

## Photoelectric Sensor with Analog Output IRS/IRN/IRD-2LA(-OP)

**IRN-2LA/AI/A-I4-OP**

 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

**Housing M30**

- With voltage or current loop output available
- Applicable for range measurement or position detection
- Applicable as turbidimeter with glass fibre optics
- Also applicable with different types of fibre optics, also as light barrier
- Type IRD applicable in Ex Zones (0), 1, 2, (20), 21, 22
- Type IRN applicable in Ex Zones (1), 2, (21), 22

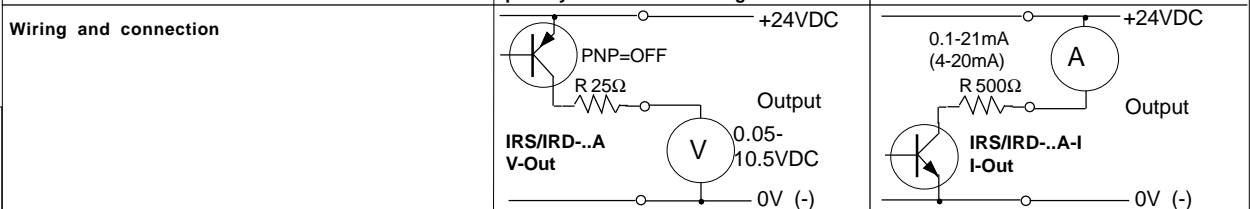
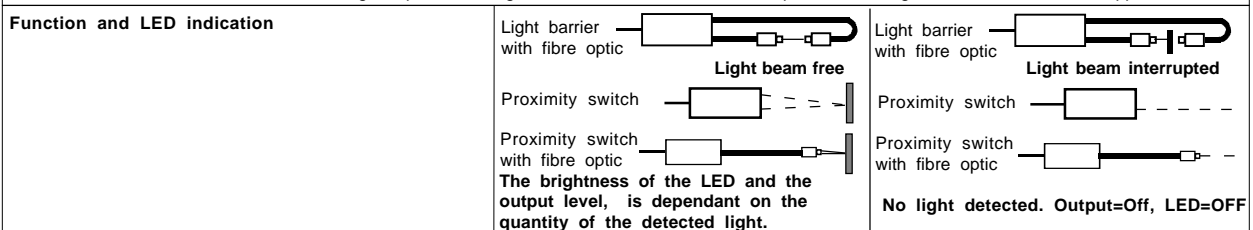
**IRD-2LA/AI/A-I4-OP**

 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

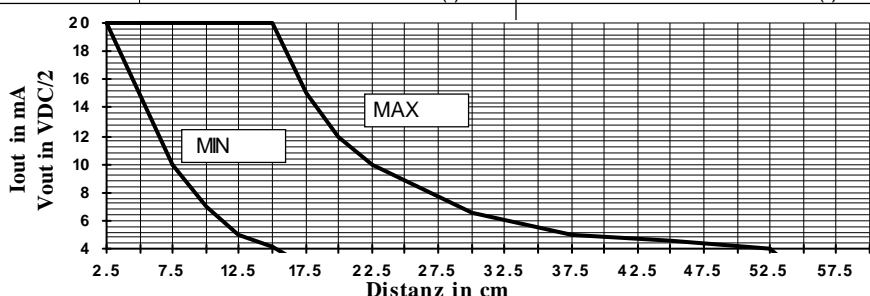
Technical data	Type V-Out Type I-Out	IRS-U-2LA IRS-U-2LAI-I4	IRN-2LA-OP IRN-2LAI-I4-OP	IRD-2LA-OP IRD-2LAI-I4-OP
Type of Ex protection	Gas, at 94/9/EG	none	II 3(2)G Ex nA [op is Gb] IIB T4 Gc	II 2(1)G Ex d [op is Ga] IIC T6 Gb
Type of Ex protection	Dust, at 94/9/EG	none	II 3(2)D Ex tc [op is Db] IIIA T135°C Dc IP67	II 2(1)D Ex tb [op is Da] IIIB T100°C Db IP67
Applicable in Ex Zones		none	(1), 2, (21), 22	(0), 1, 2, (20), 21, 22
Output signal range, voltage		0.05VDC - 10.5VDC (Ripple:<20mV)		
Output signal range, current		0.1mA - 21mA (Ripple:<40uA), (4mA - 20mA optional)		
Voltage output, nominal range, on white paper. A4. 80g		5VDC output voltage at a distance of 20cm, adjustable		
Current output, nominal range, on white paper. A4. 80g		10mA output current at a distance of 20cm, adjustable		
Working range, adjustable (on white paper A4, 80g)		5VDC/20cm or 10mA/20cm		
Light source		Infrared 870nm		
Optical Beam pattern		appr.12°		
Response time		5ms		
Power up delay time		70ms		
Supply voltage		24VDC +-15%		
Current consumption		60mA		
Maximum power dissipation		1.4W		
Output type, voltage, IR.(-U)-2A		PNP, output impedance appr. 25Ω, RLoad: 2kΩ to 1MΩ		
Output type, current, IR.(-U)-2A-I		NPN, output impedance appr. 500Ω, RLoad: 0Ω to 100Ω		
Input, only types IR...-DI (Disable input)		PNP compatible, Ri 10kΩ		
Housing		M30, brass, nickel plated		
Enclosure rating, at EN 60529		IP 54	IP 67	IP67
Vibration and shock resistance		Vibration: 30g over 20Hz to 2kHz. Shock: 100g for 3ms		
Working temperature range Tamb		-20°C ... +60°C	-20°C < Tamb < +50°C	-20°C < Tamb < +50°C
Storage temperature range		-30°C ... +70°C		
Connection cable		TPU, AWM 20236, 3+PE x 0.5mm <sup>2</sup> , shielded, leads numbering marked, length: 3m		
Connection cable, types IR...-DI		TPU, AWM 20236, 4+PE x 0.5mm <sup>2</sup> , shielded, leads numbering marked, length: 3m		
Socket, types IRS/IRN... S99		Lumberg, M12 male receptacle, type RSF 5 contacts		
Accessories, all types		- 2 nuts M30 (or 1 clamp on request)		
Accessories, types IRN/IRD...-OP		- 1x Spare safety screw with packing ring for potentiometer sealing		
Accessories, types IRN...-OP S99		- 1x Safety lock device, mount at the cable connection, for locking the connection. (black synthetic device) - 1x Warning plate "Do not separate when supply voltage connected", self-sealing, for gluing on the cord set. - 1x Protection cap for the sensor socket.		
Accessories, not included, only for IRS/IRN... S99		- Cordset Lumberg RKTS 5-298/xx or RKWTH 5-298/xx		

Options:

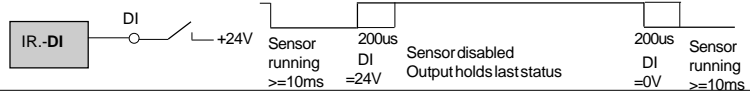
- Cable length: Up to 100m on request.
- IRS-U/IRN/IRD-2LA(-OP)-DI: With emitter disable input "DI".
- IRS-U/IRN/IRD-2LA-I4(-OP): Output current 4 - 20mA.
- IRS-U/IRN/IRD-2LA-X(-OP): Operational curve function selectable by the polarity of the supply voltage.
- IRS-U-2LA S66: Socket M12, Binder 713/4-pins, at cable 200mm, additional optic DL30, range: 5V at a distance of appr. 75cm.
- IRS/IRN-2LA S99: With socket M12, Lumberg RSF5.
- IRN-2LA-I4-OP S110: With additional optic DL30.
- IRS-U-2LA S133: Socket M12, Binder 713/4-pins, at cable 200mm.
- IRS/IRN/IRD-2LA-I4(-OP) S137: Reduced optical power for level measurement with the fibre optic type SKM-2000-2-T-FG and the probe QPR-6/320.
- IRS-U/IRN/IRD-2LA(-OP) S155: Response time: 1.5ms.
- IRS-U-2LA S176: Working temperature range: -20°C to +80°C, additional optic DL30, range: 5V at a distance of appr. 75cm.
- IRS-U-2LA S177: Working temperature range: -20°C to +100°C, additional optic DL30, range: 5V at a distance of appr. 75cm.



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



IR.-2LA-DI (Connection disable input DI)  
 U<sub>in</sub>: 18V-28VDC, DI=+24V=Inactive  
 Reaction time: <=200us  
 Hold time: >=10ms, DI = 0V=Aktiv

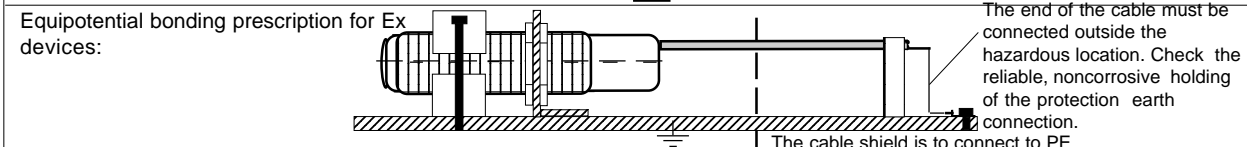


Dimensions, and electrical connection IRN/IRD-2LA(-I/-I4)-OP, IRS-U-2LA S176/S177 (Drawing without additional optic DL30) LED Potentiometer with dust protection screwing		Function:	IRN/IRD-...	IRN/IRD-...-DI
		Lead-No:	Lead-No:	Lead-No:
		+24VDC	1	1
		0V	2	2
		Output	3	3
		DI	--	4
		PE	yellow-green	yellow-green

Dimensions, and electrical connection IRS/IRN-2LA(-I/-I4)-(OP) S99 LED Potentiometer IRN: With dust protection screwing		Pin-No:	IR-... S99	IR-...-DI S99
		Function:	Function:	Function:
		1/brown	+24VDC	+24VDC
		2/white	NC	DI
		3/blue	0V	0V
		4/black	Output	Output
		5/grey	PE	PE

Dimensions, and electrical connection IRS-U-2LA(-I/-I4)		Function:	IRS-...	IRS-...-DI
		Lead-No:	Lead-No:	Lead-No:
		+24VDC	1	1
		0V	2	2
		Output	3	3
		DI	--	4
		PE	yellow-green	yellow-green

Dimensions IRS-U-2LA S66 and S133 Socket Binder series 713 M12 Cable length: 20cm LED Potentiometer		Wiring	Pin-No:
		Function:	Pin-No:
		+24VDC	1
		0V	2
		Ausgang	3
		PE	4



**ATEX related designations:**  
 CE 0158  
 Type IRD-2LA-...-OP: II 2(1)G Ex d [op is Ga] IIC T6 Gb  
 Type IRN-2LA-...-OP (S99): 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  
 T<sub>amb</sub>: 0°C < T<sub>amb</sub> < +50°C  
 (X designation of the certification number: Fibre optics must only be applied with sensors with certificated limited optical power)

Electrical data according to the chart  
 EC certification number: BVS 10 ATEX E 130 X DEKRA  
 EC certification number: BVS 10 ATEX E 130 X DEKRA  
 Declaration by manufacturer at 94/9/EC  
 Declaration by manufacturer at 94/9/EC  
 Numerals 5 to 8 of the serial number (Year/Week)  
 (Year/Week)

**Operating Manual / EC - Declaration of Conformity:**

**Installation prescriptions for hazardous locations**  
 It is necessary to take into consideration the valid international and national rules and regulations (EN 60079-14). The local equipotential bonding have to be done. The protective earth (PE) is solidly connected with the housing. The maximum input voltage U<sub>m</sub>=30VDC must not be exceeded. 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 housings. All cable terminals must be connected outside hazardous locations. Other than original manufacturer, additional optical lenses are not allowed in hazardous locations. In Ex zones 21 and 22, do not operate the sensors with out 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-2LA(-I/-I4)-OP:** Applicable 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-2LA(-I/-I4)-OP:** Only applicable 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-2A(-I/-I4)-OPS99:** Only applicable 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 RKT5-298/xx (Straight type) RKWTH5-298/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.

**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 0.05V to 10.5VDC or a current loop, 0.1 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.

**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.

**Sensors with disable input, types IR-...-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. If only one sensor is activated in the same time, a mutual influence is precluded. The response time of the DI-input is 200us.  
 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.

**Fibre optics**  
 For efficiently detection solutions look for our multiple program of fibre optics, also for high temperature areas. For Ex zones only approved fibre optics are allowed.

**Maintenance**  
 Protect the sensor and the 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:**  
 "WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES. DONOT 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, ATEX 118a, single directive 1999/92/EC.  
 The sensor and the fibre optic are conform to the following standards:  
 EN 60079-0:2009, EN 60079-1:2007, EN 60079-15:2010, EN 60079-28:2007, EN 60079-31:2010, EN 60825-1:2006, EN 60825-2:2004, EN 60529, EN 61000-4-2 to EN 61000-4-6, EN 61000-6-1/-2, EN 61000-6-4, Ex protection: 94/9/EC (ATEX 100a), Machine directive: 2006/42/EC, EMC: 2004/108/EC, RoHS: 2002/95/EC.

**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-Declaration of conformity**  
 Model IRD: EC-Certification No. BVS 10 ATEX E 130 X. DEKRA.  
 Model IRN: ATEX declaration by manufacturer at 94/9/EC  
 ATEX certification of quality type production of Ex devices at the directive 94/9/EC Certification No: BVS 12 ATEX ZQS / E 118. 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

IRS-IRN-IRD-2LA-OP\_e1.2013-02-11/HB

**Tippkemper - Matrix GmbH**  
 Meegerer 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