

Operating Instructions for Display Pressure Switch

Model: PSD



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We don't accept warranty and liability claims neither upon this publication nor in case of improper treatment of the described products.

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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.

Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:

The standard delivery includes:

- Display Pressure Switch model: PSD
- Operating Instructions

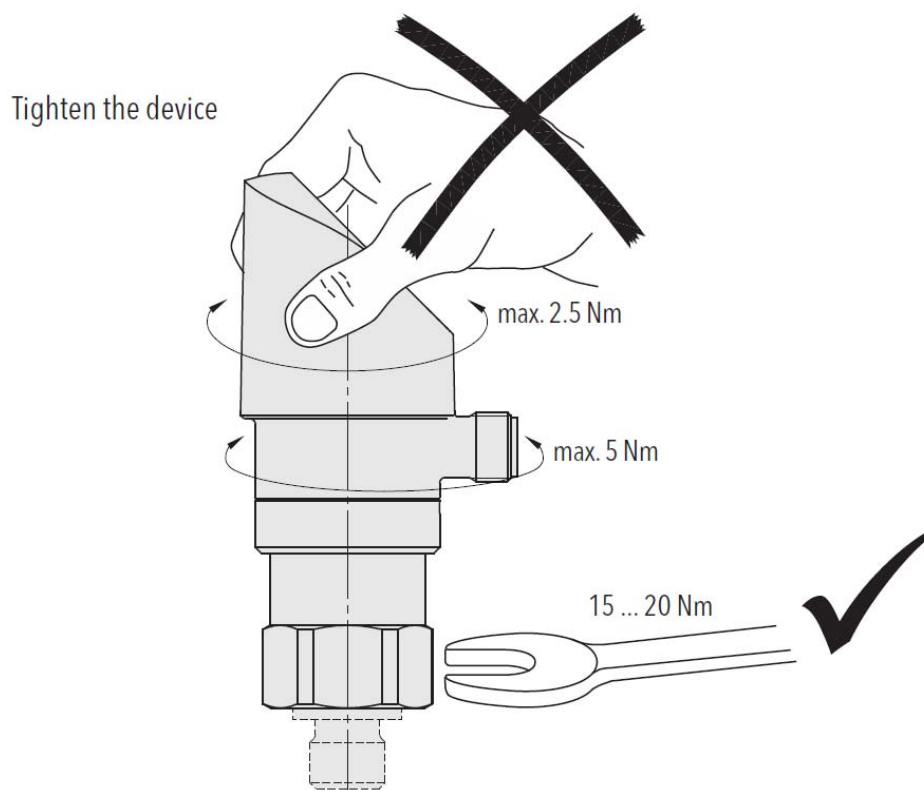
4. Regulation Use

Any use of the Display Pressure Switch, model: PSD, which exceeds the manufacturer's specification, may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

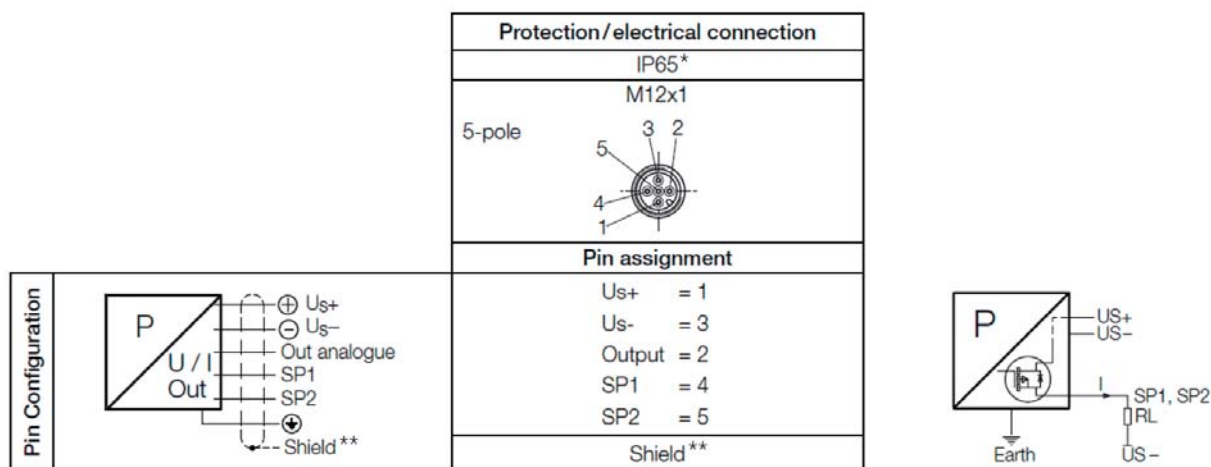
5. Operating Principle

KOBOLD is a leading international supplier of high quality sensors and monitoring instruments among other things for measurement of pressure and temperature. The PSD is the ideal combination of pressure switch and transmitter with a pressure display. The parameters can be set on the device. The settings in combination with a comprehensive set of options make the PSD suitable for a wide range of demanding applications.

6. Mechanical Connection



7. Electrical Connection



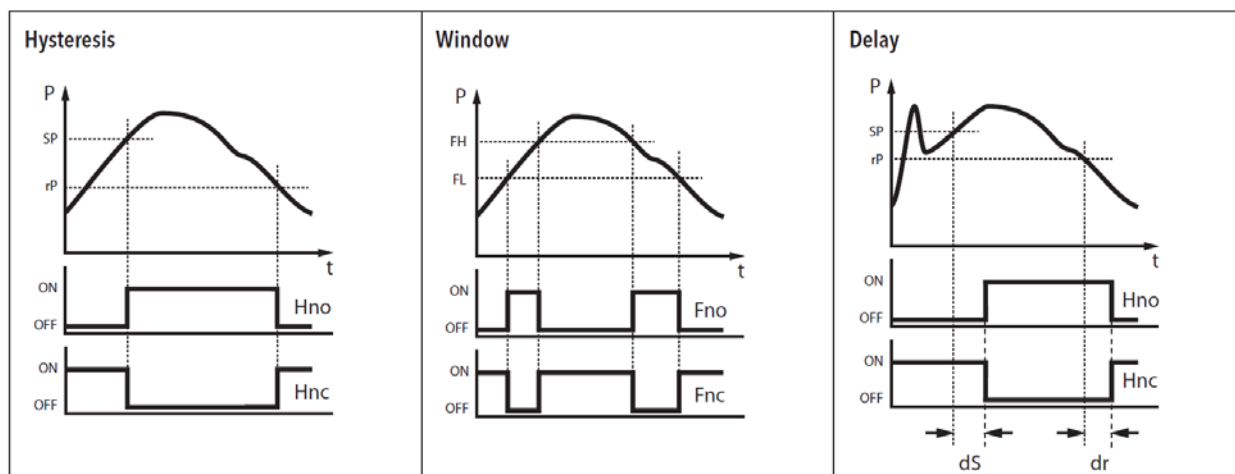
* provided that the female connector is mounted according to instructions

** The use of shielded cable is recommended

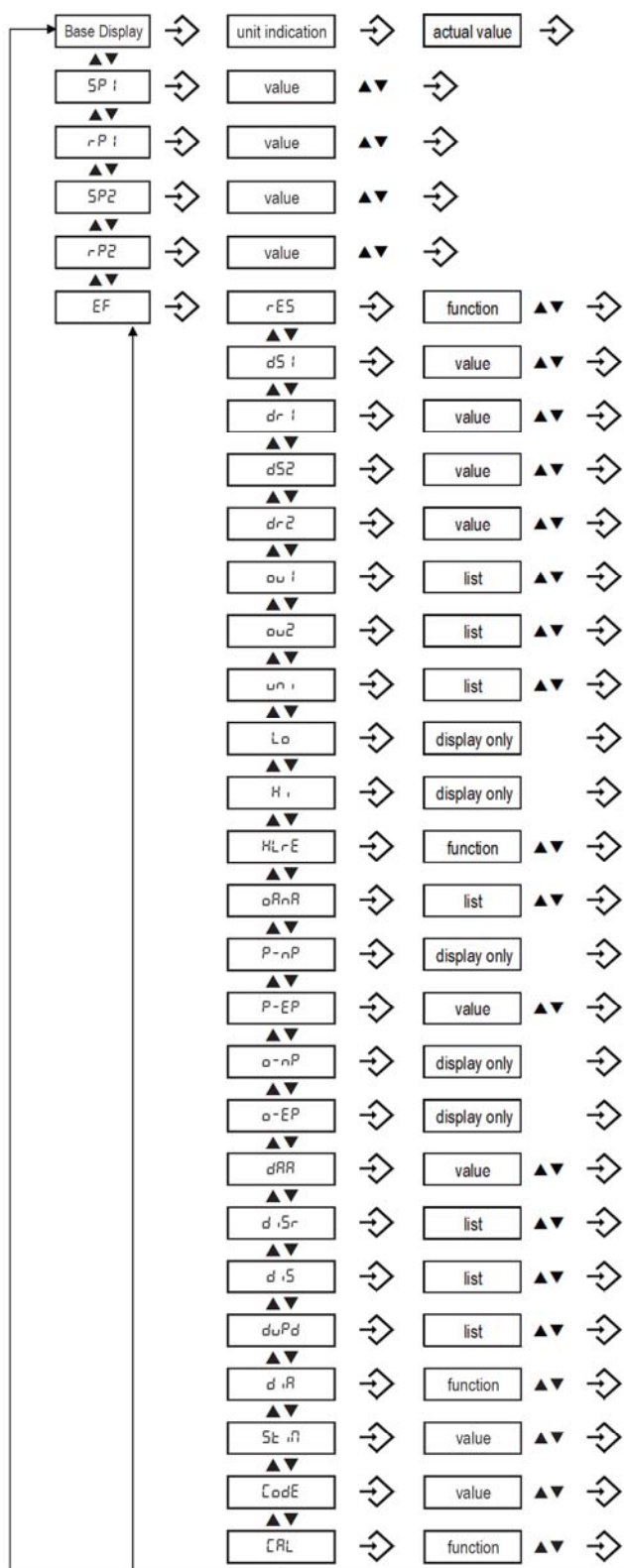
7.1 Output signal / supply voltage

| Output | I _{SUPPLY} | U _{SUPPLY} |
|------------|---------------------|---------------------|
| 4...20 mA | ≤ 30 mA | 15...30 VDC |
| 0...10 VDC | ≤ 30 mA | 15...30 VDC |

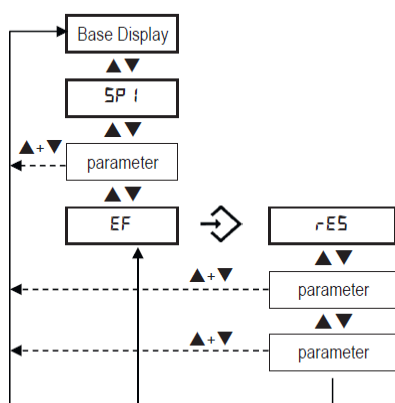
Switching output functions



8. Operating menu



| Description | Value range |
|--|---|
| Switch point SP1 (Hysteresis) or Window high FH1 | SP1 > rP1, FH1 > FL1 Hysteresis ≥ 1 % FS |
| Reset point rP1 (Hysteresis) or Window low FL1 | rP1 < SP1, FL1 < FH1 Hysteresis ≥ 1 % FS |
| Switch point SP2 (Hysteresis) or Window high FH2 | SP2 > rP2, FH2 > FL2 Hysteresis ≥ 1 % FS |
| Reset point rP2 (Hysteresis) or Window low FL2 | rP2 < SP2, FL2 < FH2 Hysteresis ≥ 1 % FS |
| Reset to factory settings | |
| Switching delay time for SP1/FH1 | 0.01 ... 99.99s |
| Switching delay time for rP1/FL1 | 0.01 ... 99.99s |
| Switching delay time for SP2/FH2 | 0.01 ... 99.99s |
| Switching delay time for rP2/FL2 | 0.01 ... 99.99s |
| Function switching output 1 | Hysteresis NO (Hno), Hysteresis NC (Hnc) Window NO (Fno), Window NC (Fnc) |
| Function switching output 2 | Hysteresis NO (Hno), Hysteresis NC (Hnc) Window NO (Fno), Window NC (Fnc) |
| Pressure unit | bar/MPa/kPa/psi/m WC/mm WC |
| Lowest measured pressure | |
| Highest measured pressure | |
| Reset highest and lowest pressure value | |
| Analogue output type | I, U, off |
| Pressure zero point | |
| Pressure end point | 50 % ... 100 % FS |
| Analogue output zero point | |
| Analogue output end point | |
| Damping analogue output rise time 10 ... 90 % nominal pressure | 0.01 ... 3.00 s |
| Display rotate | no, yes (180°) |
| Display mode | actual, highest, lowest, off, act. - 1 decimal, act. - 2 dec., act. - 3 dec. |
| Display update rate | 1, 2, 5, 20 Hz |
| Diagnostic mode | |
| Sampling time for logger | 0.1 ... 999.9 s, off (0) |
| Access code | 4-digit code |
| Factory use | |



By pressing ▲+▼ simultaneously the menu will return to the base display or automatically after ca. 60 s without operation.

pw* When performing a parameter change by pressing ▲ or ▼ and if an access code has been defined, it has to be entered digit by digit.

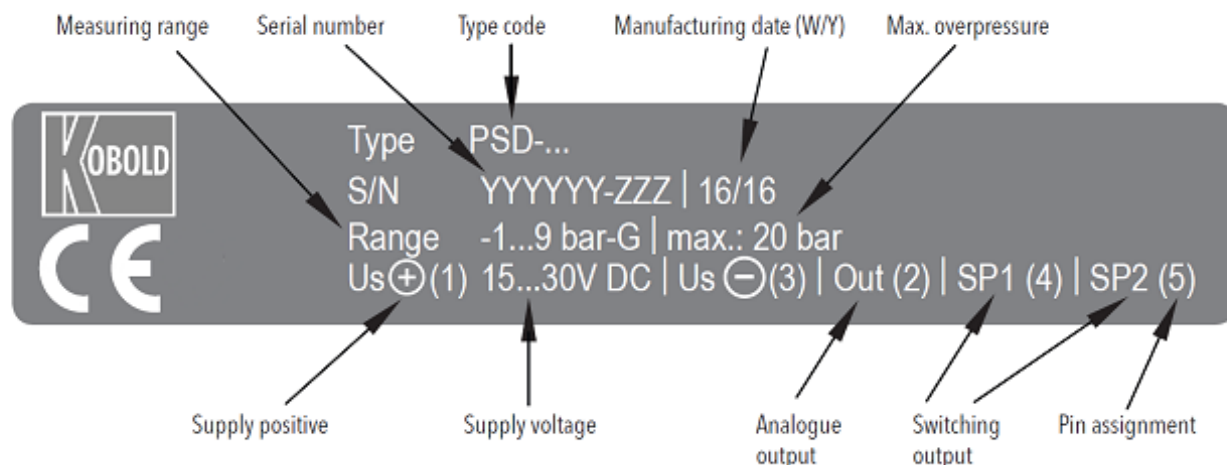


After confirming the new parameter value, the menu item of the changed parameter will be displayed.

Parameter

| Name | Standard setting (accessory ZS) | Value range | Short name |
|--|---------------------------------|--|------------|
| Switch point SP1 (hysteresis mode) Upper switch point FH1 (window mode) | 75% measuring range | SP1>RP1 FH1>FL1 hysteresis≥1% FS | SP1 |
| Reset point RP1 (hysteresis mode) Lower switch point FL1 (window mode) | 25% measuring range | RP1<SP1 FL1<FH1 hysteresis ≥ 1% FS | RP1 |
| Switch point SP2 (hysteresis mode) Upper switch point FH2 (window mode) | 75% measuring range | SP2>RP2 FH2>FL2 hysteresis≥ 1% FS | SP2 |
| Reset point RP2 (hysteresis mode) Lower switch point FL2 (window mode) | 25% measuring range | RP2<SP2 FL2<FH2 hysteresis ≥ 1% FS | RP2 |
| Switch point delay time SP1 (hysteresis mode) Switch point delay time FH1 (window mode) | 0 | 0...99.99 s | dS1 |
| Switch point delay time RP1 (hysteresis mode) Switch point delay time FL1 (window mode) | 0 | 0...99.99 s | dR1 |
| Switch point delay time SP2 (hysteresis mode) Switch point delay time FH2 (window mode) | 0 | 0...99.99 s | dS2 |
| Switch point delay time RP2 (hysteresis mode) Switch point delay time FL2 (window mode) | 0 | 0...99.99 s | dR2 |
| Functions switching output 1 | Hysteresis, closer (Hno) | Hysteresis NO (Hno), hysteresis NC (Hnc), window NO (Fno), window NC (Fnc) | ou1 |
| Functions switching output 2 | Hysteresis, closer (Hno) | Hysteresis NO (Hno), hysteresis NC (Hnc), window NO (Fno), window NC (Fnc) | ou2 |
| Pressure units | bar | bar, psi, MPa, kPa, mWC | uni |
| Measuring range adjustment | 100 % nominal pressure | 50...100% nominal pressure | P-EP |
| Damping (analogue output) | 0.01 s | 0.01...3.00 s (time constant) | dAA |
| Display rotation | no | no, yes (180°) | disr |
| Display mode | Current pressure value | Pressure value: current, highest, lowest, display off Current value: decimal places selectable (max. 3) | dis |
| Display update | 2 | 1, 2, 5, 20 Hz | duPd |

9. Type label description



10. Technical Information

| | |
|----------------------------|---|
| Measuring principle: | thin film on steel |
| Measuring range: | -1...+1.5 to 0...600 bar -14.5...+22 to 0...7500 psi adjustable 50...100 % FS |
| Output signal: | 4...20 mA 0...10 V _{DC} , switchable mA or V |
| Switching output: | 2 transistors PNP |
| Accuracy@ 25° C typ.: | ±0.5 % FS typ. |
| Media temperature: | -25° C...+85° C |
| Ambient temperature: | -25° C...+85° C |
| Pressure unit for display: | bar, psi, MPa, kPa, m WC, mm WC |

Electrical data

| | |
|------------------------|---|
| Output/supply voltage: | 4...20 mA: 24 or 0-10 V _{DC} / 24 (15...30) V _{DC} |
|------------------------|---|

| | |
|------------------|-------------|
| Switch-on-delay: | typ. 200 ms |
|------------------|-------------|

| | |
|--|------------|
| Inverse-polarity protection, Short-circuit strength @ 25° C during 5 min.; | integrated |
| Current consumption: | ≤30 mA |

Environmental conditions

| | |
|----------------------------|---------------------|
| Media temperature: | -25° C...+85° C |
| Ambient temperature: | -25° C...+85° C |
| Protection ¹⁾ : | IP65 |
| Humidity: | max. 95% relative |
| Vibration: | 10 g (10...2000 Hz) |
| Shock: | 50 g/ 3 ms |

¹⁾ see electrical connection

Analogue output

| | |
|---------------------------------|---|
| Output signal: | switchable 4-20 mA or 0-10 V _{DC} |
| Accuracy: | TEB ²⁾ @ -25 °C...+85° C [% FS typ.] ± 1.75 accuracy @ +25° C [% FS typ.] ±0.5 NLH ²⁾ @ +25° C (BSL) [% FS typ.] ±0.2 TC ²⁾ zero point and span [% FS typ.] ±0.03 long term stability 1 year [% FS typ.] ±0.1 |
| Current limiting output signal: | 4-20 mA (overload) 0...10 V _{DC} : <40 mA (short-circuit) |
| Damping (rise-time): | 0.01...3.00 s/10...90% nominal pressure |

Switching output

| | |
|-----------------------------------|--|
| Accuracy: | accuracy@ +25° C [% FS typ.] ± 0.5 TEB ²⁾ @ -25 °C...+85° C [% FS typ.] ± 1.0 accuracy @ +25° C long term stability 1 year [% FS typ.] ±0.3 |
| Adjustment range of switchpoints: | 0...100% FS |
| Switching hysteresis: | ≥ 1% FS switchpoint > reset point |
| Switching resistance: | ≤ 3 Ω |
| Output function: | hysteresis, window; normally open (NO), normally closed (NC) |
| Switching current: | ≤ 0.5 A each switching output |
| Current limiting: | ≤ 2 A each switching output |
| Switching frequency: | max. 200 Hz |
| Delay time: | 0...99.99 s |

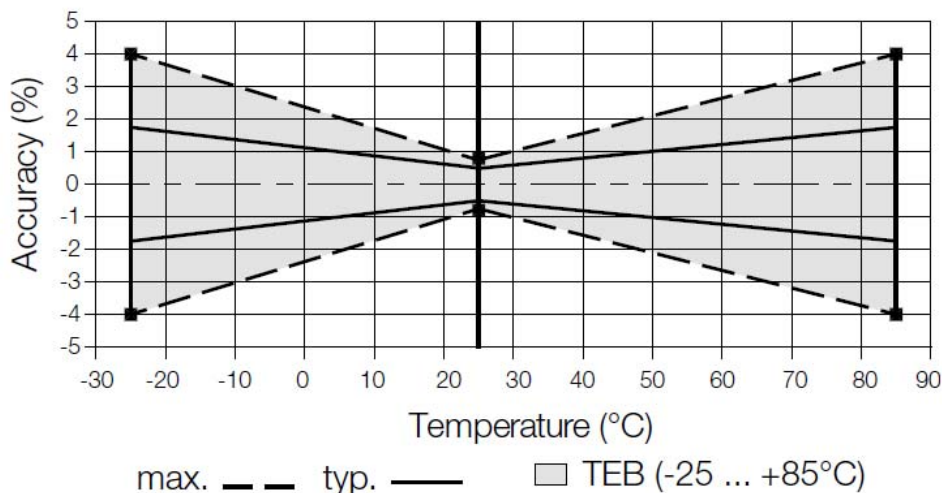
²⁾ see »Terminology«

Display

| | |
|------------------------------|---|
| Display: | 4-digit 7-segment display 180 ° flippable with disable function standard decimal places: ≤9: 3 decimal places 10...99: 2 decimal places 100...999: 1 decimal place |
| Switching status indication: | 2 LED, red |
| Operation: | with 3 buttons and menu navigation according to VDMA 24574-1 |
| Display reduction: | 0.1 % FS |
| Display range: | -3...103% FS |
| Setting parameters: | see table "Parameter" |

Mechanical data

| | |
|--|---|
| Sensor (wetted parts) | 1.452 (AISI630) |
| Pressure connection (wetted parts): | 1.452 (AISI630) |
| Housing: | steel, die cast metal galvanised, display housing plastic |
| Connection: | G $\frac{1}{4}$ male, adapter can be ordered as separate item |
| Sealing: | FPM |
| Male electrical plug: | PA-plug M12x1.5 pin |
| Mounting torque: | 15...20 Nm |
| Housing alignment: | display 335 ° rotatable, max. 2.5 Nm electrical connection 343° rotatable, max. 5 Nm |
| Pressure peak damping element: | ø 0.4 mm |
| Weight: | ~189 g |

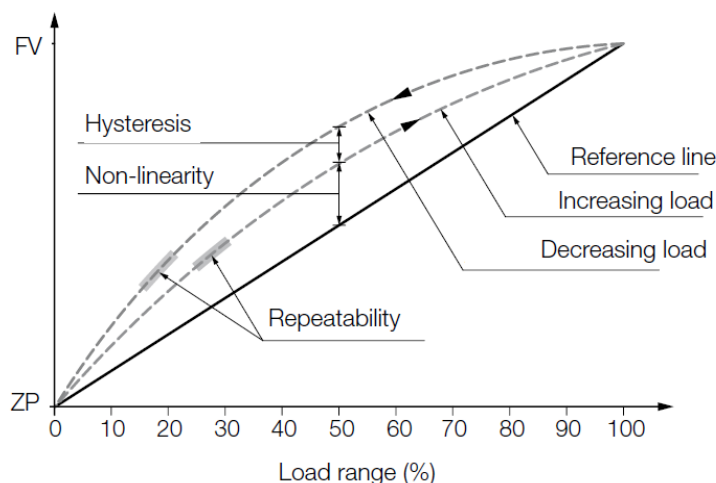


11. Terminology

Non-linearity

The largest deviation from the effective characteristic line of an ideal reference line. The reference line can be defined as a limit point adjustment, a BSL or a BSL through 0.

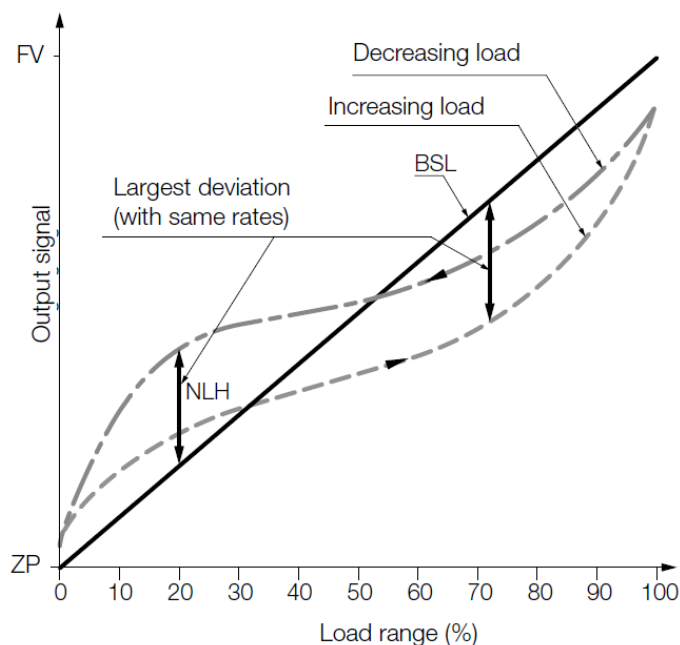
Specifications: Non-linearity, Hysteresis



BSL through Zero

As an additional requirement for the minimum value adjustment, the BSL through zero (also BSL/0) must go straight through zero or the origin.

Specifications: Accuracy NLH (BSL through zero)

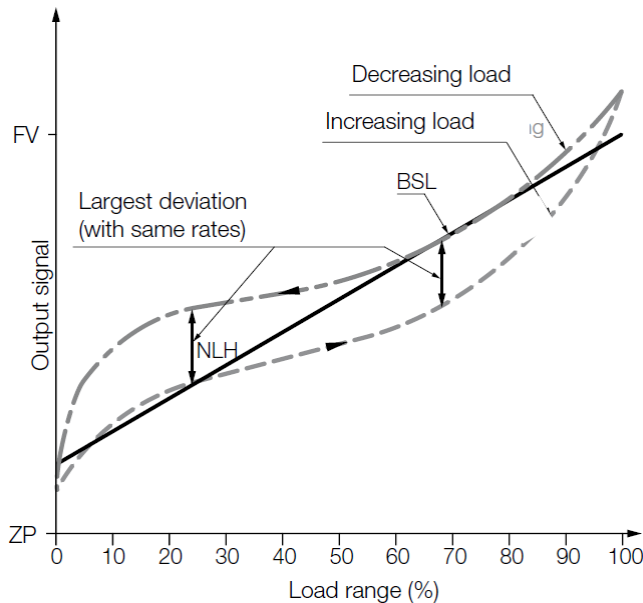


BSL Best Straight Line

The reference line according to the BSL or the minimum value adjustment is placed in such a way that the maximum positive and negative deviations are as small as possible.

Specifications: Non-linearity, Hysteresis

Specifications: Accuracy NLH (BSL)



NLH Non-linearity and Hysteresis

Largest deviation from the ideal characteristic line (BSL, BSL/0 or limit point). In pressure measuring instruments, the non-linearity and pressure hysteresis are given together at a constant temperature.

Temperature Coefficient TC

Change of measured value for zero point and span as a result of changes in temperature

Long-term Stability Long-term Drift

The change of accuracy due to aging under certain reference conditions during a certain period of time, typically 1 year.

TEB Total Error Band

Total error (root from sum of the square of the deviations) due to measurement deviations (accuracy) and temperature influence (temperature coefficient TC). The temperature influence is usually given in the information across a range larger than that given in the standard (-10 ... +60 °C). Whilst DIN 16086 also continues to add to the long-term stability over a year, the information is subject to ex-works conditions for obvious reasons.

12. Order Codes

Example: **PSD-4 3 3 R2 B4 4**

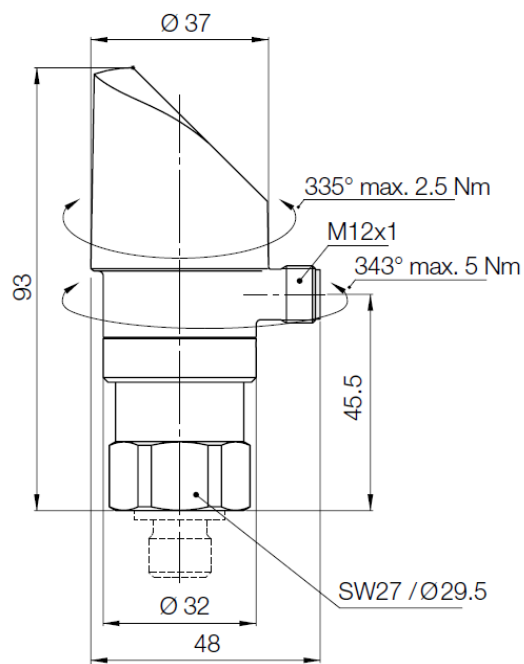
| Model | Version | Electrical connection | Material | Connection | Measuring range * [bar] | Option | Special version |
|-------|--|--|--------------------------------------|---------------------------|---|--|---|
| PSD- | 4 = 2x PNP switching output, analogue output 4-20 mA | 3 = M12 plug, 24 (15-30) V _{DC} | 3 = FPM o-ring, st. steel connection | R2 = G $\frac{1}{4}$ male | A1 = -1...1.5 A4 = -1...9 B6 = 0...6 B7 = 0...10 B8 = 0...16 B9 = 0...25 C2 = 0...100 C3 = 0...160 C4 = 0...250 C5 = 0...400 | 4 = pressure peak damping element D = 0.4 mm | 0 = none Y = special version (specify in clear text) |

* Other ranges on request

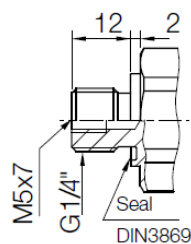
13. Dimensions

[mm]

PSD



PSD...R2...



14. EU Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Display Pressure Switch

Model: PSD

to which this declaration relates is in conformity with the standards noted below:

EN 61000-6-2:2006 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

EN 61000-6-3:2007 + A1:2010 Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments

Also the following EC guidelines are fulfilled:

2014/30/EU
2011/65/EU

EMC Directive
RoHS (category 9)

Hofheim, 12. Febr. 2018



H. Peters
General Manager



M. Wenzel
Proxy Holder