

## Operating manual: PSN-TDN-LWL-OP Multifunction O/E Converter, Housing M18



**II 3(2)G Ex nA [op is Gb] IIB T4 Gc**  
**II 3(2)D Ex tc [op is Db] IIA T135°C Dc**



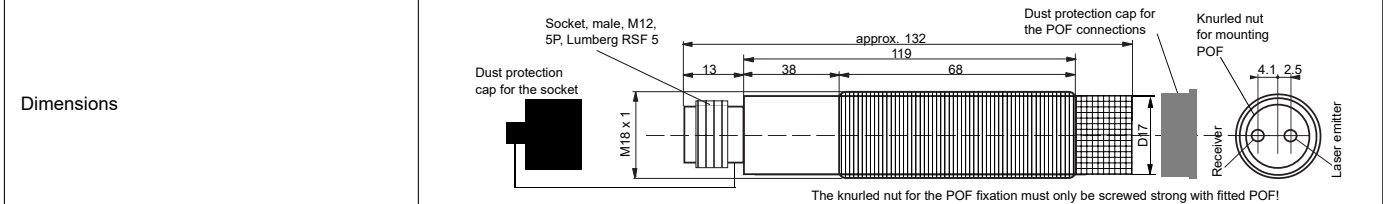
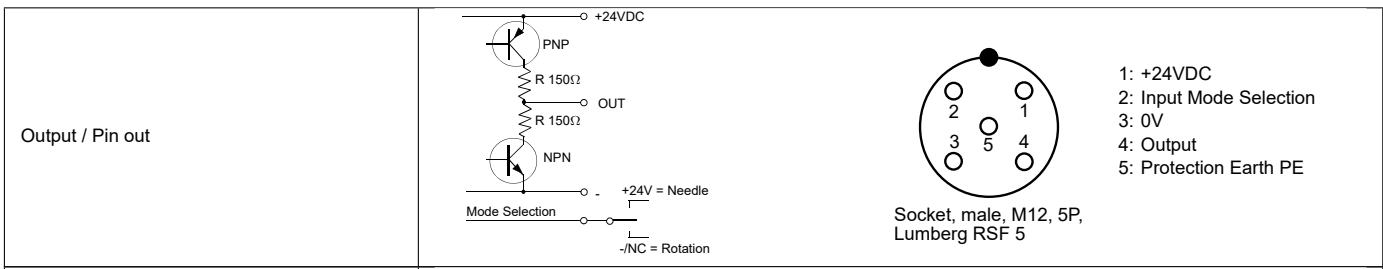
RECOGNIZED BY UNDERWRITER'S LABORATORIES, INC. ONLY AS TO NON-SPARKING SAFETY FOR USE IN CL I, DIVISION 2, GRP CD, T4A  
File No. E300158

- Function selectable between dynamic rotation speed detection, with plausibility observation and as static proximity switch for needle detection
- Simple connection of synthetic fibre optics (POF) without special tools
- Short response time and very high sensitivity as proximity switch
- Applicable in CL I, DIVISION 2, GRP CD, T4A
- Applicable in Ex Zones 2 and 22. Optical radiation can operate into hazardous locations 1, 21.
- Visible laser emitter, red 650nm

Made for

Technical Data	Type	PSN-TDN-LWL-OP / E34010034	
Gas Ex protection designation		II 3(2)G Ex nA [op is Gb] IIB T4 Gc	
Dust Ex protection designation		II 3(2)D Ex tc [op is Db] IIA T135°C Dc	
For use in Hazardous Locations		CL I, DIVISION 2, GRP CD, T4A	
For use in Ex Zones		Zones (1), 2, (21), 22	
Laser class		Class II, 650nm red, Po <= 1mW, radiant power stabilized	
Maximum optical radiant power		<15mW	
Maximum optical radiant intensity		<= 5mW/mm <sup>2</sup>	
Output type		1 x Push-Pull, short circuit protected, maximum 10mA	
Output rise and fall time		<= 1us	
Output impedance		maximum 150Ω	
Pollution degree		4	
Device designation according to EN 60947-5-1/2		R3A18CS2	
Supply voltage, Ue		24VDC	
Absolute maximum supply voltage, Um		30VDC	
Current consumption		70mA	
Maximum power dissipation		1.9W @ Tamb = 50°C	
Maximum current consumption		70mA	
Frequency		(Rotation speed detection mode): 0,01kHz - 10kHz <sup>Note 1</sup>	
Input type		1 x Mode selection, PNP compatible	
Housing		M18, yellow brass, nickel plated	
Enclosure rating		IP67 (with fitted POF and fitted cable connector), according to EN 60529	
Ambient working temperature range, Tamb		0°C up to +50°C	
Storage temperature range		-20°C up to +80°C	
Relative humidity		15% ... 90%, noncondensing	
EMC, shock and vibration resistance		Vibration: 30g over 20Hz to 2kHz. Shock: 100g for 3ms	
Socket		Lumberg, M12 male, type RSF 5, 5 pins	
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		Dependent on type and fitting of the POF	
Accessories	<b>Included</b>	<b>Optional</b>	
	<ul style="list-style-type: none"> <li>• 2x nuts M18</li> <li>• 1x Safety interlock device for the connector, to be mounted at the cable connection. (black synthetic)</li> <li>• 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.</li> <li>• 1x Protection cap for the sensor socket.</li> </ul>	<ul style="list-style-type: none"> <li>• Single ended cordset, Lumberg M12/5P straight type: RKTS 5-298/.M or right angle type: RKWTH 5-298/.M</li> </ul>	
Notes	Note 1: The real reachable switching/rotary frequency is dependent on the condition of the marking disc and the careful working up of the optical fibres. At normal conditions approximative 100'000 RPM.		
ATEX related markings	<p>CE 1258 Typ: PSN-TDN-LWL-OP Gas: II 3(2)G Ex nA [op is Gb] IIB T4 Gc ATEX:</p> <p>Test report: Tamb: Manufacturing date:</p>	<p>Manufacturer with Address Electrical data according table Dust: II 3(2)D Ex tc [op is Db] IIA T135°C Dc Manufacturer declaration according to ATEX directive 2014/34/EU IECEx CH/SEV/ExTR18.0030/00 0°C up to +50°C Number 5 to 8 of the Serial Number (Year / CW)</p>	
Mode Selection = 0V or not connected	<p style="font-size: small;">Sprayer is not running: Rotary indicator is turning:</p> <p style="font-size: small;">+24VDC 0V Rotary indicator is static: Output undefined: "L" or "H" Rotary indicator is turning: Output generates pulses equal to the rotation speed</p>		
Mode Selection = +24V	<p style="font-size: small;">Needle detected: Output = High(+24V) No object recognized: Output = L(0V)</p> <p style="font-size: small;">+24VDC 0V</p>		

PSN-TDN-LWL-OP\_e8/2023-02-23/MP/PDL



**Control Drawing for Hazardous Areas:**

**HAZARDOUS (CLASSIFIED) LOCATIONS:**  
CL I, DIVISION 2, GRP CD, T4A

Model PSN-TDN-LWL-OP Opto-electronic Sensor

**NON-HAZARDOUS AREA**

Associated NON-INCENDIVE Field Wiring Apparatus

- Nonincendive Circuit Parameters; Model PSN-TDN-LWL-OP  
 $V_{max} = 30VDC$      $V_{oc} = 30VDC$   
 $I_{max} = 75mA$      $I_{sc} = 75mA$   
 $C_i = 0$      $C_a = 0$   
 $L_i = 0$      $L_a = 0$   
 $P_i = 2070mW$
- Selected Associated Nonincendive Field Wiring Apparatus shall satisfy the following: Class 2 power supply  
 $V_{oc} \leq V_{max}$   
 $I_{sc} \leq I_{max}$   
 $C_a \geq C_i + C_{cable}$   
 $L_a \geq L_i + L_{cable}$   
 $V_{max} \geq V_{oc}$   
 $I_{max} \geq I_{sc}$   
 $C_i + C_{cable} \leq C_a$   
 $L_i + L_{cable} \leq L_a$

3. If the electrical parameters of the cable are unknown, the following values shall be used:  
 Capacitance: 60pF / ft, Inductive: 0.70uH / ft

4. Power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods - Article 510 - 4(b) of the NEC/NFPA 70 or as specified in Section 18-152 for installation within Canada and in accordance with the authority having jurisdiction.

**Operating Manual / EC-/EU-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. The PE/PA connection (terminal 5 of the cordset) and the cable shield must be connected reliable and noncorrosive to PE. The PE terminal and the socket are solid connected to the housing. ONLY Lumberg cordsets RKTS 5-298/.M (Straight type) or RKWTH 5-298/.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. Other than original manufacturer, additional optical components are not allowed in hazardous locations. When installing the sensor, the safety interlock device must be fitted at the cable connector. The additional adhesive warning label "WARNING - Explosion Hazard - Do Not Disconnect While Circuit Is Live Unless Area Is Known To Be Non-Hazardous" must be fixed to the connector housing at the connection cable. In dusty locations, the protection cap for the optical connection and for the socket must be fitted, when the connection cable or the POF's are NOT connected.

**Additional installation instruction for ATEX applications:**  
 The O/E-Converter Type PSN-TDN-LWL-OP is only applicable in the Ex Zones 2 and 22. The limited optical radiation can operate into hazardous locations 1, 2, 21, 22 over certificated fibre optics. It is necessary to take into consideration the valid international and national rules and regulations (EN 60079-14). The maximum rated input voltage  $U_m = 30VDC$  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. The O/E converters should be mounted stable and thermal conductive.

**Function rotation speed detection: (Mode Selection = 0V)**  
 Light reflection alterations, generated by the turning marking disc of the spraying apparatus, will be amplified and formed.

**Function needle detection: (Mode Selection = +24V)**  
 Is the needle positioned in front of the fibre optic, the laser light will be reflected and the output switches to ON (+24V).  
 If no needle is recognized the output switches to OFF (0V).

**Using the fibre optics**  
**WARNING:** The knurled nut for the fibre optics fixation must only be screwed strong with fitted fibre optics! The sensor must not go into operation without mounted fibre optics. The fibre optics must be handled careful. For cutting the fibre optics the special cutter or a professional tool is to use. After cutting the fibres, push them well set into the adapter and fasten the knurled nut. The maximum length of fibre optics is dependent on type and fitting of the fibre optics. The functional safety of the sensor is given by the condition of the marking disc and the careful working up of the optical fibres. 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. Equipment must only be repaired or serviced by the manufacturer.

**Safety informations to hot housing surface**  
 At an ambient temperature of +50°C, the self-heating  $\Delta T$  of the sensor can reach 25K. Disconnect the sensor from power supply and let it cool before touching.

**Safety regulations for Laser devices class 2**  
 By the installation, the going into operation and the application, it is necessary to take into consideration the valid rule EN 60825-1/-2 (Parts 12.5.1/12.6.2). Laser Class 2 without connected fibre optics. Do not stare into the beam!

**General safety instructions**  
 "WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES. DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS". The mounting of the sensor in dusty locations without fixed cordset or protection cap results in a high ignition risk. The sensors must not be used for Accident-Prevention! In worst case the output can change to any state! When installing and operating with the sensor, it is necessary to take into consideration the relevant international and other national regulations: EN 60079-14, single directive 1999/92/EC, UL 508, UL1604, UL2279 Non-Sparking Safe Apparatus for use in CL I, Division 2, GRP CD, Hazardous (Classified) Locations. The sensor and the fibre optic are conform to the following standards: UL61010-1, ANSI/ISA12.12.01-2013, UL2279, UL1604, UL508, CAN/CSA C22.2 No.213-M1987, EN60079-0:2012, EN60079-15:2010, EN60079-28:2007, EN60079-31:2010, EN60825-1:2006, EN60825-2:2004, EN61000-6-1/-2, EN61000-6-3/4, EN60529:2014, ATEX directive 2014/34/EU, Machine directive 2006/42/EC, EMC directive 2014/30/EU, RoHS directive 2011/65/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. The sensor type PSN-TDN-LWL-OP complies with the requirements of EU Directive 2014/35/EU and the above mentioned standards for II 3(2)G Ex nA [op is Gb] IIB T4 Gc and II (3)D Ex tc [op is Db] IIA T135°C Dc. The sensor does not have an EU type examination, but an own manufacturer declaration according to directive 2014/34/EU. The optical circuit (laser transmitter) of the sensor complies with the standard IEC60079-28 for EPL Gb, Partial Report No. IECEx CH/SEV/ExTR18.0030/00, Eurofins Electric & Electronic Product Testing AG, Luppennstrasse 3, CH-8320 Fehraltorf Switzerland. ATEX certification of quality manufacturing of Ex equipment according to Directive 2014/34/EU, CE 1258. Certification number: SEV 21 ATEX 4580.

The conformity of the devices with all used standards and directives and the EC-type examination certificate and the observation of the Quality Management System ISO 9001:2015 with the ATEX module „Production“, declares:

Ehrendingen, 23.2.2023  
  
 Pablo Ledergerber, Matrix Elektronik AG

PSN-TDN-LWL-OP\_e8/2023-02-23/MP/PDL

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