

# Original Operating Manual:

## Photoelectric sensors with analog output: IRS/IRN/IRD-010-A\*\*(-OP)

IRD-010-A\*\*-OP

Housing M30

IRN-010-A\*\*-OP



II 2(1)G  
II 2(1)D

IECEX designation  
Ex d [op is Ga] IIC T6 Gb  
Ex tb [op is Da] IIIB T100°C Db IP67

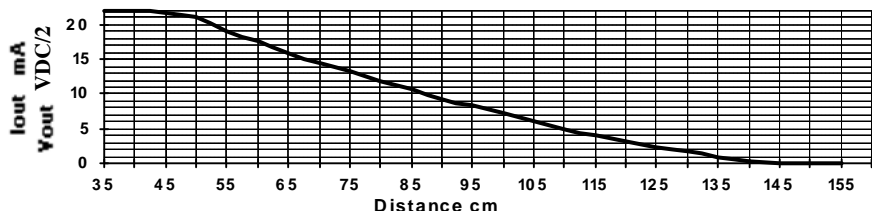
- Also for using with different certificated fibre optics
- IRD: ATEX and IECEX certificated
- Types IRD: For use in Ex Zones (0), 1, 2, (20), 21, 22
- Types IRN: For use in Ex Zones (1), 2, (21), 22
- With voltage or current loop output available
- Applicable for range measurement or position detection
- Applicable with glass fibre optics



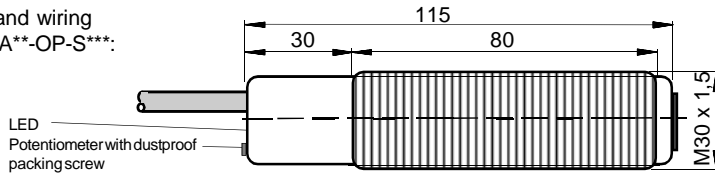
ATEX-Kennzeichnung:  
II 3(2)G Ex nA [op is Gb] IIB T4 Gc, II 3(2)D Ex tc [op is Db] IIIA T135°C Dc IP67

Technical data	Type	IRS-010-A**	IRN-010-A**-OP	IRD-010-A**-OP
<b>A**= Type of analog output. AVO: Voltage output 0 ... 10V. AIO: current loop output 0mA ... 20mA. AI4: current loop output 4mA ... 20mA</b>				
Type of Ex protection Gas, according to 2014/34/EU		NONE	II 3(2)G Ex nA [op is Gb] IIB T4 Gc	II 2(1)G Ex d [op is Ga] IIC T6 Gb
Type of Ex protection Dust, according to 2014/34/EU		NONE	II 3(2)D Ex tc [op is Db] IIIA T135°C Dc IP67	II 2(1)D Ex tb [op is Da] IIIB T100°C Db IP67
For use in Ex Zones		NONE	Zones (1), 2, and (21), 22	Zones (0), 1, 2 and (20), 21, 22
Output signal range		0.03VDC - 10.5VDC	Ripple: <20mV or 0.06mA - 21mA or 4mA - 20mA	
Voltage output, nominal range, on white paper. A4. 80g		5VDC output voltage at a distance of 1m, adjustable		
Current output, nominal range, on white paper. A4. 80g		10mA output current at a distance of 1m, adjustable		
Light source		Infrared 870nm		
Optical angle		approx. 10°		
Maximum optical radiant power		NOT LIMITED	<=35mW	<=15mW
Maximum radiant power		NOT LIMITED	<=5mW/mm²	<=5mW/mm²
Response time		5ms (faster response time, on request)		
Power up delay time		500ms		
Supply voltage		24VDC +10%, Um = maximum 30VDC		
Intrinsic current consumption		max. 60mA		
Maximum power dissipation		2.1W		
Output type, voltage, IR*-010-AVO(-OP)		PNP, output impedance appr. 25Ω, RLoad: 2kΩ to 1MΩ		
Output type, current, IR*-010-AIO/AI4(-OP)		NPN, output impedance appr. 500Ω, RLoad: 0Ω to 100Ω		
Disable-Input, only types IR*-010-A**(-OP)-S259		PNP compatible, Ri 10kΩ		
Housing		M30, brass Ms 58, nickel plated (optional stainless steel 1.4404, types: IR*-010-A**(-OP)-S224		
Enclosure rating, according to EN 60529		IP 65	IP 67	IP 67
Ambient working temperature range Tamb		-20°C up to +50°C		
Storage temperature range		-20°C ... +70°C		
Relative humidity		15% ... 80%		
Vibration and shock resistance		Vibration: 30g over 20Hz to 2kHz. Shock: 100g for 3ms		
Pollution degree, according to EN 60664-1:2007		4		
Device designation, according to EN 60947-5-2		R3A30AP1		
Connection cable		3+PE x 0.5mm², TPU, shielded, leads numbering marked, oil resistant cable for trailing, L: 3m		
Connection cable, types IR*-010-A**(-OP)-S259		4+PE x 0.5mm², TPU, shielded, leads numbering marked, oil resistant cable for trailing, L: 3m		
Socket, IRS/IRN-010-A**(-OP)-S099		Male connector M12, Lumberg RSF 5, 5-leads		
Accessories, all devices		- 2x nuts M30 (or 1 clamp on demand)		
Accessories, only IRD/IRN-010-A**-OP		- 1x Spare safety screw with packing ring for potentiometer sealing		
Accessories, only IRN-010-A**-OP-S099		- 1x Safety lock device, mount at the cable connection, for locking the connection - 1x Warning plate "Do not open/close when supply voltage connected" - 1x Protection cap for the sensor socket		
Accessories, not included, only IRS/IRN*-S099		- Single ended cordset, types RKTS 5-298/xx or RKWTH 5-298/xx, Lumberg		
Options		- Cable length: Up to maximum 100m. Designation: IR*-010-LA*(-OP)/K:100m - IRS/IRN-010-A**(-OP)-S099: Male connector M12: Lumberg RSF-5, 5 pins - IRS-010-A**-S135: With external potentiometer at cable 2xAWG24, length: 3m. Must not be connected at supply voltage without mounted external potentiometer - IRS/IRN-010-A**(-OP)-S193: Replacement for series IRS-U-10A/I-GF, for applications with fibre optics series ...Y1... (Special adoption) - IRN/IRD-010-A**(-OP)-S224: Housing stainless steel 1.4404 / 316L - IR*-010-A**(-OP)-S259: With emitter disable input (DI) - IRS-010-A**-S-MT: With 10 turns special potentiometer		
Function and LED indication		<p>Light barrier with fibre optic</p> <p>Proximity switch</p> <p>Proximity switch with fibre optic</p> <p>The brightness of the LED and the output level, is dependant on the quantity of the detected light.</p>		<p>Light barrier with fibre optic</p> <p>Proximity switch</p> <p>Proximity switch with fibre optic</p> <p>No light detected. Output=OFF, LED=OFF</p>
Wiring and connection		<p>PNP=OFF</p> <p>R 25Ω</p> <p>Output</p> <p>IR*-010-AVO V-Out</p> <p>0.03-10.5VDC</p> <p>0V (-)</p>		<p>0.06-21mA (4-20mA)</p> <p>R 500Ω</p> <p>Output</p> <p>IR*-010-AIO/AI4 I-Out</p> <p>0V (-)</p>

**Output diagram**  
(measured on white paper, 80g, 20cmx30cm)  
Potentiometer on MAXIMUM

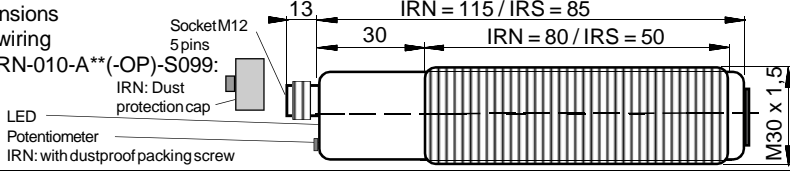


**Dimensions and wiring**  
IRN/IRD-010-A\*\*(-OP)-S\*\*\*:



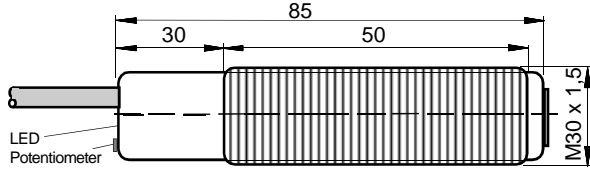
Function:	Lead-No:	Lead-No:
+24VDC	1	1
0V	2	2
Output	3	3
(DI-Input)	--	4
FE	yellow-green	yellow-green

**Dimensions and wiring**  
IRS/IRN-010-A\*\*(-OP)-S099:



Function:	Pin-No:	Pin-No:
+24VDC	1	brown
(DI-Input)	2	white
0V	3	blue
Output	4	black
FE	5	grey

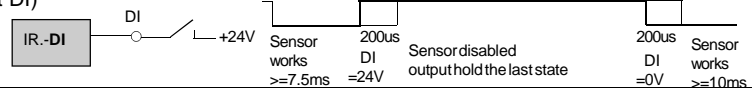
**Dimensions and wiring**  
IRS-010-A\*\*:



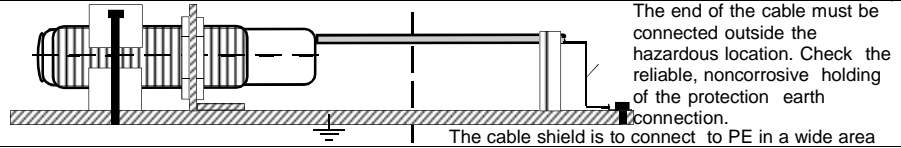
Function:	Lead-No:
+24VDC	1
0V	2
Output	3
(DI-Input)	4 (only S259)
FE	yellow-green

**IR\*-010-A\*\*(-OP)-S259 (with optional disable input DI)**

U<sub>in</sub>: DI=+24V=disabled / 0V=enabled  
Response time: <=200us  
Holdtime: >=10ms



**Equipotential Bonding pre-  
scription for Ex Devices:**



**ATEX related markings on the sensors**

Device type	ATEX-Certification	IECEx-Certification	ATEX declaration by manufacturer	Electrical data according to the chart
IRD-010-A**(-OP)-S***	II 2(1)G Ex d [op is Ga] IIC T6 Gb, II 2(1)D Ex tb [op is Da] IIIB T100°C Db IP67	II 3(2)G Ex nA [op is Gb] IIB T4 Gc, II 3(2)D Ex tc [op is Db] IIIA T135°C Dc IP67	II 2(1)G Ex d [op is Ga] IIC T6 Gb, II 2(1)D Ex tb [op is Da] IIIB T100°C Db IP67	No. BVS 10 ATEX E 130 X DEKRA
IRN-010-A**(-OP)-S***	ATEX-Certification	IECEx-Certification	ATEX declaration by manufacturer	IECEx 14.0108X
IRN-010-A**(-OP)-S***	ATEX-Certification	IECEx-Certification	ATEX declaration by manufacturer	IECEx 14.0108X
IRN-010-A**(-OP)-S***	ATEX-Certification	IECEx-Certification	ATEX declaration by manufacturer	IECEx 14.0108X
Tamb:	-20°C <= Tamb <= +50°C			according to the ATEX directive 2014/34/EU
Date of production:	Numerals 5 to 8 of the serial number (year / calendar week)			Electrical data according to the chart

(X designation of the certification number: Fibre optics must only be used with sensors with certificated limited optical power)

**Mounting prescriptions:**

**General prescriptions for all Ex devices**

It is necessary to take into consideration the valid international and national rules and regulations (EN 60079-14). The maximum input voltage U<sub>m</sub>=30VDC must not be exceeded. The local equipotential bonding have to be done. The protective earth (PE) is solid connected with the housing. 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. Additional optical lenses are not allowed in hazardous locations. In dust Ex zones, do not operate the sensors without fixed dustproof sealing crew. After adjust the potentiometer, the dustproof sealing crew with undamaged packing ring, must be screwed down. Damaged or lost screws or packing rings must be replaced.

**Type IRD-010-A\*\*(-OP)-S\*\*\*:** Only for use in Ex zones 1, 2, 21, 22. The limited optical radiation can operate into hazardous locations 0 or 20 over certificated fibre optics or through a viewing glass.

**Type IRN-010-A\*\*(-OP)-S\*\*\*:** Only for use in Ex zones 2, 22. The limited optical radiation can operate into hazardous locations 1 or 21 over certificated fibre optics or through a viewing glass.

**Type IRN-010-A\*\*(-OP)-S099:** Only for use in Ex zones 2, 22. The limited optical radiation can operate into hazardous locations 1 or 21 over certificated fibre optics or through a viewing glass. Do not separate the connector when the supply voltage is connected to the cable. 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. Lumberg cordsets RKTS 5-298/xx (Straight type) or RKWTH 5-298/xx (Right angle type), are allowed ONLY. It is necessary to take into consideration the mounting prescription of the connector manufacturer. In dusty locations, the protection cap for the sensor socket must be fitted, when no connection cable is connected.

**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 should be connected to the protection earth, large-surfaced. Connection cables must not be installed parallel to high voltage cables. Do not exceed the maximum ratings.

**Function**

Corresponding to the quantity of detected light, the output of the sensor generates an analog output signal. Without fibre optics or with fibres 2 in 1 type, the sensor is applicable as relative distance detection device or similar applications. With 2-2 type fibres, function as light barrier, the sensor can be used for turbidity measurement or similar applications. Dependent on the selected type, the output generates a voltage signal from 0.03V to 10.5VDC or a current loop, 0.06 or 4mA to 21mA. Please check the permissible load for the two different types of outputs. For best measurement results the sensor can be adjusted by the potentiometer.

**IR\*-010-A\*\*(-OP)-S259: Optional emitter disable input "DI"**

If several sensors are installed close to another, it is necessary to use sensors with disable input. By using the disable input DI, each sensor can be controlled in a short reaction time (Response time: 200us). If only one sensor is activated in the same time, a mutual influence is precluded.

DI= 0V or not connected = emitter enabled  
DI= High (24VDC) = emitter disabled

For a correct function the sensor must be enabled for at minimum >= 10ms (DI=0V). If the DI input will be disabled, the outputs holds the previous output status from the last enabled time.

The DI input is PNP compatible.

**Operating manual, EC-/EU-declaration of conformity:**

**Nominal range**

The nominal range is defined as function "distance measurement" on white paper. At the nominal distance the output level shows the middle of the output range. The real output level is depended on the color, the form, the dimension, and the surface finish of the object.

**Fibre optics**

For efficiently detection solutions look for our multiple program of fibre optics, also for high temperature areas. Fibre optics for Ex zones must only be driven by sensors series IRN and IRD.

**Maintenance**

Protect the sensors and the optional fibre optics against pollution. If the fibre optics or the sensor lenses are contaminated, clean with alcohol. Do not use aggressive solvents. Optical fibres can be destroyed by strong solvents. Equipment must only be repaired or serviced by the manufacturer.

**General safety instructions**

Types IRN-010-A\*\*(-OP)-S099 : "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 light barriers 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. In worst case the output can change to any state!

The sensors are conform to the following standards: IEC/EN 60079-0:2012 + A11:2013, IEC/EN 60079-1:2007, EN 60079-15:2010, IEC/EN 60079-28:2007, IEC/EN 60079-31:2010, EN 60529:2014, EN 60950-1:2006; EN 61000-4-2 to EN 61000-4-6, EN 61000-6-1/-2, EN 61000-6-4, 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.

**EC-/EU-Declaration of conformity:**

IECEx certification, types IRD: Ex d [op is Ga] IIC T6 Gb, Ex tb [op is Da] IIIB T100°C Db IP67. Certification No. IECEx BVS 14.0108X.

<http://iecex.iec.ch/iecexweb.nsf/0/FE79714C0BAEF6F5C1257D7E004F6A9?opendocument>

ATEX certification, types IRD: II 2(1)G Ex d [op is Ga] IIC T6 Gb, II 2(1)D Ex tb [op is Da] IIIB T100°C Db IP67. Certification No. BVS 10 ATEX E 130 X, DEKRA EXAM GmbH, Zertifizierungsstelle, Carl-Beyling-Haus, Dinendahlstrasse 9, D-44809 Bochum, ident number: 0158.

ATEX certification, types IRN: II 3(2)G Ex nA [op is Gb] IIB T4 Gc, II 3(2)D Ex tc [op is Db] IIIA T135°C Dc IP67. ATEX declaration by manufacturer in accordance to 2014/34/EU and for Ex op is test report No. BVS PP 10-2233 EG, DEKRA EXAM GmbH, notified body, Carl-Beyling-Haus, Dinendahlstrasse 9, D-44809 Bochum, Identification number: 0158.

ATEX certification of quality type production of Ex devices in accordance to the ATEX directive 2014/34/EU, CE 0158. Certification No: BVS 15 ATEX ZQS / E118, QAR No. DE/BVS/QAR13.0004/01. The conformity of the devices with the EC standards and directives and the EC-type examination certificate and the observation of the Quality Safety System ISO 9001:2008 with the ATEX module "Production", declares:

Hans Bracher, Matrix Elektronik AG

**Tippkemper - Matrix GmbH**  
Meegener Str. 43 D-51491 Overath  
Tel.: +49 2206 9566-0 Fax -19  
info@tippkemper-matrix.com

**Matrix Elektronik AG (Manufacturer)**  
Kirchweg 24 CH-5420 Ehrendingen  
Tel.: +41 56 20400-20 Fax -29  
info@matrix-elektronik.com

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