Pressure Sensor - SMO31H2 - PLd

Variohm
Eurosensor

- Pressure transducer for applications with Safety Integrated Level or Performance Level requirements
- Up to 1000 Bar pressure range
- High strength, rugged stainless steel design
- With EC79 and EC406 approval for use with Hydrogen
- SIL2, PL:d

EC79 EC406 PL:d

The **SMO31H2-PLd** is a version of the SMO31H2 Series intended for hydrogenic applications with safety integrated level or performance level requirements. It is a high quality all stainless steel pressure transducer for use around the measurement, production, storage and transportation of hydrogen in many industries.

The SMO series sensor has well proven use for high accuracy pressure sensing in automotive and industrial equipment amongst others, and now offers ECU and other safety controlled applications compliance with DIN EN ISO 13849-1and IEC 61508 and several other recognised safety accreditations.

The electronics in the **SMO31H2-PLd** are fully enclosed in a high-strength stainless steel housing with IP67 protection as standard and up to IP69K on request. Shock and vibration and other environmental performance specifications are more than consistent with the high reliability and long life offered by these premium range sensors.

Specification

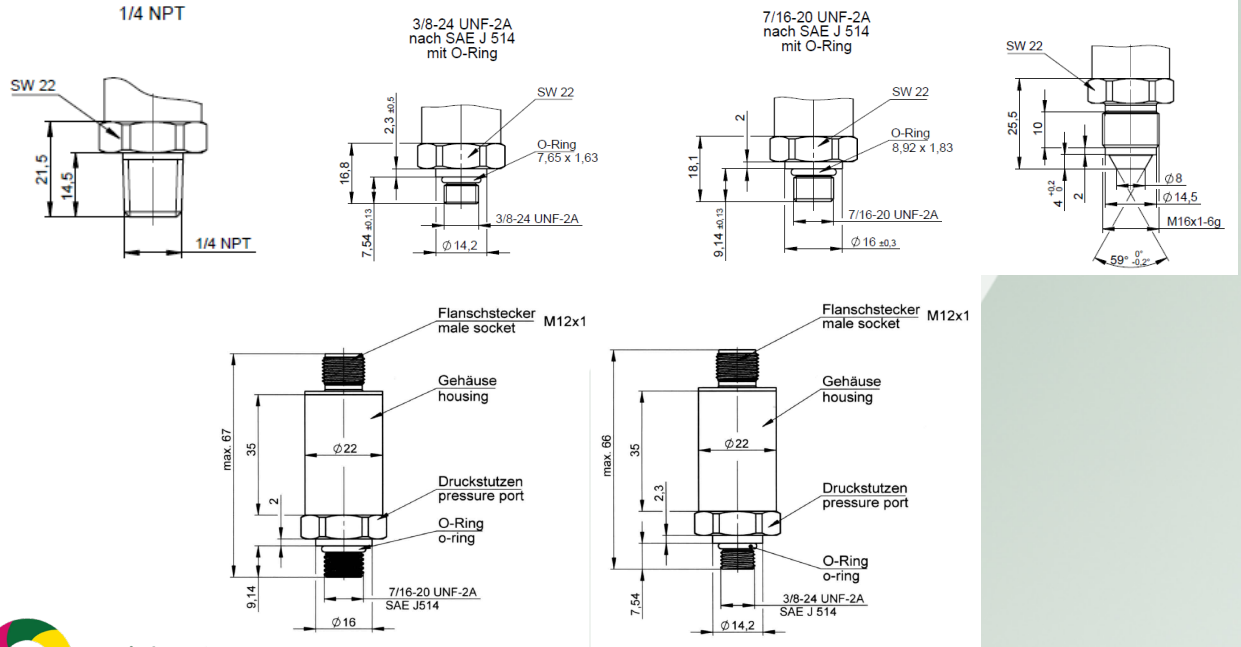
Performance		
Accuracy @ RT	% of the range (gauge and vacuum sensors) < 0.5 BFSL ≤ 0.125	(incl. nonlinearity, hysteresis, repeatability, zero-offset and final offset acc. to IEC 61298-2)
Non-linearity	% of the range ≤ 0.30	
Repeatability	% of the range ≤ 0.20	
Stability/year	% of the range ≤ 0.20	
Response time	(10..90%) t(ms)1	
Overrange pressure	up to 2x rated pressure	
Burst pressure	up to 5x rated pressure	
Pressure cycles	> 10 million	

Electronics	
Output → Supply	4 - 20 mA → 10 - 32 VDC
Current consumption	< 10 mA
Output impedance	$< \frac{U_B\text{-}10V}{20\ mA}$
Reverse voltage protection	Yes

Environment	
Temperature [°C]:	
Measuring medium	-40...125
Ambience	-40...105
Storage	-40...125
Compensated range	-20...85
Temperature coefficient within the compensated range:	
Mean TC offset	% of the range ≤ 0,15 / 10K
Mean TC range	% of the range ≤ 0,15 / 10K
Shock	1000 G, 11 msec., 1/2 Sine
Vibration	25 G peak, 20 to 2000 Hz
Sealing	IP 67, optional IP69K

Mechanics	
Material	stainless steel
Pressure port	see select table
Electrical connection	see select table
Weight	ca. 60 g

Dimensions in mm



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Ordering Information

(Please use the characters in the chart below to construct your product code)

Sample Code: SMO31H2-PLd - B - 01000 - B - 2 -A

Series	Port Configuration	Pressure Range	Pressure Unit	Output Signal	Electrical Interface
SMO31H2	**M16** - M16x1 male **up to 1000 bar** (EC79 is limited to 700 bar) **B** - 1/4 NPT up to 500 bar max. **D** - 7/16" - 20 UNF 2A Male up to 1000 bar (EC79 bis limited to 700 bar) **N** - 3/8"-24 UNF2A up to 1000 bar (EC79 is limited to 700 bar)	Please use code from table below	B - gauge pressure V - vacuum pressure	2 = 4...20 mA	A - 600 mm cable C - Packard Metripac connector F – M12x1 Round connector

Custom options available on request

Pressure Range																				
Bar	1.0	1.6	2.5	4	6	10	16	20	25	40	50	60	100	160	250	400	448	600	700	1000
Order Code	00100	00160	00250	00400	00600	01000	01600	02000	02500	04000	05000	06000	10000	16000	25000	40000	44800	60000	70000	100000

The SMO31H2-PLd series is backed by a 1 Year Warranty. The purchaser is responsible for compatibility of the media, functional adequacy and correct installation of the transmitter.

Wiring

Type		Output	PIN 1	PIN 2	PIN 3	PIN 4
	Round connector M12x1 A	4..20mA	+ Supply	N/A	Current output -	N/A
		Output	**PIN A**	**PIN B**	**PIN C**	**-**
	Packard Metripac	4..20mA	Current output -	+ Supply	N/A	-
		Output	**Red**	**Black**	**White**	**Green**
	Cable assembly	4..20mA	+ Supply	Current output -	N/A	-

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PRODUCT CONFIGURATION

Product series: **SMO**
Output Signal configuration: **18.0**

SIL2

PERFORMANCE LEVEL INFORMATION

The sensor enables and EC-controlled safety system to perform as follows.
These values have been calculated in accordance to

[1] DIN EN ISO 13849-1
[2] EN61508-6
[3] IEC-TR62380
[4] EPB-000110 & EPB-000206
[5] FSM ZSC31050 Rev. 1.00 / April 2015

Output Signal Safety Limits / diagnostic range:
The electronic circuity and signal conditioner are providing defined safety limits for the output signal. These limits must be considered in the System ECU to enable the system to go into a safe state upon detecting these.
The ***low*** diagnostic range is **<3,85mA**
The ***high*** diagnostic range is **>22mA**
Depending on the detected failure, the output signal will go *below* or *above* these limits.

Detected internal failures:
The following internal failures are detected by the signal conditioner and will actively lead to an output signal *below* or *above* the defined safety limits

- Broken bond wires (connections to the sensing element, in operation)	**RESULT:**	**>22mA**
- Broken bond wires (connection to the sensing element, before power on)	**RESULT:**	**< 3,85mA**
- Internal EEPROM errors caused by CRC	**RESULT:**	**< 3,85mA**
- Internal Watchdog (will trigger for different internal failures)	**RESULT:**	**< 3,85mA**

Startup time / power on:
- Startup time / power on = **max 40 ms**

During the defined startup period the output signal may vary between the diagnostic ranges.
The Signal **must not** be used in the ECU to determine sensor or system status.

MTTFd Values / Performance Level:
The following performance level values have been determined (ref [4] and [5])

- $MTTF_d$	**= 228(100*) years**
- Failure Rate (λ_F)	**= 0,832310 10^{-6} H^{-1}**
- DC (diagnostic coverage, dangerous failures)	**= 72,17% (considered *low*)**
- CCF (common cause failures)	**= 65% („use of proven component“ [5])**
- PERFORMANCE LEVEL	**= d, for a category 2 system, acc. Table K1 of [1]**

**According to [1] the $MTTF_d$ is limited to 100 years.*

The following values are not used for performance level rating, but may be used for system evaluation.

- PFH	**= 1,392* $10^{-7}H^{-1}$**
- SFF	**= 83,27%**

The hardware architecture is defined as: 1001
Considered mission profile for failure rate calculation: *Automotive, Motor control cycling of [3]*

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