



OPTIBAR PSM 2010 Handbook

Electronic pressure switch with flush welded diaphragm

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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 2010** 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.

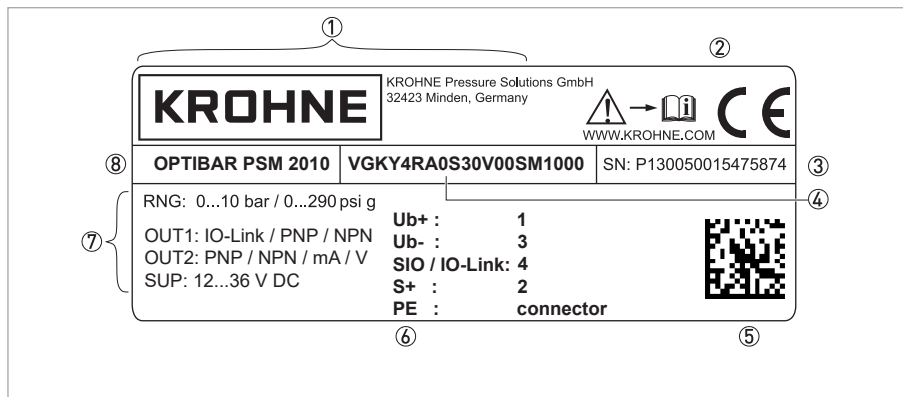


Figure 2-1: Example for a nameplate

- 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]
Wrench size of steel	
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]
Wrench size of plastic	
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

3.3.4 Installation steps for clamp and Varivent connections

Notes for versions acc. to 3A standard



INFORMATION!

The device must be assembled according to 3A standard 74-06.

The device has to be installed in the way that drainability (E1.8.1) and demands acc. to L1.1 are met. The device must be installed with the pressure port downwards or to the side.

The user is responsible for:

- using a suitable sealing material
- defining adequate service intervals
- using an elastomer sealing material according to 3A standard 18-03 and 21CFR177.2600
- the right dimension of the gasket

Make sure that welding sockets are mounted flush inside the tank.

General procedure



- When sealing, use a suitable gasket that corresponds to the product and pressure to be measured.
- Place the gasket on the corresponding fitting.
- Centre the clamp or Varivent connection over the corresponding fitting and gasket.
- Then use a suitable connecting element (e.g. half ring or clamp ring connection) to attach the device according to the manufacturer's specifications.

3.3.5 Installation steps for flange connections



- When sealing, use a suitable gasket that corresponds to the product and pressure to be measured (e.g. a fibre gasket)
- Put the gasket between connecting flange and counter flange.
- Then fasten the device using 4 or 8 screws (depending on flange version) to the counter flange.

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!

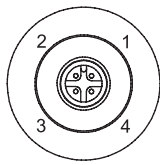
		
Electrical connections	Description	M12x1 (4-pin)
Supply +		1
Supply -		3
Signal 1	IO-Link / PNP / NPN switchable (SIO)	4
Signal 2	PNP / NPN / mA / V switchable	2
Shielding		Pressure-port

Table 4-1: Terminal assignment

4.3 Electrical connection diagrams

Configuration of switching output

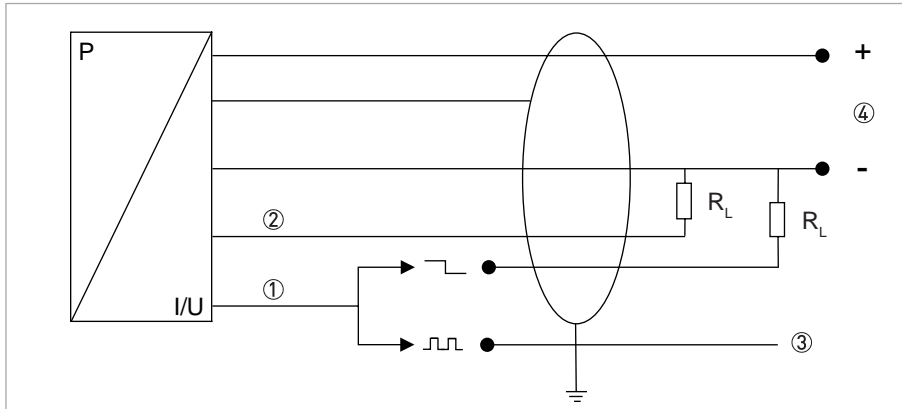


Figure 4-1: Electrical connection diagram 3-wire, switching output

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

Configuration of analogue output

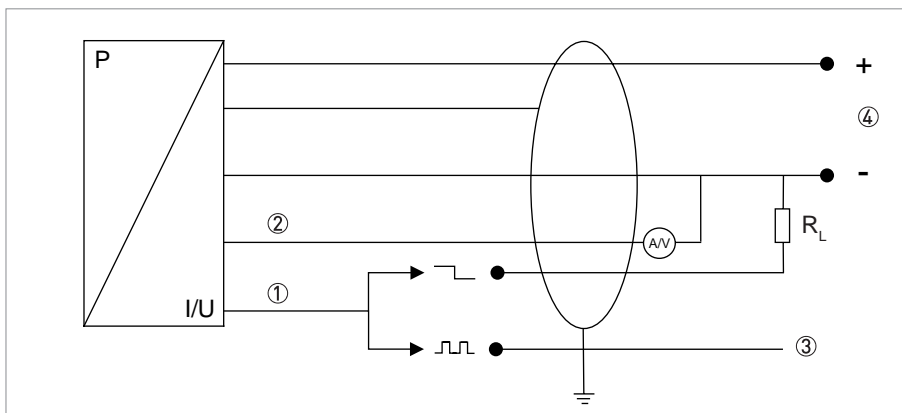


Figure 4-2: Electrical connection diagram 3-wire, analogue output

- 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:

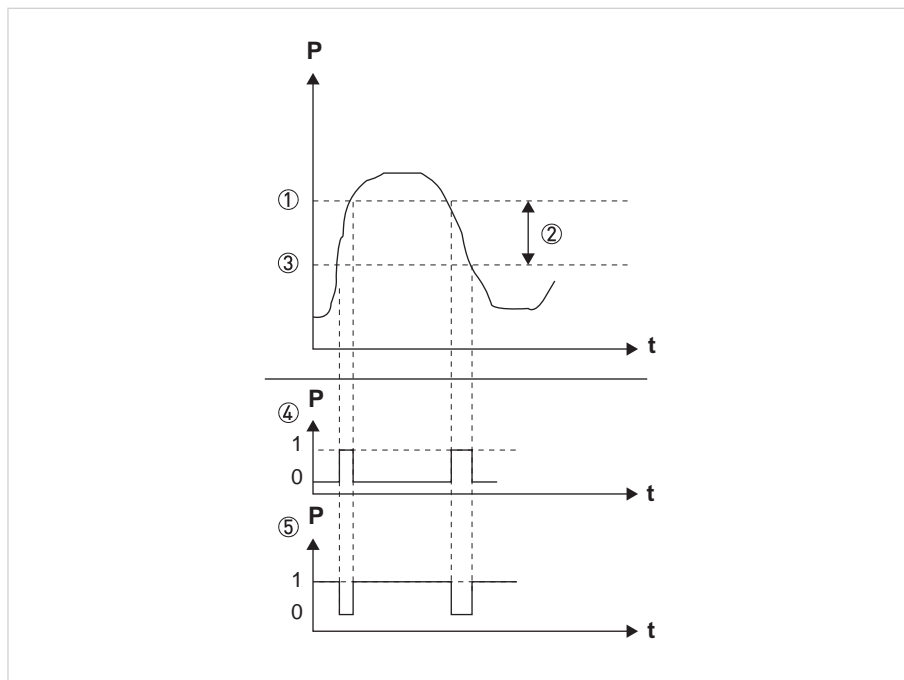


Figure 4-3: Switching output signals (window function)

- 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:

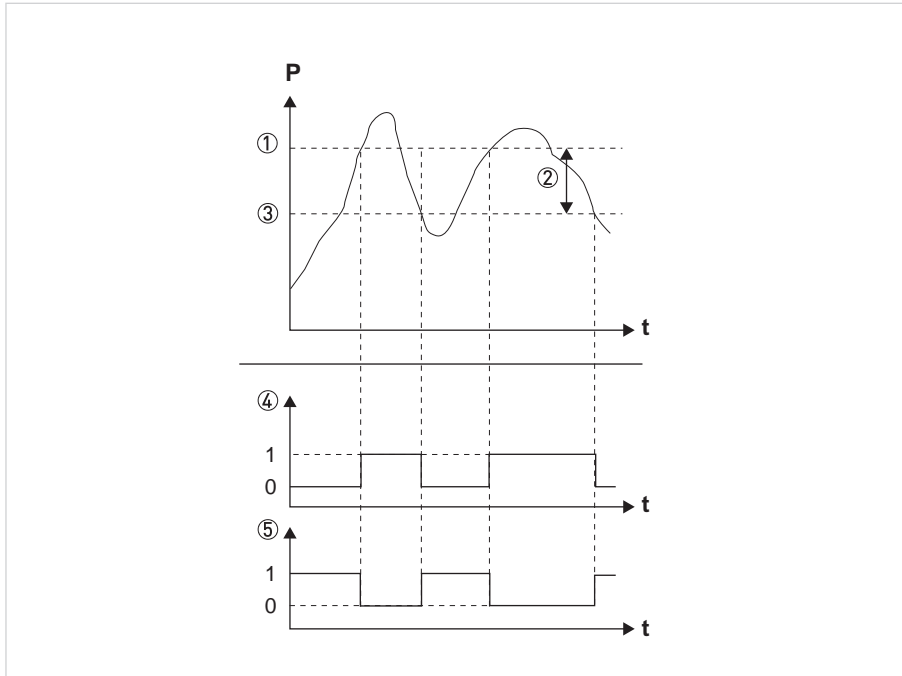


Figure 4-4: Switching output signals (hysteresis-function)

- 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:

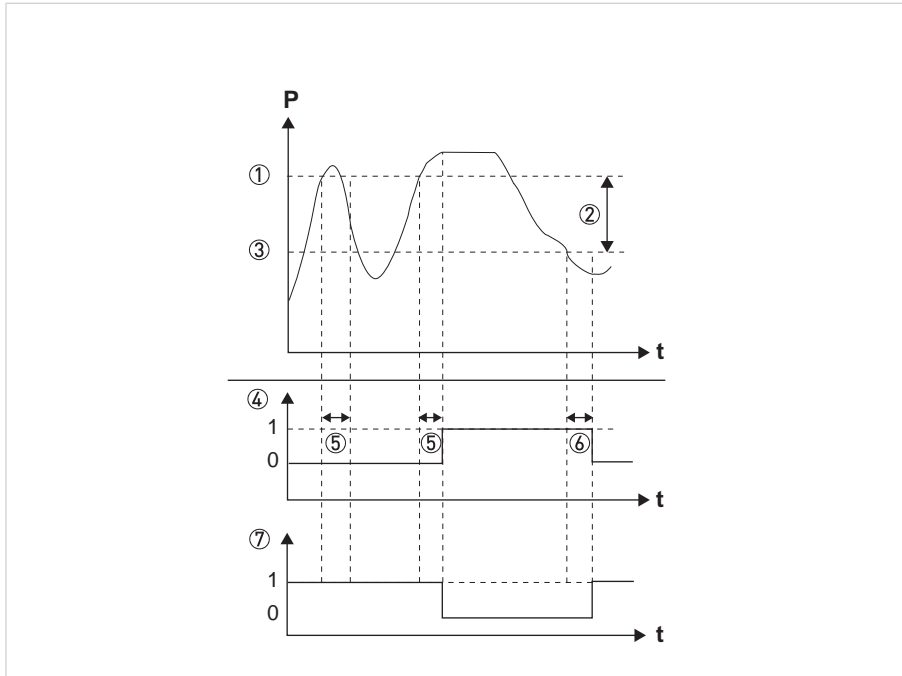


Figure 4-5: Switching output signals (hysteresis-function with damping)

- 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.

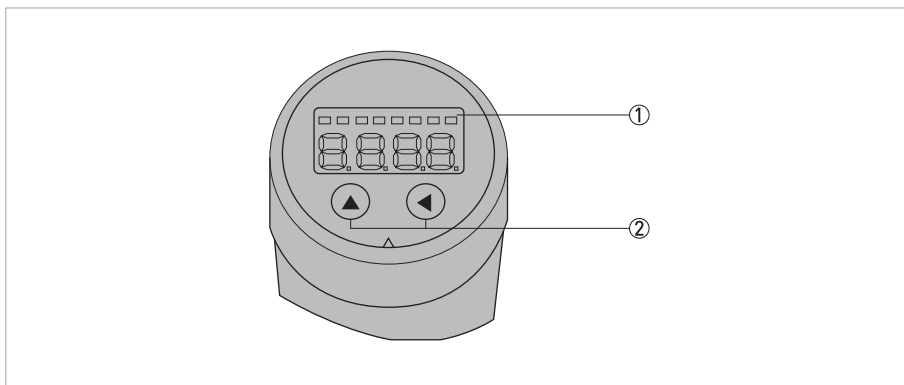


Figure 5-1: Keypad

- 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° and $+100^\circ$ Ambient temperatures below -20°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	PACTware™ via IODD and 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) ≥ 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	≤ 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	Silicone oil: -40...+125°C / -40...+257°F
	Food grade oil: -10...+125°C / +14...+257°F
	With cooling fins (optional): Silicone oil: P _N > 0 barg: -40...+300°C / -40...+572°F; P _N < 0 barg: -40...+150°C / -40...+302°F Food grade oil: P _N > 0 barg: -10...+250°C / +14...+482°F; P _N < 0 barg: -10...+150°C / +14...+301°F
CIP / SIP	Max. medium temperature for gauge pressure range p > 0 bar is +150°C / +302°F for 60 minutes at max. ambient temperature of +50°C / +1200°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 ≤ 160 bar)

Process connections

Thread	Thread ISO 228 G1/2", DIN 3852 (P _N ≥ 1 bar / 14.5 psi), Thread ISO 228 G3/4", DIN 3852 (P _N ≥ 600 mbar / 8.7 psi), Thread ISO 228 G1", DIN 3852; Thread ISO 228 G1", cone Thread ISO228 G1/2" hygienic design; DIN3852 Thread ISO228 G1" hygienic design; DIN3852
Clamp	Clamp DN25 ISO 2852; clamp DN38 ISO 2852; clamp DN51 ISO 2852 Others on request.

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...20mA / 3-wire: R _{lmax} ≤ (U _b - U _{bmin}) / 0.036 A [Ohm] 0...10 V / 3-wire: R _{lmin} ≥ 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: ≤ 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
Other standards and approvals	
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 ($P_N \geq 60$ bar / 870 psi)
Hygienic	3-A approved; FDA approved materials

7.2 Dimensions

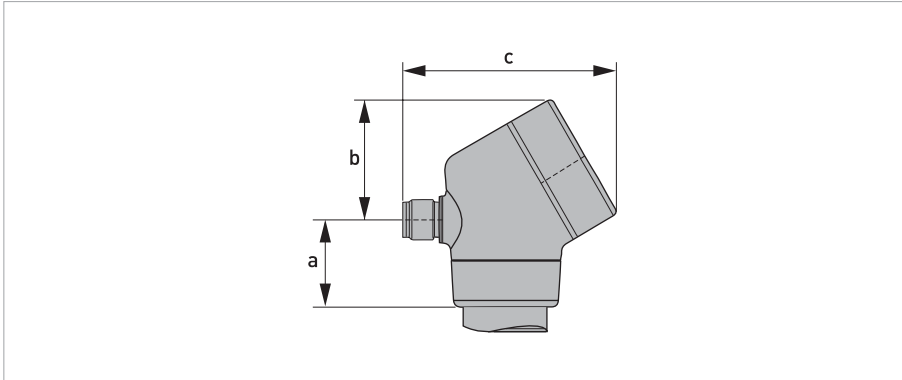


Figure 7-1: Dimensions

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

Pressure transmitter with threaded connection

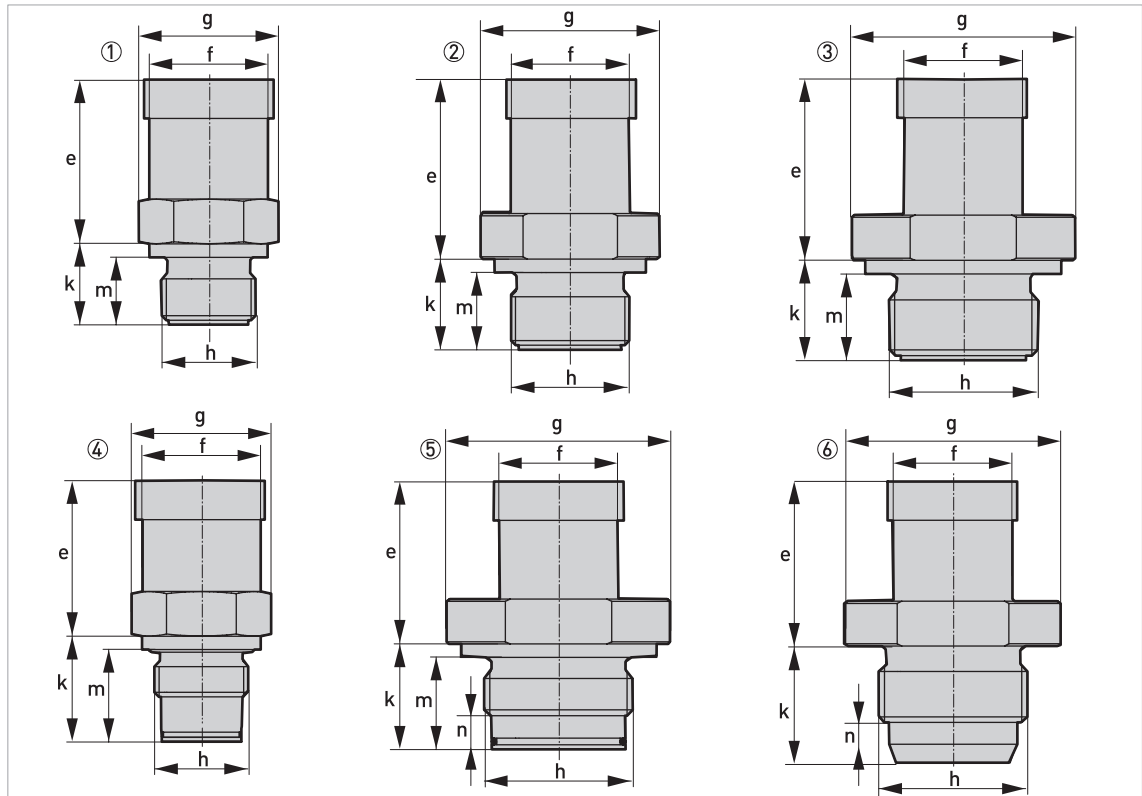


Figure 7-2: Dimensions for pressure transmitter with threaded connection

- ① G1/2" DIN 3852 flush
- ② G3/4" DIN 3852 flush
- ③ G1" DIN 3852 flush
- ④ G1/2" DIN 3852 flush hygienic design
- ⑤ G1" DIN 3852 flush hygienic design
- ⑥ G1" cone

	Dimensions											
	①		②		③		④		⑤		⑥	
	[mm]	[""]	[mm]	[""]	[mm]	[""]	[mm]	[""]	[mm]	[""]	[mm]	[""]
e	60	2.36	60	2.36	60	2.36	60	2.36	60	2.36	60	2.36
f	Ø26.5	Ø1.04	Ø26.5	Ø1.04	Ø26.5	Ø1.04	Ø26.5	Ø1.04	Ø26.5	Ø1.04	Ø26.5	Ø1.04
g	WS27		WS34		WS41		WS27		WS41		WS34	
h	G½"		G¾"		G1"		G½"		G1"		G1"	
k	18	0.71	20	0.79	22	0.87	23.5	0.93	23.5	0.93	26	1.02
m	15	0.59	17	0.67	19	0.75	20.5	0.81	20.5	0.81	-	-
n	-	-	-	-	-	-	-	-	7.5	0.3	9	0.35

The entire length of the device is made up of the electrical connection (a), the transmitter housing (e) and the process connection (k).
 With cooling fins (optional) additional 32 mm / 1.26".

Pressure transmitter with cooling fins and hygienic process connections

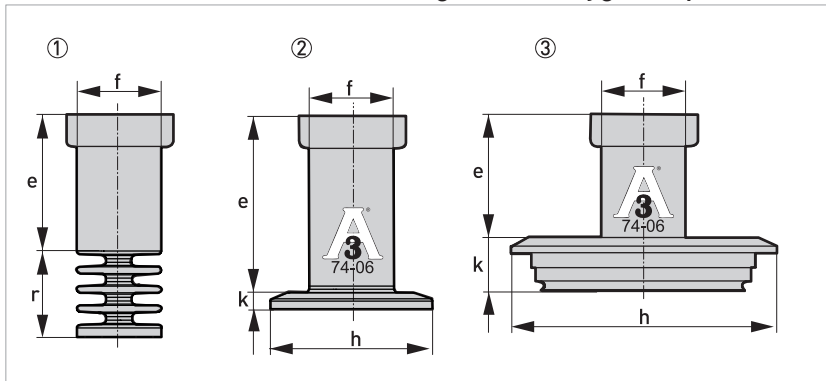


Figure 7-3: Dimensions for pressure transmitter with cooling fins and hygienic process connections

- ① Cooling fins (optional)
- ② Clamp DIN 32678 / ISO 2852, 3-A approved
- ③ Varivent® DN40/50, 3-A approved

	Dimensions					
	①		②		③	
	[mm]	["]	[mm]	["]	[mm]	["]
e	50	1.97	50	1.97	48	1.89
f	Ø26.5	Ø1.04	Ø26.5	Ø1.04	Ø26.5	Ø1.04
h	-	-	DN25: 50.5 DN38: 50.5 DN51: 64	DN25: 2.0 DN38: 2.0 DN51: 2.5	Ø84	Ø3.3
k	-	-	5	0.2	17	0.67
r	32	1.26	-	-	-	-

The entire length of the device is made up of the electrical connection (a), the transmitter housing (e) and the process connection (k).



INFORMATION!

Other hygienic connections are available on request.

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

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

8.1 General description

The PSM 2010 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	V-number
1157	1128	0x0485	0x000468	OPTIBAR Pressure Switch	5 - 400mbar / 40kPa / 5.8psi - A - Absolute	VGKY4A5
1157	1129	0x0485	0x000469	OPTIBAR Pressure Switch	6 - 500mbar / 50kPa / 7.5psi - A - Absolute	VGKY4A6
1157	1130	0x0485	0x00046A	OPTIBAR Pressure Switch	7 - 600mbar / 60kPa / 8.7psi - A - Absolute	VGKY4A7
1157	1131	0x0485	0x00046B	OPTIBAR Pressure Switch	A - 1.0bar / 100kPa / 14.5psi - A - Absolute	VGKY4AA
1157	1132	0x0485	0x00046C	OPTIBAR Pressure Switch	B - 1.6bar / 160kPa / 23psi - A - Absolute	VGKY4AB
1157	1133	0x0485	0x00046D	OPTIBAR Pressure Switch	C - 2.0bar / 200kPa / 29psi - A - Absolute	VGKY4AC
1157	1134	0x0485	0x00046E	OPTIBAR Pressure Switch	D - 2.5bar / 250kPa / 36psi - A - Absolute	VGKY4AD
1157	1135	0x0485	0x00046F	OPTIBAR Pressure Switch	E - 4.0bar / 400kPa / 58psi - A - Absolute	VGKY4AE

Vendor ID (dec)	Device ID (dec)	Vendor ID (hex)	Device ID (hex)	Product family	Product variant	V-number
1157	1136	0x0485	0x000470	OPTIBAR Pressure Switch	F - 5.0bar / 500kPa / 72.5psi - A - Absolute	VGKY4AF
1157	1137	0x0485	0x000471	OPTIBAR Pressure Switch	G - 6.0bar / 600kPa / 87psi - A - Absolute	VGKY4AG
1157	10138	0x0485	0x000472	OPTIBAR Pressure Switch	H - 10bar / 1MPa / 145psi - A - Absolute	VGKY4AH
1157	10139	0x0485	0x000473	OPTIBAR Pressure Switch	K - 16bar / 1.6MPa / 232psi - A - Absolute	VGKY4AK
1157	1140	0x0485	0x000474	OPTIBAR Pressure Switch	M - 25bar / 2.5MPa / 363psi - A - Absolute	VGKY4AM
1157	1141	0x0485	0x000475	OPTIBAR Pressure Switch	N - 40bar / 4MPa / 580psi - A - Absolute	VGKY4AN
1157	1142	0x0485	0x000476	OPTIBAR Pressure Switch	1 - 100mbar / 10kPa / 1.5psi - R Gauge	VGKY4R1
1157	1143	0x0485	0x000477	OPTIBAR Pressure Switch	2 - 160mbar / 16kPa / 2.3psi - R Gauge	VGKY4R2
1157	1144	0x0485	0x000478	OPTIBAR Pressure Switch	4 - 250mbar / 25kPa / 3.6psi - R Gauge	VGKY4R4
1157	1145	0x0485	0x000479	OPTIBAR Pressure Switch	5 - 400mbar / 40kPa / 5.8psi - R Gauge	VGKY4R5
1157	1146	0x0485	0x00047A	OPTIBAR Pressure Switch	6 - 500mbar / 50kPa / 7.5psi - R Gauge	VGKY4R6
1157	1147	0x0485	0x00047B	OPTIBAR Pressure Switch	7 - 600mbar / 60kPa / 8.7psi - R Gauge	VGKY4R7
1157	1148	0x0485	0x00047C	OPTIBAR Pressure Switch	A - 1.0bar / 100kPa / 14.5psi - R Gauge	VGKY4RA
1157	1149	0x0485	0x00047D	OPTIBAR Pressure Switch	B - 1.6bar / 160kPa / 23psi - R Gauge	VGKY4RB
1157	1150	0x0485	0x00047E	OPTIBAR Pressure Switch	C - 2.0bar / 200kPa / 29psi - R Gauge	VGKY4RC
1157	1151	0x0485	0x00047F	OPTIBAR Pressure Switch	D - 2.5bar / 250kPa / 36psi - R Gauge	VGKY4RD
1157	1152	0x0485	0x000480	OPTIBAR Pressure Switch	E - 4.0bar / 400kPa / 58psi - R Gauge	VGKY4RE
1157	1153	0x0485	0x000481	OPTIBAR Pressure Switch	F - 5.0bar / 500kPa / 72.5psi - R Gauge	VGKY4RF
1157	1154	0x0485	0x000482	OPTIBAR Pressure Switch	G - 6.0bar / 600kPa / 87psi - R Gauge	VGKY4RG

Vendor ID (dec)	Device ID (dec)	Vendor ID (hex)	Device ID (hex)	Product family	Product variant	V-number
1157	1155	0x0485	0x000483	OPTIBAR Pressure Switch	H - 10bar / 1MPa / 145psi - R Gauge	VGKY4RH
1157	1156	0x0485	0x000484	OPTIBAR Pressure Switch	K - 16bar / 1.6MPa / 232psi - R Gauge	VGKY4RK
1157	1157	0x0485	0x000485	OPTIBAR Pressure Switch	M - 25bar / 2.5MPa / 363psi - R Gauge	VGKY4RM
1157	1158	0x0485	0x000486	OPTIBAR Pressure Switch	N - 40bar / 4MPa / 580psi - R Gauge	VGKY4RN
1157	1159	0x0485	0x000487	OPTIBAR Pressure Switch	1 - 100mbar / 10kPa / 1.5psi - N - Gauge Neg.	VGKY4N1
1157	1160	0x0485	0x000488	OPTIBAR Pressure Switch	2 - 160mbar / 16kPa / 2.3psi - N - Gauge Neg.	VGKY4N2
1157	1161	0x0485	0x000489	OPTIBAR Pressure Switch	4 - 250mbar / 25kPa / 3.6psi - N - Gauge Neg.	VGKY4N4
1157	1162	0x0485	0x00048A	OPTIBAR Pressure Switch	5 - 400mbar / 40kPa / 5.8psi - N - Gauge Neg.	VGKY4N5
1157	1163	0x0485	0x00048B	OPTIBAR Pressure Switch	6 - 500mbar / 50kPa / 7.5psi - N - Gauge Neg.	VGKY4N6
1157	1164	0x0485	0x00048C	OPTIBAR Pressure Switch	7 - 600mbar / 60kPa / 8.7psi - N - Gauge Neg.	VGKY4N7
1157	1165	0x0485	0x00048D	OPTIBAR Pressure Switch	A - 1.0bar / 100kPa / 14.5psi - R Gauge	VGKY4NA
1157	1166	0x0485	0x00048E	OPTIBAR Pressure Switch	B - 1.6bar / 160kPa / 23psi - N - Gauge Neg.	VGKY4NB
1157	1167	0x0485	0x00048F	OPTIBAR Pressure Switch	C - 2.0bar / 200kPa / 29psi - N - Gauge Neg.	VGKY4NC
1157	1168	0x0485	0x000490	OPTIBAR Pressure Switch	D - 2.5bar / 250kPa / 36psi - N - Gauge Neg.	VGKY4ND
1157	1169	0x0485	0x000491	OPTIBAR Pressure Switch	E - 4.0bar / 400kPa / 58psi - N - Gauge Neg.	VGKY4NE
1157	1170	0x0485	0x000492	OPTIBAR Pressure Switch	F - 5.0bar / 500kPa / 72.5psi - N - Gauge Neg.	VGKY4NF
1157	1171	0x0485	0x000493	OPTIBAR Pressure Switch	G - 6.0bar / 600kPa / 87psi - N - Gauge Neg.	VGKY4NG
1157	1172	0x0485	0x000494	OPTIBAR Pressure Switch	H - 10bar / 1MPa / 145psi - N - Gauge Neg.	VGKY4NH
1157	1173	0x0485	0x000495	OPTIBAR Pressure Switch	K - 16bar / 1.6MPa / 232psi - N - Gauge Neg.	VGKY4NK

Vendor ID (dec)	Device ID (dec)	Vendor ID (hex)	Device ID (hex)	Product family	Product variant	V-number
1157	1174	0x0485	0x000496	OPTIBAR Pressure Switch	M - 25bar / 2.5MPa / 363psi - N - Gauge Neg.	VGKY4NM
1157	1175	0x0485	0x000497	OPTIBAR Pressure Switch	N - 40bar / 4MPa / 580psi - N - Gauge Neg.	VGKY4NN

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)

Parameter	Index	Type
Local menu password	96	UInteger (16 Bit)
Output configuration	147	UIntegerT (8 Bit)
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

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
-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

Pressure range	Min. value	Max. value	Unit [bar] multiplier	Unit [mbar] multiplier
-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

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

8.9 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 8-13: 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 8-14: 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 8-15: Error code meaning





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