

# Data Processing Receiver for pressure / temperature sensors with current output 3.36 - 20mA, PNP type



RECOGNIZED BY UNDERWRITER'S LABORATORIES INC. ONLY AS TO NON-SPARKING SAFETY FOR USE IN CL I, DIVISION 2, GR CD, T4A  
File No.E300158


## Housing M18

- For data processing with optical inputs for fibre optics
- 2 independent receivers inside
- Simple connection of POF without special tools
- Short response time and very high sensitivity
- 2 x current outputs 3.36mA-20mA and
- 2 x fault indication outputs
- For use in CL. I, Division 2, GRP. CD and Zone 2

## ORN-G-AO-LWL



II 3G Ex nA IIB T4 Gc

Technical data	Type	ORN-G-AO-LWL / E34010029
For use in Hazardous Locations		CL I, Division 2, GRP CD
For use in Ex Zones		Zone 2, II 3G Ex nA IIB T4 Gc
Number of receivers		2
Minimum pulse width at the inputs		$\geq 3\mu s$
Minimum optical input power		$\geq 0.2\mu W$ (LWL, L:10m, D:1mm; pulse with $\geq 3\mu s$ )
Supply voltage		24VDC $\pm 10\%$
Absolute maximum supply voltage $U_m$		$U_m = 30VDC$
Maximum current consumption		50mA (+ 40mA load current maximum)
Maximum power dissipation		1.4W (maximum 2.38W)
Analog current outputs		2 x PNP-current outputs, 3.36mA to 20mA (P/T,PNP)
Analog current output, resolution		6.6Hz / 66uA
Supply voltage for current outputs		over main supply voltage, terminal 1
Tolerance current output signal		$\pm 2.5\%$ at 4mA, $\pm 2\%$ at 20mA
Analog output current, without optical input signal		2.95mA $\pm 5\%$
Ripple on the output current		$< 2\%$
External load resistance		RL: $0\Omega$ to $200\Omega$
Fault indication outputs		2 x Push-Pull, short circuit protected, maximum 10mA
Output impedance, fault indication output		maximum $150\Omega$ , RL: $1500\Omega$ to $10k\Omega$
Inputs		2 x optical for synthetic fibre optics, 2.2mm, core 1mm
Housing		M18, yellow brass, nickel plated
Enclosure rating at EN 60529		IP 67 (with fitted POF and fitted cable connector)
Vibration and shock resistance		300m/s <sup>2</sup> , 10Hz to 55Hz, all directions, in accordance to EN 60947-5-2
Ambient operating temperature range $T_{amb}$		$0^\circ C < T_{amb} < +50^\circ C$
Storage temperature range		$-20^\circ C \dots +70^\circ C$
Relative humidity		15% ... 90%, noncondensing
Pollution degree, at EN 60664-1		4
Device designation, at EN 60947-5-2		T3A18CS2
Sensor socket		Lumberg, M12 male receptacle, type RSF 8, 8 contacts
Fibre optics fitting		Screwed connection, without additional parts or special tools
Tightening torque for the fibre optics fixing screw		0.8Nm .. 1.5Nm
Length of fibre optics (Dia. 2.2/1mm)		Dependent on type and fitting of the POF
Accessories included		- 2x nuts M18 - 1x Safety lock device, mount at the cable connection, for locking the connection. (black synthetic device) - 1x Warning plate "WARNING - Explosion Hazard - Do Not Disconnect While Circuit Is Live Unless Area Is Known To Be Non-Hazardous", self-sealing, for gluing on the cable connector.
Accessories optional		- Single ended cordset, straight type: RKTS 8-299/..M or right angle type: RKWTH 8-299/..M, Lumberg M12/8P
ATEX related designation		CE Manufacturer with address Device type: ORN-G-AO-LWL Electrical data according to the chart  II 3G Ex nA IIB T4 Gc Declaration by manufacturer at 2014/34/EU Date of construction: Numeral 5 to 8 of the serial number (yr/cw)

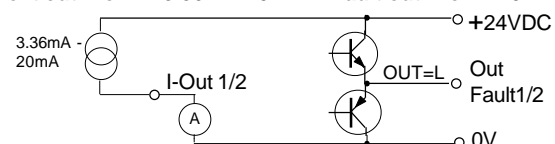
ORN\_AO\_PNP\_G\_UL\_ATEX\_V12\_e2/2016-09-13/HB

Function:

Pressure: -1 to 25 Bar

Battery OK:

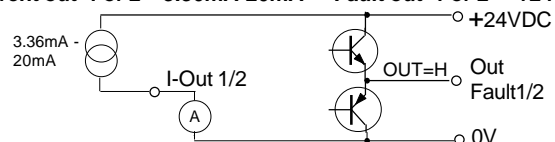
 - Current out: 3.36mA to 20mA  
- Fault out: Low

**Current out 1 or 2 = 3.36mA-20mA**     **Fault out 1 or 2 = 0V**


Pressure: -1 to 25 Bar

Battery discharged:

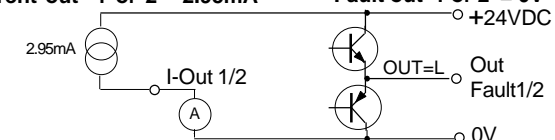
 - Current out: 3.36mA to 20mA  
- Fault out: High

**Current out 1 or 2 = 3.36mA-20mA**     **Fault out 1 or 2 = +24V**


No optical input signal

or no fibre optic connected:

 - Current out: 2.95mA  
- Fault out: Low

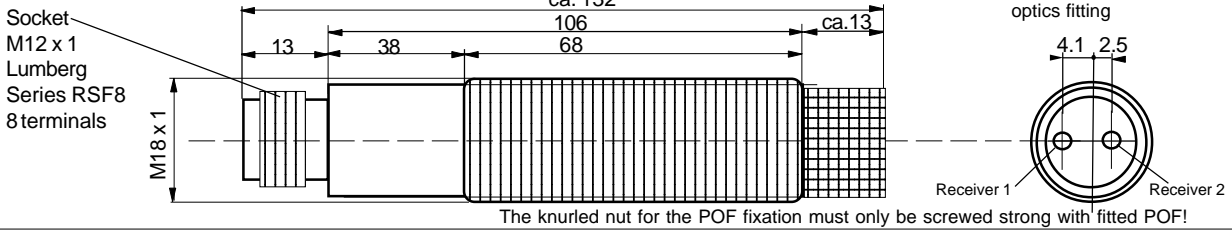
**Current out 1 or 2 = 2.95mA**     **Fault out 1 or 2 = 0V**


**Connection diagram ORN-G-AO-LWL:**

(wire colors at DIN 47100  
Connection layout at EN 50044)

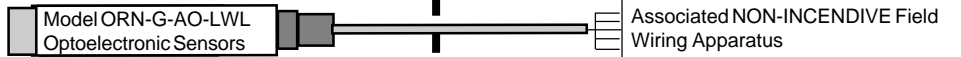
- 1: +24VDC
  - 2: 0V
  - 3: +24VDC
  - 4: Current out 1, 3.36-20mA
  - 5: +24VDC
  - 6: Current out 2, 3.36-20mA
  - 7: Fault out 1
  - 8: Fault out 2
- ⚡ Protection earth PE at the cable shield

**Dimensions ORN-G-AO-LWL:**



**Control Drawing for Hazardous Areas:**

HAZARDOUS (CLASSIFIED) LOCATIONS CLASS I, DIVISION 2, GROUPS C, D, T4



**Notes:**

- Nonincendive Circuit Parameters:  
Model ORN-G-AO-LWL  

V <sub>max</sub> = 30VDC	V <sub>oc</sub> = 30VDC
I <sub>max</sub> = 50mA	I <sub>sc</sub> = 50mA
C <sub>i</sub> = 0	C <sub>a</sub> = 0
L <sub>i</sub> = 0	L <sub>a</sub> = 0
P <sub>i</sub> = 1400mW	
- Selected Associated Nonincendive Field Wiring Apparatus shall satisfy the following: Class 2 power supply  

Associated Nonincendive Field Wiring Apparatus	Model ORN-G-AO-LWL
V <sub>oc</sub>	≤ V <sub>max</sub>
I <sub>sc</sub>	≤ I <sub>max</sub>
C <sub>a</sub>	≥ C <sub>i</sub> + C <sub>ccable</sub>
L <sub>a</sub>	≥ L <sub>i</sub> + L <sub>ccable</sub>
V <sub>max</sub>	≥ V <sub>oc</sub>
I <sub>max</sub>	≥ I <sub>sc</sub>
C <sub>i</sub> + C <sub>ccable</sub>	≤ C <sub>a</sub>
L <sub>i</sub> + L <sub>ccable</sub>	≤ L <sub>a</sub>
- If the electrical parameters of the cable are unknown, the following values shall be used:  
Capacitance: 60pF / ft, Inductive: 0.70uH / ft
- Nonincendive Field Wiring must be wise in accordance with 510.4B of the NEC/NFPA70or as specified in Section 18-152 for installation within Canada and in accordance with the authority having jurisdiction.

**Operating Manual / Declaration of Conformity:**

**INSTALLATION INSTRUCTIONS FOR HAZARDOUS LOCATIONS:**  
**A. "WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2"**  
**B. "WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES."**  
**C. "WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS."**

Provides nonincendive field circuits when installed per the installation instructions. The local equipotential bonding have to be done by the cable shielding. The cable shield must be connected reliable and noncorrosive to PE/PA. ONLY Lumberg cordsets, EMC types, RKTS 8-299/..M (Straight type) or RKWTH 8-299/..M (Right angle type) are allowed. The cable have to be installed and protected against damages. The cable with termination fittings, or in cable tray systems and installed in a manner to avoid tensile stress at the termination fittings. To connect cables inside hazardous locations only use certificated Ex e housings. All cable terminals must be connected outside hazardous locations. When installing the sensor, the safety lock device must be fitted at the cable connector. The additional adhesive warning label must be fixed to the connector housing at the connection cable.

**Additional installation instruction for ATEX applications:**

The data processing receiver Type ORN-G-AO-LWL is only applicable for the Ex zone 2. It is necessary to take into consideration the valid international and national rules and regulations (EN 60079-14). The maximum rated input voltage U<sub>m</sub> = 30VDC must not be exceeded.

**General mounting prescriptions:**

Do not exceed the maximum ratings. The electrical connections must be exactly as shown in the connection diagram. The cable shield must be connected short. The cable shield must be connected to the protection earth, large-surfaced. Connection cables must not be installed parallel to high voltage cables. For the upward compatibility with future types ,the additional supply voltage +24VDC must be connected at terminals 3 (green) and 5 (grey)

**Function**

The device has 2 independent data receivers inside. Each receiver has an analog current and a fault indication output.

	Battery	Current Out	Fault Out
Pressure: -1 to 25 Bar	OK	3.36-20mA	LOW
Pressure: -1 to 25 Bar	Low	3.36-20mA	HIGH
No input signal	-	2.95mA	LOW

**Current outputs 3.36-20mA**

PNP type outputs. The load must be connected from the output to 0V and must be ≤ 200Ω.

**Using the fibre optics**

**WARNING:** The knurled nut for the POF fixation must only be screwed strong with fitted POF! The fibre optics must be handled careful. For cutting the fibre optics, the special cutter or a professional tool is to use. The face of optical fibers must be completely even and free of scratches. After cutting the fibres, push them well set into the adaptor

and fasten the screws. The maximum length of fibre optics is dependent on type and fitting of the POF. Do not use optical fibres longer then 10m. The functional safety of the data receiver is given by the working up of the optical fibres. Specially near the sensor, the fibre optics must not be buckled or laid with a small radius. Buckled or bad laid fibre optics results to a strong decrease of performance. Avoid performance decreasing and failures caused by wear, by a functional mounting of the fibre optics.

**Maintenance**

Protect the fibre optic adaptor of the sensor and the optical fibres against pollution. Please set up the protection cap if no optical fibres are connected. If the fibre optic adapter is contaminated, clean with alcohol. Do not use aggressive solvents. Plastic optical fibres can be destroyed by strong solvents. Equipment must only be repaired or serviced by the manufacturer.

**Safety informations to warm housing surface**

At a ambient temperature of +50°C, the self-heating ΔT of the sensor can reach 20K. Disconnect the sensor from power supply and let him cooling before touching.

**General Safety Informations**

The dismounting of the connector safety lock device while the supply voltage is connected is hazardous! The data receiver ORN-G-AO-LWL must not be used for Accident-Prevention! In worst case of disturbance, the outputs can show any state. When installing and operating with the sensor, it is necessary to take into consideration the relevant international and other national regulations. UL 508, UL1604, UL2279 Non-Sparking Safe Apparatus for use in CL I, Division 2, GRP CD, Hazardous (Classified) Locations, EN 60079-14, RL 1999/92/EC.

The sensor and the fibre optic are conform to the following standards: UL 61010-1, ANSI/ISA 12.12.01-2013, UL 2279, UL 1604, UL 508, CAN/CSA C22.2 No. 213-M1987, EN 60079-0:2012 + A11:2013, EN 60079-15:2010, EN 61000-6-1/-2, EN 61000-6-3/4, EN 60529:2014, ATEX directive: 2014/34/EU, Machine directive: 2006/42/EC, RoHS directive: 2011/65/EU, EMC directive: 2014/30/EU.

**General Notes, disposal**

We reserve the right to modify our equipment. Our equipment is designed such way, that it has the least possible adverse effect on the environment. It neither emit or contain any damaging or siliconized substances and use a minimum of energy and resources. No longer usable or irreparable units must be disposed of in accordance with local waste disposal regulations.

**EU-Declaration of Conformity**

UL-Recognized: File No. E300158. ATEX Declaration of conformity by manufacturer according to 2014/34/EU. ATEX certification of quality type production of Ex devices according to the directive 2014/34/EU, CE 0158. Certification No: BVS 15 ATEX ZQS / E118. The conformity of the devices with the UL and EC standards and ISO 9001:2008 with the ATEX module "Production", declares:

*Hans Bracher*

Hans Bracher, Matrix Elektronik AG

ORN\_AO\_PNP\_G\_UL\_ATEX\_V12\_e2/2016-09-13/HB

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