

LENTISENS GmbH

Module Series L-MPP

TECHNICAL SPECIFICATIONS

Small Titanium Pressure Sensor Modules with IP54 housing

MAIN FEATURES	APPLICATION
 Small relative pressure sensing modules with resistive Wheatstone bridge 	Space saving applications
 Small titanium sensor body with IP54 titanium housing and flexible cable 	A Hydraulics and pneumatics
■ Resolution 0.01%span	▲ Chemical industries
Nominal pressure ranges from1 MPa to 150 MPa	
 Operating temperature range from -45°C up to +200°C 	Machine construction
■ Dielectric strength 700 VAC	Pumping stations and compressors

DESCRIPTION

New solutions in pressure measurement by Silicon on Sapphire technology where tight space is key

The highly sensitive element of this mini pressure sensor family is a two-layer sapphire-titanium membrane with monocrystalline silicon resistive strain gauges. Due to a stable connection with titanium the monocrystalline sapphire membrane is a perfect elastic element that acquires the best quality at high deformation levels and preserves its elastic and insulating properties at temperatures up to 400°C. Monocrystalline silicon resistive strain gauges are atomically connected to the sapphire and provide almost no hysteresis or fatigue effects. Exceptional insulating properties and radiation resistance of sapphire enable utilization of the sensitive element within the temperature range from -200°C to +350°C even under the impact of high electromagnetic interferences and radiation. Our strain gauge elements are manufactured by solidstate microelectronic methods and provide high quality and long therm stable repeatability.



Data sheet 31S00010A page 1 of 8

TECHNICAL DATA

STANDARD PRESSURE RANGES

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Nominal pressure range	[MPa]	1	1.6	2.5	4	6	10	16	25	40
Under pressure 1)	[MPa]	-1	-1	-1	-1	-1	-1	-1	-1	-1
Over pressure	[MPa]	2	3.2	5	8	12	20	32	50	80
Burst pressure	[MPa]	3	4.8	7.5	12	18	30	48	75	120
Nominal pressure range	[MPa]	60	100	150						
Under pressure 1)	[MPa]	-1	-1	-1						

165

220

Note

Over pressure

Burst pressure

1) Reverse pressure

[MPa]

[MPa]

120

180

All values relating to relative pressure. Customer specific pressure ranges on request. 1 MPa = 10 bar

150

200

TEMPERATURE RANGES

Standard operating temperature range, option 1 $(-45 \text{ to } +125)^{\circ}\text{C}$ Extended operating temperature range, option 2 $(-45 \text{ to } +155)^{\circ}\text{C}$ High operating temperature range, option 3 $(-45 \text{ to } +200)^{\circ}\text{C}$

ELECTRICAL PARAMETERS

If not otherwise mentioned valid in the specified operating temperature ranges.

Parameter	Min.	Тур.	Max.	Unit
Bridge offset voltage 1)	-15		+15	mV
Offset TC	-0.05		+0.05	%span/K
Full scale output signal ¹⁾ for nominal pressure ranges > 1 MPa for nominal pressure range 1 MPa	100 65	150 100	200 135	mV
Span TC	-0.05		+0.05	%span/K

Data sheet 31S00010A page 2 of 8

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Signal resolution		0.01	%span
Nonlinearity (best fit straight line)	-0.15	+0.15	%span
Hysteresis		0.05	%span
Output signal repeatability	-0.05	+0.05	%span
Bridge resistance 2)	3.4	4.85	kΩ
Bridge resistance TC	1650	1850	ppm/K
Dielectric strength	700		VAC
Isolation resistance at room temperature	100		ΜΩ
Isolation resistance over operating temperature range	20		ΜΩ
Bridge supply voltage, DC	1	10	V
Long term stability of sensitivity	-0.15	0.15	%span/ year
Additional offset error caused by vibration impact 3)	-0.05	0.05	%span
Additional offset error caused by overload pressures	-0.25	0.25	%span
Additional sensitivity error caused by overload pressures	-0.1	0.1	%span

Notes

- At 10 V bridge supply voltage, 25°C and ambient pressure At 25°C and ambient pressure 1)
- 2)
- 3) For condition details see section mechanical parameters

MECHANICAL PARAMETERS

Material of process media wetted sensor part	Titanium alloy with 87% titanium
Ingress protection	IP 54
Module weight depending on pressure port type 4)	(4 to 7.7) g
Min. vibration proofness (sinus) according to IEC 68-2-6 and IEC 68-2-38	500 m/s ² at (10 to 5000) Hz
Min. multiple shock proofness according to IEC 68-2-32	1000 m/s ² Shock pulse width 2 ms
Max. mounting torque ⁵⁾ for pressure port types M1, U1 for pressure port types M2, U2, M3, U3	25 Nm 5 Nm

Notes

- For details refer also section pressure ports Only with proper tools at flat side areas allowed 4)
- 5)

Data sheet 31S00010A page 3 of 8

SENSOR BRIDGE CIRCUITS

	Modul	les with titanium housing and flexil	ole cable
S	Sensor bridge type/ wire mapping	Circuit diagram	Notes
white: red: black: blue:	output minus supply plus output plus supply minus	Pressure sensor 1 White Pin 1 2 Red Pin 2 Supply (+) Black Pin 3 Output (+) Blue Pin 4 Supply (-)	All wires with cross-sections of 0.08 mm and PTFE insulation
Open white: red: black: green: blue:	output minus supply plus output plus 1 output plus 2 supply minus	Pressure sensor 1 White Pin 1 2 Red Pin 2 Black Pin 3 Green Pin 4 Blue Pin 5 Output (-) Output (-) Output (-) Supply (+) Output 2 (+) Supply (-)	0.08 mm and PTFF insulation

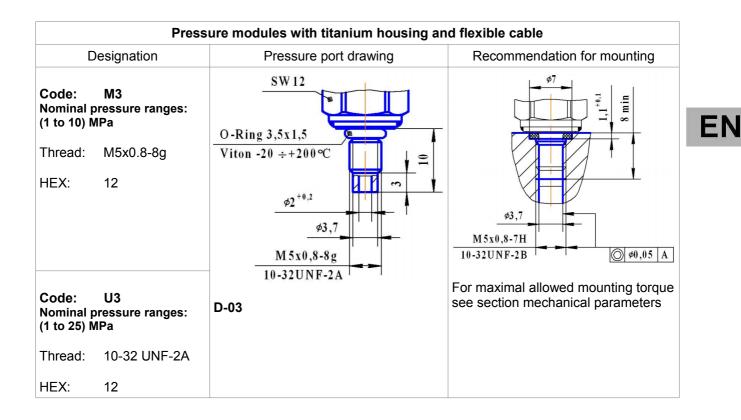
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Data sheet 31S00010A page 4 of 8

PRESSURE PORTS

Pressure modules with titanium housing and flexible cable Designation Pressure port drawing Recommendation for mounting L (size is to be ordered) Code: **M**1 Nominal pressure ranges: (1 to 150) MPa 25 A **Ø12** ___ 0,05 A Thread: M10x1-8g HEX: 12 12,6 Laser welding SW 12 \$5.5 Code: U1 Nominal pressure ranges: M10x1-7H (1 to 150) MPa 3/8-24UNJF-3B Ø ø0,05 A \$\phi_3,5^{+0,3}\$ Thread: 3/8-24 UNJF-3A For maximal allowed mounting torque φ**4**,7 see section mechanical parameters HEX: 12 M10x1-8g 3/8-24UNJF-3A D-01 SW 12 Code: **M2** Nominal pressure ranges: (1 to 25) MPa O-Ring 6x1,5 Viton -20 ÷+200°C Thread: M8x1-8g HEX: 12 φ2^{+0,2} $\phi 6,3$ Code: U2 $\phi 6.3$ M8x1-7H Nominal pressure ranges: Ø Ø0,05 A 5/16-24UNF-2B (1 to 25) MPa M8x1-8g 5/16-24UNF-2A For maximal allowed mounting torque 5/16-24 UNF-2A Thread: D-02 see section mechanical parameters HEX: 12

Data sheet 31S00010A page 5 of 8



RECOMMENDED PROCESS MEDIA

All gases and liquids and their mixtures which are not aggressive against titanium alloys like air, sea water, 5% vitriol acid, chlorine water, chloride solutions, mineral oils, ethyne etc.

Data sheet 31S00010A page 6 of 8

ORDERING CODES Product Pressure Sensor Pressure port **Electrical** Temperabridge circuit family type connection range ture range Industrial pressure sensor L-MPP module

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Standard	pressure	ranges
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Standard pressure ranges	
(0 to 1) MPa	1
(0 to 1.6) MPa	1.6
(0 to 2.5) MPa	2.5
(0 to 4) MPa	4
(0 to 6) MPa	6
(0 to 10) MPa	10
(0 to 16) MPa	16
(0 to 25) MPa	25
(0 to 40) MPa	40
(0 to 60) MPa	60
(0 to 100) MPa	100
(0 to 150) MPa	150

Media temperature range

-45°C to +125°C	1
-45°C to +155°C	2
-45°C to +200°C	3

Sensor bridge circuit

Closed bridge	0
Open bridge	1

Pressure port type

M10x1-8g (pressure port drawing D-01, D-04)	M1
3/8-24 UNJF-3A (pressure port drawing D-01, D-04)	U1
M8x1-8g (pressure port drawing D-02, D-05)	M2
5/16-24 UNF-2A (pressure port drawing D-02, D-05)	U2
M5x0.8-8g (pressure port drawing D-03, D-06)	М3
10-32 UNF-2A (pressure port drawing D-03, D-06)	U3

Data sheet 31S00010A page 7 of 8

	Product family	Pressure range	Tempera- ture range	Sensor bridge circuit	Pressure port type	Electrical connection
Electrical connection						
Flexible cable with customer specified length (in millimeter)						L

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In case other wire lengths are wished please add the required length to the wire code L in millimeters. For example L100 for 100 mm wire length.

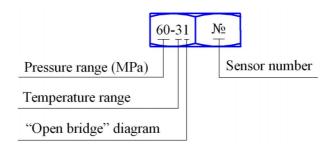
	Product family	Pressure range	Tempera- ture range	Sensor bridge circuit	Electrical connection
Ordering example					
Pressure sensor module for (0 to 600) bar and (0 to 60) MPa resp., operating temperature range (-45 to +200)°C with open sensor bridge and a wire length of 500 mm	L-MPP	60	3	1	L500

Your order code according to this example would be:

L-MPP-60-31-L500

PRODUCT MARKING

All pressure sensor modules are marked on hex including the presure range, temperature range, bridge type and a sensor number like shown in the picture below.



Data sheet 31S00010A page 8 of 8