OPERATING MANUAL

Precont® PS4 | Universal Electronic Pressure Gauge with ceramic or metal measuring diaphragm with a wide range of configuration options with LED display

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senseca

Contents

1 Notes on the Document

1.1 Document Features

This manual describes the product's design, functions, and use, and helps you operate the product as intended.

Read the manual carefully before using the product. This will help you avoid potential injury, property damage, and damage to the device.

The operating manual is an integral part of the device and must be kept accessible at all times in the immediate vicinity of the operating site.

The information in this document reflects the knowledge available at the time of printing. Subject to change without notice.

1.2 Terms

NOTE

Information on how to prevent malfunctions, operational failures, and damage to the device or system.


WARNING

Failure to follow these instructions may result in serious or fatal injury.

[04-5]

Reference to a variant >> Product Code section

1.3 Additional Documentation

In addition to this document, you can find additional documentation online.

2 Safety Instructions

2.1 Authorized Personnel

Installation, electrical connection, commissioning, operation, maintenance, disassembly, and disposal of the device must be performed by a qualified and authorized specialist in accordance with the instructions in the operating manual and applicable standards.

This specialist must have read and understood the operating instructions, particularly the safety instructions. The required personal protective equipment must always be worn when working on or with the device.

2.2 Intended Use

The device is an electronic pressure sensor for monitoring, controlling, and continuously measuring pressures in gases, vapors, liquids, and dusts.

The device's operational safety is guaranteed only when used as intended. Improper or unintended use of this product may result in application-specific hazards, such as a container overflow due to incorrect installation or adjustment. This can result in property damage, personal injury, or environmental damage. Furthermore, this may impair the device's performance.

Improper use, failure to follow the operating instructions and technical regulations, the use of inadequately qualified personnel, unauthorized modifications, and damage to the device exclude the manufacturer's liability for any resulting damages. The manufacturer's warranty is void.

2.3 Operational Safety

The device is designed and tested in accordance with the state of the art to ensure operational safety. It may only be operated when it is in technically sound and safe operating condition. The operator is responsible for ensuring the trouble-free operation of the device.

The device may only be used within the permissible operating limits. Any use outside these intended limits may result in significant hazards.

The materials must be checked for compatibility with the application requirements prior to use. An unsuitable material can lead to damage, malfunction, or destruction of the device and the resulting hazards.

The device must not be used as the sole means of preventing hazardous conditions on machines and systems.

For safety and warranty reasons, any interventions beyond the described operating procedures may only be performed by personnel authorized by the manufacturer. Unauthorized modifications or alterations are expressly prohibited. For safety reasons, only accessories specified by the manufacturer may be used.

This device complies with Article 4(3) of EU Directive 2014/68/EU (Pressure Equipment Directive) and is designed and manufactured in accordance with good engineering practice.

The device meets the requirements of all relevant EU directives. This is confirmed by the CE marking affixed to the device. The corresponding EU Declaration of Conformity can be requested or downloaded from the website.

3 Product Description

3.1 Function

The device is an electronic pressure sensor for monitoring, controlling, and continuously measuring pressures in gases, vapors, liquids, and dusts.

A wide variety of process connections and electronic configurations allows it to be used for a multitude of applications, including demanding measurement tasks.
Thanks to its high accuracy, the device can be adapted to a wide range of applications.

The flush-mounted process connection enables process-integrated cleanability of the measuring membrane in contact with the medium, including via CIP/SIP cleaning processes. This ensures maintenance-free and trouble-free pressure measurement even in critical applications involving viscous or frequently changing media.

The device series is available with various measuring cells for optimal adaptation to the application:

Type	(K)eramic / (M)etal Membrane	Internal membrane	Diaphragm flush with front	Dry transmission	Oil-filled transmission	Sensor: (C)apacitive / (D)MS	Sensor seal: none	Sensor seal: elastomer	Pressure variant: (R)elative / (A)bsolute	Process pressure: Low pressure	Process pressure: High pressure	Process temperature	Measurement Accuracy	Measurement Accuracy Xcellence	IP Protection	ATEX/IECEx	Food
PS4SK	K	x	x	x		D		x	R/A	++	++	++	+	x	++	x	
PS4SC	K	x	x	x		k		x	R/A	++	o	++	++	x	++	x	
PS4SM	M	x	x	x	x	D	x	x	R/A	+	++	++	+	x	++	x	

PS4LM	M		x		x	D		x	R/A	++	o	++	+	x	++	x	x

PS4*C: The highly accurate, long-term stable, and robust capacitive ceramic sensing element reliably ensures highly precise measurements at low to medium pressures and enables operation even under demanding environmental conditions, such as low temperatures, high shock and vibration loads, or problematic media.

PS4*K: The long-term stable and robust strain gauge ceramic sensing element reliably ensures precise measurements at low to high pressures and enables operation even under demanding environmental conditions, such as low temperatures, high shock and vibration loads, or problematic media.

PS4SM: The long-term stable and robust strain gauge or piezoresistive metal sensing element ensures reliably precise measurements at low to very high pressures and enables operation even under demanding environmental conditions, such as low temperatures, high shock and vibration loads, or problematic media.

PS4LM: The EHEDG-tested flush-mounted diaphragm, with a surface roughness of Ra < 0.4 µm, is fully welded to the process connection and equipped with a form-fit seal. This ensures a reliable, gap-free, and dead-space-free seal for aseptic applications.

3.2 Design

3.2.1 Ceramic sensor diaphragm

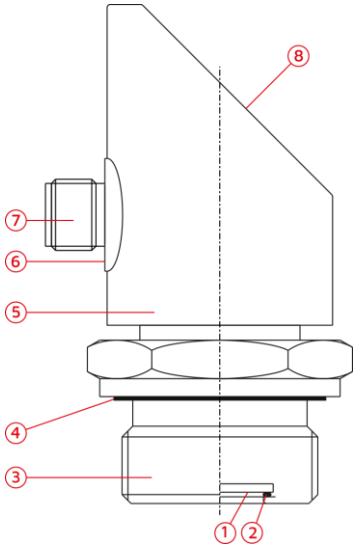

Image3 .1 : grf00182_cmp_ps4sc

3.2.2 Metal Sensor Membrane

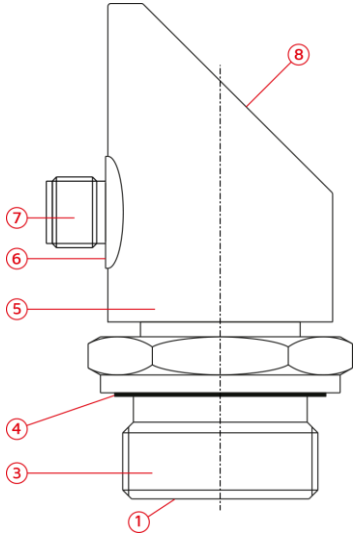

Image3 .2 : grf00183_cmp_ps4sm

1 Pressure Transducer Diaphragm
2 Pressure cell seal
3 Process connection
4 Process seal
5 Connection housing
6 Pressure-compensating diaphragm
7 Connector
8 Display, Keypad

The device is installed in the respective system via the process connection (3). Depending on the model, the process connection is sealed off from the process either by a suitable elastomer seal (4) or without an elastomer.

The process pressure acts:

- **PS4*C**: directly (dry system) via the process diaphragm (1) on the capacitor mounted on the rear side, causing a change in capacitance there,
- **PS4*K**: directly (dry system) via the process diaphragm (1) on the thick-film strain gauge mounted on the rear side, causing a change in resistance there,
- **PS4SM**: either directly (dry system) via the internal process membrane (1) or via the face-flush process membrane (1) using a pressure-transmitting fluid on the thin-film or piezoresistive strain gauge applied to the rear side, causing a change in resistance there,
- **PS4LM**: via the front-flush process membrane (1) using a pressure-transmitting fluid on the piezoresistive strain gauge applied to the rear, causing a change in resistance there,

which is detected by the electronics integrated into the connection housing (5), processed according to the settings, and output via the outputs on the connector (7).

- **PS4*C/PS4*K**: The process diaphragm (1) is sealed to the process connection (3) by the elastomer measuring cell seal (2).
- **PS4SM/PS4LM**: The process diaphragm (1) is hermetically welded to the process connection (3).

The device features a pressure-compensating diaphragm (6) to compensate for changes in atmospheric pressure.

Parameterization and operation of the integrated evaluation electronics are performed directly on the device via the display and keypad.

Laser-etched marking on the nameplate affixed to the housing tube (2) ensures the device's identifiability throughout its entire service life.

3.3 Nameplate

The nameplate contains the most important data for identifying and using the device.

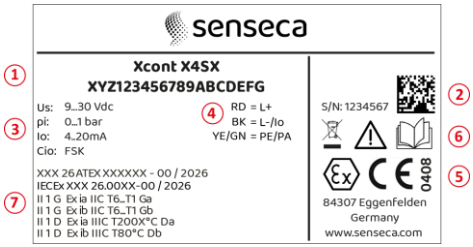

Image3 .3 : grf00002_lab001

1 Product code
2 Serial number
3 Technical Specifications
4 Electrical Connection
5 Approvals
6 Safety Instructions
7 Type of ignition protection

3.4 Product Code

PS4 [01][02][03][04][05][06][07][08][09][10][11][12][13][14][94][95][96][97][98][99]

	Device	PS4	Pressure Gauge
01	Application Type	S	Standard – [02-C/K/M]
01		L	Hygiene – [02-M]
02	Sensor	C	Capacitive, Al_2O_3 ceramic – [01-S]
02		K	Strain Gauge – Thick-film, Al_2O_3 ceramic – [01-S]
02		M	DMS - Thin Film/Piezoresistive, Steel 316Ti/630 – [01-S]
02			DMS - piezoresistive, 316L steel – [01-L]

03	Approval	S	Standard
04	Process Connection	3	Thread ISO 228-1 – G¼"A, ISO 1179-2 E - [PS4*C/K]
04		6	Thread ISO 228-1 – G¼"A, EN 837 (pressure gauge)
04		4	Thread ISO 228-1 – G¼"I, female thread - [PS4*C/K]
04		9	Thread ISO 228-1 – G½“A, flush with front – [PS4*C]
04		0	Thread ISO 228-1 – G½"B, face-flush - [PS4SM]
04		1	Thread ISO 228-1 – G½"A, EN 837 (pressure gauge)
04		2	Thread ISO 228-1 – G½"A, internal bore - [PS4*C/K]
04		8	Thread ISO 228-1 – G¾"A, ISO 1179-2 E, flush with front – [PS4*C/K]
04		5	Thread ISO 228-1 – G1"A, ISO 1179-2 E, face-flush - [PS4*C/K]
04			Thread ISO 228-1 – G1"B, face-flush - [PS4SM – 08-03/16/17]
04			Thread ISO 228-1 – G1"B, face-flush, EHEDG - [PS4LM]
04		7	ISO 228-1 thread – G1½"B, front-flush – [PS4*C]
04		E	ANSI thread – NPT ¼" - [PS4*C/K]
04		C	ANSI – NPT ½" thread - [PS4*C/K]
04		R	DIN 11851 dairy pipe fitting – DN25 - [PS4*C]
04		N	DIN 11851 Milk Pipe Fitting – DN40 - [PS4*C] / [PS4LM]

04		M	Milk pipe fitting DIN 11851 – DN50 - [PS4*C] / [PS4LM]
04		P	Varivent N - DN40...162 (1½...6"), Ø68 mm - [PS4*C] / [PS4LM]
04		L	DRD – DN50, Ø65 mm - [PS4*C] / [PS4LM]
04		U	Clamp DIN 32676-A – DN20 - [PS4*C]
04		S	Clamp DIN 32676-A/-C – DN25…40, ISO 2852 – DN25…38 - [PS4*C]
04		T	Clamp DIN 32676-A/-C – DN50/2", ISO 2852 – DN40…51 - [PS4*C]
05	Process Seals	0	None / NBR - [PS4SM]
05		1	FKM/FPM
05		3	EPDM, FDA - [PS4*C/K] / [PS4*M]
05		4	FFKM - [PS4*C]
05		6	FFKM, high-density - [PS4*C]
06	Process connection	V	CrNi steel
07	Connection housing	C	S41, 316L steel
08	Measuring range	26	0…50 mbar - [PS4*C]
08		01	0…100 mbar - [PS4*C] / [PS4LM]
08		02	0…200 mbar - [PS4*C] / 0…250 mbar - [PS4*K] / [PS4LM]
08		03	0…400 mbar - [PS4*C/K] / [PS4*M]
08		04	0…600 mbar - [PS4*C/K] / [PS4LM]

08		05	0…1 bar
08		06	0…1.6 bar - [PS4*C/K]
08		07	0…2.5 bar - [PS4*C/K] / [PS4LM]
08		08	0…4 bar
08		09	0…6 bar - [PS4*C/K] / [PS4*M]
08		10	0…10 bar
08		11	0…16 bar - [PS4*C/K] / [PS4*M]
08		12	0…20 bar - [PS4*C] / 0…25 bar - [PS4*K] / [PS4*M]
08		13	0…40 bar - [PS4*C/K] / [PS4SM]
08		14	0…60 bar - [PS4*C/K] / [PS4SM]
08		19	0…100 bar - [PS4*K] / [PS4SM]
08		20	0…160 bar - [PS4*K] / [PS4SM]
08		21	0…250 bar - [PS4*K] / [PS4SM]
08		22	0…320 bar - [PS4*K] / [PS4SM]
08		23	0…400 bar - [PS4*K] / [PS4SM]
08		24	0…600 bar - [PS4*K] / [PS4SM]
08		25	0…1000 bar - [PS4SM – 04-1/6]

08		15	-100...0 mbar - [PS4*C]
08		16	-1...0 bar - [PS4*C/K] / [PS4*M]
08		17	-1...+1 bar - [PS4*C/K] / [PS4*M]
08		18	-100...+100 mbar - [PS4*C]
09	Electronics – Output	A	2x PNP switches, 3-/4-wire
09		B	Current 4...20 mA, PNP switch, 3-/4-wire
09		C	Current 4...20 mA, 2x PNP switches, 3-/4-/5-wire
09		D	Current 4...20 mA, PNP switch, 3-/4-wire, Desina
10	Electronics – Function	S	Standard
11	Process Temperature	0	-40...+100 °C (-40...+212 °F) - [PS4*C/K] / [PS4SM]
11			-20...+150 °C (-4...+302 °F) - [PS4LM]
11		1	-40...+125 °C (-40...+257 °F) - [PS4*C] / [PS4SM]
11			-40...+135 °C (-40...+275 °F) - [PS4*K]
12	Pressure variant	R	Relative pressure
12		A	Absolute pressure - [PS4*C] / [PS4*K ≥ 1 bar ... ≤ 40 bar] / [PS4*M]
13	Measurement accuracy	1	0.2% - [PS4*C]
13		4	0.5% - [PS4*K] / [PS4*M]

14	Electrical Connection	S	M12-A-4P/-5P connector
94	Optional Feature	+SF	LABS-free, silicone-free / Paint-compatible version
95	Additional option	+ML	Measurement point designation / TAG - laser marking
96	Additional option	+MZ	Material Test Certificate – EN 10204 3.1 / [PS4*C/K]
97	Additional Option	+WT	Factory Certificate – Suitability for Drinking Water
98	Additional Option	+KF	Configuration / Default Settings
99	Additional Option	+WK	Factory Calibration - Calibration Certificate

Variants are generally identified by the letter Y in the product code.

3.5 Dimensions

Dimensions in mm

3.5.1 Connection housing

Process temperature [11-0]

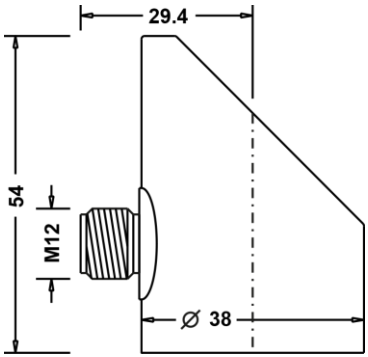

Image3 .4 : grf00184_dim_ps4

Process Temperature [11-1] – PS4SC/K, PS4SM

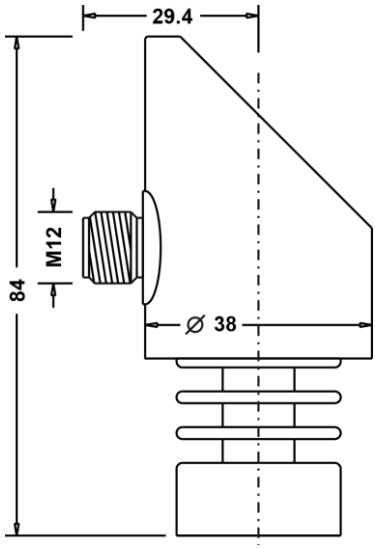

Image3 .5 : grf00185_dim_ps4_tek

3.5.2 Internal process diaphragm

Thread ISO 228-1 – G1/4", EN 837 / PS4*C - [04-6]

Process pressure Pmax = 60 bar

Torque Mmax = 50 Nm

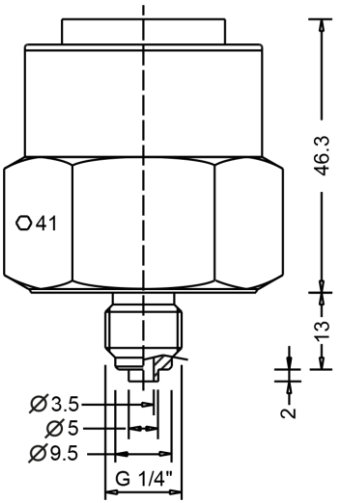

Image3 .6 : grf00186_dim_ps4_04_6

Thread ISO 228-1 – G1/4", EN 837 / PS4*K - [04-6]

Process pressure Pmax = 60 bar

Torque Mmax = 50 Nm

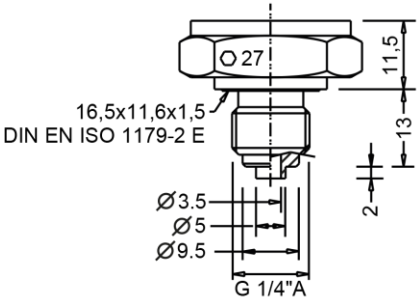

Image3 .7 : grf00215_dim_ps4sk_04_6

Thread ISO 228-1 – G1/4", EN 837 / PS4SM - [04-6]

Process pressure Pmax = 1000 bar

Torque Mmax = 50 Nm

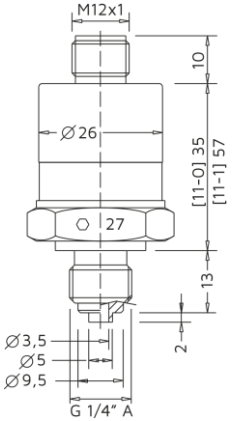

Image3 .8 : grf00119_dim_pu4sm_04_6

Thread ISO 228-1 – G1/2", EN 837 / PS4*C - [04-1]

Process pressure Pmax = 60 bar

Torque Mmax = 50 Nm

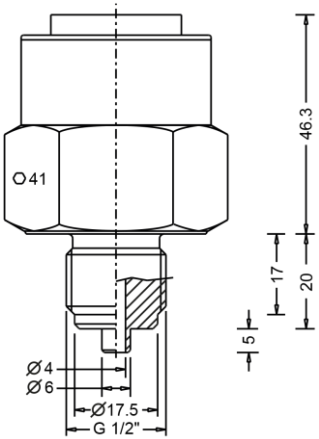

Image3 .9 : grf00187_dim_ps4_04_1

Thread ISO 228-1 – G1/2", EN 837 / PS4*K - [04-1]

Process pressure Pmax = 60 bar

Torque Mmax = 50 Nm

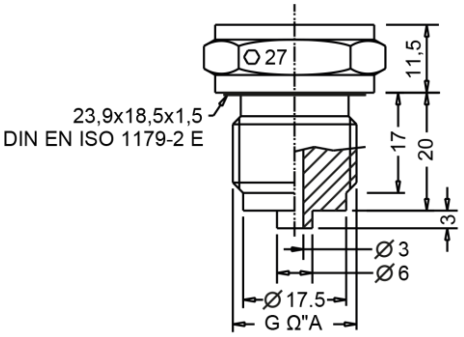

Image3 .10 : grf00216_dim_ps4sk_04_1

Thread ISO 228-1 – G1/2", EN 837 / PS4SM - [04-1]

Process pressure Pmax = 1000 bar

Torque Mmax = 50 Nm

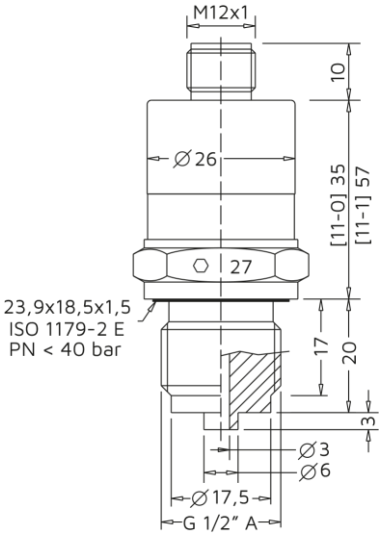

Image3 .11 : grf00120_dim_pu4sm_04_1

Thread ISO 228-1 – G1/4", ISO 1179-2 E / PS4*C/K - [04-3]

Process pressure Pmax = 60 bar

Torque Mmax = 50 Nm

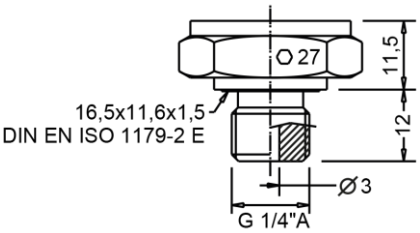

Image3 .12 : grf00188_dim_ps4_04_3

Thread ISO 228-1 – G1/4"I, female thread / PS4*C - [04-4]

Process pressure Pmax = 60 bar

Torque Mmax = 50 Nm

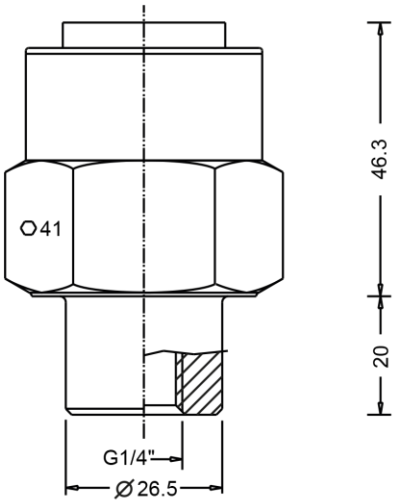

Image3 .13 : grf00189_dim_ps4_04_4

Thread ISO 228-1 – G1/4"I, female thread / PS4*K - [04-4]

Process pressure Pmax = 60 bar

Torque Mmax = 50 Nm

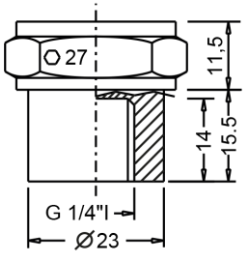

Image3 .14 : grf00217_dim_ps4sk_04_4

Thread ISO 228-1 – G1/2", internal bore / PS4*C - [04-2]

Process pressure Pmax = 60 bar

Torque Mmax = 50 Nm

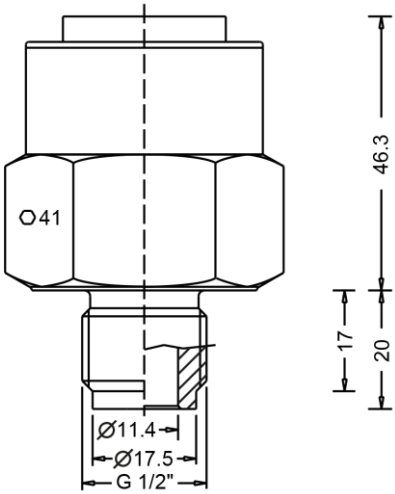

Image3 .15 : grf00190_dim_ps4_04_2

Thread ISO 228-1 – G1/2", internal bore / PS4*K - [04-2]

Process pressure Pmax = 60 bar

Torque Mmax = 50 Nm

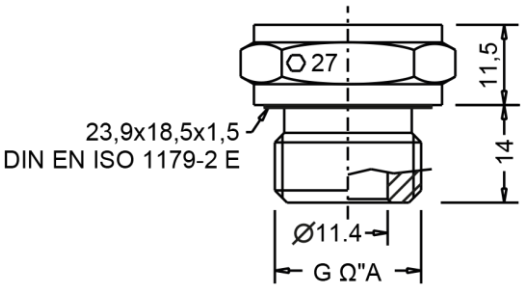

Image3 .16 : grf00218_dim_ps4sk_04_2

ANSI – NPT 1/4" thread / PS4*C/K - [04-E]

Process pressure Pmax = 60 bar

Maximum torque Mmax = 50 Nm

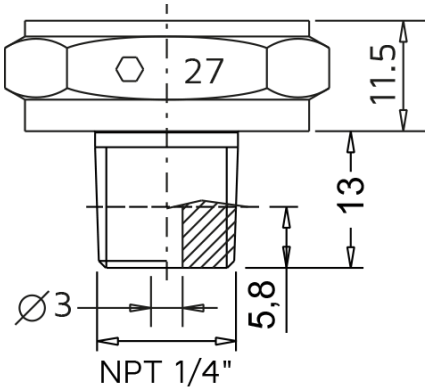

Image3 .17 : grf00191_dim_ps4_04_e

ANSI – NPT 1/2" thread / PS4*C/K - [04-C)

Process pressure Pmax = 60 bar

Maximum torque Mmax = 50 Nm

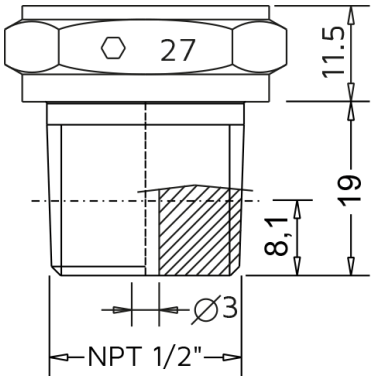

Image3 .18 : grf00192_dim_ps4_04_c

3.5.3 Flush-mounted process diaphragm

Thread ISO 228-1 – G1/2" / PS4*C - [04-9]

Process pressure Pmax = 20 bar
Torque Mmax = 20 Nm

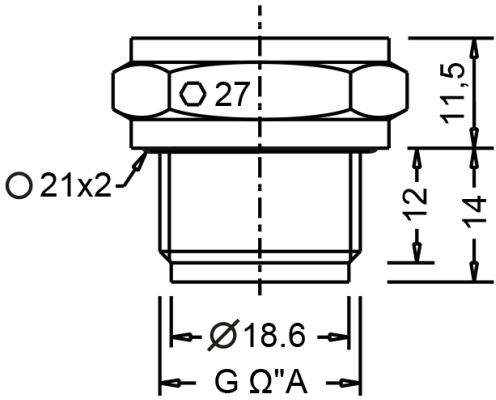

Image3 .19 : grf00193_dim_ps4_04_9

Thread ISO 228-1 – G1/2" / PS4SM - [04-0]

Process pressure Pmax = 600 bar (> 1 bar]
Torque Mmax = 50 Nm

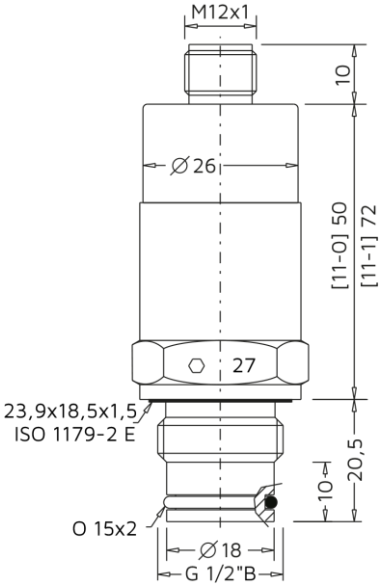

Image3 .20 : grf00121_dim_pu4sm_04_0

Thread ISO 228-1 – G3/4", ISO 1179-2 E / PS4*C/K - [04-8]

Process pressure Pmax = 20 bar [02-C] / 60 bar [02-K]
Torque Mmax = 50 Nm

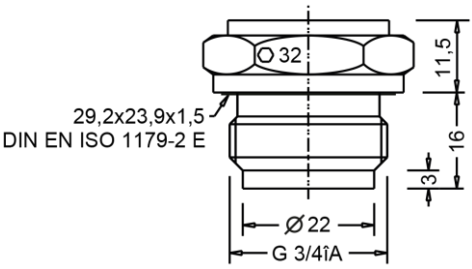

Image3 .21 : grf00194_dim_ps4_04_8

Thread ISO 228-1 – G1", ISO 1179-2 E / PS4*C/K - [04-5]

Process pressure Pmax = 20 bar [02-C] / 1 bar [02-K]
Torque Mmax = 50 Nm

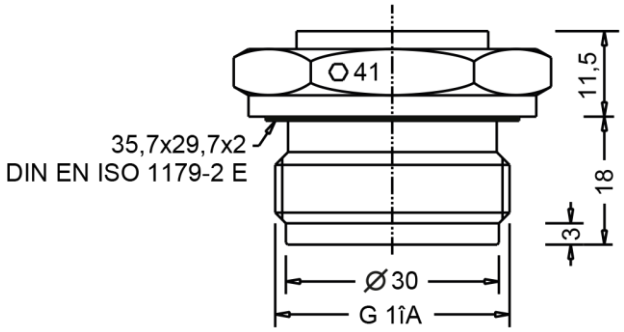

Image3 .22 : grf00195_dim_ps4_04_5

Thread ISO 228-1 – G1" / PS4SM - [04-5]

Process pressure Pmax = 1 bar

Torque Mmax = 50 Nm

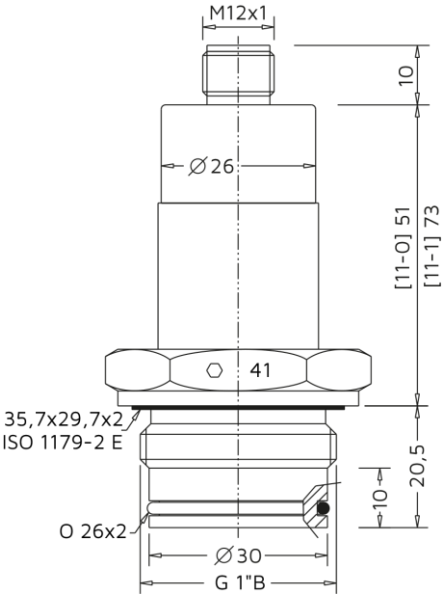

Image3 .23 : grf00122_dim_pu4sm_04_5

Thread ISO 228-1 – G1" / PS4LM - [04-5]

Process pressure Pmax = 25 bar

Maximum torque Mmax = 50 Nm

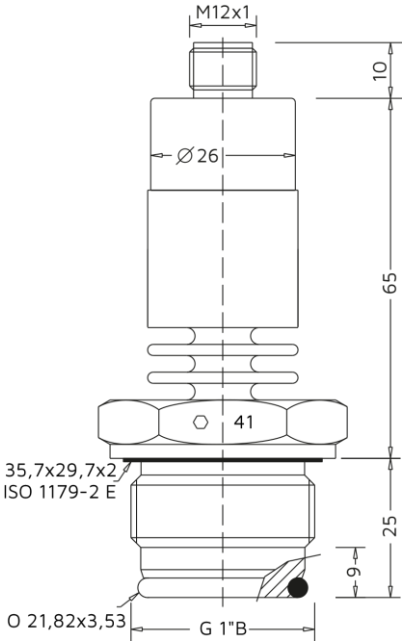

Image3 .24 : grf00126_dim_pu4lm_04_5

Thread ISO 228-1 – G1½" / PS4*C - [04-7]

Process pressure Pmax = 40 bar

Torque Mmax = 50 Nm

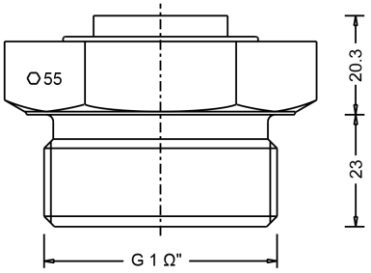

Image3 .25 : grf00196_dim_ps4_04_7

Milk pipe DIN 11851 DN25 / PS4*C - [04-R]

Process pressure Pmax = 20 bar

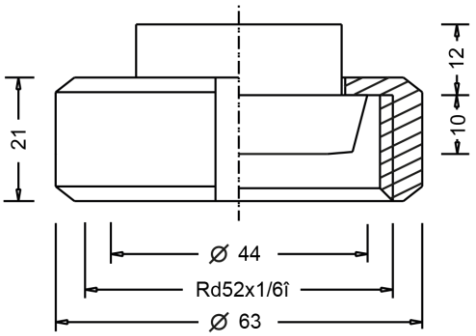

Image3 .26 : grf00197_dim_ps4_04_r

Milk pipe DIN 11851 DN40 / PS4*C - [04-N]

Process pressure Pmax = 40 bar

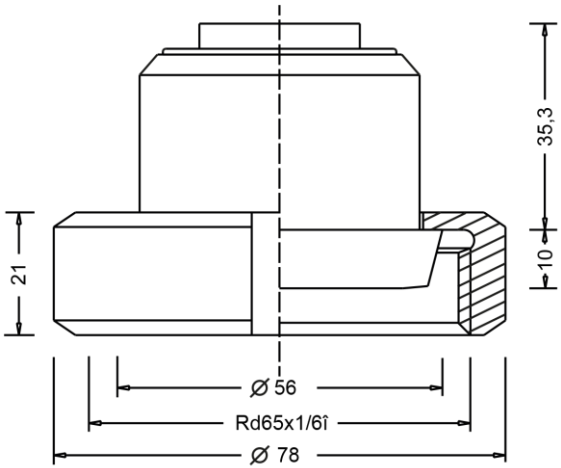

Image3 .27 : grf00198_dim_ps4_04_n

Milk pipe DIN 11851 DN40 / PS4LM - [04-N]

Process pressure Pmax = 25 bar

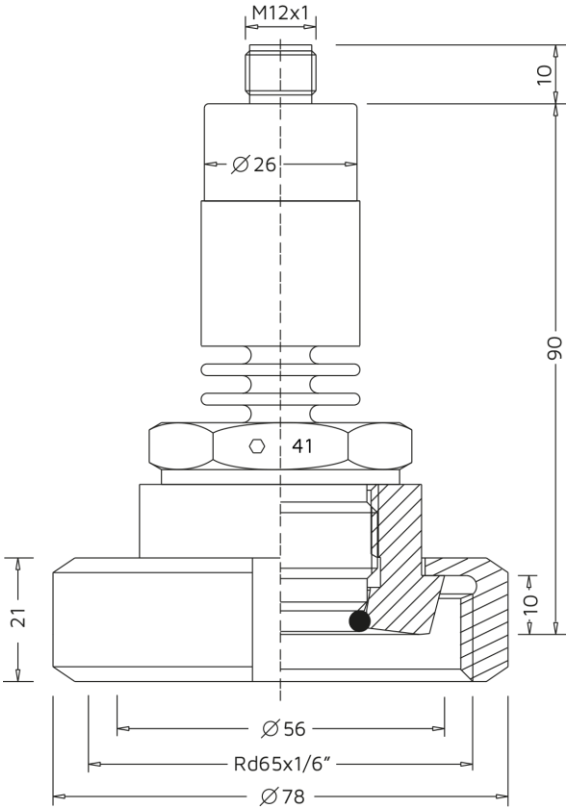

Image3 .28 : grf00127_dim_pu4lm_04_n

Milk pipe DIN 11851 DN50 / PS4*C - [04-M]

Process pressure Pmax = 25 bar

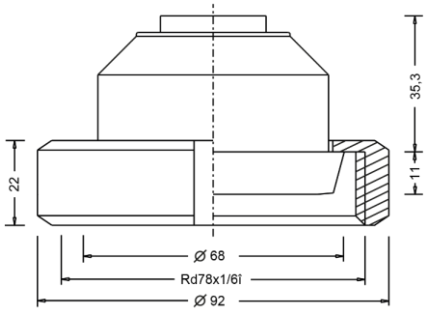

Image3 .29 : grf00199_dim_ps4_04_m

Milk pipe DIN 11851 DN50 / PS4LM - [04-M]

Process pressure Pmax = 25 bar

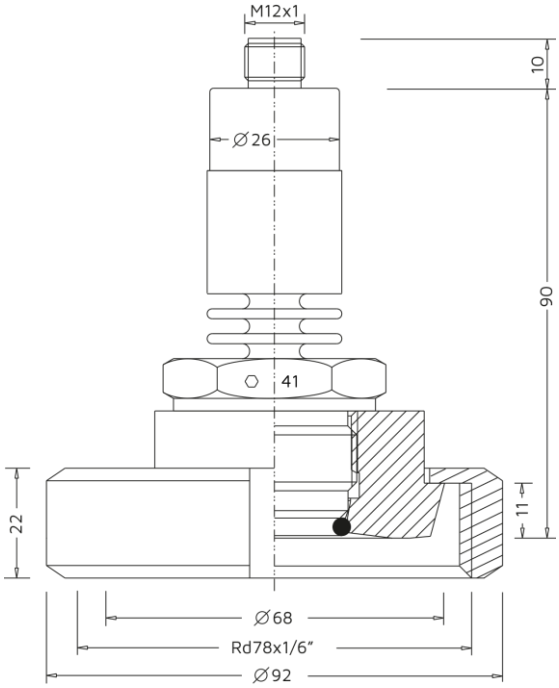

Image3 .30 : grf00128_dim_pu4lm_04_m

Varivent N - DN40-162 (1½...6"), Ø68 mm / PS4*C - [04-P]

Process pressure Pmax = 40 bar

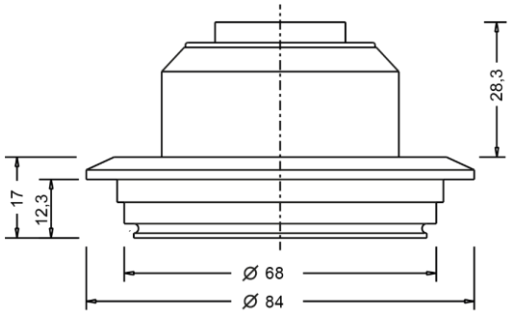

Image3 .31 : grf00200_dim_ps4_04_p

Varivent N - DN40-162 (1½...6"), Ø68 mm / PS4LM - [04-P]

Process pressure Pmax = 25 bar

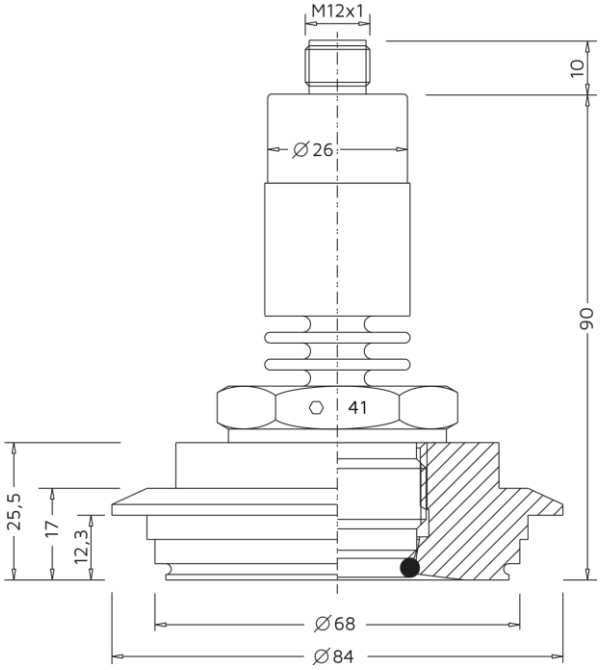

Image3 .32 : grf00129_dim_pu4lm_04_p

DRD – DN50, Ø65 mm / PS4*C - [04-L]

Process pressure Pmax = 25 bar

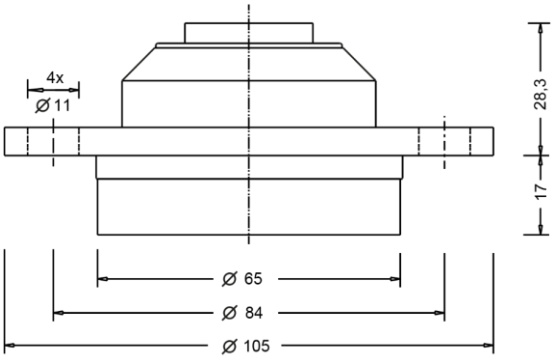

Image3 .33 : grf00201_dim_ps4_04_l

DRD – DN50, Ø65 mm / PS4LM - [04-L]

Process pressure Pmax = 25 bar

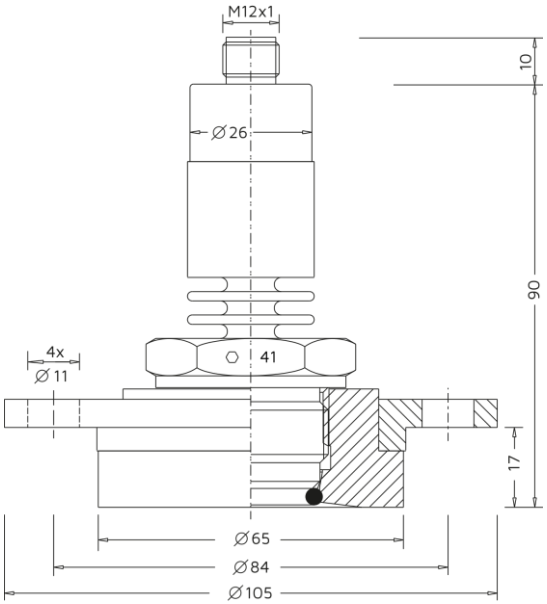

Image3 .34 : grf00130_dim_pu4lm_04_l

Clamp DIN 32676 – DN20 / PS4*C - [04-U]

Process pressure Pmax = 20 bar

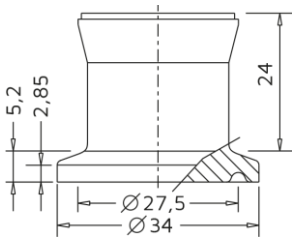

Image3 .35 : grf00202_dim_ps4_04_u

Clamp DIN 32676 – DN25...40/1...1½", ISO 2852 – DN25...38 / PS4*C - [04-S]

Process pressure Pmax = 25 bar

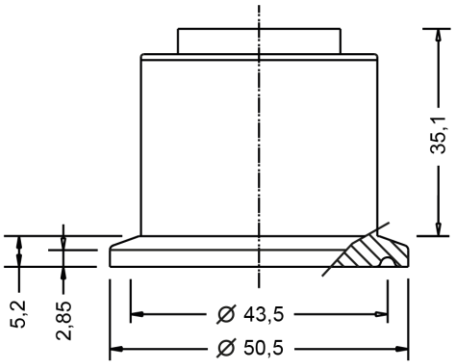

Image3 .36 : grf00203_dim_ps4_04_s

Clamp DIN 32676 – DN50/2", ISO 2852 – DN40...51 / PS4*C - [04-T]

Process pressure Pmax = 25 bar

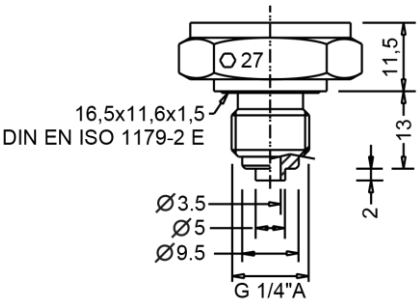

Image3 .37 : grf00204_dim_ps4_04_t

3.6 Packaging, Transport, Storage

The device is protected by packaging designed to withstand normal transport stresses. Transport must be carried out in accordance with the instructions on the shipping packaging. Failure to do so may result in damage to the device.

Upon receipt, the shipment must be inspected immediately for correctness, completeness, and any transport damage. Any transport damage or hidden defects found must be handled accordingly.

The packages must be kept sealed until installation and, unless otherwise specified, stored only under the following conditions:

- Do not store outdoors
- Store in a dry, dust-free location
- Do not expose to corrosive substances
- Protect from direct sunlight
- Avoid mechanical shocks
- Storage and transport temperature: -20...+85 °C
- Relative humidity 20...85 %

3.7 Accessories

A comprehensive range of accessories, optimally tailored to the device, is available for installation and electrical connection.

4 Installation

4.1 Ambient and Process Conditions

Proper operation of the device within the specified technical data can only be guaranteed if the permissible environmental and process conditions at the installation site (see the "Technical Data" section) are not exceeded. Therefore, before installation, ensure that all parts of the device in contact with the process (e.g., measuring diaphragm, process seal, process connection) are suitable for the prevailing process conditions (e.g., process pressure, process temperature, chemical properties of the media, abrasion, mechanical stresses).

4.2 Installation Location

Avoid installing the device in a location where high pressure surges may occur.

The device should be installed in temperature-stabilized locations whenever possible. Significant fluctuations in process temperature can cause temporary increases in measurement signal deviations.

At high process temperatures, heat transfer to the connection housing can be reduced by insulating the medium-carrying part of the system or by using a temperature decoupler.

PS4*C: If the temperature falls below the dew point—e.g., cold process medium at high ambient temperatures—condensation may form inside the pressure sensor, which can lead to temporary increased measurement deviations or malfunctions. These deviations are fully reversible once the condensation dries out. The use of a device with a strain gauge pressure sensor is recommended in this case.

The installation orientation may cause a zero-point shift (see Technical Data section) due to the weight of the measuring diaphragm.

Pressure Measurement in Gases:

Install the device above the connection so that condensate can drain into the process.

Use a shut-off valve.

Pressure measurement in vapors:

Install the device downstream of a U-bend or loop and a shut-off valve below the sampling port. Condensate forms in the pipe bends, creating a protective water seal. In superheated steam applications, this ensures a medium temperature of ≤100 °C at the transmitter.

Pressure measurement in liquids:

Install the device downstream of the shut-off valve, either below or at the same level as the sampling port. Install the device below the lowest measurement point. This ensures that the differential pressure line is always filled with liquid, allowing gas bubbles to rise back into the process line. Do not install the device in the flow stream, in the suction zone of a pump, or at a location in the tank where it may be subjected to pressure pulses from an agitator.

4.3 Installation Instructions


WARNING

Install the device only when the system is depressurized. There is a risk of rapidly escaping measured media or a pressure surge.


WARNING

Allow the system to cool sufficiently before installation. There is a risk from escaping, hazardous, and hot measured media

Do not remove the packaging until immediately before installation, and inspect the device for any damage.

The transport protection cap attached to the process connection or the diaphragm must not be removed until immediately before installation. The transport protection cap must be removed. The diaphragm must not be damaged.

Contamination or damage to the pressure-compensating diaphragm can lead to incorrect measurement results.

Sealing surfaces and threads on the device and at the installation site must be clean and undamaged. Cylindrical threads must be sealed using a suitable O-ring, flat gasket, or profiled gasket. Additional sealing material such as tow, adhesive tape, or PTFE tape should not be used.

Tapered threads must be wrapped with additional sealing material, such as PTFE tape, to ensure a proper seal.

NOTE

Installing a device into a shut-off connection that is completely filled with process fluid can result in the destruction of the measuring diaphragm. The reduction in fluid volume when screwing in the device leads to a very sharp increase in pressure, which can exceed the maximum allowable pressure many times over. Therefore, the connection must be sufficiently drained before installation.

NOTE

The threaded process connection must be tightened only at the hexagon using a suitable wrench and no more than the maximum permissible tightening torque (see the “Product Description – Dimensions” section).

5 Electrical Connection

5.1 Pin Assignment

Electrical Connection A – [09-A]

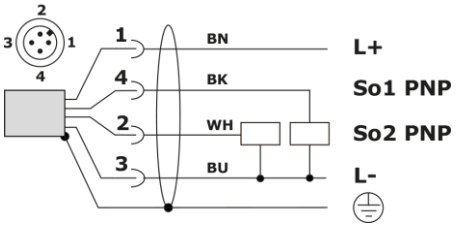

Image5 .1 : grf00038_eac_m12_4p_4w_2spnp

Electrical Connection B – [09-B]

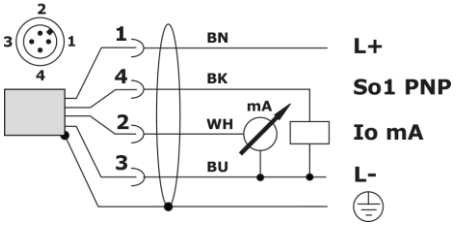

Image5 .2 : grf00036_eac_m12_4p_4w_ma_spnp

Electrical Connection C – [09-C]

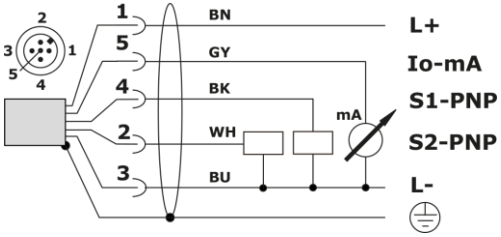

Image5 .3 : grf00205_eac_m12_5p_5w_ma_2spnp

Electrical Connection D – [09-D]

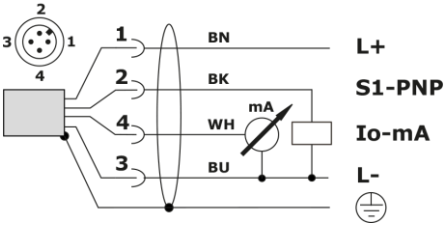

Image5 .4 : grf00206_eac_m12_4p_4w_ma_spnp_desina

5.1.1 Connection Cable

Cable: M12 – A-coded, 1-BN = brown / 2-WH = white / 3-BU = blue / 4-BK = black / 5-GY = gray

Cable: Use a 2–5-conductor, twisted-pair, shielded cable.

5.1.2 Connection Instructions

WARNING

Install the device only when it is de-energized.

NOTE

Switch off all connected control devices before commissioning.

NOTE

Operate inductive loads (auxiliary contactors, solenoid valves) at the switching outputs only with a free-wheeling diode or an RC circuit.

Observe the maximum permissible supply voltage Us at the L+/L- terminals:

- Us = 10.5…35 Vdc

Observe the maximum permissible load resistance RL of the analog output:

- RL ≤ (Us – 10.5 V) / 22 mA

Ground the device, preferably via the metallic process connection, or alternatively via the cable shield.

Route the cable separately from power-carrying lines; ground the cable shield.

6 Operation

6.1 Control and Display Elements

grf00207_ope_ps4_front

A. LED Display

- Display of measured values and operating menus

B. Set button

- Access to the control menus
- In the selection menu: Enters the selected submenu
- In the input menu: Accept value

C. Change button

- Switch between submenus
- Cancel: Cancel value entry without accepting
- Toggle the counting direction of the +/- key from + (increase) to - (decrease).

D. +/– key

- Change the value by pressing + (increase) or - (decrease). The counting direction is always set to + (increase) by default. Toggle the counting direction using the Change button.
- Changing a setting in a selection menu

E. Unit LED

- Unit display via green LED

F. Error Indicator LED

- Fault condition indicated by a red LED

G. Operating LED

- Operational status indicated by a green LED

H. Switching status LED

- Indicates the active switching output via the corresponding yellow LED

6.2 Operating mode

6.2.1 Run Mode

The device measures the applied physical quantity and performs the selected functions according to the set parameters.

Active operation is indicated by the green operating LED.

The measured value is displayed in the display window.

The selected unit is indicated by the corresponding green unit LED lighting up.

The current output and the switching outputs are activated.

An activated switching output is indicated by the corresponding yellow switching status LED lighting up.

Exceeding frame specifications, faulty operating conditions, or device malfunctions are indicated by the red error LED, which may be steady or flashing.

6.2.2 Programming Mode

Access the operating menus using the Set button.

- In the switch function menu—password 1903—the configurable parameters and functions are specifically designed for using the device as a switch.
- In the transmitter function menu—password 3009—the configurable parameters and functions are specifically designed for using the device as a transmitter when the analog output is in use.
- In the Switching Point Menu—Password 1111—only the switching and reset points of the PNP switching outputs are accessible for quick adjustment. The function of the switching outputs can be displayed.

From both the Switch Function Menu and the Transmitter Function Menu, you can equally access the display settings, the service parameters (system damping, error memory, and minimum/maximum value memory), as well as the option to reset all parameters to factory defaults.

6.3 Switching Output S1 / S2

6.3.1 Switching Point / Resetting Point

The input values refer to the current measured value or are based on the display scaling.

The reset point must always be less than or equal to the switch point.

A minimum distance (hysteresis) between the turn-on and reset points or between the upper and lower switching points is not specified.

If the reset point is set to a value greater than or equal to the switch-on point, or if the lower switch point is set to a value greater than or equal to the upper switch point, the system automatically sets the reset point equal to the switch-on point or the lower switch point equal to the upper switch point.

The red error indicator LED will flash.

The affected switching output (S1oG or S2oG) is displayed in the Service Fault Memory (SEr) / Fault Message Memory (ErrM).

6.3.2 Turn-on Delay Time / Turn-off Delay Time

The activation or deactivation of the switching output can be subject to a delay time (resolution 0.1 s) to implement simple sequence controls.

6.3.3 Operating Mode

The operating mode determines the functional direction of the switching output.

Normally Open / NO

- No signal is present at the output if the switching condition is not met.
- A signal is present at the output when the switching condition is met

Normally Closed (NC)

- A signal is present at the output when the switching condition is not met.
- No signal is present at the output when the switching condition is met

6.3.4 Hysteresis function

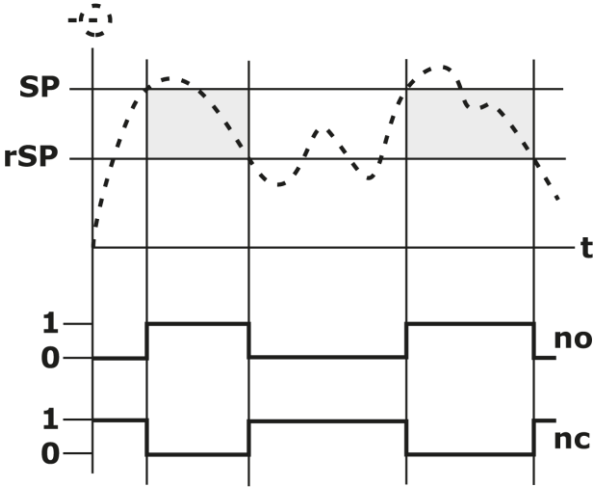

Figure6 .1 : grf00209_fun_sw_hf_sp_rsp

The hysteresis function ensures a stable switching state, regardless of system-related signal fluctuations around the setpoint.

It can be used for signal-controlled two-point control.

The switching range is defined by specifying the turn-on point and the turn-off point.

The switching output is activated when the current measured value exceeds the switch-on point and the set switch-on delay time has elapsed.

The switching output is deactivated when the current measured value falls below the reset point and the reset delay time (if set) has elapsed.

Either the currently applied measurement signal or any arbitrary value can be used as the turn-on or turn-off point.

6.3.5 Window Function

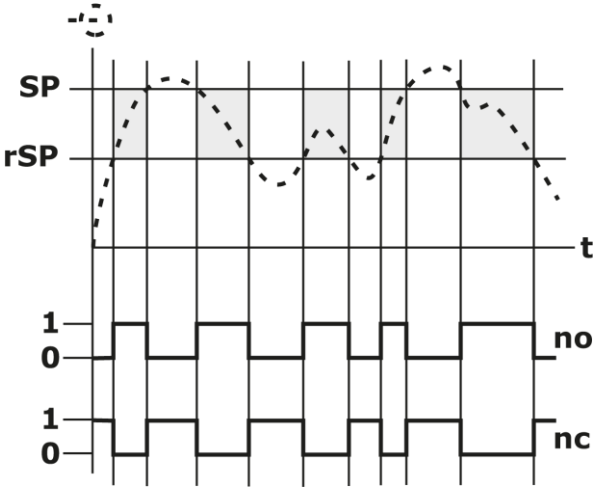

Figure6 .2 : grf00210_fun_sw_ff_sp_rsp

The window function defines a signal range—the "good range"—within which the switching output assumes a defined switching state.

The switching range is defined by specifying a switch-on point and a switch-off point.

The switching output is activated when the current measured value lies within the range defined by the switching point and reset point and the set switch-on delay time has elapsed.

The switching output is deactivated when the current measured value lies outside the range defined by the switch point and reset point and the set reset delay time has elapsed.

Either the currently applied measurement signal or any arbitrary value can be used as the switch-on or switch-back point.

6.3.6 Fault Signal Function

The switching output S1 can alternatively also be used in fault signal mode. In this case, a switching response occurs if the output signal exceeds 20 mA or falls below 4 mA.

6.4 Current Output

The nominal values of the current output (4 mA/20 mA) refer to the set signal zero point and signal end point.

6.4.1 Error Signal

Defines the current output in terms of its operating range and whether faults are detected.

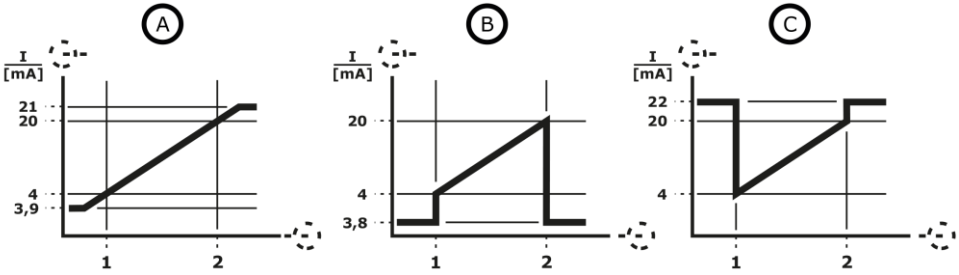

Figure6 .3 : grf00211_fun_iout_4_20_h_39_21_e_38_22

A Off >> 3.9–21 mA

B 3.8 mA

C 22 mA

6.4.2 Invert signal

Inverts the current output.

- 4–20 mA >> 20–4 mA

6.5 Menu Structure

6.5.1 Menu Structure: Switch Function Menu - Password 1903

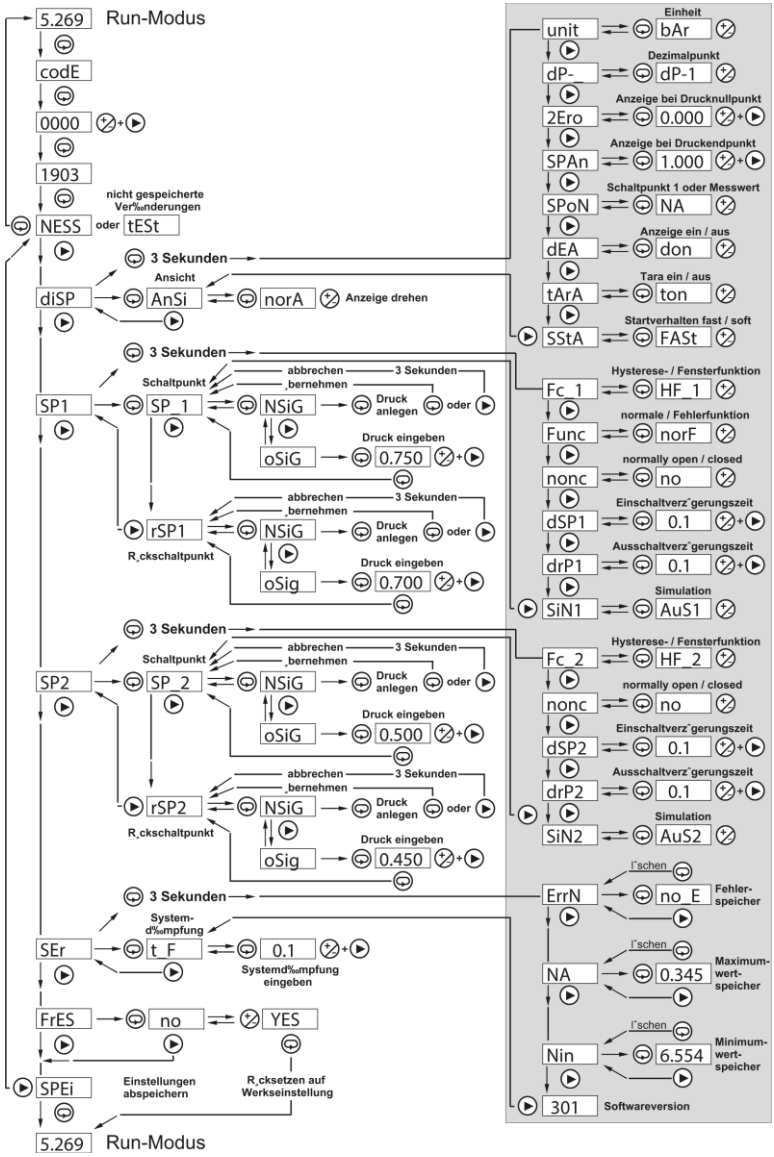

Image6 .4 : grf00212_ope_ps4_swfm

6.5.2 Menu Structure: Transmitter Function Menu - Password 3009

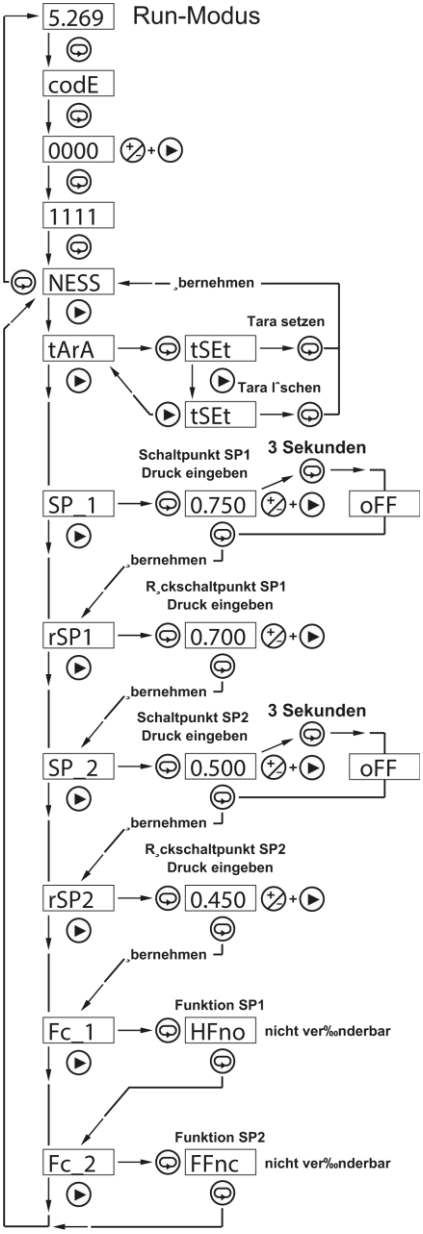

Image6 .5 : grf00213_ope_ps4_spm

6.5.3 Menu Structure: Switch Point Menu - Password 1111

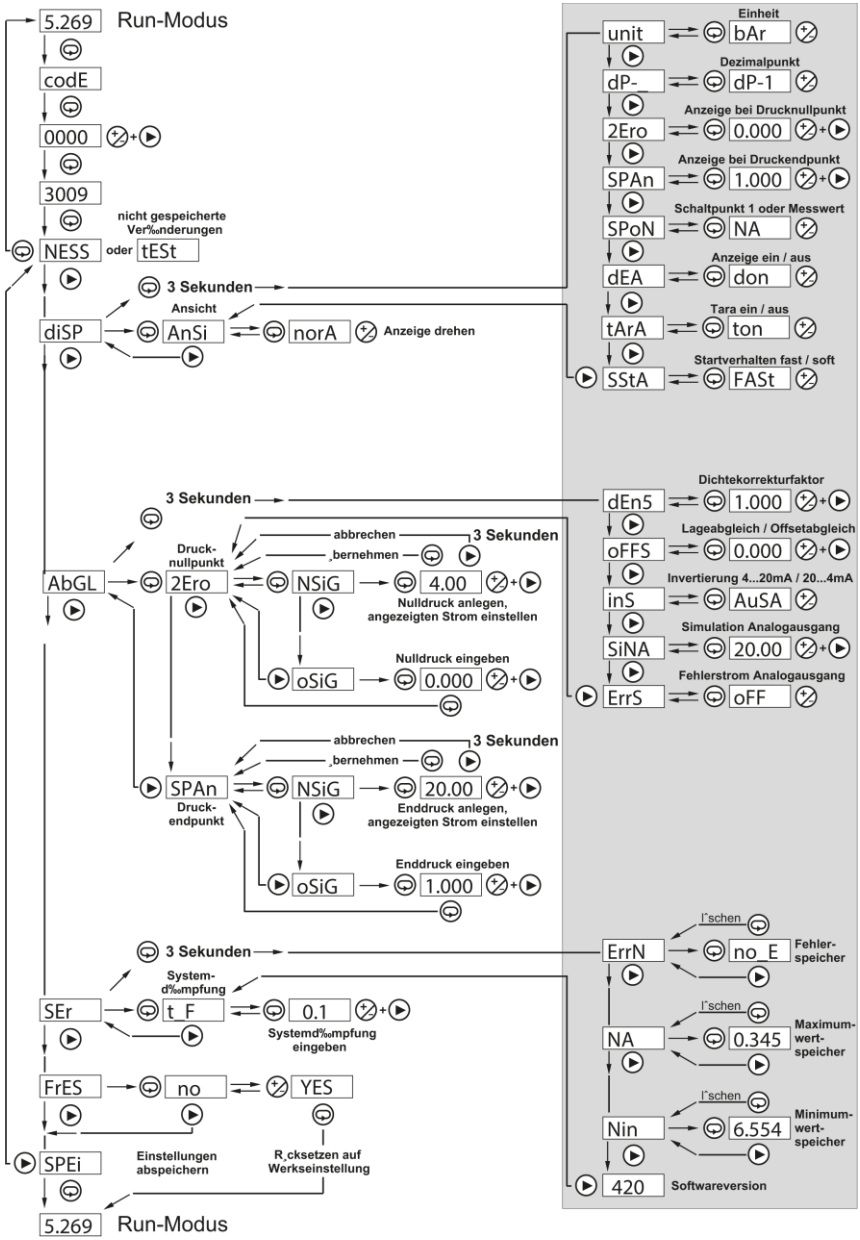

Image6 .6 : grf00214_ope_ps4_tfm

6.6 Parameter Overview

Group	Function	Input	Description
codE		3009	Password entry to access the transmitter function menu
		1903	Password entry to access the switch function menu
		1111	Password entry to access the switching point menu

Group	Function	Input	Description
diSP			DISPLAY - Contains all parameters related to the display
	AnSi	norA	Normal view
		GEdA	View rotated by 180°
	Unit	bAr	Unit: bar
		HPA	Unit: kPa; may not be available for excessively large pressure ranges
		PSI	Unit: psi; may not be available for pressure ranges that are too large
		NPA	Unit: MPa; may not be available for pressure ranges that are too small
			If the slope of the >>Pressure – Display<< characteristic curve is changed in the CALIBRATION menu group, the unit display is deactivated because it is then no longer correct. An offset correction—that is, a uniform shift of the lower and upper pressure reference values or of the lower and upper display values—does not change the slope of the characteristic curve. If this setting is changed, the switch-on and switch-back points are adjusted according to the modified >>Pressure – Display<< characteristic curve.
	dP-_	dp-0	No decimal point; the measured value is displayed without a decimal place
		dp-1	One decimal point; the measured value is displayed with one decimal place

		dp-2	Two decimal points; the measured value is displayed with two decimal places
		dp-3	Three decimal points; the measured value is displayed with three decimal places
			If it is no longer possible to increase the display resolution, the display is adjusted to match the unit. For example, when switching from one decimal point to three decimal points for the kPa unit, the unit is automatically converted to bar. Otherwise, only the decimal point is shifted. If this setting is changed, the switch-on and switch-back points are adjusted according to the modified >> Pressure – Display << characteristic curve.
	2Ero		Freely adjustable lower display value. This corresponds to the calibrated lower pressure reference value. If this value is changed, the switch-on and switch-back points are adjusted according to the modified >> Pressure – Display << characteristic curve.
	SPAn		Freely adjustable upper display value. This corresponds to the calibrated upper pressure reference value. If this value is changed, the activation and reset points are adjusted according to the modified >> Pressure – Display << characteristic curve.
	SPoN	NA	Measured value display—the current measured value is shown on the display
		SPA	Switch-on point display—the upper limit value of switch-on point 1 is shown on the display
	dEA	don	Display on—the measured value and status LEDs are activated
		doFF	Display off—the measured value and unit LEDs are deactivated in Run mode. The operating, error, and switching status LEDs remain active Pressing both the +/- and > buttons simultaneously for three seconds to access the password prompt turns the display back on.

Group	Function	Input	Description
SP1			SWITCHING OUTPUT 1 - Contains all parameters related to switching output 1
	SP_1	NSiG	Alignment with the applied signal – The current pressure value is used as the activation point or upper switching point
		oSiG	Calibration without an applied signal – The current switch-on point / upper switching point is displayed and can be adjusted using the +/- and > control buttons.
	rSP1	NSiG	Calibration with applied signal – The current applied pressure value is adopted as the reset point or lower switching point
		oSig	Calibration without an applied signal – The current reset point / lower switching point is displayed and can be adjusted using the +/- and > control buttons.
	Fc_1	HF_1	Switching output 1 operates in hysteresis mode with an activation point and a reset point
		FF_1	Switching output 1 operates in window mode with lower and upper switching points
	Func	norF	Normal function – Switching output 1 operates in hysteresis or window mode
		ErrF	Fault signal function – Switching output 1 operates in fault signal mode for the current output. If the current falls below 4 mA or exceeds 20 mA, switching output 1 is activated as a normally closed or normally open contact, depending on the settings.
	nonc	no	Switching output 1 operates on the working current principle or as a normally closed contact – no normally open
		nc	Switching output 1 operates according to the quiescent current principle, i.e., as a normally closed contact – nc

	dSP1		Switching delay for the switch-on point / upper switching point of switching output 1. Switching output 1 is activated only if, after the activation condition is met and the time set here has elapsed, the pressure signal still meets the activation conditions. This allows, for example, brief pressure surges to be filtered out. The setting range is 0...99 seconds, in increments of 0.1 seconds
	drP1		Switching delay for the reset point / lower switching point of switching output 1. Switching output 1 is deactivated only if, after the reset condition is met and the time set here has elapsed, the pressure signal still meets the reset conditions. This allows, for example, short pressure surges to be filtered out. The setting range is 0...99 seconds, in increments of 0.1 seconds
	SiN1	Off1	Simulation – Switching output 1 is deactivated
		On1	Simulation – Switching output 1 is enabled

Group	Function	Input	Description
SP2			SWITCHING OUTPUT 2 - Contains all parameters related to switching output 2
	SP_2	NSiG	Calibration with applied signal – The currently applied pressure value is used as the switch-on point or upper switch point
		oSiG	Calibration without an applied signal – The current switch-on point / upper switching point is displayed and can be adjusted using the +/- and > control buttons.
	rSP2	NSiG	Calibration with applied signal – The current applied pressure value is adopted as the reset point or lower switching point
		oSig	Calibration without an applied signal – The current reset point / lower switching point is displayed and can be adjusted using the +/- and > control buttons.

	Fc_2	HF_2	Switching output 2 operates in hysteresis mode with an activation point and a reset point
		FF_2	Switching output 2 operates in window mode with lower and upper switching points
	nonc	no	Switching output 2 operates according to the operating current principle or as a normally open contact – no
		nc	Switching output 2 operates on the quiescent current principle or as a normally closed contact – nc
	dSP2		Switching delay for the switch-on point / upper switching point of switching output 2. Switching output 2 is activated only if, after the activation condition is met and the time set here has elapsed, the pressure signal still meets the activation conditions. This allows, for example, brief pressure surges to be filtered out. The setting range is 0...99 seconds, in increments of 0.1 seconds
	drP2		Switching delay for the reset point / lower switching point of switching output 2. Switching output 2 is deactivated only if, after the reset condition is met and the time set here has elapsed, the pressure signal still meets the reset conditions. This allows, for example, short pressure surges to be filtered out. The setting range is 0...99 seconds, in increments of 0.1 seconds
	SiN2	Off2	Simulation – Switching output 2 is deactivated
		On2	Simulation – Switching output 2 is enabled

Group	**Function**	**Input**	**Description**
AbGL			PRESSURE EQUALIZATION - Includes all parameters related to pressure equalization

	2Ero	NSiG	Calibration of lower pressure reference value with applied signal - The currently applied pressure value is adopted as the lower pressure reference value. - The 4 mA output current, which can be adjusted as desired using the +/- and > control buttons, is assigned to this pressure reference value. Calibration range: 3.9 mA to 21 mA. - The 2Ero value on the display refers to this pressure reference value. - If the calibrated measurement range is less than 25% of the nominal measurement range, the value will not be accepted and the display will show EEEE.
		oSiG	Calibration of lower pressure reference value without an applied signal - The freely adjustable pressure value, in the selected unit (Unit-), is adopted as the lower pressure reference value. - The 2Ero value on the display refers to this pressure reference value. - The lower output current value, 4 mA, refers to this pressure reference value. - The measurement span cannot be calibrated to less than 25% of the nominal measurement span.
			If the endpoint is not shifted by the same amount as the zero point, the slope of the >>Pressure – Display<< characteristic curve changes, and as a result, the unit display is deactivated because it is no longer accurate.
	SpAn	NSiG	Calibration of Upper Pressure Reference Value with Applied Signal - The currently applied pressure value is adopted as the upper pressure reference value. - The 20 mA output current, which can be adjusted as desired using the +/- and > control buttons, is assigned to this pressure reference value. Calibration range: 3.9 mA to 21 mA. - The SPAn value on the display refers to this pressure reference value. - If the calibrated measurement range is less than 25% of the nominal measurement range, the value will not be accepted and the display will show EEEE.

		oSiG	Calibration of upper pressure reference value without an applied signal - The freely adjustable pressure value, in the selected unit, is adopted as the upper pressure reference value. - The SPAn value on the display refers to this pressure reference value. - The upper output current value, 20 mA, refers to this pressure reference value. - The measurement span cannot be calibrated to less than 25% of the nominal measurement span.
			If the zero point is not shifted by the same amount as the end point, the slope of the >>Pressure – Display<< characteristic curve changes, and as a result, the unit display is deactivated because it is no longer accurate.
	dEnS		Freely adjustable density correction factor in the range from 0.500 to 2.000. This factor is applied to the measured pressure relative to the calibrated pressure range. If a density correction factor other than 1 is set, the unit display is deactivated, since this changes the slope of the >>Pressure – Display<< characteristic curve and the unit is then no longer correct.
	oFFS		The measured pressure in the set unit is shifted by the value set here, in accordance with the sign, by a maximum of ±5% of the nominal measuring range. Both the lower and upper pressure reference values are shifted by the same amount. For example, to obtain a display (setpoint) of 0.000 or an output current of 4 mA when the displayed pressure (depending on installation orientation) is 0.004, enter the difference between the setpoint pressure and the displayed pressure (0.000 – 0.004). Thus, enter the value -0.004.
	inS	AUSA	The output current behaves according to the calibration mapping >> 4...20 mA
		EinA	The output current behaves inversely to the calibration mapping >> 20...4 mA
	SiNA		The current output can be simulated to any value within the entire usable range of 3.8 mA to 22 mA using the +/- and > control buttons

	ErrS	oFF	The current output operates linearly in the range from 3.9 mA to 21.0 mA. Current output beyond these limits is not possible; the final values are maintained if the limits are exceeded. No fault current is output when the limits are exceeded or not reached.
		FS38	The current output operates linearly in the range from 4.0 mA to 20.0 mA. If the current falls below 4 mA or exceeds 20 mA, a constant current of 3.8 mA is output.
		FS22	The current output operates linearly in the range from 4.0 mA to 20.0 mA. If the current falls below 4 mA or exceeds 20 mA, a constant current of 22 mA is output.

Group	Function	Input	Description
SEr			Service – Includes all parameters used for service purposes
	t_F		Set the system damping to suppress short pressure surges or to smooth out cyclically fluctuating pressure signals. The setting range is 0...40 seconds, in increments of 0.1 seconds
	ErrN	noE	No error recorded in the error log
		dun	System pressure has remained below the maximum permissible value for an extended period.
		dob	System pressure consistently exceeds the maximum permissible value.
		FLAS	Error in the internal non-volatile data memory (flash).
		dunt	The value has fallen below the lower measurement range limit (display zero).
		duEb	The upper measurement range limit (Display Span) has been exceeded.
		Aunt	The current output has fallen below the lower limit (3.9 mA).
		AuEb	The upper limit of the current output (21 mA) has been exceeded.

		S1oG	The reset point rSP1 of switching output 1 has been calibrated to be greater than or equal to the switching point SP_1.
		S2oG	The reset point rSP2 of switching output 2 has been calibrated to be greater than or equal to the switching point SP_2.
		S1oP	Switching output 1 is not turned on, even though it should be.
		S2oP	Switching output 2 is not turned on, even though it should be.
		rAN	An error has been detected in the internal random-access memory (RAM).
	NA		Maximum value memory – display of the highest measured pressure value.
	Nin		Minimum value memory – Displays the lowest measured pressure value.
	301		Version number of the installed firmware
FrES			Factory Reset – Resets all parameters to factory settings
SPEi			Save – Saves all parameters with data protection

Group	Function	Input	Description
SP_1			The current turn-on point / upper switching point of switching output 1 is displayed and can be adjusted using the +/- and > control buttons.
rSP1			The current return switch point / lower switch point of switching output 1 is displayed and can be adjusted using the +/- and > control buttons.
SP_2			The current turn-on point / upper switching point of switching output 2 is shown on the display and can be adjusted using the +/- and > control buttons.
rSP2			The current reverse switching point / lower switching point of switching output 2 is shown on the display and can be adjusted using the +/- and > control buttons.

Fc_1			The switching function of switching output 1, as set via the switch function menu, is displayed. This setting cannot be changed here.
		HFno	Switching output 1 operates in hysteresis mode with a normally open operating principle
		HFnc	Switching output 1 operates in hysteresis mode with a normally closed operating principle
		FFno	Switching output 1 operates in window mode with a normally open operating principle
		FFnc	Switching output 1 operates in window mode with a normally closed operating principle
Fc_2			The switching function of Switch Output 2, as set via the switch function menu, is displayed. This setting cannot be changed here.
		HFno	Switching output 2 operates in hysteresis mode with a normally open operating principle
		HFnc	Switching output 2 operates in hysteresis mode with a normally closed operating principle
		FFno	Switching output 2 operates in window mode with a normally open operating principle
		FFnc	Switching output 2 operates in window mode with a normally closed operating principle

7 Fault Diagnosis and Troubleshooting

The plant operator is responsible for taking appropriate measures to resolve any malfunctions that occur.

The red error indicator LED signals that operating limits have been exceeded, that incorrect inputs have been entered, or that a device error has occurred.

Information on the cause of an error message can be found in one of the two function menus under the “Advanced Functions” section of the “Service” menu item.

Only the most recently recorded error is displayed.

The error information in the Service menu is not stored in a power-failure-safe manner.

Each time the device is restarted, the system is rechecked for parameters and settings.

LED	Error Indication in the Service Menu	Description / Remedy
Red Yellow – flashing	None	Short circuit at the switching output whose yellow status LED is flashing. Check the load connected to the respective switching output.
red	dim	System pressure consistently below the minimum permissible level. Check the system pressure of your system. If the system pressure is within the permissible range, there may be an irreversible device malfunction.
red	dob	The system pressure has consistently exceeded the maximum permissible level. Check the system pressure of your system. If the system pressure is within the permissible range, there may be an irreversible device malfunction.
red	FLAS	Error in the internal non-volatile data memory (Flash). If the error cannot be resolved even after repeatedly restarting the device by briefly disconnecting the power supply, there is an irreversible device malfunction.

Red – flashing	dunt	The value has fallen below the lower measurement range limit (value in Disp-Zero). Check the system pressure of your system. This is lower than the measurement range zero point.
Red – flashing	duEb	The upper measurement range limit (value in Disp-SPAn) has been exceeded. Check the system pressure of your system. It is higher than the measurement range end point.
Red – flashing	Aunt	The current output has fallen below the lower limit (3.9 mA). Check the calibration of the current output. The system pressure is lower than the pressure value corresponding to a current output of 3.9 mA.
Red – flashing	AuEb	The upper limit of the current output (21 mA) has been exceeded. Check the calibration of the current output. The system pressure is higher than the pressure value corresponding to the current output at 21 mA.
Red – flashing	S1oG	The reset point rSP1 of switching output 1 has been calibrated to a value greater than or equal to the switching point SP_1. Check the calibration of switching output 1
Red – flashing	S2oG	The reset point rSP2 of switching output 2 has been calibrated to a value lower than or equal to the switching point SP_2. Check the calibration of switching output 2
red – flashing	S1oP	A malfunction has been detected at switching output 1. Disconnect the load from switching output 1. If the error cannot be resolved even after restarting the device several times by briefly turning off the supply voltage, there is an irreversible device defect.
Red – flashing	S2oP	A malfunction has been detected at switching output 2. Disconnect the load from switching output 2. If the error cannot be resolved even after repeatedly restarting the device by briefly turning off the supply voltage, the device has an irreversible defect.
red – flashing	rAN	An error has been detected in the internal memory (RAM). If the error cannot be resolved even after restarting the device several times by briefly turning off the power supply, the device has an irreversible defect.

EEEE	Display during operation	Incorrect password entered – Acknowledge with the “Set” button Measuring range calibrated to ±25% of the nominal measuring range—recalibration required Maximum display value of 9999 has been exceeded – Correct the calibration
-EEE	Display during operation	Display value has fallen below the minimum value of -999 – Correct the calibration
0.004	Display during operation	During calibration without a signal, the unit LED goes out The zero point and end point must always be shifted by the same amount. If, for example, only the zero point is shifted, the pressure–display characteristic curve is no longer correct

In the event of a malfunction, check:

Component / Area	Test	Remedy
Housing	Damage	Replace or return the device
Pressure diaphragm	Contamination	Clean the device or send it in
	Damage	Replace or return the device
Process seals	Damage	Replace the process seal
		Use a different sealing material if necessary
Pressure-compensating capillary	Contamination	Send the device in for repair
Supply voltage	Operating voltage present	Turn on operating voltage
		Check or repair the connection terminals
	Operating voltage polarity reversed	Reverse the polarity of the operating voltage
	Operating voltage too low	Adjust or repair
	Operating voltage too high	Send the device in for repair

	Load resistance too high	Increase operating voltage
	Connection cable is damaged	Send the unit in for repair

If the malfunction cannot be resolved, please contact the manufacturer.

8 Maintenance

The device is maintenance-free when used as intended.

Deposits adhering to the diaphragm can cause incorrect readings. In this case, clean the diaphragm regularly. Do not use sharp or hard tools, compressed air, or corrosive chemicals. Device disassembly: See the “Disassembly” section.

9 Repair

The device is not intended for repair by the user. Repairs may only be performed by the manufacturer.

9.1 Disassembly

Wear appropriate protective clothing, e.g., safety goggles and gloves.


WARNING

Allow the device and system to cool sufficiently before disassembly. There is a risk from hot surfaces as well as leaking, hazardous, and hot measured media.


WARNING

Install the device only when the system is depressurized. There is a risk from rapidly escaping measured media or water hammer.


WARNING

Disassemble the device only when it is de-energized.


WARNING

Shut down all connected control devices before disassembly.

After disassembly, the diaphragm must be covered with a protective cap.

9.2 Returns

Returns can only be accepted if the device is accompanied by a decontamination declaration.

The declaration is available for download on the website and must be fully completed and affixed to the outside of the packaging in a manner that protects it from the elements and ensures safe transport.

9.3 Disposal

Image9 .1 : sym00001_weee_can

In accordance with EU Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE), this product is marked with the symbol shown to minimize the disposal of WEEE as unsorted household waste. These products must not be disposed of as unsorted household waste and may be returned to the manufacturer for disposal. Returns are subject to the manufacturer's general terms and conditions or individually agreed terms.

10 Technical Specifications

Reference Conditions	Ta = +15...+25 °C (+59...+77 °F) / Pa = 860...1060 kPa / r.F. = 45...75 %
	Us = 24 Vdc ±0.1 V / ton = 240 s / vertical, sensor at the bottom
Measurement Deviation	EN/IEC 60770-1: Characteristic curve deviation – Setpoint adjustment

10.1 Inputs

10.1.1 Pressure input – PS4*C sensor – Relative pressure [12-R] – Measurement range [08-##]

Process connection	ISO 228-1 – [04-3/5/8/9]			AISI NPT – [04-E/C]		
Diaphragm D18mm	DIN 11851 – [04-R]			Clamp DIN 32676-A – [04-U]		
Sensor Type	Capacitive cell					
Type code	[08-15]	[08-18]	[08-16]	[08-17]	[08-26]	[08-01]
Measurement range PN– FSI	-0.1..0 bar	-0.1...0.1 bar	-1..0 bar	-1..1 bar	0..0.05 bar	0..0.1 bar
Overload/burst pressure, rel	4 bar	5 bar	10 bar	18 bar	4 bar	4 bar
Vacuum, abs.	0.7 bar	0 bar	0 bar	0 bar	0.7 bar	0.7 bar
Type code	[08-02]	[08-03]	[08-04]	[08-05]	[08-06]	[08-07]
Measurement Range PN – FSI	0..0.2 bar	0..0.4 bar	0..0.6 bar	0..1 bar	0..1.6 bar	0..2.5 bar
Overload/burst pressure, rel.	5 bar	6 bar	10 bar	10 bar	18 bar	25 bar
Vacuum, abs.	0 bar	0 bar	0 bar	0 bar	0 bar	0 bar

Type code	[08-08]	[08-09]	[08-10]	[08-11]	[08-12]	
Measurement Range PN – FSI	0..4 bar	0..6 bar	0..10 bar	0…16 bar	0..20 bar	
Overload/burst pressure, rel.	25 bar	40 bar	40 bar	40 bar	40 bar	
Vacuum, abs.	0 bar	0 bar	0 bar	0 bar	0 bar	

Process connection	ISO 228-1 - [04-1/2/4/6/7]			DIN 11851 - [04-N/M]		
Diaphragm D32mm	Varivent - [04-P]			DRD - [04-L]		
	Clamp DIN 32676-A/-C / ISO 2852 - [04-S/T]					
Sensor Type	Capacitive cell					
Type code	[08-15]	[08-18]	[08-16]	[08-17]	[08-26]	[08-01]
Measurement Range PN – FSI	-0.1..0 bar	-0.1..0.1 bar	-1..0 bar	-1..1 bar	0..0.05 bar	0..0.1 bar
Overload/burst pressure, rel.	4 bar	5 bar	10 bar	18 bar	4 bar	4 bar
Vacuum, abs.	0.7 bar	0.5 bar	0 bar	0 bar	0.7 bar	0.7 bar
Type code	[08-02]	[08-03]	[08-04]	[08-05]	[08-06]	[08-07]
Measurement range PN– FSI	0..0.2 bar	0..0.4 bar	0..0.6 bar	0..1 bar	0..1.6 bar	0..2.5 bar
Overload/burst pressure, rel.	5 bar	8 bar	10 bar	10 bar	18 bar	25 bar
Vacuum, abs.	0.5 bar	0 bar	0 bar	0 bar	0 bar	0 bar
Type code	[08-08]	[08-09]	[08-10]	[08-11]	[08-12]	[08-13]
Measurement Range PN – FSI	0..4 bar	0..6 bar	0..10 bar	0…16 bar	0..20 bar	0–40 bar

Overload/burst pressure, rel.	25 bar	40 bar	40 bar	60 bar	60 bar	60 bar
Vacuum, abs.	0 bar	0 bar	0 bar	0 bar	0 bar	0 bar
Type code	[08-14]					
Measuring range PN – FSI	0..60 bar					
Overload/burst pressure, rel.	105 bar					
Vacuum, abs.	0 bar					

10.1.2 Input Pressure – PS4*C Sensor – Absolute Pressure [12-A] – Measurement Range [08-##]

Process connection	ISO 228-1 – [04-3/5/8/9]			AISI NPT – [04-E/C]		
Diaphragm D18mm	DIN 11851 – [04-R]			Clamp DIN 32676-A – [04-U]		
Sensor Type	Capacitive cell					
Type code	[08-01]	[08-02]	[08-03]	[08-04]	[08-05]	[08-06]
Measurement Range PN – FSI	0..0.1 bar	0..0.2 bar	0..0.4 bar	0..0.6 bar	0..1 bar	0..1.6 bar
Overload pressure, abs.	4 bar	5 bar	6 bar	10 bar	10 bar	18 bar
Type code	[08-07]	[08-08]	[08-09]	[08-10]	[08-11]	[08-12]
Measuring range PN – FSI	0..2.5 bar	0..4 bar	0..6 bar	0..10 bar	0…16 bar	0–20 bar
Overload pressure	25 bar	25 bar	40 bar	40 bar	40 bar	40 bar

Process connection	ISO 228-1 - [04-1/2/4/6/7]	DIN 11851 - [04-N/M]

Diaphragm D32mm	Varivent - [04-P]			DRD - [04-L]		
	Clamp DIN 32676-A/-C / ISO 2852 - [04-S/T]					
Sensor Type	Capacitive cell					
Type code	[08-01]	[08-02]	[08-03]	[08-04]	[08-05]	[08-06]
Measurement Range PN – FSI	0..0.1 bar	0..0.2 bar	0..0.4 bar	0..0.6 bar	0..1 bar	0..1.6 bar
Overload pressure	4 bar	5 bar	8 bar	10 bar	10 bar	18 bar
Type code	[08-07]	[08-08]	[08-09]	[08-10]	[08-11]	[08-12]
Measuring range PN – FSI	0..2.5 bar	0..4 bar	0..6 bar	0..10 bar	0…16 bar	0–20 bar
Overload pressure	25 bar	25 bar	40 bar	40 bar	60 bar	60 bar
Type code	[08-13]	[08-14]				
Measuring range PN – FSI	0..40 bar	0..60 bar				
Overload pressure	60 bar	105 bar				

10.1.3 Input Pressure – PS4*K Sensor – Relative Pressure [12-R] – Measurement Range [08-##]

Sensor type	Strain gauge thick-film cell					
Type code	[08-02]	[08-03]	[08-04]	[08-05]	[08-06]	[08-07]
Measuring Range PN – FSI	0..0.25 bar	0..0.4 bar	0..0.6 bar	0..1 bar	0..1.6 bar	0–2.5 bar
Overload pressure	0.75 bar	1.2 bar	1.8 bar	3 bar	6 bar	6 bar
Vacuum, abs.	0 bar	0 bar	0 bar	0 bar	0 bar	0 bar

Type code	[08-08]	[08-09]	[08-10]	[08-11]	[08-12]	[08-13]
Measurement Range PN – FSI	0..4 bar	0..6 bar	0..10 bar	0…16 bar	0..25 bar	0–40 bar
Overload pressure	15 bar	15 bar	20 bar	40 bar	40 bar	100 bar
Vacuum, abs.	0 bar	0 bar	0 bar	0 bar	0 bar	0 bar
Type code	[08-14]	[08-19]	[08-20]	[08-21]	[08-22]	[08-23]
Measurement Range PN – FSI	0..60 bar	0..100 bar	0..160 bar	0..250 bar	0..320 bar	0–400 bar
Overload pressure	100 bar	200 bar	400 bar	400 bar	800 bar	800 bar
Vacuum, abs.	0 bar	0 bar	0 bar	0 bar	0 bar	0 bar
Model code Measurement range	[08-24]	[08-16]	[08-17]			
Measurement Range PN – FSI	0..600 bar	-1..0 bar	-1..1 bar			
Overload pressure	900 bar	3 bar	6 bar			
Vacuum, abs.	0 bar	0 bar	0 bar			

10.1.4 Input Pressure – PS4*K Sensor – Absolute Pressure [12-A] – Measurement Range [08-##]

Sensor type	Strain Gauge Thick-Film Cell					
Type code	[08-05]	[08-06]	[08-07]	[08-08]	[08-09]	[08-10]
Measurement Range PN – FSI	0..1 bar	0..1.6 bar	0..2.5 bar	0..4 bar	0..6 bar	0–10 bar
Overload pressure	3 bar	6 bar	6 bar	15 bar	15 bar	20 bar
Vacuum, abs.	0 bar	0 bar	0 bar	0 bar	0 bar	0 bar
Type code	[08-11]	[08-12]	[08-13]	[08-11]	[08-12]	[08-13]

Measurement Range PN – FSI	0…16 bar	0..25 bar	0..40 bar	0…16 bar	0..25 bar	0..40 bar
Overload pressure	40 bar	40 bar	100 bar	40 bar	40 bar	100 bar
Vacuum, abs.	0 bar	0 bar	0 bar	0 bar	0 bar	0 bar

10.1.5 Inlet Pressure – PS4SM Sensor

Sensor Type	Strain Gauge Thin-Film Cell / Piezoresistive Strain Gauge Cell					
Type code	[08-03]	[08-05]	[08-08]	[08-09]	[08-10]	[08-11]
Measuring range PN – FSI	0..0.4 bar	0..1 bar	0..4 bar	0..6 bar	0..10 bar	0…16 bar
Overload pressure	2 bar	5 bar	17 bar	35 bar	35 bar	35 bar
Vacuum, abs.	0 bar	0 bar	0 bar	0 bar	0 bar	0 bar
Burst pressure	2.4 bar	6 bar	20.5 bar	42 bar	42 bar	42 bar
Type code	[08-12]	[08-13]	[08-14]	[08-19]	[08-20]	[08-21]
Measurement Range PN – FSI	0..20 bar	0..40 bar	0..60 bar	0..100 bar	0..160 bar	0–250 bar
Overload pressure	80 bar	80 bar	80 bar	200 bar	320 bar	500 bar
Vacuum, abs.	0 bar	0 bar	0 bar	0 bar	0 bar	0 bar
Burst pressure	96 bar	400 bar	400 bar	800 bar	1,000 bar	1,200 bar
Type code	[08-22]	[08-23]	[08-24]	[08-25]	[08-16]	[08-17]
Measurement Range PN – FSI	0..320 bar	0..400 bar	0..600 bar	0..1000 bar	-1..0 bar	-1..1 bar
Overload pressure	800 bar	800 bar	1200 bar	1,500 bar	5 bar	10 bar
Vacuum, abs.	0 bar	0 bar	0 bar	0 bar	0 bar	0 bar
Burst pressure	1,700 bar*	1,700 bar*	2,400 bar*	3,000 bar	6 bar	12 bar

* [04-0] / [04-5]: Burst pressure when sealed with a sealing ring beneath the hexagon; otherwise, max. 1,500 bar

10.1.6 Inlet Pressure – PS4LM Sensor

Sensor Type	Piezoresistive strain gauge cell					
Type code	[08-01]	[08-02]	[08-03]	[08-04]	[08-05]	[08-07]
Measurement Range PN – FSI	0..0.1 bar	0..0.25 bar	0..0.4 bar	0..0.6 bar	0..1 bar	0..2.5 bar
Overload pressure	1 bar	2 bar	2 bar	4 bar	5 bar	17 bar
Vacuum, abs.	0 bar	0 bar	0 bar	0 bar	0 bar	0 bar
Burst pressure	2 bar	2.4 bar	2.4 bar	4.8 bar	6 bar	20.5 bar
Type code	[08-08]	[08-09]	[08-10]	[08-11]	[08-12]	
Measurement Range PN – FSI	0..4 bar	0..6 bar	0..10 bar	0…16 bar	0..25 bar	
Overload pressure	17 bar	35 bar	35 bar	80 bar	80 bar	
Vacuum, abs.	0 bar	0 bar	0 bar	0 bar	0 bar	
Burst pressure	20.5 bar	42 bar	42 bar	96 bar	96 bar	
Type code	[08-16]	[08-17]				
Measuring range PN – FSI	-1..0 bar	-1..1 bar				
Overpressure	5 bar	10 bar				
Vacuum, abs.	0 bar	0 bar				
Burst pressure	6 bar	12 bar				

10.1.7 Input pressure

Resolution	FSI ≥ 16 bits
Characteristic curve deviation	PS4*C: ±0.2% FSI
	PS4*K: ≤ ±0.5% FSI
	PS4*M: ≤ ±0.5% FSI
Effect of auxiliary power	≤ ±0.002% FSI/V
Hysteresis	PS4*C: negligible
	PS4*K / PS4*M: ≤ ±0.1% FSI
Repeatability	PS4*C: negligible
	PS4*K: ≤ ±0.1% FSI
	PS4*M: ≤ ±0.03% FSI
Temperature Effect	PS4*C:
	Tk zero point ≤ ±0.015 %FSI/K, ≤ ±0.75 %FSI
	Tk span ≤ ±0.015 %FSI/K, ≤ ±0.5 %FSI (≥0.4 bar/4 mH_2O)
	Tk span ≤ ±0.8 %FSI (<0.4 bar/4 mH_2O)
	PS4*K: Tk ≤ ±0.05 %FSI/K
	PS4SM:
	Tk ≤ ±0.02 %FSI/K (-20…+85 °C)
	Tk ≤ ±0.03 %FSI/K (-40…-20 °C / +85…+125 °C)
	PS4LM:
	Tk zero point
	[≤ 250 mbar]: ≤ ±0.04 %FSO/K (0…+80 °C) / ≤ ±0.06 %FSO/K (-20…0 °C / +80…+150 °C)
	[≥ 400 mbar]: ≤ ±0.02 %FSO/K (0…+80 °C) / ≤ ±0.03 %FSO/K (-20…0 °C / +80…+150 °C)

	Temperature range: ≤ ±0.02 %FSO/K (0…+80 °C) / ≤ ±0.03 %FSO/K (-20…0 °C / +80…+150 °C)
Effect of mounting orientation	PS4*C: Measurement range < 1 bar: ≤ +0.2 mbar (orientation: vertical, sensor at the top)
	PS4*C: Measurement range ≥ 1 bar: ≤ +0.1 mbar (orientation: vertical, sensor at the top)
	PS4*K: ≤ 0.2 mbar (position: vertical, sensor at the top)
	PS4SM: ≤ 4 mbar (position: vertical, sensor at the top)
	PS4SM: ≤ 10 mbar (Orientation: vertical, sensor at the top) - [04-5]: G1"
	PS4LM: ≤ 10 mbar (orientation: vertical, sensor at the top)
Long-term zero-point drift	PS4*C: ≤ ±0.15% F.S. per year
	PS4*K / PS4*M: ≤ ±0.2% F.S. per year

10.2 Outputs

10.2.1 Analog output – current 4...20 mA

Signal range	4…20 mA = Measurement range >> [08-##], Limit value 3.9…20.5 mA / /Error 3.8 mA/22 mA
Resolution	≤ 1 µA
Permissible load RL	≤ (Us – 10.5 V) / 20.5 mA
Time response t90-min	PS4*C: ≤ 3 ms (td = 0 s)
	PS4*K / PS4*M: ≤ 5 ms (td = 0 s)
Effect of auxiliary power	≤ ±0.5 µA/V
Temperature Ta influence	≤ ±0.5 µA/K

10.2.2 Switching output – PNP

Specifications	2x PNP, switching to +L/-L
Output Signal Uo	≤ 0.2...≥ (Us – 2 V) / Io = 0…200 mA (current-limited to ≤ 450 mA, short-circuit-proof)
Time response t90-min	≤ 4 ms (td = 0 s)
Switching delay time	≤ 30 µs (RL ≤ 3 kOhm / Io ≥ 4.5 mA)
Switching cycles	≥ 100,000,000

10.3 Auxiliary power

Supply voltage Us	10.5…35 Vdc, reverse-polarity protected / residual ripple ≤ 2 Vpp
Input current Is	≤ 60 mA (Io = 22 mA / So without load)
Turn-on delay time	≤ 1 s (td = 0 s)

10.4 Environmental conditions

Process temperature Tp	PS4*C - [11-0]: -40…+100 °C (-40…+212 °F)
	PS4*C - [11-1]: -40…+125 °C (-40…+257 °F) / +140 °C (+284 °F) – 1 h
	PS4*K - [11-0]: -40…+100 °C (-40…+212 °F)
	PS4*K - [11-1]: -40…+135 °C (-40…+275 °F) / +150 °C (+302 °F) – 1 h
	PS4SM - [11-0]: -40…+100 °C (-40…+212 °F)
	PS4SM - [11-1]: -40…+125 °C (-40…+257 °F)
	PS4LM - [11-0]: -20…+150°C (-13°F…+302°F)
	[05-0] (NBR): -20…+100 °C (-4…+212 °F)
	[05-1] (FKM/FPM): -20…+150 °C (-4…+302 °F)
	[05-3] (EPDM): -40…+140 °C (-40…+284 °F)

	[05-4/6] (FFKM): -15…+150 °C (+5…+284 °F)
Pressure cycles	≥ 100 million (1.2x PN)
Ambient temperature Ta	-40…+85 °C (-40…+185 °F)
Protection rating	IP65 (EN/IEC 60529)
Climate class	4K4H (EN/IEC 60721-3-4)
Shock resistance	50 g [11 ms] (EN/IEC 60068-2-27)
Vibration resistance	20 g [10…2000 Hz] (EN/IEC 60068-2-6)
EMC	Equipment Class B / Industrial Environment (EN/IEC 61326)
Dielectric strength	500 VAC
Protection class	III
Pollution degree	4
Operating altitude	2,000 m above sea level
MTTF	160 years
Weight	PS4*C/K / PS4SM: 0.35...1.0 kg
	PS4LM: 0.3...1.2 kg

10.5 Materials

Process membrane	PS4*C: 99.9% Al_2O_3 ceramic
in contact with the process	PS4*K: Al_2O_3 ceramic, 96%
	PS4SM: Steel 1.4571/316Ti
	PS4SM: [04-1]/[04-6] (EN 837) ≥ 40 bar: Steel 1.4542/630, Steel 1.4534/SI13800
	PS4LM: Steel 1.4435/316L
Process connection	PS4*C/K / PS4SM: Steel 1.4404/316L, Steel 1.4571/316Ti

in contact with the process	PS4LM: Steel 1.4435/316L
Process seal	NBR, FKM/FPM, EPDM, FFKM
In contact with the process	
Not in contact with the process	CrNi steel, PES, PTFE, PUR, FKM/FPM
Filling oil	PS4SM - [04-0/5] (flush-mounted) / [04-1/6] (EN 837) ≤ 25 bar: Synthetic oil
	PS4LM: Synthetic oil

11 Inspection

Version	Changes
UMN07.26	Initial release

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