa / 8702psi - N - Gauge Neg.	VGKU4N1W

Table 8-2: Device IDs for different product variants

## 8.3 Modes

### 8.3.1 SIO-mode (standard IO mode)

In this mode the sensor operates like a normal pressure sensor with standard output signals. The digital output is always on Pin 4 (output 1) of the M12 connector. Depending on the version, pin 2 (output 2) can be an analog or an additional digital output.

### 8.3.2 IO-Link mode (communication mode)

The pressure sensor switches into IO-Link communication mode when operating under an IO-Link master. IO-Link communication is only possible via Pin 4 of the M12 connector.

## 8.4 Parameter overview

Parameter	Index	Type
System commands	2	UInteger (8 Bit)
Device Access Locks	12	UIntegerT (16 Bit)
Vendor name	16	StringT (64 Byte)
Vendor text	17	StringT (64 Byte)
Product name	18	StringT (64 Byte)
Product ID	19	StringT (64 Byte)
Product text	20	StringT (64 Byte)
Serial number	21	StringT (16 Byte)
Hardware version	22	StringT (64 Byte)
Firmware version	23	StringT (64 Byte)
Application specific tag	24	StringT (32 Byte)
Error count	32	UInteger (16 Bit)
Device status	36	UIntegerT (8 Bit)
Detailed device status	37	OctetStringT (30 Byte)
Process data input	40	RecordT (16 Bit)
Set point #1	60	UInteger (16 Bit)
Set point mode #1	61	UInteger (8 or 16 Bit)
Set point #2	62	UInteger (16 Bit)
Set point mode #2	63	UInteger (8 or 16 Bit)
Rotate display	80	UInteger (8 Bit)
Temperature	82	UInteger (16 Bit)
Operating hours	87	UInteger (32 Bit)
Local menu password	96	UInteger (16 Bit)
Output configuration	147	UIntegerT (8 Bit)

Parameter	Index	Type
Output 2 mode	151	UInteger (8 Bit)
Pressure peaks	152	UInteger (32 Bit)
Analog start	153	Float (32 Bit)
Analog end	154	Float (32 Bit)
Set point delay "on" #1	208	UInteger (16 Bit)
Set point delay "off" #1	209	UInteger (16 Bit)
Set point delay "on" #2	210	UInteger (16 Bit)
Set point delay "off" #2	211	UInteger (16 Bit)
Pressure unit	212	UIntegerT (8 Bit)
Minimum pressure	213	UInteger (16 Bit)
Maximum pressure	214	UInteger (16 Bit)
Damping	215	UInteger (16 Bit)

Table 8-3: Parameters with index and type

## 8.5 System commands

System command information:

Address	Type	Declaration
Index 2, subindex 0	UInteger (8 Bit)	WriteOnly

Table 8-4: System command information

System commands	Text	Description
1	Upload start	Start block parameter upload
2	Upload end	Stop block parameter upload
3	Download start	Start block parameter download
4	Download end	Stop block parameter download
5	Store	Finalize block parameterization and start data storage
6	Break	Cancel block parameterization
128	Device reset	Same effect as power up device
130	Restore factory settings	Restore factory settings
131	Reset min/max	Reset minimum and maximum values with actual pressure value
160	Set zero	Pressure deviation up to $\pm 3\%$ of nominal pressure is set to zero

Table 8-5: System commands

## 8.6 Identification

Parameter	Index	Sub- index	Type	Declaration	Factory setting
Vendor name	16	0	StringT (64 Byte)	ReadOnly	KROHNE Pressure Solutions GmbH
Vendor text	17	0	StringT (64 Byte)	ReadOnly	www.krohne.com
Product name	18	0	StringT (64 Byte)	ReadOnly	OPTIBAR PSM 1010 or PSM 2010
Product ID	19	0	StringT (64 Byte)	ReadOnly	VGKU ...
Product text	20	0	StringT (64 Byte)	ReadOnly	Pressure Switch ...
Serial number	21	0	StringT (16 Byte)	ReadOnly	
Hardware version	22	0	StringT (64 Byte)	ReadOnly	V1.0
Firmware version	23	0	StringT (64 Byte)	ReadOnly	n011

Table 8-6: Configuration of identification parameters

## 8.7 Observation

Process data input	RecordT (16 Bit)	Description
Pressure	IntegerT (16 Bit)	Actual pressure

Table 8-7: Process data record

The process data length of the sensor is 16 bit. The switching state of output signal #1 and #2 as well as the current measured value are transmitted. The 14 bit of the measured value are scaled according to the measuring range.

Bit 15	Bit 14 ... 2	Bit 1	Bit 0
Signed bit	Measured value	Output signal 2	Output signal 1

Table 8-8: Process data length

Parameter	Index	Sub-index	Type	Declaration	Description
Pressure	40	3	Integer (14 Bit)	ReadOnly	Measured value (range according to the following table)
Temperature	82	0	Integer (16 Bit)	ReadOnly	Measured temperature in °C

Table 8-9: Configuration of measuring parameter

## Gauge pressure range / absolute pressure range:

**INFORMATION!**

*Absolute pressure ranges have a min. value of "0"*

Pressure range	Min. value	Max. value	Unit [bar] multiplier	Unit [mbar] multiplier
0 ... 0.1 bar	-125 d	1125 d	* 0.0001	* 0.1
0 ... 0.16 bar	-200 d	1800 d	* 0.0001	* 0.1
0 ... 0.25 bar	-313 d	2813 d	* 0.0001	* 0.1
0 ... 0.4 bar	-500 d	4500 d	* 0.0001	* 0.1
0 ... 0.5 bar	-625 d	5625 d	* 0.0001	* 0.1
0 ... 0.6 bar	-750 d	6750 d	* 0.0001	* 0.1
0 ... 1 bar	-125 d	1125 d	* 0.001	* 1
0 ... 1.6 bar	-200 d	1800 d	* 0.001	* 1
0 ... 2 bar	-250 d	2250 d	* 0.001	* 1
0 ... 2.5 bar	-313 d	2813 d	* 0.001	* 1
0 ... 4 bar	-500 d	4500 d	* 0.001	* 1
0 ... 5 bar	-625 d	5625 d	* 0.001	* 1
0 ... 6 bar	-750 d	6750 d	* 0.001	* 1
0 ... 10 bar	-125 d	1125 d	* 0.01	* 10
0 ... 16 bar	-200 d	1800 d	* 0.01	* 10
0 ... 25 bar	-313 d	2813 d	* 0.01	* 10
0 ... 40 bar	-500 d	4500 d	* 0.01	* 10
0 ... 60 bar	-750 d	6750 d	* 0.01	* 10
0 ... 100 bar	-125 d	1125 d	* 0.1	* 100
0 ... 160 bar	-200 d	1800 d	* 0.1	* 100
0 ... 250 bar	-313 d	2813 d	* 0.1	* 100
0 ... 400 bar	-500 d	4500 d	* 0.1	* 100
0 ... 600 bar	-750 d	6750 d	* 0.1	* 100

Table 8-10: Absolute pressure ranges

## Gauge pressure ranges with neg. nominal measuring range (-x ... x bar):

Pressure range	Min. value	Max. value	Unit [bar] multiplier	Unit [mbar] multiplier
-0.1 ... 0.1 bar	-1250 d	1250 d	* 0.0001	* 0.1
-0.16 ... 0.16 bar	-2000 d	2000 d	* 0.0001	* 0.1
-0.2 ... 0.2 bar	-2500 d	2500 d	* 0.0001	* 0.1
-0.25 ... 0.25 bar	-3125 d	3125 d	* 0.0001	* 0.1
-0.4 ... 0.4 bar	-5000 d	5000 d	* 0.001	* 1
-0.5 ... 0.5 bar	-6250 d	6250 d	* 0.001	* 1
-0.6 ... 0.6 bar	-7500 d	7500 d	* 0.001	* 1
-1 ... 1 bar	-1250 d	1250 d	* 0.001	* 1

Pressure range	Min. value	Max. value	Unit [bar] multiplier	Unit [mbar] multiplier
-1 ... 1.6 bar	-1325 d	1925 d	* 0.001	* 1
-1 ... 2 bar	-1375 d	2375 d	* 0.001	* 1
-1 ... 2.5 bar	-1438 d	2938 d	* 0.001	* 1
-1 ... 4 bar	-1625 d	4625 d	* 0.001	* 1
-1 ... 5 bar	-1750 d	5750 d	* 0.001	* 1
-1 ... 6 bar	-1875 d	6875 d	* 0.001	* 1
-1 ... 7 bar	-2000 d	8000 d	* 0.001	* 1
-1 ... 10 bar	-238 d	1138 d	* 0.01	* 10
-1 ... 16 bar	-313 d	1813 d	* 0.01	* 10
-1 ... 20 bar	-362 d	2262 d	* 0.01	* 10
-1 ... 25 bar	-425 d	2825 d	* 0.01	* 10
-1 ... 40 bar	-613 d	4513 d	* 0.01	* 10
-1 ... 60 bar	-863 d	6763 d	* 0.01	* 10
-1 ... 100 bar	-136 d	1126 d	* 0.1	* 100
-1 ... 160 bar	-211 d	1801 d	* 0.1	* 100
-1 ... 250 bar	-324 d	2814 d	* 0.1	* 100

Table 8-11: Gauge pressure ranges

Parameter	Index	Sub-index	Type	Declaration	Description
State output signal 1	40	1	Boolean	ReadOnly	indicates state of output signal 1 0: inactive 1: active
State output signal 2	40	2	Boolean	ReadOnly	indicates state of output signal 2 0: inactive 1: active

Table 8-12: Configuration of state output signal

## 8.8 Parameter

### 8.8.1 Pressure unit

Parameter	Index	Sub-index	Type	Declaration	Description	Factory setting
Pressure unit	212	0	IntegerT (8 Bit)	ReadWrite	Configuration of pressure unit 0: [bar] 1: [mbar] 2: [psi] 3: [MPa]	0

Table 8-13: Configuration of pressure unit



## 8.8.2 Output configuration

Parameter	Index	Sub- index	Type	Declaration	Description	Factory setting
Output configuration	147	0	UIntegerT (8 Bit)	ReadWrite	Configuration of output signal 1 0: PNP 1: NPN	0

Table 8-14: Output configuration signal 1

Parameter	Index	Sub- index	Type	Declaration	Description	Factory setting
Output configuration	151	0	UInteger (8 Bit)	ReadWrite	Configuration of output signal 2 0: PNP 1: NPN 2: Analog 0 ... 10 V 3: Analog 4 ...20 mA	0

Table 8-15: Output configuration signal 2

## 8.8.3 Set point

Output signal 1

Parameter	Index	Sub- index	Type	Declaration	Description	Factory setting
Set point 1	60	1	Integer (16 Bit)	ReadWrite	Configuration of 1 <sup>st</sup> set point	750 <sup>1</sup>
Set point 2	60	2	Integer (16 Bit)	ReadWrite	Configuration of 2 <sup>nd</sup> set point	740 <sup>1</sup>
Delay set point on	208	0	UInteger (16 Bit)	ReadWrite	Configuration of delay time for activation output signal (SIO) range: 0-500 (0-50 sec) e.g. 15 (15 x 0.1 sec = 1.5 sec)	0
Delay set point off	209	0	UInteger (16 Bit)	ReadWrite	Configuration of delay time for deactivation output signal (SIO) range: 0-500 (0-50 sec) e.g. 20 (20 x 0.1 sec = 2 sec)	0

Table 8-16: Configuration of output signal 1

<sup>1</sup>ranges refer to *Observation* on page 38

Output signal 2 (PNP- or NPN-mode)

Parameter	Index	Sub- index	Type	Declaration	Description	Factory setting
Set point 1	62	1	Integer (16 Bit)	ReadWrite	Configuration of 1 <sup>st</sup> set point	850 <sup>1</sup>
Set point 2	62	2	Integer (16 Bit)	ReadWrite	Configuration of 2 <sup>nd</sup> set point	840 <sup>1</sup>
Delay set point on	210	0	UInteger (16 Bit)	ReadWrite	Configuration of delay time for activation output signal (SIO) range: 0 500 (0 0 sec) e.g. 15 (15 x 0.1 sec = 1.5 sec)	0
Delay set point off	211	0	UInteger (16 Bit)	ReadWrite	Configuration of delay time for deactivation output signal (SIO) range: 0 500 (0 50 sec) e.g. 20 (20 x 0.1 sec = 2 sec)	0

Table 8-17: Configuration of output signal 2

<sup>1</sup>ranges refer to *Observation* on page 38

#### 8.8.4 Analog signal

This configuration is only possible, when output signal 2 is configured as "Analog 0 ... 10V" or "Analog 4 ... 20 mA" refer to *Output configuration* on page 41.

Parameter	Index	Sub- index	Type	Declaration	Description	Factory setting
Analog start	153	0	Float (32 Bit)	ReadWrite	Setting of zero point analog signal	0
Analog end	154	0	Float (32 Bit)	ReadWrite	Setting of end point analog signal	10

Table 8-18: Configuration of analog signal

## 8.8.5 Output logic

### Signal 1

Parameter	Index	Sub- index	Type	Declaration	Description	Factory setting
Output logic	61	2	UInteger (8 Bit)	ReadWrite	Configuration of general behavior of output signal setting: 128 up to 131 (according to following tables)	128

Table 8-19: Configuration output logic signal 1

### Signal 2 (PNP- or NPN-mode)

Parameter	Index	Sub- index	Type	Declaration	Description	Factory setting
Output logic	63	2	UInteger (8 Bit)	ReadWrite	Configuration of general behavior of output signal setting: 128 up to 131 (according to following tables)	128

Table 8-20: Configuration output logic signal 2

Switching modes (SI0)	
<b>128:</b> Hysteresis mode contact: normally opened (NO)	<b>129:</b> Hysteresis mode inverted contact: normally closed (NC)
For further information refer to <i>Switching output signals</i> on page 15	

Table 8-21: Switching mode of hysteresis mode

Switching modes (SI0)	
<b>130:</b> Window mode contact: normally opened (NO)	<b>131:</b> Window mode inverted contact: normally closed (NC)
For further information refer to <i>Switching output signals</i> on page 15	

Table 8-22: Switching mode of window mode

### 8.8.6 Minimum pressure

Parameter	Index	Sub- index	Type	Declaration	Description	Factory settin
Minimum pressure	213	0	Integer (16 Bit)	ReadWrite	This shows the minimum pressure during operation	-

Table 8-23: Configuration of minimum pressure

### 8.8.7 Maximum pressure

Parameter	Index	Sub- index	Type	Declaration	Description	Factory setting
Maximum pressure	214	0	Integer 16 Bit)	ReadWrite	This shows the maximum pressure during operation	-

Table 8-24: Configuration maximum pressure

### 8.8.8 Operating hours

Parameter	Index	Sub- index	Type	Declaration	Description	Factory setting
Operating hours	87	0	UInteger (32 Bit)	ReadOnly	Information about total operating time of device	0

Table 8-25: Configuration of operating hours

### 8.8.9 Peak counter

Parameter	Index	Sub- index	Type	Declaration	Description	Factory setting
Peak counter	152	0	UIntegerT (32 Bit)	ReadOnly	Increments when pressure is out of bounds < -5 % of FSO and > +105 % FSO note: detecting peaks < 10 msec depend of occurrence and measurement period	0

Table 8-26: Configuration of peak counter

### 8.8.10 Rotate display

Parameter	Index	Sub- index	Type	Declaration	Description	Factory setting
Rotate display	80	0	UIntegerT (8 Bit)	ReadWrite	Configuration change viewing of display 1: normal view 2: view flipped 180°	1

Table 8-27: Configuration for "rotate display"

### 8.8.11 Damping

Parameter	Index	Sub- index	Type	Declaration	Description	Factory setting
Damping	215	0	UIntegerT (16 Bit)	ReadWrite	Damping influences displayed value, process value, analog signal and set point range: 0 ... 1000 [msec]	0

Table 8-28: Configuration of parameter damping

### 8.8.12 Setup

Parameter	Index	Sub- index	Type	Declaration	Description	Factory setting
Device access lock	12	0	UInteger (16 Bit)	ReadWrite	Configuration of various lock of device 0: unlocked 1 up to 11: locked (see following table)	0

Table 8-29: Configuration of "device access lock"

Setting	IO-Link	Data storage	Parametrization	User interface
1	Locked			
2		Locked		
3	Locked	Locked		
4			Locked	
5	Locked		Locked	
6		Locked	Locked	
7	Locked	Locked	Locked	
8				Locked
9	Locked			Locked
10		Locked		Locked
11	Locked	Locked		Locked

Table 8-30: Settings for "device access lock"

## 8.9 Diagnosis

Parameter	Index	Sub- index	Type	Declaration	Description	Factory setting
Error count	32	0	UIntegerT (16 Bit)	ReadOnly	Every time an error occurs, value will be incremented by one. Power on or reset set value to 0.	0
Device status	36	0	UIntegerT (8 Bit)	ReadOnly	0: device is OK 2: process value out of limit -10 ... 110 % FSO 4: sensor module error	0
Detailed device status	37	0	Octet StringT (30 Byte)	ReadOnly	Indicates the 10 latest subsequent events that occurred. One event is coded in 3-byte array.	0, 0, 0

Table 8-31: Configuration of diagnosis parameters

## 8.10 Events

Code	Device status	Process data quality	Class	Name	Description
0x0000 0d	0	Valid	-	No malfunction	No malfunction
0x1000 4096d	4	Invalid	Error	General malfunction	Error
0x8C10 5856d	2	Valid	Warning	Process variable range overrun	Process data uncertain
0x8C30 35888d	2	Valid	Warning	Process variable range underrun	Process data uncertain

Table 8-32: Event code meaning

## 8.11 Error types

Code	Name	Description
0x8000 32768d	Device application error (no detail)	Service has been refused by the device application and no detailed information of the incident is available
0x8011 32785d	Index not available	Access occurs to a not existing index
0x8012 32786d	Subindex not available	Access occurs to a not existing subindex
0x8023 32803d	Access denied	Write access on read-only parameter
0x8030 32816d	Parameter value out of range	Written parameter value is outside its permitted value range
0x8031 32817d	Parameter value to high	Written parameter is above allowed limit
0x8032 32818d	Parameter value to low	Written parameter is below allowed limit
0x8033 32819d	Parameter length overrun	Written parameter length is above its predefined length
0x8034 32820d	Parameter length underrun	Written parameter length is below its predefined length
0x8035 32821d	Function not available	Written command is not supported by the device application
0x8041 32833d	Inconsistent parameter set	Parameter inconsistencies were found at the end of block parameter transfer, device plausibility check failed

Table 8-33: Error code meaning

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