

## Photoelectric Sensor with Analog Output IRS/IRN/IRD-2A-I(-GD)

### IRN-2A-I/I4-GD



II 3G Ex nA IIB T4 Gc  
II 3D Ex tb IIIB 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 Range, appr. NTU 80 to NTU 500
- Also applicable with different types of fibre optics, also as light barrier
- Type IRD applicable in Ex Zones 1, 2, 21, 22
- Type IRN applicable in Ex Zones 2, 22

### IRD-A-I/I4-GD



II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIB T90°C Db IP67

Technical data	Type V-Out Type I-Out	IRS-U-2A IRS-U-2A-I/I4	IRN-2A-GD IRN-2A-I/I4-GD	IRD-2A-GD IRD-2A-I/I4-GD
Type of Ex protection Gas, at 94/9/EG		none	II 3G Ex nA IIB T4 Gc	II 2G Ex d IIC T6 Gb
Type of Ex protection Dust, at 94/9/EG		none	II 3D Ex tb IIIB T135°C Dc IP67	II 2D Ex tb IIIB T90°C Db IP67
Applicable in Ex Zones		none	2, 22	1, 2, 21, 22
Output signal range, voltage		0.03VDC - 10.5VDC( Ripple:<20mV)		
Output signal range, current		0.06mA - 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		
Possible range for turbidity measurement		NTU80-NTU500, with adapted fibre optic, 10VDC/20mA, at NTU80, to adjust at this value		
Light source		Infrared 870nm		
Optical Beam pattern		appr.10°		
Response time		5ms		
Supply voltage		24 VDC (20 to 28VDC)		
Current consumption		40mA		
Maximum power dissipation		1.3W		
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 T <sub>Amb</sub>		-20°C < T <sub>Amb</sub> < +60°C	-20°C < T <sub>Amb</sub> < +50°C	-20°C < T <sub>Amb</sub> < +50°C
Connection cable		3+PE x 0,5mm <sup>2</sup> , shielded, TPE, oil resistant, Length: 3m		
Connection cable, types IR.-.-DI		4+PE x 0,5mm <sup>2</sup> , shielded, TPE, oil resistant, 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...-GD		- 1x Spare safety screw with packing ring for potentiometer sealing		
Accessories, types IRN...-GD 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 RKT5 5-298/xx or RKWTH 5-298/xx		
Options:		-IR.-.-DI: With disable input -IR.-.A-I4: Sensors with current output 4 - 20mA -Cable length: up to 100m, on request -IRN/IRD-2A/I/I4-OP: With limited optical radiant power at EN 60079-28. 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 -IRS-U-2/4A/I/I4 S66: Socket Binder 713/4, at cable 200mm, mounted optic DL30 Range 5V output voltage at distance 75cm -IRS/IRD-2A/I/I4 S93: Special for application with fibre optic type:QW-..../2,3-50-U-SE -IRS-U-2A/MT: With 10 turns special potentiometer -IRS... S140: Enclosure rating: IP 65 -IRS-U-2A-I S142: Special for application with fibre optic: QWS-1500/2,3-50-U-SE and with socket M12: Lumberg RSF 5, 5 pins -IRS-U-2/4A/I/I4 S193: Replacement for series IRS-U-2A/I-GF, for applications with fibre optics series ....Y1.... (Special adoption)		

ATEX related designations:

CE 0158

Type IRD...-GD:



Manufacturer with address  
II 2G Ex d IIC T6 Gb, II 2D Ex tb IIIB T90°C Db IP67  
II 3G Ex nA IIB T4 Gc, II 3D Ex tb IIIB T135°C Dc IP67

Type IRN...-GD:

TA: -20°C < T<sub>Amb</sub> < +50°C



Date of construction: Numeral 5 to 8 of the serial number (Week/Year)

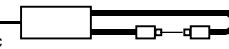
Electrical data according to the chart

EC certification number: BVS 10 ATEX E 130 X

Declaration by manufacturer at 94/9/EC

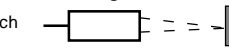
### Function and LED indication

Light barrier with fibre optic



Light beam free

Proximity switch



Light barrier with fibre optic

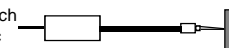


Light beam interrupted

Proximity switch



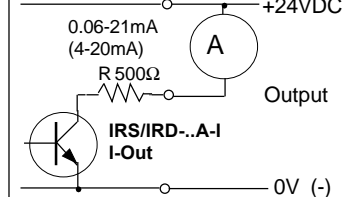
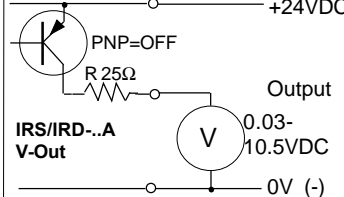
Proximity switch with fibre optic



The brightness of the LED and the output level, is dependant on the quantity of the detected light.

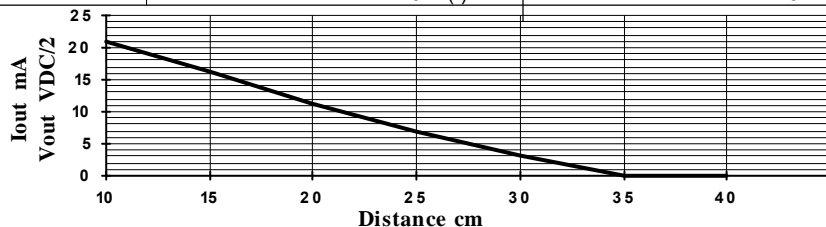
No light detected. Output=Off, LED=OFF

### Wiring and connection



### Output diagram

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



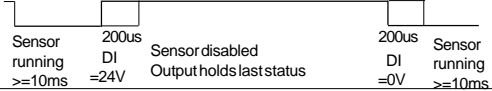
IRS-IRN-IRD-2A-GD\_e26,2011-08-19/HB

**IR.-2A-DI (Connection disable input DI)**

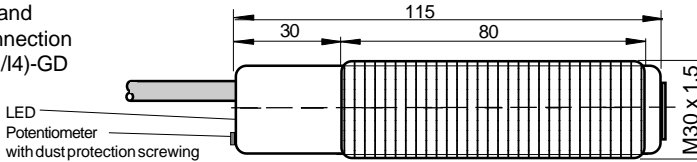
Uin: 18V-28VDC, DI=+24V=Inactive

Reaction time: <=200us

Hold time: >=10ms, DI = 0V=Aktiv

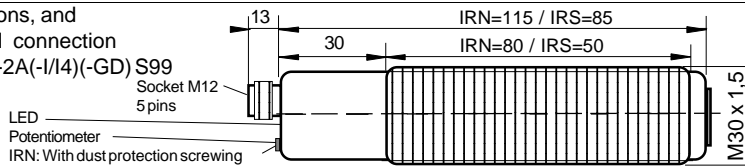


Dimensions, and electrical connection  
IRN/IRD-2A(-I/I4)-GD



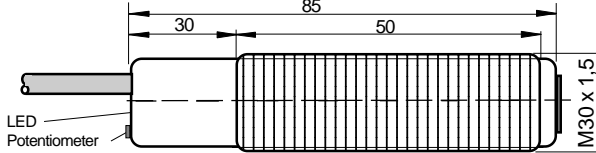
	IRN/IRD-..	IRN/IRD-...-DI
+24VDC	1	1
0V	2	2
Output	3	3
DI	--	4
PE	yellow-green	yellow-green

Dimensions, and electrical connection  
IRS/IRN-2A(-I/I4)(-GD) S99



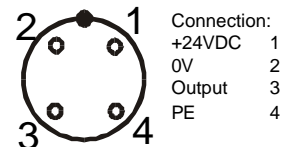
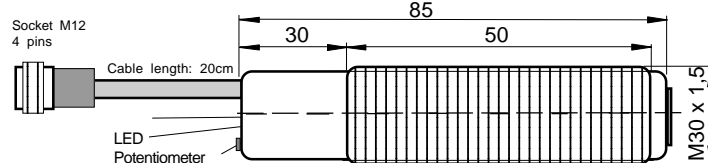
	IR-... S99	IR-...-DI S99
+24VDC	1/brown	+24VDC
NC	2/white	DI
0V	3/blue	0V
Output	4/black	Output
PE	5/grey	PE

Dimensions, and electrical connection  
IRS-U-2A(-I/I4)

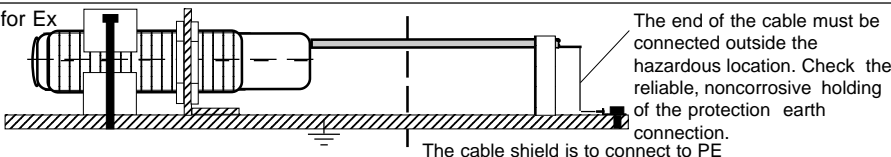


	IRS-..	IRS-...-DI
+24VDC	1	1
0V	2	2
Output	3	3
DI	--	4
PE	yellow-green	yellow-green

Dimensions IRS-U-2A S66



Equipotential bonding prescription for Ex devices:



**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 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 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 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-2A(-I/I4)-GD:** Only applicable in Ex Zones 1, 2 and 21, 22.

**Type IRN-2A(-I/I4)-GD:** Only applicable for the Ex zones 2 and 22.

The maximum input voltage Um=30VDC must not be exceeded.

**Type IRN-2A(-I/I4)-GD:** Only applicable for the Ex zones 2 and 22. 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) 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. The maximum input voltage Um=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 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 0.03V 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.

**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.

**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. 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, 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 60079-31:2010, 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 03 ATEX ZQS / E118. 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-2A-GD\_e26,2011-08-19/HB

# Photoelectric Sensor with Analog Output IRS/IRN/IRD-4A/-I(-GD)

## IRN-4A/-I-GD



II 3G Ex nA IIB T4 Gc  
II 3D Ex tb IIIB 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, reflective method. Range, appr. NTU 80 to NTU 500
- Also applicable with different types of fibre optics, also as light barrier
- Type IRD applicable in Ex Zones 1, 2, 21, 22
- Type IRN applicable in Ex Zones 2, 22

## IRD-4A/-I-GD



II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIB T90°C Db IP67

Technical data	Type V-Out Type I-Out	IRS-U-4A IRS-U-4A-I	IRN-4A-GD IRN-4A-I-GD	IRD-4A-GD IRD-4A-I-GD
Type of Ex protection Gas, at 94/9/EG		none	II 3G Ex nA IIB T4 Gc	II 2G Ex d IIC T6 Gb
Type of Ex protection Dust, at 94/9/EG		none	II 3D Ex tb IIIB T135°C Dc IP67	II 2D Ex tb IIIB T90°C Db IP67
Applicable in Ex Zones		none	2, 22	1, 2, 21, 22
Output signal range, voltage		0.03VDC - 10.5VDC( Ripple:<20mV)		
Output signal range, current		0.06mA - 21mA (Ripple:<40uA), (4mA - 20mA optional)		
Voltage output, nominal range, on white paper. A4. 80g		5VDC output voltage at a distance of 40cm, adjustable		
Current output, nominal range, on white paper. A4. 80g		10mA output current at a distance of 40cm, adjustable		
Possible range for turbidity measurement		NTU80-NTU500, with adapted fibre optic, 10VDC/20mA, at NTU80, to adjust at this value		
Light source		Infrared 870nm		
Optical Beam pattern		appr.10°		
Response time		5ms		
Supply voltage		24 VDC (20 to 28VDC)		
Current consumption		50mA		
Maximum power dissipation		1.5W		
Output type, voltage, IR(-U)-4A		PNP, output impedance appr. 25Ω, RLoad: 2kΩ to 1MΩ		
Output type, current, IR(-I)-4A-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 T <sub>Amb</sub>		-20°C < T <sub>Amb</sub> < +60°C	-20°C < T <sub>Amb</sub> < +50°C	-20°C < T <sub>Amb</sub> < +50°C
Connection cable		3+PE x 0.5mm <sup>2</sup> , shielded, TPE, oil resistant, Length: 3m		
Connection cable, types IR...-DI		4+PE x 0.5mm <sup>2</sup> , shielded, TPE, oil resistant, 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...-GD		- 1x Spare safety screw with packing ring for potentiometer sealing		
Accessories, types IRN...-GD 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 RKT5 5-298/xx or RKWTH 5-298/xx		
Options:		- IR...-DI (with disable input) - IR...-A-I4: Sensors with current output 4 - 20mA - Cable length up to 100m, on request - IRN/IRD-4A-OP: With limited optical radiant power at EN 60079-28. 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 -IRS-U-4A S66: Socket Binder 713/4, at cable 200mm, mounted optic DL30 Range 5V output voltage at distance 75cm With 10 turns special potentiometer -IRS-U-4A/MT: Enclosure rating: IP 65 -IRS... S140: With external potentiometer at cable 2xAWG24, length: 3m. Must not be connected at supply voltage without mounted external potentiometer. -IRS-U-4A S135: Replacement for series IRS-U-4A/I-GF, for applications with fibre optics series ...Y1.... (Special adoption)		

ATEX related designations:

CE 0158

Type IRD...-GD:

II 2G Ex d IIC T6 Gb, II 2D Ex tb IIIB T90°C Db IP67

Electrical data according to the chart

EC certification number: BVS 10 ATEX E 130 X

Type IRN...-GD:

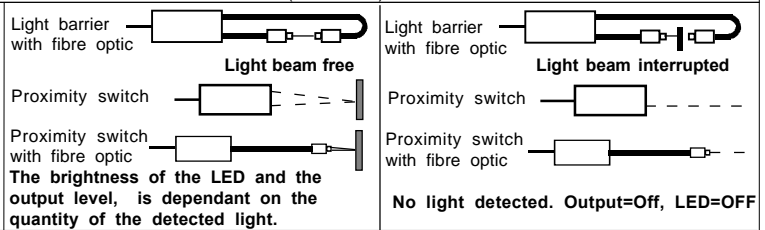
II 3G Ex nA IIB T4 Gc, II 3D Ex tb IIIB T135°C Dc IP67

Declaration by manufacturer at 94/9/EC

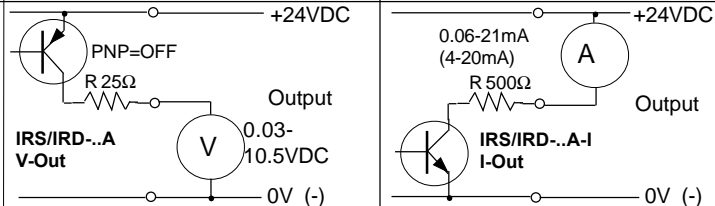
TA: -20°C < T<sub>Amb</sub> < +50°C

Date of construction: Numeral 5 to 8 of the serial number (Week/Year)

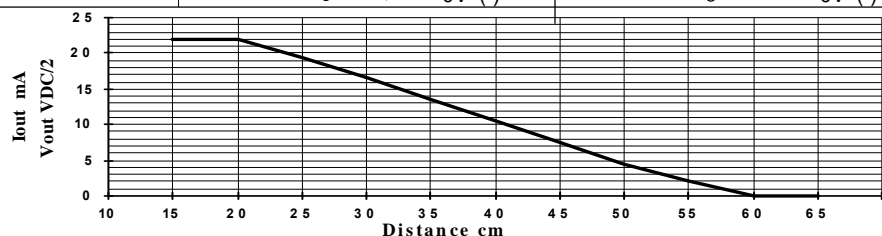
### Function and LED indication



### Wiring and connection



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



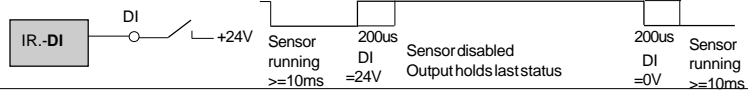
IRS-IRN-IRD-4A-GD...e26,2011-08-19/HB

**IR.-4A-DI (Connection disable input DI)**

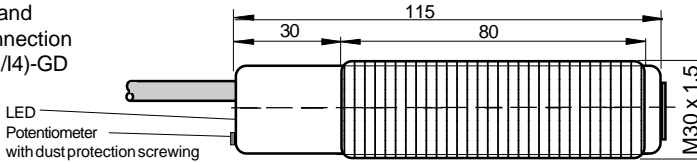
Uin: 18V-28VDC, DI=+24V=Inactive

Reaction time: <=200us

Hold time: >=10ms, DI = 0V=Aktiv

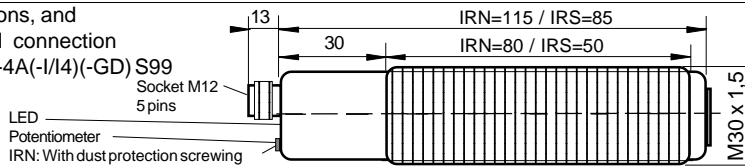


Dimensions, and electrical connection  
IRN/IRD-4A(-I/I4)-GD



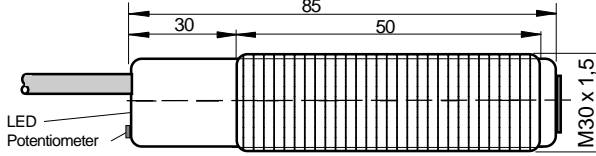
	IRN/IRD-..	IRN/IRD-...-DI
+24VDC	1	1
0V	2	2
Output	3	3
DI	--	4
PE	yellow-green	yellow-green

Dimensions, and electrical connection  
IRS/IRN-4A(-I/I4)(-GD) S99



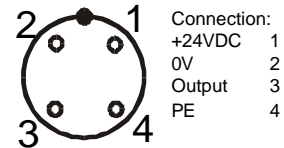
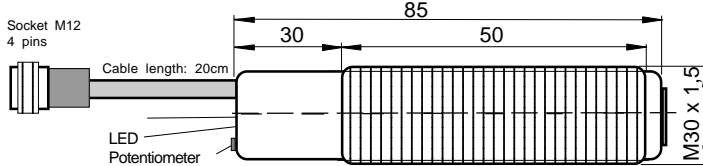
	IR-... S99	IR-...-DI S99
+24VDC	1/brown	+24VDC
NC	2/white	DI
0V	3/blue	0V
Output	4/black	Output
PE	5/grey	PE

Dimensions, and electrical connection  
IRS-U-4A(-I/I4)

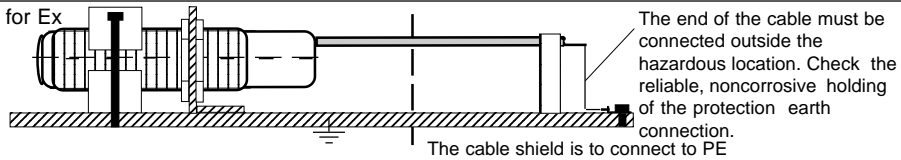


	IRS-..	IRS-...-DI
+24VDC	1	1
0V	2	2
Output	3	3
DI	--	4
PE	yellow-green	yellow-green

Dimensions IRS-U-4A S66



Equipotential bonding prescription for Ex devices:



**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 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 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 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-4A(-I/I4)-GD:** Only applicable in Ex Zones 1, 2 and 21, 22.

**Type IRN-4A(-I/I4)-GD:** Only applicable for the Ex zones 2 and 22.

The maximum input voltage Um=30VDC must not be exceeded.

**Type IRN-4A(-I/I4)-GD:** Only applicable for the Ex zones 2 and 22. 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) 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. The maximum input voltage Um=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 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, for turbidity measurement based on reflective measurement, or similar applications. With 2-2 type fibres, function as light barrier, for different measurement methods. 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 cab 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.

**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. 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, 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 60079-31:2010, 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: 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 03 ATEX ZQS / E118. 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-4A-GD\_e26.2011-08-19/HB

**Photoelectric Sensor with Analog Output IRS/IRN/IRD-1LA**
**IRD-1LA/AI-GD**
**Housing M30**
**IRN-1LA/AI-GD**
**II 2 G EEx d IIC T6  
II 1/2 D IP67 T90°C**

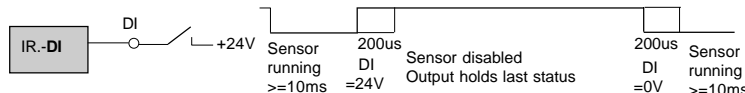
- With voltage or current loop output available
- Also for using with different types of fibre optics
- Applicable for range measurement or as turbidimeter
- Usable for position detection
- Type IRD applicable in Ex Zones 1+20/21
- Type IRN applicable in Ex Zones 2+22

**II 3 G EEx nA II T6  
II 3 D IP67 T90°C**

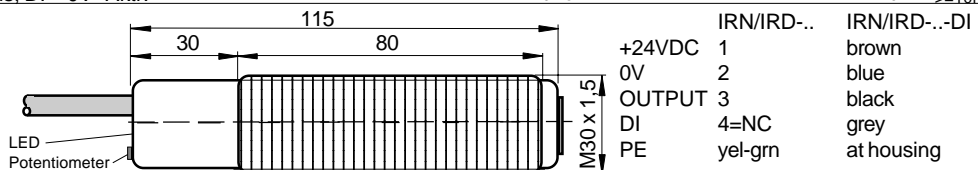
Technical Data	Type V-Out Type I-Out	IRS-U-1LA IRS-U-1LAI	IRN-1LA-GD IRN-1LAI-GD	IRD-1LA-GD IRD-1LAI-GD
Type of Ex protection, Gas at EN 94/9EC		none	II 2G EEx d IIC T6	II 3G EEx nA II T6
Type of Ex protection, Dust at EN 94/9EC		none	II 1/2D IP67 T90°C	II 3D IP67 T90°C
Applicable in Ex Zones		none	Zones 1,2 and 20/21,22	Zones 2 and 22
Output signal range	V-Out I-Out	0.05VDC - 10.5VDC (Ripple:<20mV) 0.1mA - 21mA (Ripple:<40uA), (4mA - 20mA optional)		
Optical range, (adjustable) (On white paper 80g, 20cm x 30cm)	V-Out I-Out	5VDC/10cm 10mA/10cm		
Light source		Infrared, 880nm		
Beam pattern		appr.12°		
Maximum radiant intensity		4.5mW/mm <sup>2</sup>		
Response time		5ms		
Supply voltage		24 VDC (20 to 28VDC)		
Current consumption		maximum 60mA		
Maximum power dissipation		1.4W		
Output	V-Out I-Out	PNP, Output impedance appr. 25Ω, RL: 2kΩ to 1MΩ NPN, Output impedance appr. 500Ω, RL: 0Ω to 100Ω		
Input, only types IR-...-DI (Disable input)		PNP compatible, Ri 10kΩ		
Housing		M30, yellow brass ( Ms 58), nickel plated		
Enclosure rating at EN 60529		IP 54	IP 67	IP 67
Maximum working ambient temperature TA		-20°C < TA < +60°C	-20°C < TA < +50°C	-20°C < TA < +50°C
Connection cable		3+PE x 0,5mm <sup>2</sup> or 3+PE x 0,75mm <sup>2</sup> , shielded / L=3m		
Connection cable, types IR-...-DI		4 x AWG24 (0,2mm <sup>2</sup> ), shielded / L=3m, PE at the housing		
Sensor socket, types 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-...GD		- 1x Spare safety screw with packing ring for potentiometer sealing		
Accessories, types IRN-...GD 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 optional, only type IRS/IRN-... S99		- Single ended cordset, straight type: RKTS 5-298/xx or right angle type: RKWTH 5-298/xx, Lumberg M12/5P		
Options		- IR-...-DI (with disable input) - IRS/IRN/IRD-1L-X: Output function invertible by the polarity of the supply voltage - IRS/IRN-... S99: Socket types, M12, Lumberg, 5 terminals	- IR-...-A-I4:	Sensors with current output 4 - 20mA
ATEX related designations		CE 0158 Device type  Certification number, type IRD: TA: -20°C < TA < +50°C Date of construction: Numerals 4 to 7 of the serial number		Manufacturer with address IRD: II 2 G, II 1/2 D IP67 T90°C IRN: II 3 G, II 3 D IP67 T90°C DMT 99 ATEX E 056 Electrical data according to the chart
Function and LED indication		LB with fibre optic full quantity of light  Proximity sensor		LB with fibre optic reduced quantity of light  Proximity sensor
		The brightness of the LED and the output level, is dependant on the quantity of the detected light.		
Output configuration				
Output diagram (measured on white Paper, 80g, 20cmx30cm) Potentiometer at minimum and maximum position				

### IR.-1LA-DI (Connection disable input DI)

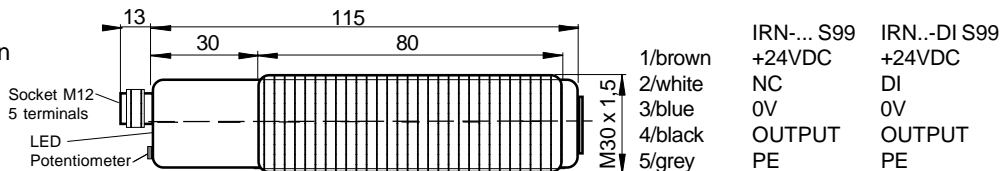
U<sub>in</sub>: 18V-28VDC, DI=+24V=Inactive  
 Reaction time: <=200us  
 Hold time: >=10ms, DI = 0V=Aktiv



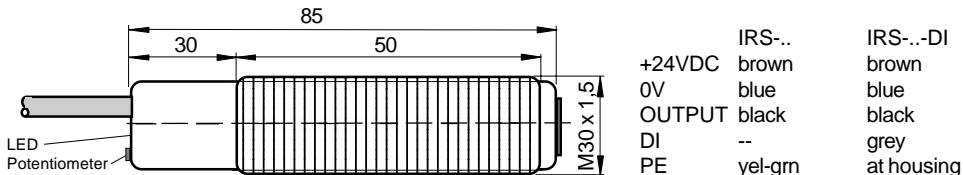
Dimensions and electrical connection  
 IRN/IRD-1LA:



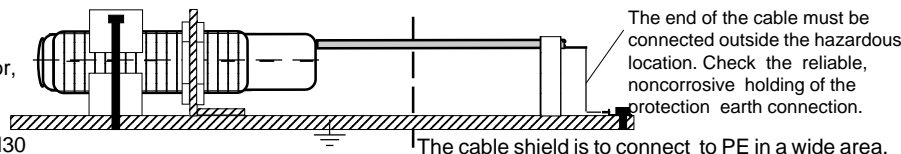
Dimensions and electrical connection  
 IRS/IRN-1LA S99:



Dimensions and electrical connection  
 IRS-U-1LA:



Equipotential Bonding prescription:  
 For types without PE at the connector, the local equipotential bonding have to be done with conductive corrosion-resistant clamps or nuts M30



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

#### Operating Manual:

#### Ex protection:

#### General prescriptions for all Ex types:

It is necessary to take into consideration the valid international and national rules and regulations. The maximum input voltage U<sub>m</sub>=30VDC must not be exceeded. The local equipotential bonding have to be done. At sensors with a PE-terminal, the protective earth (PE) is solid connected with the housing. At sensors without a PE-terminal, connect the housing reliable and noncorrosive to the general protection earth by using the nuts M30. The cable have to be protected against damages. To connect cables inside hazardous locations only use certificated EEx e housings. All cable terminals must be connected outside hazardous locations. Use only original manufactured fibre optics and additional optical lenses, other additional optical lenses are not allowed in hazardous locations. In Ex zones 20/21 and 22, 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-1LA/AI:** Applicable in Ex zones 1, 2 and 20/21, 22. For the zones 20/21 only the front part (optical lens) can be mounted inside the zone 20. The rear part with the cable must be in the zone 21.

**Type: IRN-1LA/AI-GD:** Only applicable in Ex zones 2 and 22.

**Type: IRN-1LA/AI-GD S99:** Only applicable in Ex zones 2 and 22. 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 5-298/xx (Straight type) RKTW/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 socket protection cap must be fitted, when the connection cable is NOT 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 0.1V to 10VDC or a current loop, 0 or 4mA to 20mA. Please check the permissible load for the two different types of outputs. For best measurement results the sensor can be adjusted by the potentiometer.

#### 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.

#### 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.

#### Maintenance

Protect the sensor 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.

#### Safety Informations

The sensors types IRS/IRN/IRD-.. must not be used for Accident-Prevention! When installing and operating with the sensor, it is necessary to take into consideration the relevant international and other national regulations. ATEX118a, EX-RL(BGR104), ElexV, TrbF, TRD, UVV, BetrSichV(ATEX137), Einzel-RL 1999/92/EG.

#### Standards met:

- EN 50014, IRD: EN 50021, EN 50281-1-1;
- EN 61000-6-1/-2, EN 61000-6-3/4; EN 60529
- Ex protection: 94/9/EG (ATEX 100a)
- Machine directive: 98/37/EG
- Low voltage directive: 73/23/EWG, 93/68/EWG
- EMC 89/336/EWG, 91/263/EWG, 92/31/EWG, 93/68/EWG
- RoHS, 2002/95/EG

#### General Notes

We reserve the right to modify our equipment. Our equipment neither emit or contain any damaging or siliconized substances. No longer usable or irreparable units must be disposed of in accordance with local waste disposal regulations.

#### Declaration of Conformity

Certification, series IRD-..: DMT 99 ATEX E 056  
 Certification, series IRN-..: Declaration of conformity by manufacturer at 94/9/EC. Tech File No: AN-MAT-02-EX-E056.  
 ATEX certification of quality type production of Ex devices at the directive 94/9/EC Certification No: BVS 03 ATEX ZQS / E118  
 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 9001:2000 with the ATEX module "Production", declares:  
 Hans Bracher, Matrix Elektronik AG

IRSND\_ANALOG\_1L\_GD\_e1\_JUL02\_2007/HB

**Photoelectric Sensor with Analog Output IRS/IRN/IRD-2LA**
**IRD-2LA/AI-GD**
**Housing M30**
**IRN-2LA/AI-GD**

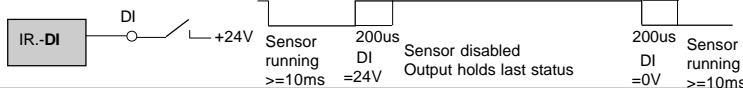
**II 2 G EEx d IIC T6  
II 1/2 D IP67 T90°C**

- With voltage or current loop output available
- Also for using with different types of fibre optics
- Applicable for range measurement
- Applicable as turbidimeter
- Usable for position detection
- Type IRD applicable in Ex Zones 1+20/21
- Type IRN applicable in Ex Zones 2+22

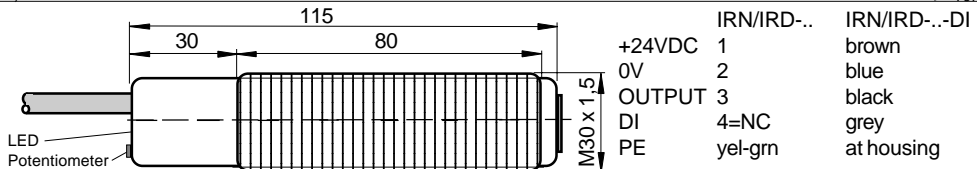

**II 3 G EEx nA II T6  
II 3 D IP67 T90°C**

Technical Data	Type V-Out	IRS-U-2LA	IRN-2LA-GD	IRD-2LA-GD
	Type I-Out	IRS-U-2LAI	IRN-2LAI-GD	IRD-2LAI-GD
Type of Ex protection		none	EEx nA II T6	EEx d IIC T6
Applicable in Ex Zones		none	Zones 2 and 22	Zones 1 and 20/21
Category / grouping		--	II 3 G, II 3 D IP67 T90°C	II 2 G, II 1/2 D IP67 T90°C
Output signal range	V-Out	0.05VDC - 10.5VDC (Ripple: <20mV)		
	I-Out	0.1mA - 21mA (Ripple: <40uA), (4mA - 20mA optional)		
Optical range, (adjustable)	V-Out	2.5cm to 50cm / 5VDC/20cm		
(On white paper 80g, 20cm x 30cm)	I-Out	2.5cm to 50cm / 10mA/20cm		
Light source		Infrared, 880nm		
Beam pattern		appr. 12°		
Maximum radiant intensity		4.5mW/mm²		
Response time		5ms		
Supply voltage		24 VDC (20 to 28VDC)		
Current consumption		maximum 60mA		
Maximum power dissipation		1.4W		
Output	V-Out	PNP, Output impedance appr. 25Ω, RL: 2kΩ to 1MΩ		
	I-Out	NPN, Output impedance appr. 500Ω, RL: 0Ω to 100Ω		
Input, only types IR-...-DI (Disable input)		PNP compatible, Ri 10kΩ		
Housing		M30, yellow brass ( Ms 58), nickel plated		
Protection rating at EN 60529		IP 54	IP 67	IP67
Maximum working ambient temperature TA		-20°C < TA < +60°C	-20°C < TA < +50°C	-20°C < TA < +50°C
Connection cable		3+PE x 0,5mm², shielded / L=3m		
Connection cable, types IR-...-DI		4 x AWG24 (0,2mm²), shielded / L=3m, PE at the housing		
Sensor socket, types 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-...-GD		- 1x Spare safety screw with packing ring for potentiometer sealing		
Accessories, types IRN-...-GD 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 crd set. - 1x Protection cap for the sensor socket.		
Options		- IR-...-DI (with disable input) - IRS/IRN/IRD-2L-X: Output function invertible by the polarity of the supply voltage - IRS-U-2LA S66: With additional lens type DL30, socket type Binder 713/4-terminals with a cord length of 20cm. Nomial range: 75cm. - IRS/IRN-... S99: Socket types, M12, Lumberg, 5 terminals - IRN-2LAI4-GD S110: With additional optic DS30 and special reflector - IRS-U-2LA S133: With socket type Binder 713/4-terminals with a cord length of 20cm. - IRS/IRN/IRD-2LA-I4 S137: Reduced light emitting power for level meadsuring with fibre optic type SKM-2000-2-T-GF and QPR-6/320		
ATEX related designations		CE 0158 Device type	Manufacturer with address IRD: II 2 G, II 1/2 D IP67 T90°C IRN: II 3 G, II 3 D IP67 T90°C DMT 99 ATEX E 056/N1/N4 Electrical data according to the chart	
Function and LED indication		LB with fibre optic full quantity of light Proximity sensor	 LB with fibre optic reduced quantity of light Proximity sensor	The brightness of the LED and the output level, is dependant on the quantity of the detected light.
Output configuration		 IRS/IRD-...A V-Out	 IRS/IRD-...A-I I-Out	
Output diagram (measured on white Paper, 80g, 20cmx30cm) Potentiometer at minimum and maximum position				

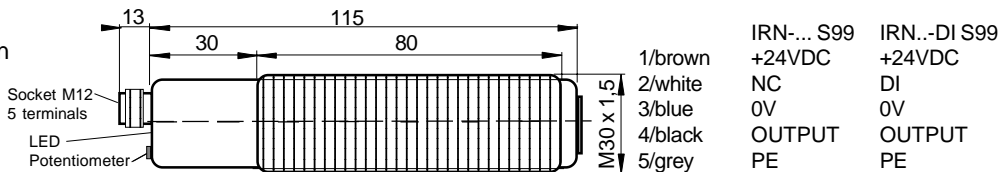
**IR.-2LA-DI (Connection disable input DI)**  
 Uin: 18V-28VDC, DI=+24V=Inactive  
 Reaction time: <=200us  
 Hold time: >=10ms, DI = 0V=Aktiv



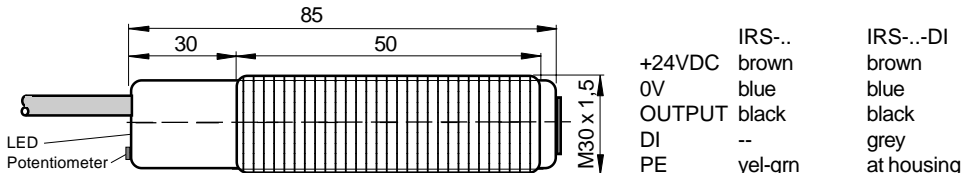
**Dimensions and electrical connection IRN/IRD-2LA:**



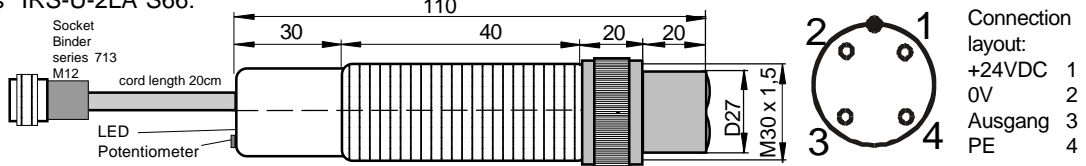
**Dimensions and electrical connection IRS/IRN-2LA S99:**



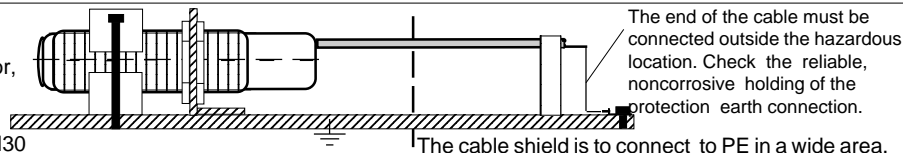
**Dimensions and electrical connection IRS-U-2LA:**



**Dimensions IRS-U-2LA S66:**



**Equipotential Bonding prescription:**  
 For types without PE at the connector, the local equipotential bonding have to be done with conductive corrosion-resistant clamps or nuts M30



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

**Operating Manual:**

**Ex protection:**

**General prescriptions for all Ex types:**

It is necessary to take into consideration the valid international and national rules and regulations. The maximum input voltage Um=30VDC must not be exceeded. The local equipotential bonding have to be done. At sensors with a PE-terminal, the protective earth (PE) is solid connected with the housing. At sensors without a PE-terminal, connect the housing reliable and noncorrosive to the general protection earth by using the nuts M30. The cable have to be protected against damages. To connect cables inside hazardous locations only use certificated EEx e housings. All cable terminals must be connected outside hazardous locations. Use only original manufactured fibre optics and additional optical lenses, other additional optical lenses are not allowed in hazardous locations. In Ex zones 20/21 and 22, 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-2LA/AI:** Applicable in Ex zones 1, 2 and 20/21, 22. For the zones 20/21 only the front part (optical lens) can be mounted inside the zone 20. The rear part with the cable must be in the zone 21.

**Type: IRN-2LA/AI-GD:** Only applicable in Ex zones 2 and 22.

**Type: IRN-2LA/AI-GD S99:** Only applicable in Ex zones 2 and 22. 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 5-186/xx (Straight type) RKTW/RKWT5 5-186/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 socket protection cap must be fitted, when the connection cable is NOT 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 0.1V to 10VDC or a current loop, 0 or 4mA to 20mA. Please check the permissible load for the two different types of outputs. For best measurement results the sensor can be adjusted by the potentiometer.

**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.

**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.

**Maintenance**

Protect the sensor 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.

**Safety Informations**

The sensors types IRS/IRN/IRD-.. must not be used for Accident-Prevention! When installing and operating with the sensor, it is necessary to take into consideration the relevant international and other national regulations. ATEX118a, EX-RL(BGR104), ElexV, TrbF, TRD, UVV, BetrSichV(ATEX137), Einzel-RL 1999/92/EG.

**Standards met:**

- EN 50014, IRD: EN 50018, IRN: EN 50021, EN 50281-1-1; EN 61000-6-1/-2, EN 61000-6-3/4; EN 60529
- Ex protection: 94/9/EG (ATEX 100a)
- Machine directive: 98/37/EG
- Low voltage directive: 73/23/EWG, 93/68/EWG
- EMC 89/336/EWG, 91/263/EWG, 92/31/EWG, 93/68/EWG
- RoHS, 2002/95/EG

**General Notes**

We reserve the right to modify our equipment. Our equipment neither emit or contain any damaging or siliconized substances. No longer usable or irreparable units must be disposed of in accordance with local waste disposal regulations.

**Declaration of Conformity**

Approvals: DMT 99 ATEX E 056/N1/N4  
 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 with the ATEX module "Production", declares:  
 Hans Bracher, Matrix Elektronik AG

IRNSD\_ANALOG\_2L\_GD\_e7\_MAY12,06/HB



**Photoelectric Sensor with Analog Output IRS/IRN/IRD-5LA**
**IRD-5LA/AI-GD**
**Housing M30**
**IRN-5LA/AI-GD**

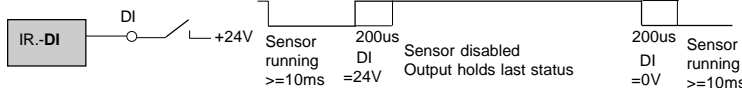
**II 2 G EEx d IIC T6  
II 1/2 D IP67 T90°C**

- With voltage or current loop output available
- Also for using with different types of fibre optics
- Applicable for range measurement
- Applicable as turbidimeter
- Usable for position detection
- Type IRD applicable in Ex Zones 1+20/21
- Type IRN applicable in Ex Zones 2+22

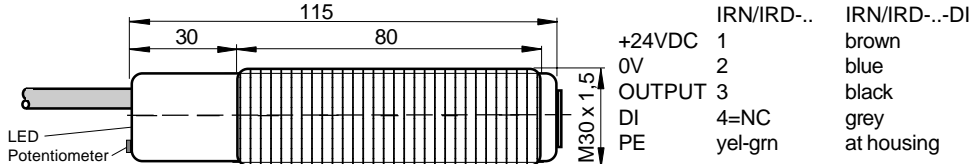

**II 3 G EEx nA IIC T6  
II 3 D IP67 T90°C**

Technical Data	Type V-Out	IRS-U-5LA	IRN-5LA-GD	IRD-5LA-GD
	Type I-Out	IRS-U-5LAI	IRN-5LAI-GD	IRD-5LAI-GD
Type of Ex protection		none	EEx nA IIC T6	EEx d IIC T6
Applicable in Ex Zones		none	Zones 2 and 22	Zones 1 and 20/21
Category / grouping		--	II 3 G, II 3 D IP67 T90°C	II 2 G, II 1/2 D IP67 T90°C
Output signal range		0.05VDC - 10.5VDC (Ripple: <20mV)		
	V-Out	0.1mA - 21mA (Ripple: <40uA), (4mA - 20mA optional)		
	I-Out			
Optical range, (adjustable) (On white paper 80g, 20cm x 30cm)	V-Out	2.5cm to 50cm / 5VDC/50cm		
	I-Out	2.5cm to 50cm / 10mA/50cm		
Light source		Infrared, 880nm		
Beam pattern		appr. 12°		
Maximum radiant intensity		4.5mW/mm <sup>2</sup>		
Response time		5ms		
Supply voltage		24 VDC (20 to 28VDC)		
Current consumption		maximum 60mA		
Maximum power dissipation		1.4W		
Output	V-Out	PNP, Output impedance appr. 25Ω, RL: 2kΩ to 1MΩ		
	I-Out	NPN, Output impedance appr. 500Ω, RL: 0Ω to 100Ω		
Input, only types IR-...-DI (Disable input)		PNP compatible, Ri 10kΩ		
Housing		M30, yellow brass (Ms 58), nickel plated		
Protection rating at EN 60529		IP 54	IP 67	IP 67
Maximum working ambient temperature TA		-20°C < TA < +60°C	-20°C < TA < +50°C	-20°C < TA < +50°C
Connection cable		3+PE x 0,5mm <sup>2</sup> , shielded / L=3m		
Connection cable, types IR-...-DI		4 x AWG24 (0,2mm <sup>2</sup> ), shielded / L=3m, PE at the housing		
Sensor socket, types 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-...-GD		- 1x Spare safety screw with packing ring for potentiometer sealing		
Accessories, types IRN-...-GD 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 cable connector. - 1x Protection cap for the sensor socket.		
Options	- IR-...-DI (with disable input) - IRS/IRN/IRD-5L-X: Output function invertible by the polarity of the supply voltage - IRS-U-5LA S66: With additional lens type DL30, socket type Binder 713/4-terminals with a cord length of 20cm. Nomial range: 150cm. - IRS/IRN-...S99: Socket types, M12, Lumberg, 5 terminals	- IR-...A-I4: Sensors with current output 4 - 20mA		
ATEX related designations	CE 0158 Device type  Certification number, type IRD: TA: -20° < TA < 50° Date of construction: Numerals 4 to 7 of the serial number	Manufacturer with address IRD: II 2 G EEx d IIC T6, II 1/2 D IP67 T90°C IRN: II 3 G EEx nA IIC T6, II 3 D IP67 T90°C DMT 99 ATEX E 056/N1/N4/N5 Electrical data according to the chart		
Function and LED indication	LB with fibre optic full quantity of light  Proximity sensor		LB with fibre optic reduced quantity of light  Proximity sensor	
	The brightness of the LED and the output level, is dependant on the quantity of the detected light.			
Output configuration				
Output diagram (measured on white Paper, 80g, 20cmx30cm) Potentiometer at minimum and maximum position				

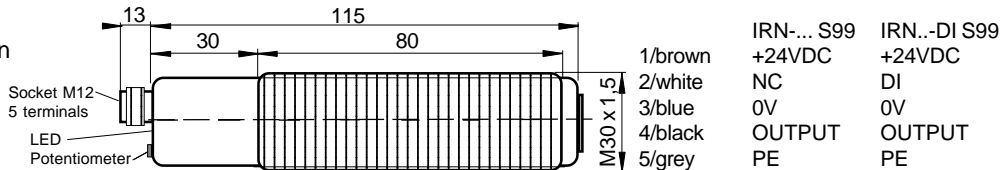
**IR.-5LA-DI (Connection disable input DI)**  
 Uin: 18V-28VDC, DI=+24V=Inactive  
 Reaction time: <=200us  
 Hold time: >=10ms, DI = 0V=Aktiv



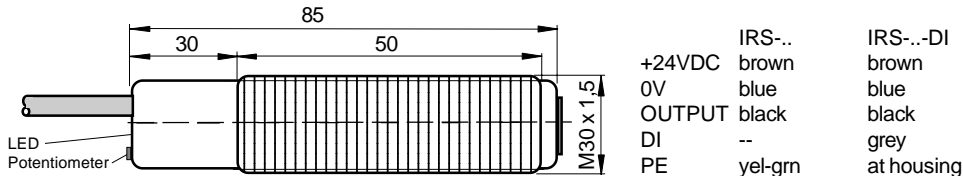
**Dimensions and electrical connection IRN/IRD-5LA:**



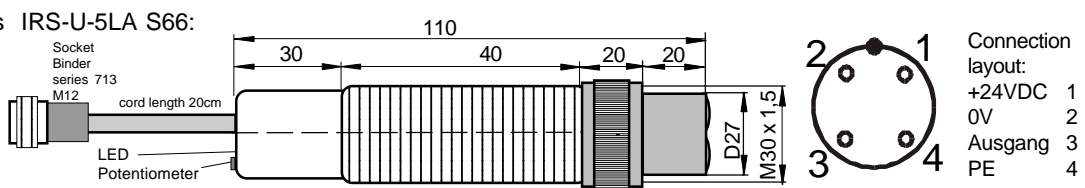
**Dimensions and electrical connection IRS/IRN-5LA S99:**



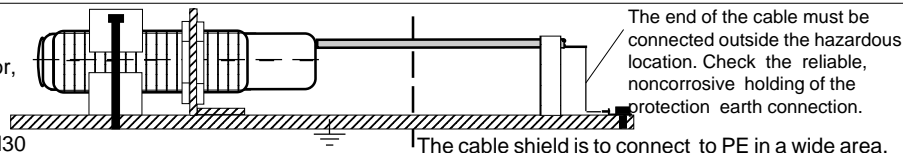
**Dimensions and electrical connection IRS-U-5LA:**



**Dimensions IRS-U-5LA S66:**



**Equipotential Bonding prescription:**  
 For types without PE at the connector, the local equipotential bonding have to be done with conductive corrosion-resistant clamps or nuts M30



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

**Operating Manual:**

**Ex protection:**

**General prescriptions for all Ex types:**

It is necessary to take into consideration the valid international and national rules and regulations. The maximum input voltage  $U_m=30VDC$  must not be exceeded. The local equipotential bonding have to be done. At sensors with a PE-terminal, the protective earth (PE) is solid connected with the housing. At sensors without a PE-terminal, connect the housing reliable and noncorrosive to the general protection earth by using the nuts M30. The cable have to be protected against damages. To connect cables inside hazardous locations only use certificated EEx e housings. All cable terminals must be connected outside hazardous locations. Use only original manufactured fibre optics and additional optical lenses, other additional optical lenses are not allowed in hazardous locations. In Ex zones 20/21 and 22, 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-5LA/AI:** Applicable in Ex zones 1, 2 and 20/21, 22. For the zones 20/21 only the front part (optical lens) can be mounted inside the zone 20. The rear part with the cable must be in the zone 21.

**Type: IRN-5LA/AI-GD:** Only applicable in Ex zones 2 and 22.

**Type: IRN-5LA/AI-GD S99:** Only applicable in Ex zones 2 and 22. 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 5-186/xx (Straight type) RKTW/RKWTW 5-186/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 socket protection cap must be fitted, when the connection cable is NOT 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 0.1V to 10VDC or a current loop, 0 or 4mA to 20mA. Please check the permissible load for the two different types of outputs. For best measurement results the sensor can be adjusted by the potentiometer.

**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  $\geq 10ms$  (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.

**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.

**Maintenance**

Protect the sensor 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.

**Safety Informations**

The sensors types IRS/IRN/IRD-.. must not be used for Accident-Prevention! When installing and operating with the sensor, it is necessary to take into consideration the relevant international and other national regulations. ATEX118a, EX-RL(BGR104), ElexV, TrbF, TRD, UVV, BetrSichV(ATEX137), Einzel-RL 1999/92/EG.

**Standards met:**

- EN 50014, IRD: EN 50018, IRN: EN 50021, EN 50281-1-1; EN 61000-6-1/-2, EN 61000-6-3/4; EN 60529
- Ex protection: 94/9/EG (ATEX 100a)
- Machine directive: 98/37/EG
- Low voltage directive: 73/23/EWG, 93/68/EWG
- EMC 89/336/EWG, 91/263/EWG, 92/31/EWG, 93/68/EWG

**General Notes**

We reserve the right to modify our equipment. Our equipment neither emit or contain any damaging or siliconized substances. No longer usable or irreparable units must be disposed of in accordance with local waste disposal regulations.

**Declaration of Conformity**

Approvals: DMT 99 ATEX E 056/N1/N4/N5  
 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 with the ATEX module "Production", declares:

Hans Bracher, Matrix Elektronik AG

IRNSD\_ANALOG\_5L\_GD\_e4.DEC.15.05/HB

# Photoelectric Proximity Switch IRS/IRN/IRD

IRD-..  
CE 0158

II 2G Ex d IIC T6  
II 1/2D Ex tD A20/A21 IP67 T90°C

## Housing M30

- Also for using with fibre optics
- Type IRD, applicable in ex zones 1 and 20, 21
- Type IRN, applicable in ex zones 2 and 22
- Robust sensor for industrial applications

IRN-..-GD  
CE

II 3G Ex nA IIB T4  
II 3D Ex tD A22 IP67 T135°C

Technical Data	Type	IRS-U- 2/4/10/15/25/30N/P	IRN- 2/4/10/15/25/30N/P-GD	IRD- 2/4/10/15/25/30N/P
Type of Ex protection, Gas, at 94/9/EC		none	II 3G Ex nA IIB T4	II 2G Ex d IIC T6
Type of Ex protection, Dust, at 94/9/EC		none	II 3D Ex tD A22 IP67 T135°C	II 1/2D Ex tD A20/A21 IP67 T90°
Applicable in Ex Zones		--	Zones 2 and 22	Zones 1,2 and 20/21,22
Range (on white paper A4,80g)		0.2m to 3m (Designations 2, 4, 10, 15, 25, 30)		
Light source		Infrared 870nm		
Optical angle (at nominal range)		appr. 10°		
Maximum optical radiant power		<=35mW		
Response time		5ms / 100Hz (1ms / 500Hz, on request)		
Supply voltage		24 VDC (20 to 28VDC), absolute maximum Um=30VDC		
Current consumption		maximum 60mA		
Maximum power dissipation		1.68W		
Output		Push-Pull, 100mA, short circuit protected		
Input, only types IR-..-DI (Disable Input)		PNP compatible, Ri 10kΩ		
Housing		M30, yellow brass, type Ms58, nickel plated		
Enclosure rating at EN 60529		IP 54	IP 67	IP 67
Working temperature range TA		-20°C < TA < +50°C		
Shock and vibrating resistance		Vibration: 30g over 20Hz to 2kHz. Shock:50g for each direction (X, Y, Z)		
Electrical connection cable		4 x 0.5mm <sup>2</sup> , shielded, TPE/PUR, length: =3m		
Electrical connection cable, types IR-..-DI		5 x 0.5mm <sup>2</sup> , shielded, TPE/PUR, length: =3m		
Socket for types IRS/IRN-.. S99		Socket M12, Lumberg type RSF, 5 terminals		
Accessories, all types		- 2 nuts M30 (optional 1 clamp on demand)		
Accessories, types IRD-.. + IRN-..-GD		- 1x Spare safety screw with packing ring for potentiometer sealing		
Accessories, only type IRN-..-GD S99		- 1x Safety lock device, mount at the cable connection, for locking the connection. (black synthetic device) - 1x Warning plate "Do not open/close when supply voltage connected", self-sealing, for gluing on the cable connector. - 1x Protection cap for the sensor socket.		
Accessories, optional for the types S99		- Single ended cordset, types RKTS 5-298/xx or RKWTH 5-298/xx, Lumberg		
Accessories, not included, only IRS-U-.. S125		- Spare safety screw with packing ring for potentiometer sealing		
Options		- Cable length up to 100m - IR-..-DI: With emitter disable input DI - IR-..4/10-1kHz: 1kHz switching frequency - IR-..1N: For near range applications - IR-..2-W: With wide optical angle 22° - IR-..2-10kHz: 10kHz switching frequency - IRD-10P S86: Switching frequency: 1.5kHz, with special high flexible, oil resistant cable for trailing, length: 10m - IRD-4P S95: With premounted optic, type: AD-4-W 15 / Cable length: 6m - IRD-4P S97: Response time:150us / Cable length: 5m - IRS/IRN-.. S99: Socket M12, Lumberg RSF 5, 5 terminals - IRD-25N-G S101: Response Time:1ms/500Hz / Cable: 10m, Ölflex, special high flexible for trailing - IRS-U-2P/4P S125: Potentiometer with dust proof screwing. (IRS-U-2P S125: Range = 180mm+5%) - IRS/IRN/IRD-..N/P VA: With additional pollution indication output - IRS/IRN/IRD-..NP: With output function selection by changing the supply voltage polarity		
Function and LED display				
IRS-..N / IRN-..N IRD-..N Output low side switching (NPN)				
IRS-..P / IRN-..P IRD-..P Output high side switching (PNP)				
IR-..-DI (with optional Disable Input) Uin: 18V-28VDC, DI=+24V=Disable Response time: <=200us Hold time: >=7.5ms, DI = 0V=Enable				
ATEX related designations:				
CE 0158	Manufacturer with address	Date of construction: Numeral 4 to 7 of the serial number		
Device type: IRD-..:	II 2G Ex d IIC T6, II 1/2D Ex tD A20/A21 IP67 T90°C	Certification number: DMT 99 ATEX E 056		
Device type: IRN-..:	II 3G Ex nA IIB T4, II 3D Ex tD A22 IP67 T135°C	Declaration by manufacturer at 94/9/EG, Tech File Nr: AN-MAT-08-EX-E056		
TA: -20°C < TA < +50°C	Electrical data according to the chart			

IRSND\_GD\_e34\_2009-10-02/HB

**Dimensions**  
**Connection layout**  
**IRN/IRD-..**  
**IRS-U-2P/4P S125:**

+24VDC	IRN/IRD-..	IRN/IRD-..DI
0V	1	1
Output	2	2
DI	3	3
FE	4(S101=NC)	4
	yellow-green	yellow-green

**Dimensions**  
**Connection layout**  
**IRS/IRN-.. S99:**  
**IRN: Dust protection cap**  
**LED for the socket**  
**Potentiometer**  
**IRN: with dustproof packing screw**

1/brown	IRN-.. S99	IRN-..DI S99
2/white	+24VDC	+24VDC
3/blue	NC	DI
4/black	0V	0V
5/grey	Output	Output
	PE	PE

**Dimensions**  
**Connection layout**  
**IRS-..:**

+24VDC	IRS-..	IRS-..DI
0V	brown	brown
Output	blue	blue
DI	black	black
PE	--	grey
	yellow-green	at the housing

**Dimensions**  
**Connection layout**  
**IRS-.. Socket M18:**

1	IRS-..	IRS-..DI
2	+24VDC	+24VDC
3	Output	Output
4	0V	0V
	PE	DI
		PE
		at the housing

**Equipotential Bonding prescription for Ex Devices:**  
 For types without PE at the connector, the local equipotential bonding have to be done with conductive corrosion-resistant clamps or nuts M30

The end of the cable must be connected outside the hazardous location. Check the reliable, noncorrosive holding of the protection earth connection.

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

**Ex protection**  
**General regulations for all types of Ex devices:**  
 It is necessary to take into consideration the valid international and national rules and regulations (EN 60079-14). The maximum rated supply voltage  $U_m = 30VDC$  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. Other then original manufacturer, additional optical lenses are not allowed in hazardous locations. In Ex zones 20/21 and 22, 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.

**Types IRD-..:** Are applicable in Ex zones 1, 2 and 20/21, 22. For the zones 20/21 only the front part (optical lens) can be mounted inside the zone 20. The rear part with the cable must be in the zone 21.

**Types IRN-..-GD:** Are applicable in Ex zones 2 and 22.

**Types IRN-..-GD S99:** Are only applicable in Ex zones 2 & 22 hazardous locations. 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 5-298/xx (Straight type) RKTW/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 socket must be fitted, when the connection cable is NOT 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 IR-..-N/P**  
 The sensor works basically as proximity switch on diffuse optical reflections. If the sensor detects reflected light, the LED shows red and the output switches on +24VDC (P types) or 0V (N types). If no reflected light will be recognized, the output switches to 0V (P types) or +24VDC (N types). The push-pull output allows to connect the load to +24VDC or 0V.

**Function IRD-25N S101**  
 The sensor works basically as proximity switch on diffuse optical reflections. If the sensor detects reflected light, the LED shows red and the output switches on 0V. If no reflected light will be recognized, the output switches to +24VDC. The push-pull output allows to connect the load to +24VDC or 0V. By changing the polarity of the supply voltage, the output function will be inverted.

**Optional pollution indication output, series "VA":**  
 The VA output will be activated by polluted lenses or reduced optical input signal. If only reduced optical input signal will be detected, the LED shows yellow and the pollution indication output will be activated. If no light can be detected both outputs are switched OFF and the LED shows red. If strong light is detected only the standard output is switched ON, the pollution indication output is switched OFF and the LED shows green.

**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.

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

For a correct function the sensor must be enabled for at minimum  $\geq 7.5ms$  (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.

**Optical range**  
 The nominal range for the types IR-2/4/10/15 is defined on white paper A4, 80g. The nominal range for the types IR-.25/30 is defined on white paper 1m-2, 80g. The range will be influenced by the color, kind of surface and shape 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 sensor 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.

**Safety Informations**  
 The dismounting of the connector safety lock device while the supply voltage is connected is hazardous! The mounting of the sensor in dusty locations without fixed cordset or protection cap results in a high ignition risk. The sensors types IRS/IRN/IRD-.. must not be used for Accident-Prevention! In worst case of disturbance, the output 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. ATEX 118a, ElexV, TRbF, TRD, UVV, EX-RL(BGR104), BetrSichV(ATEX137), Single directive 1999/92/EG

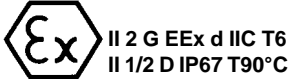
Standards met:  
 EN 60079-0:2004, EN 60079-1:2004, EN 60079-15:2006-05, EN 60079-28:2007, EN 60241-0:2004, EN 61241-1:2004; EN 60529:2000, EN 60950-1:2006; EN 61000-4-2 to EN 61000-4-6, EN 61000-6-1/-2, EN 61000-6-4; Ex Protection: 94/9/EC (ATEX 100a)  
 Machine directive: 2006/46/EC. RoHS: 2002/95/EC. Low voltage directive: 73/23/EWG, 93/68/EWG. EMC: 89/336/EWG, 91/263/EWG, 92/31/EWG, 93/68/EWG

**General Notes**  
 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.

**CE Declaration of Conformity**  
 Certification, series IRD-..: DMT 99 ATEX E 056  
 Certification, series IRN-..: Declaration of conformity by manufacturer at 94/9/EC. Tech File No: AN-MAT-08-EX-E056.  
 ATEX certification of quality type production of Ex devices at the directive 94/9/EC Certification No: BVS 03 ATEX ZQS / E118  
 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

# Photoelectric Proximity Switch IRS/IRN/IRD-..I

**IRD-..I**

**Housing M30**

- Also for using with fibre optics
- Type IRD, applicable in ex zones 1 and 20, 21
- Type IRN, applicable in ex zones 2 and 22
- Robust sensor for industrial applications

**IRN-...I-GD**


Type	IRS-U- 2/4/10/15/25/30I	IRN- 2/4/10/15/25/30I-GD	IRD- 2/4/10/15/25/30I
<b>Technical Data</b>			
Type of ex protection	none	EEx nA II T6	EEx d IIC T6
Applicable in ex zones	none	Zones 2, 22	Zones 1, 2, 20/21, 22
Category	--	II 3 G, II 3 D IP67 T90°C	II 2 G, II 1/2 D IP67 T90°C
Range (on white paper A4,80g)	0.2m to 3m (Designations 2, 4, 10, 25, 30)		
Light source	Infrared 880nm		
Beam pattern (at nominal range)	appr. 12°		
Response time	5ms		
Supply voltage	24 VDC (20 to 28VDC)		
Current consumption	maximum 60mA		
Maximum power dissipation	1.68W		
Output	Push-Pull, 100mA, short circuit protected		
Input, only types IR-..I-DI (Disable Input)	PNP compatible, Ri 10kΩ		
Housing	M30, yellow brass, type Ms58, nickel plated		
Protection rating at EN 60529	IP 54	IP 67	IP67
Ambient temperature range TA	-20°C < TA < +50°C		
Electrical connection	Cable, 3+PE x 0,5mm <sup>2</sup> + Shield / L=3m		
Electrical connection, types IR-..I-DI	Cable, 4 x AWG24 (0,2mm <sup>2</sup> )+ Shield / L=3m, PE at the housing		
Socket for types IRS/IRN-.. S99	Socket M12, Lumberg type RSF, 5 terminals		
Accessories, all types	- 2 nuts M30 (optional 1 clamp on demand)		
Accessories, types IRD-..I + IRN-..I-GD	- 1x Spare safety screw with packing ring for potentiometer sealing		
Accessories, only type IRN-..I-GD S99	- 1x Safety lock device, mount at the cable connection, for locking the connection. (black synthetic device) - 1x Warning plate "Do not open/close when supply voltage connected", self-sealing, for gluing on the cable connector. - 1x Protection cap for the sensor socket.		
Accessories optional only type IRN-..GD S99	- Single ended cordset, straight type: RKTS 5-298/xx or right angle type: RKWTH 5-298/xx, Lumberg M12/5P		
Options	- IR-..I-DI (with emitter disable input) - IRS-..I with connector, type Binder series 714 - IR-2I-10kHz (10kHz switching frequency) - IRS/IRN-..I(-GD) S99: Connector: M12, Lumberg, 5 terminals - IR-4/10I-1kHz (1kHz switching frequency) - IRD-10I-PNPI (Only PNP output type, Out = H when light detected) - Cable length up to 100m		
Function and LED display	Light barrier with fibre optics Beam not interrupted Proximity switch with fibre optic reflection detected, LED=ON	Light barrier with fibre optics Beam interrupted Proximity switch with fibre optic no reflection detected, LED=OFF	
Function on standard connection: Output low side switching (NPN) Connection layout: 1 / brown = +24VDC 2 / blue = 0V 3 / black = Output 4 / grey = Disable-input (only.-DI) yellow-green = PE white/blank = Cable shield	 PNP=OFF 1 / brown R 15Ω Out 3 / black NPN=ON - 2 / blue	 PNP=ON 1 / brown R 15Ω Out 3 / black NPN=OFF - 2 / blue	
Function on reversed connection: Output high side switching (PNP) Connection layout: 1 / brown = 0V 2 / blue = +24V 3 / black = Output 4 / grey = Disable-input (only.-DI) yellow-green = PE white/blank = Cable shield	 PNP=ON 2 / blue R 15Ω Out 3 / black NPN=OFF - 1 / brown	 PNP=OFF 2 / blue R 15Ω Out 3 / black NPN=ON - 1 / brown	
IR-..I-DI (with optional Disable Input) Uin: 18V-28VDC, DI=+24V=Disable Response time: <=200us Hold time: >=7.5ms, DI = 0V=Enable	 IR-DI DI +24V Sensor enabled >=7.5ms =24V Sensor disabled 200us Output holds previous state Sensor enabled >=7.5ms =0V		
ATEX related designations	CE 0158 Manufacturer with address Device type IRD: II 2 G, II 1/2D IP67 T90°C / IRN: II 3 G, II 3 D IP67 T90°C Certification number, series IRD: DMT 99 ATEX E 056 TA: -20° < TA < 50°  Electrical data according to the chart Date of construction: Numeral 4 to 7 of the serial number		

**Dimensions**  
**Connection layout**  
**IRN/IRD-...:**

+24VDC	1	IRN/IRD-..	IRN/IRD-...-DI
0V	2		brown
Output	3		blue
DI	4		black
PE			grey
			yellow-green at the housing

**Dimensions**  
**Connection layout**  
**IRS/IRN-..I S99:**

1/brown	+24VDC	IRN-..I S99	IRN-..I-DI S99
2/white	NC		+24VDC
3/blue	0V		DI
4/black	Output		Output
5/grey	PE		PE

**Dimensions**  
**Connection layout**  
**IRS-...:**

+24VDC	brown	IRS-..	IRS-...-DI
0V	blue		blue
Output	black		black
DI	--		grey
PE	yellow-green		at the housing

**Dimensions**  
**Connection layout**  
**IRS-.. Socket M18:**

1	+24VDC	IRS-..	IRS-..-DI
2	Output		Output
3	0V		0V
4	PE		DI
			PE
			at the housing

**Equipotential Bonding prescription for Ex Devices:**  
 For types without PE at the connector, the local equipotential bonding have to be done with conductive corrosion-resistant clamps or nuts M30

The end of the cable must be connected outside the hazardous location. Check the reliable, noncorrosive holding of the protection earth connection.  
 The cable shield is to connect to 0V (-) of the supply voltage

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

**Ex protection:**  
**General regulations for all types of Ex devices:**  
 It is necessary to take into consideration the valid international and national rules and regulations. The maximum rated supply voltage  $U_m = 30VDC$  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. Other than original manufacturer, additional optical lenses are not allowed in hazardous locations. In Ex zones 20/21 and 22, 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.  
**Types: IRD-..I** are applicable in Ex zones 1, 2 and 20/21, 22. For the zones 20/21 only the front part (optical lens) can be mounted inside the zone 20. The rear part with the cable must be in the zone 21.  
**Types: IRN-..I-GD** are applicable in Ex zones 2 and 22.  
**Types: IRN-..I-GD S99** are only applicable in Ex zones 2 & 22 hazardous locations. 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) RKTW/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 socket must be fitted, when the connection cable is NOT 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**  
 The sensor works basically as proximity switch on diffuse optical reflections. By changing the polarity of the supply voltage, the output function will be inverted. If the sensor detects reflected light, the LED shows red and the output switches on 0VDC or +24VDC dependent of the polarity of the supply voltage. If no reflected light will be recognized, the LED distinguished and the output switches on +24VDC or 0V dependent of the polarity of the supply voltage. The push-pull output allows to connect the load to +24VDC or 0V.  
**Sensors with disable input, types IR-..I-..-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.

DI= 0V or not connected = emitter enabled  
 DI= High (24VDC) = emitter disabled  
 For a correct function the sensor must be enabled for at minimum  $\geq 7.5ms$  (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.  
**Optical range**  
 The nominal range for the types IR-2/4/10/15I is defined on white paper A4, 80g. The nominal range for the types IR-25/30I is defined on white paper 1m-2, 80g. The range will be influenced by the color, kind of surface and shape 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 0 and 20 must only be driven by ATEX approved sensors with limited optical output power at **DMT 99 ATEX 056/N5!**  
**Maintenance**  
 Protect the sensor 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.  
**Safety Informations**  
 The sensors types IRS/IRN/IRD-.. must not be used for Accident-Prevention! In worst case of disturbance, the output 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. ATEX118a, EX-RL(BGR104), ElExV, TrbF, TRD, UVV, BetrSichV(ATEX137), Einzel-RL 1999/92/EG.  
 Standards met:  
 - EN 50014, EN 50281-1-1, IRD: EN 50018, IRN: EN 50021;  
 EN 61000-4-2 to EN 61000-4-6, EN 61000-6-1/2, EN 61000-6-4; EN 60529  
 - Ex protection: 94/9/EG (ATEX 100a)  
 - Machine directive: 98/37/EG  
 - Low voltage directive: 73/23/EWG, 93/68/EWG  
 - EMC: 89/336/EWG, 91/263/EWG, 92/31/EWG, 93/68/EWG  
 - Tech. File Rev.: EXD\_NA5A:2003  
**General Notes**  
 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.  
**Declaration of Conformity:**  
**Approvals: DMT 99 ATEX E 056/N1/N4/N5**  
 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 with the ATEX module "Production", declares:

Hans Brach nik AG

IRSDND\_I\_gd\_e7.FEB.16.06/HB

# Photoelectric Proximity Switch IRS / IRN / IRD - .. - XC

IRN-..-XC-GD

Housing M30

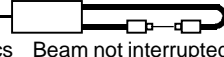
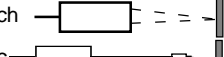
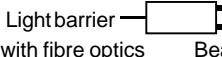
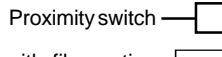
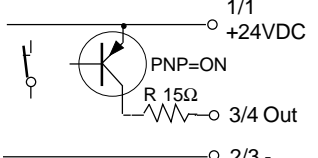
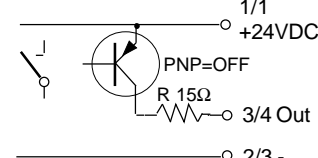
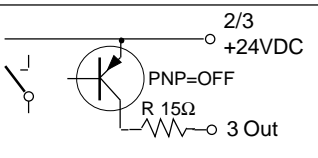
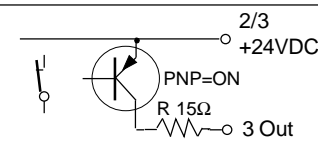
IRD-..-XC



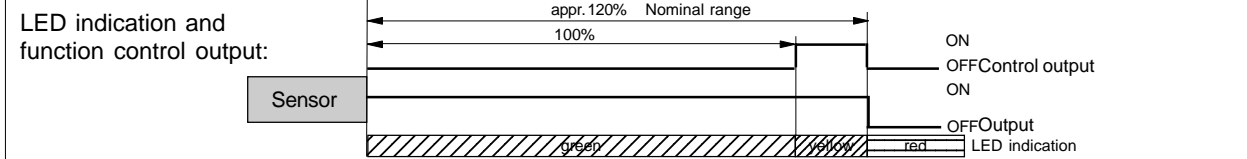
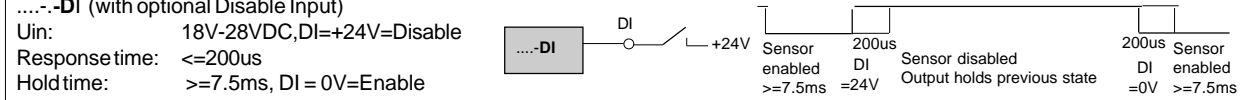
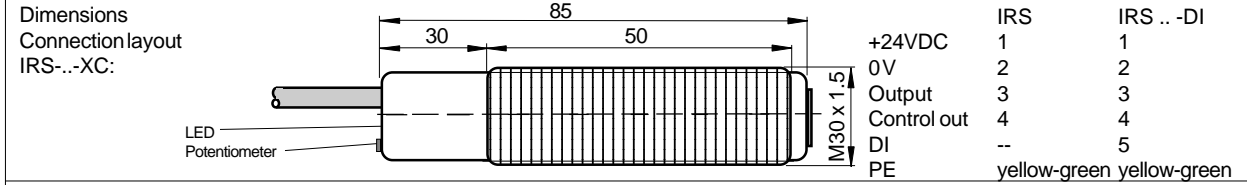
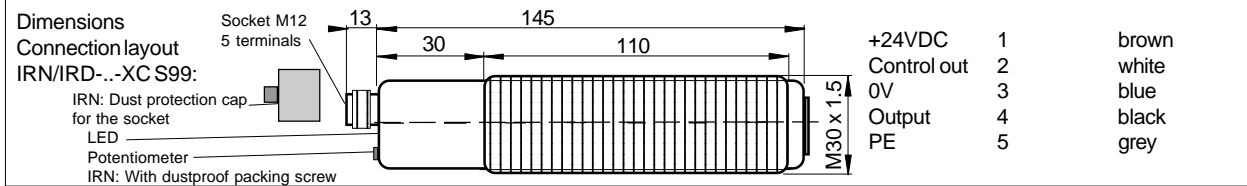
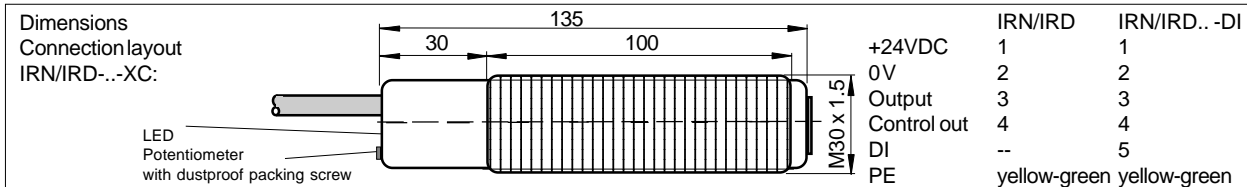
- Applicable with different fibre optics
- Type IRD, applicable in Ex Zones 1, 2, 20/21, 22
- Type IRN, applicable in Ex Zones 2, 22
- Robust sensor for industrial applications


 II 3G Ex nA IIB T4  
II 3D Ex tD A22 IP67 T135°C

 II 2G Ex d IIC T6  
II 1/2D Ex tD A20/21 IP67 T90°C

Technical Data	Type	IRS-5/10/15/20-XC	IRN-5/10/15/20-XC-GD	IRD-5/10/15/20-XC
Type of Ex protection Gas, at 94/9/EG		None	II 3G Ex nA IIB T4	II 2G Ex d IIC T6
Type of Ex protection Dust, at 94/9/EG		None	II 3D Ex tD A22 IP67 T135°C	II 1/2D Ex tD A20/A21 IP67 T90°C
Applicable in Ex zones		None	2, 22	1, 2, 20/21, 22
Range (adjustable) (on white paper. A4. 80g)			IR.-5-XC = 0.5m IR.-10-XC = 1.0m IR.-15-XC = 1.5m IR.-20-XC = 2.0m	
Response time			5ms	
Light source			Infrared, 880nm	
Optical beam angle (Distance 2m)			appr. 12°	
Maximum radiant intensity			3.5mW/mm²	
Supply voltage			20VDC - 28VDC	
Maximum current consumption			60mA	
Maximum power dissipation			1.4W	
Output			PNP, short circuit protected, maximum 100mA	
Control output (Pollution indication)			PNP, short circuit protected, maximum 100mA	
Emitter disable input, only types ...-DI			PNP compatible, Ri=10kΩ	
Housing		M30, yellow brass, nickel plated		
Enclosure rating, at EN 60529		IP54	IP67	IP67
Operating temperature range TA		-20°C < TA < +50°C		
Connection cable, types IRN and IRD		4 x 0.5mm² + PE, shielded, PUR/TPE, oil resistant, for cable traying, Length=3m		
Connection cable, type IRS		4 x 0.5mm² + PE, shielded, PVC, Length=3m		
Connection cable, types IR.-DI		6 x 0.5mm² + PE, shielded, PVC, Length=3m		
Socket, types IRS/IRN-5/10/15/20-XC S99		Socket M12, Lumberg type RSF 5, 5 terminals		
Accessories included, all types		- 2 nuts M30 (or 1 clamp, on request)		
Accessories included, only IRN and IRD		- 1x Spare safety screw with packing ring for potentiometer sealing		
Accessories, included, only IRN-5/10/15/20-XC S99		- 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 - 1x Protection cap for the sensor socket.		
Accessories, not included only IRS/IRN-5/10/15/20-XC S99		- Cord Set Lumberg RKT5 5-298/xx (straight type), or RKTW/RKWTH 5-298/xx (right angle type)		
Options		- Cable length up to 100m, on request - IR.-..-XC-DI: With emitter disable input (not for types S99) - IR.-..-XC:-2kHz: Switching frequency 2kHz - IR.-5-XC:-5kHz: Switching frequency 5kHz - IRS/IRN-..-XC S99: Socket M12, Lumberg RSF 5 - IRD-5-XC S149: Cable oil resistant, type ÖLFLEX 810CP for cable traying - IRD-10-XC S149: Cable oil resistant, type ÖLFLEX 810CP for cable traying - IRS-5/10-XC MT3/FT3: External multi-turn (MT3) or single-turn (ST3) potentiometer for range adjustment, at a shielded cable, length: 3m		
Function and LED display		Light barrier  with fibre optics Beam not interrupted Proximity switch  with fibre optic Reflection detected, LED=YELLOW or GREEN	Light barrier  with fibre optics Beam interrupted Proximity switch  with fibre optic No reflection detected, LED=RED	
Function at standard supply voltage wiring:				
Function at reversed supply voltage wiring:				

IRSND\_XC\_GD\_e14/2009-08-18/HB



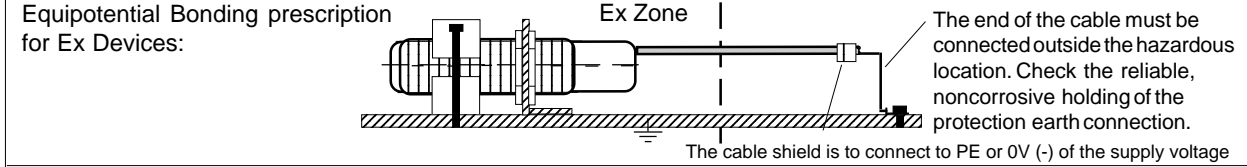
**ATEX RELATED MARKINGS ON THE SENSORS:**

CE 0158 Manufacturer with address Production date: Numbers 4 to 7 of the serial number

Device type: IRD...: II 2G Ex d IIC T6, II 1/2D Ex tD A20/A21 IP67 T90°C Certification number: DMT 99 ATEX E 056

Device type: IRN...: II 3G Ex nA IIB T4, II 3D Ex tD A22 IP67 T135°C Declaration by manufacturer, Tech File No: AN-MAT-08-EX-E056

TA: -20°C < TA < +50°C Electrical data according to the chart



**Operating Manual, CE Declaration of Conformity:**

**Mounting prescriptions**

**Ex Protection:**  
It is necessary to take into consideration the valid international and national rules and regulations (EN 60079-14). The maximum input voltage  $U_m=30VDC$  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 Ex zones 20/21 and 22, 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...-XC:** Only applicable in Ex zones 1, 2 and 20/21, 22. For the zones 20/21 only the front part (optical lens) can be mounted inside the zone 20. The rear part with the cable must be in the zone 21.

**Type IRN...-XC-GD:** Only applicable in Ex zones 2 and 22.

**Type IRN...-XC-GD S99:** Only applicable for the Ex zones 2 and 22. 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) RKTW/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**  
The sensor works basically as proximity switch on diffuse optical reflections. If the sensor detects reflected light, the output switches to +24VDC or 0V dependent of the polarity of the supply voltage. If the sensor works under safe conditions the LED shows green. If the sensor detects only poor reflected light, the LED shows yellow and the Control Output switches to +24VDC. If no reflected light will be recognized, the LED shows red, the outputs switches to 0V and the control-output is switching OFF. The load on the outputs must be connected to 0V.

**Sensors with disable input, types IR...-XC-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.  
DI= 0V or not connected = emitter enabled  
DI= High (24VDC) = emitter disabled

For a correct function the sensor must be enabled for at minimum  $\geq 7.5ms$  (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.

**Maintenance**  
For a high reliability hold the lens and the mirror free from sediment. No special maintenance is required. If the lens or the mirror becomes dirty, they should be cleaned with a non-aggressive cleaning liquid. Equipment must only be repaired by the manufacturer.

**Safety Informations**  
The dismounting of the connector safety lock device while the supply voltage is connected is hazardous! The mounting of the sensor in dusty locations without fixed cordset or protection cap results in a high ignition risk. The sensor IRS/IRN/IRD...-XC 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. ATEX 118a, ElexV, TRbF, TRD, UVV, EX-RL(BGR104), BetrSichV(ATEX137), Single directive 1999/92/EC

Standards met:  
- EN 60079-0:2004, EN 60079-1:2004, EN 60079-15:2006-05, EN 60079-28:2007, EN 60241-0:2004, EN 61241-1:2004;  
- EN 60529:2000, EN 60950-1:2006;  
- 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: 2006/46/EC  
- RoHS: 2002/95/EC  
- Low Voltage Directive: 73/23/EWG, 93/68/EWG  
- EMC: 89/336/EWG, 91/263/EWG, 92/31/EWG, 93/68/EWG

**General Notes**  
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.

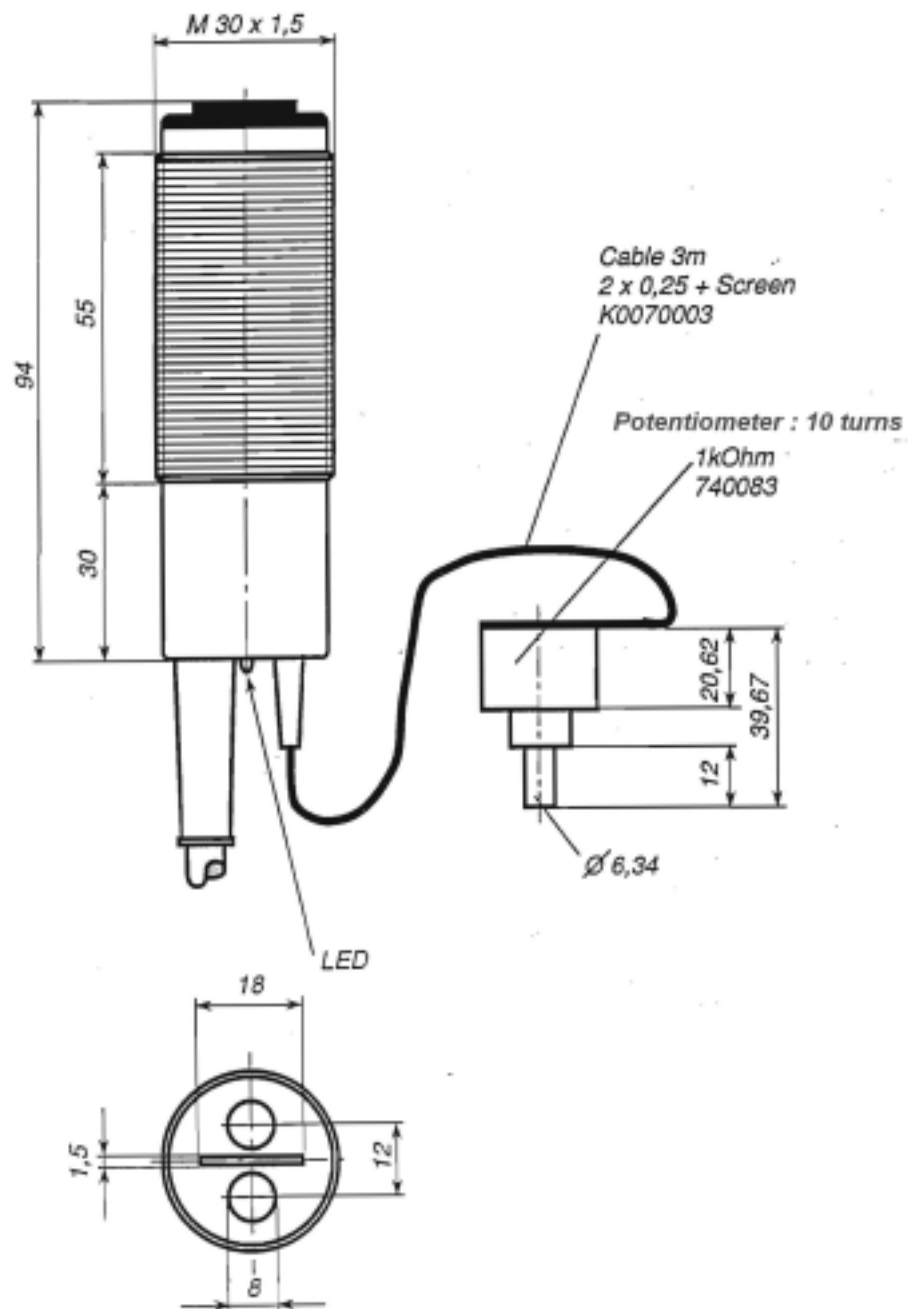
**CE Declaration of Conformity**  
Certification, series IRD...: DMT 99 ATEX E 056  
Certification, series IRN...: Declaration of conformity by manufacturer at 94/9/EC. Tech File No: AN-MAT-08-EX-E056.  
ATEX certification of quality type production of Ex devices at the directive 94/9/EC Certification No: BVS 03 ATEX ZQS / E118  
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

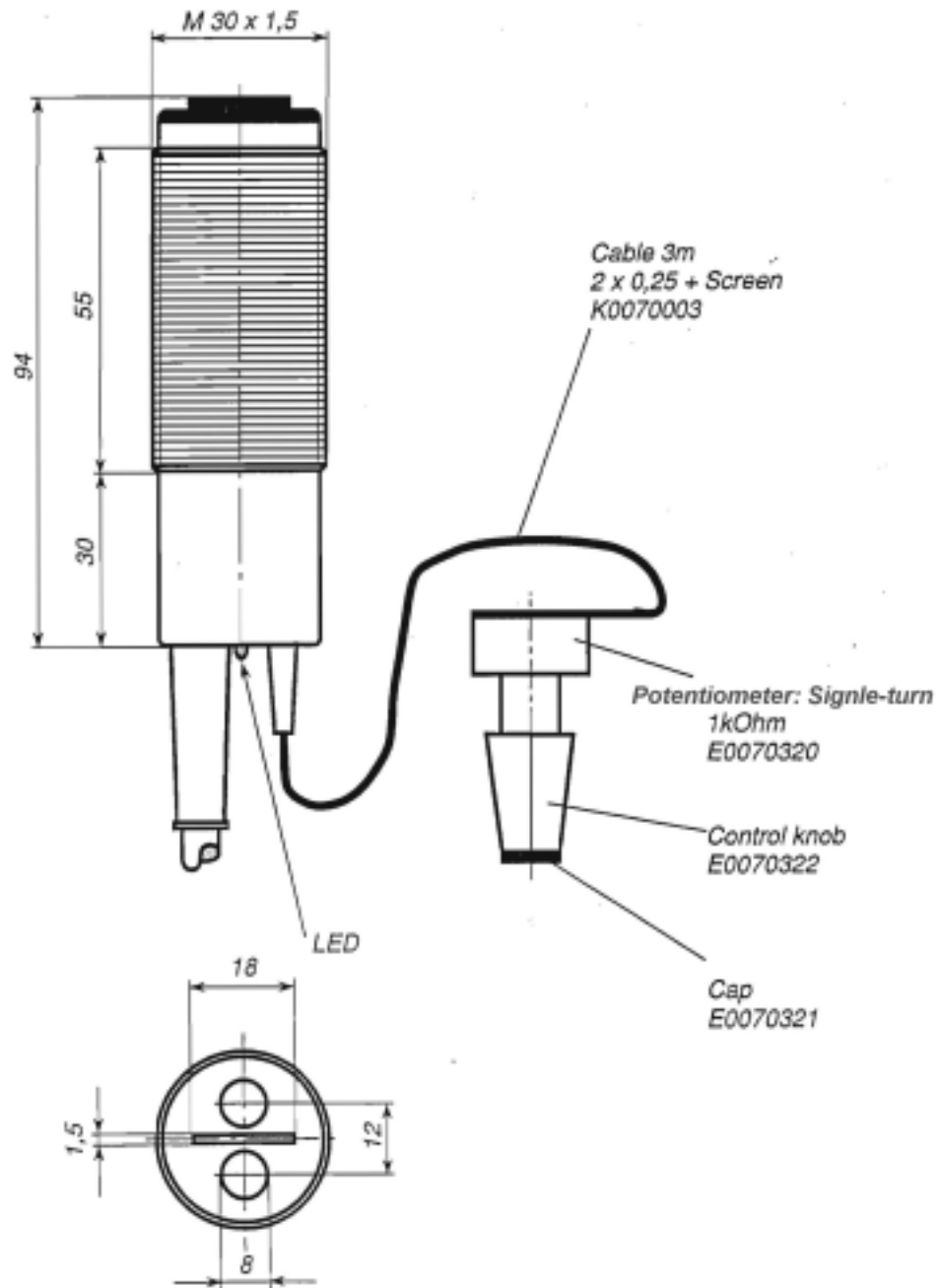
IRSND\_XC\_GD\_e14/2009-08-18/HB



## Dimensions: IRS-5XC/10XC-MT3



## Dimensions: IRS-5XC/10XC-ST3



# Photoelectric Proximity Switch IRS/IRN/IRD-15N/P S157/S160/S180

IRD-...  
CE 0158  
II 2G Ex d IIC T6  
II 1/2D Ex tD A20/A21 IP67 T90°C

**Housing M30**  
• Also for using with fibre optics  
• Type IRD, applicable in ex zones 1 and 20/21  
• Type IRN, applicable in ex zones 2 and 22  
• Robust sensor for industrial applications

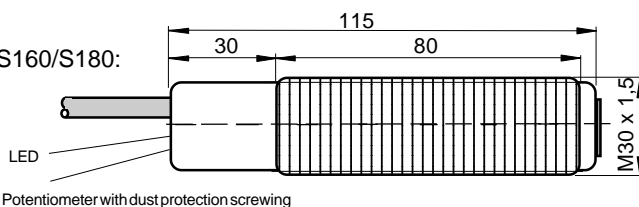
IRN-...GD  
CE  
II 3G Ex nA IIB T4  
II 3D Ex tD A22 IP67 T135°C

Type	IRS-U-15N/P S160 IRS-U-15N/P S157/S180	IRN-15N/P-GD S160 IRN-15N/P-GD S157/S180	IRD-15N/P-GD S160 IRD-15N/P-GD S157/S180
<b>Technical Data</b>			
Type of Ex protection, Gas, at 94/9/EG	none	II 3G Ex nA IIB T4	II 2G Ex d IIC T6
Type of Ex protection, Dust, at 94/9/EG	none	II 3D Ex tD A22 IP67 T135°C	II 1/2D Ex tD A20/A21 IP67 T90°C
Applicable in Ex Zones	--	Zones 2 and 22	Zones 1,2 and 20/21,22
Range (on white paper A4,80g)	1.5m		
Light source	Infrared 880nm		
Beam pattern (at nominal range)	appr. 12°		
Response time	0.5ms / 1kHz		
Supply voltage	24 VDC (20 to 28VDC), absolute maximum Um=30VDC		
Current consumption	maximum 60mA		
Maximum power dissipation	1.68W		
Output	Push-Pull, 100mA, short circuit protected		
Input, only types IR-...-DI (Disable Input)	PNP compatible, Ri 10kΩ		
Housing	M30, yellow brass, type Ms58, nickel plated		
Enclosure rating at EN 60529	IP 54	IP 67	IP 67
Working temperature range TA	-20°C < TA < +50°C		
Electrical connection	Socket M12, Lumberg RSF 8, 8 terminals		8 x 0.5mm², LiYCY, L= 5m
Accessories, all types	- 2 nuts M30 (optional 1 clamp on demand)		
Accessories, types IRD-.. + IRN-...GD	- 1x Spare safety screw with packing ring for potentiometer sealing		
Accessories, only types IRN-15N/P-GD S160/S157/S180	- 1x Safety lock device, mount at the cable connection, for locking the connection. (black synthetic device) - 1x Warning plate "Do not open/close when supply voltage connected", self-sealing, for gluing on the cable connector. - 1x Protection cap for the sensor socket.		
Accessories, optional for the types IRS and IRN	- Single ended cordset, Lumberg RKTS 8-298/xx or RKWTH 8-298/xx		
Options	- IR-...-DI: With emitter disable input - IR-...-VA: With pollution indication output and 3-colour LED - IR-...-S157: Multiturn potentiometer fixed at the device - IR-...-S160: External multiturn potentiometer - IR-...-S180: Multiturn potentiometer fixed at the device and reduced hysteresis (3%)		
Connection of the external potentiometer: (Only S160)	P ext. = max. 1kΩ 		SENSOR MUST NOT BE DRIVEN WITHOUT WIRED EXTERNAL POTENTIOMETER!
Function and LED display	Light barrier with fibre optics: Beam not interrupted Proximity switch with fibre optic: reflection detected, LED=ON	Light barrier with fibre optics: Beam interrupted Proximity switch with fibre optic: no reflection detected, LED=OFF	
IRS-.N / IRN-.N IRD-.N Output low side switching (NPN)			
IRS-.P / IRN-.P IRD-.P Output high side switching (PNP)			
IR-...-DI (with optional Disable Input) Uin: 18V-28VDC, DI=+24V=Disable Response time: <=200us Hold time: >=7.5ms, DI = 0V=Enable			
ATEX related designations	CE 0158 Device type IRD: II 2G Ex d IIC T6, II 1/2D Ex tD A20/A21 IP67 T90°C Device type IRN: II 3G Ex nA IIB T4, II 3D Ex tD A22 IP67 T135°C Series IRD: DMT 99 ATEX E 056 Series IRN: Declaration by manufacturer at 94/9/EC TA: -20°C < TA < +50°C Electrical data according to the chart Date of construction: Numeral 4 to 7 of the serial number		

IRSND-15-S160-GD\_e8\_2009-10-28/HB

## Dimensions and wiring layout

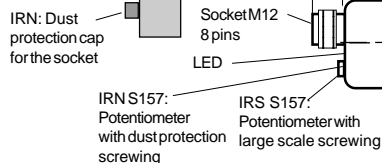
IRD-15N/P S157/S160/S180:



S160	IRD-15.	IRD-15.-DI	S157
+24VDC	1	white	24VDC
0V	2	brown	0V
Output	3	green	Out
VA-OUT, optional	4	yellow	VA
Pot A	5	grey	NC
Pot B	6	pink	NC
DI, optional	-	blue	DI
PE	yel-grn	red	FE

## Dimensions and wiring layout

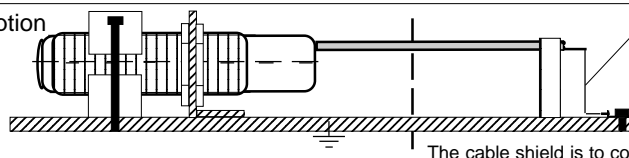
IRS/IRN-15N/P S157/S160/S180:



The functions DI and VA are optional.

1/white	IRS/IRN-15.	IRS/IRN-15.-DI
2/brown	+24VDC	+24VDC
3/green	0V	0V
4/yellow	Output	Output
5/grey	VA-Output	VA-Output
6/pink	Pot A (S 160)	Pot A (S 160)
7/blue	Pot B (S 160)	Pot B (S 160)
8/red	NC	DI-Input
S157: Pins 5 + 6 = NC	FE	FE

## Equipotential Bonding prescription for Ex Devices:



The end of the cable must be connected outside the hazardous location. Check the reliable, noncorrosive holding of the protection earth connection.

## Operating Manual / EC - Declaration of Conformity:

### Ex protection:

#### General regulations for all types of Ex devices:

It is necessary to take into consideration the valid international and national rules and regulations. The maximum rated supply voltage  $U_m = 30VDC$  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. Other than original manufacturer, additional optical lenses are not allowed in hazardous locations. In Ex zones 20/21 and 22, 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.

**Types: IRD-..** are applicable in Ex zones 1, 2 and 20/21, 22. For the zones 20/21 only the front part (optical lens) can be mounted inside the zone 20. The rear part with the cable must be in the zone 21.

**Types: IRN-..-GD** are only applicable in Ex zones 2 & 22 hazardous locations. 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 8-298/xx (Straight type) RKTW/RKWTH 8-298/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 socket must be fitted, when the connection cable is not 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 IR-...-N/P

The sensor works basically as proximity switch on diffuse optical reflections. If the sensor detects reflected light, the LED shows red and the output switches on +24VDC (P types) or 0V (N types). If no reflected light will be recognized, the output switches to 0V (P types) or +24VDC (N types). The push-pull output allows to connect the load to +24VDC or 0V.

#### Optional pollution indication output, series "VA":

The VA output will be activated by polluted lenses or reduced optical input signal. If only reduced optical input signal will be detected, the LED shows yellow and the pollution indication output will be activated. If no light can be detected both outputs are switched OFF and the LED shows red. If strong light is detected only the standard output is switched ON, the pollution indication output is switched OFF and the LED shows green.

#### Optical power adjustment by the external potentiometer 1k $\Omega$ , only S160:

With the potentiometer the sensor can be adapted at different requirements. THE SENSOR MUST NOT BE CONNECTED AT THE SUPPLY VOLTAGE WITHOUT WIRED EXTERNAL POTENTIOMETER! THE MAXIMUM VALUE OF THE EXTERNAL POTENTIOMETER MUST BE EQUAL OR LESS THEN 1k $\Omega$ . The terminal Pot B is internal connected at 0V. The series S157 is provided with a fixed at the sensor mounted potentiometer.

#### 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.

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

For a correct function the sensor must be enabled for at minimum  $\geq 7.5ms$  (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.

#### Optical range

The nominal range is defined on white paper A4, 80g. The range will be influenced by the color, kind of surface and shape 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 0 and 20 must only be driven by ATEX approved sensors with limited optical output power at DMT 99 ATEX 056.

#### Maintenance

Protect the sensor 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.

#### Safety Informations

The dismounting of the connector safety lock device while the supply voltage is connected is hazardous! The mounting of the sensor in dusty locations without fixed cordset or protection cap results in a high ignition risk. The sensors types IRS/IRN/IRD-.. must not be used for Accident-Prevention! In worst case of disturbance, the output 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. ATEX118a, EX-RL(BGR104), ElexV, TrbF, TRD, UVV, BetrSichV(ATEX137), Einzel-RL 1999/92/EG.

#### Standards met:

- EN 60079-0:2004, EN 60079-1:2004, EN 60079-15, EN 60079-28:2007, EN 60241-0:2004, EN 61241-1:2004;
- EN 60529:2000, EN 60950-1:2006;
- 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: 98/37/EC
- RoHS: 2002/95/EC
- Low Voltage Directive: 73/23/EWG, 93/68/EWG
- EMC: 89/336/EWG, 91/263/EWG, 92/31/EWG, 93/68/EWG
- Tech. File Rev.: AN-MAT-08-EX-E056

#### General Notes

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.

#### CE Declaration of Conformity

Certification, series IRD-..: DMT 99 ATEX E 056  
Certification, series IRN-..: Declaration of conformity by manufacturer at 94/9/EC. Tech File No: AN-MAT-08-EX-E056.  
ATEX certification of quality type production of Ex devices at the directive 94/9/EC Certification No: BVS 03 ATEX ZQS / E118  
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

IRSND-15-S160-GD\_e8,2009-10-28/HB

## Diffuse reflective photoelectric sensors IRS/IRN/IRD-2X(-GD) 10KHZ (S160)

IRD-..



II 2G Ex d IIC T6  
II 1/2D Ex tD A20/21 IP67 T90°C

Housing M30

- Applicable with different types of fibre optics
- Type IRD, applicable in Ex Zones 1, 2, 20/21, 22
- Type IRN, applicable in Ex Zones 2
- Short response time, 10kHz

IRN-...-GD



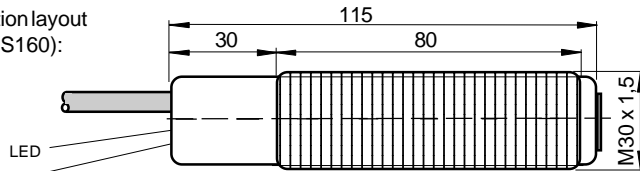
II 3G Ex nA IIB T4

Type	IRS-2X 10KHZ (S160)	IRN-2X-G 10KHZ (S160)	IRD-2X-GD 10KHZ (S160)																																																												
<b>Technical Data</b>																																																															
Type of Ex protection Gas, at 94/9/EG	None	II 3G Ex nA IIB T4	II 2G Ex d IIC T6																																																												
Type of Ex protection Dust, at 94/9/EG	None	None	II 1/2D Ex tD A20/21 IP67 T90°C																																																												
Applicable in Ex zones	None	2	1, 2, 20/21, 22																																																												
Rated sensing distance	20cm ( on white paper, A4, 80g)																																																														
Sensing distance adjustment	Potentiometer at the device / S160: External potentiometer 1kΩ																																																														
Light source	Infrared LED, 880nm																																																														
Optical output power																																																															
Directional angle	5° to 15°																																																														
Response time	45us / 11.1kHz																																																														
Power reset time	20ms																																																														
Power supply voltage	24 VDC +-10%, Um = maximum 30VDC																																																														
Current consumption	80mA																																																														
Output type	Smart power switch (push-pull)																																																														
Current switching	100mA, short circuit protected																																																														
Input, only types IR-..-DI (Disable input)	PNP compatible, Ri 10kΩ																																																														
Housing	M30, brass, nickel plated. Lens cover: Borosilicate glass																																																														
Enclosure rating at EN 60529	IP 54	IP 67	IP67																																																												
Shock and vibrating resistance	Vibration: 30g over 20Hz to 2kHz. Shock:50g for each direction (X, Y, Z)																																																														
Operating and storage temperature range TA	-10°C < TA < +40°C																																																														
Connection cable, jacket	PVC	PUR/TPE																																																													
Connection cable	3G/4Gx0.5mm2, L=3m Wires colored	4G or 5Gx0.5mm2, shielded, L=5m Wires numbered																																																													
Connection cable, IRD-2X-GD-10KHZ S160	7G x 0.5mm <sup>2</sup> , Vollflex NUM CY, shielded, L= 5m																																																														
Socket, IRS/IRN-2X 10KHZ S99	Socket M12, Lumberg RSF 5, 5 terminals																																																														
Socket, IRS/IRN-2X 10KHZ S160	Socket M12, Lumberg RSF 8, 8 terminals																																																														
Accessories included, all types	- 2 nuts M30 (or 1 clamp, on request)																																																														
Accessories, only IRN-2X-G 10KHZ S99 + S160	- 1x Safety lock device, mount at the cable connection, for locking the connection - 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 - 1x Protection cap for the sensor socket.																																																														
Accessories, only ATEX devices with potentiometer	- 1x Spare safety screw with packing ring for potentiometer sealing																																																														
Options	- IR- DI: With emitter disable input - IRS/IRN S99: Socket M12, Lumberg RSF 5 - IRD S160: External potentiometer at the cable end for sensitivity adjustment. - IRS/IRN S160: Connection for external potentiometer at the socket M12																																																														
Wiring for external potentiometer: (Only S160)	<p>P ext. = max. 1kR</p> <p>Lead Pot A</p> <p>Lead Pot B(-)</p> <p><b>SENSOR MUST NOT BE DRIVEN WITHOUT CONNECTED EXTERNAL POTENTIOMETER!</b></p>																																																														
Function and LED display	<p>Light barrier with fibre optics: Beam not interrupted</p> <p>Proximity switch with fibre optic: Reflection detected, LED=ON</p>	<p>Light barrier with fibre optics: Beam interrupted</p> <p>Proximity switch with fibre optic: No reflection detected, LED=OFF</p>																																																													
Connection for Light-ON function:	<table border="1"> <thead> <tr> <th></th> <th>IRN/IRD</th> <th>IRD S160</th> <th>IRS</th> <th>IRS/IRN S99</th> <th>IRS/IRN S160</th> </tr> </thead> <tbody> <tr> <td>+24VDC</td> <td>1</td> <td>1</td> <td>brown</td> <td>1</td> <td>1</td> </tr> <tr> <td>0V</td> <td>2</td> <td>2</td> <td>blue/grey</td> <td>3</td> <td>2</td> </tr> <tr> <td>Output</td> <td>3</td> <td>3</td> <td>black</td> <td>4</td> <td>3</td> </tr> <tr> <td>DI (optional) (4)</td> <td>4</td> <td>4</td> <td>grey</td> <td>--</td> <td>4</td> </tr> <tr> <td>POT A (S160)</td> <td>--</td> <td>5</td> <td>--</td> <td>--</td> <td>5</td> </tr> <tr> <td>POT B (S160)</td> <td>--</td> <td>6</td> <td>--</td> <td>--</td> <td>6</td> </tr> <tr> <td>NC</td> <td>--</td> <td>7</td> <td>--</td> <td>--</td> <td>7</td> </tr> <tr> <td>PE</td> <td>yel-gr</td> <td>yel-gr</td> <td>yel-gr</td> <td>5</td> <td>8</td> </tr> <tr> <td>Cable shield</td> <td>white</td> <td>white</td> <td>white</td> <td></td> <td></td> </tr> </tbody> </table>		IRN/IRD	IRD S160	IRS	IRS/IRN S99	IRS/IRN S160	+24VDC	1	1	brown	1	1	0V	2	2	blue/grey	3	2	Output	3	3	black	4	3	DI (optional) (4)	4	4	grey	--	4	POT A (S160)	--	5	--	--	5	POT B (S160)	--	6	--	--	6	NC	--	7	--	--	7	PE	yel-gr	yel-gr	yel-gr	5	8	Cable shield	white	white	white				
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IR-..-DI (with optional Disable Input)	<p>Uin: 18V-26.4VDC, DI=+24V=Disable</p> <p>Response time: &lt;=50us</p> <p>Hold time: &gt;=100us, DI = 0V=Enable</p>																																																														

IRSND-2X-10KHZ-S160\_e2.2009-01-23/HB

Dimensions, connection layout  
 IRD-2X-GD-10KHZ (S160):  
 IRN-2X-G-10KHZ:  
 IRS-2X-10KHZ:

IRN:  
 Potentiometer  
 with dustproof  
 packing screw



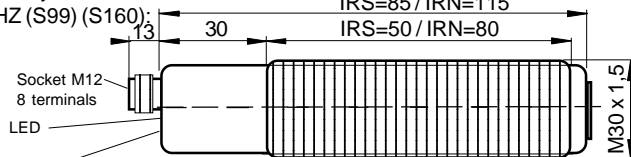
	IRD S160	IRS
+24VDC	1	1
0V	2	2
Output	3	3
DI, optional	(4)	4
Pot A	--	5
Pot B	--	6
NC	--	7
PE	yel-gr	yel-gr

Dimensions, connection layout

IRS/IRN-2X(-G) 10KHZ (S99) (S160):

IRN: Dust  
 protection  
 cap for the  
 socket

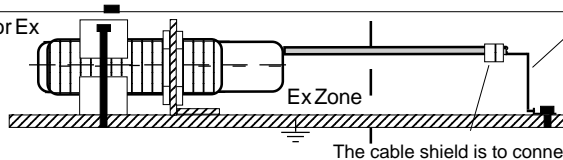
IRN:  
 Potentiometer  
 with dustproof  
 packing screw



The DI function is optional

	IRS/IRN S99	IRS/IRN S160
+24VDC	1	1
0V	2	2
Output	3	3
DI, optional	4	4
Pot A	--	5
Pot B	--	6
NC	--	7
PE	yel-gr	8

Equipotential Bonding prescription for Ex Devices:



The end of the cable must be connected outside the hazardous location. Check the reliable, noncorrosive holding of the protection earth connection.

The cable shield is to connect to PE or 0V (-) of the supply voltage

ATEX RELATED MARKINGS ON THE EX DEVICES:

CE 0158  
 Type: IRD-2X-GD 10KHZ (S160)  
 Type: IRN-2X-G 10KHZ (S99/S160)  
 Type IRD: EC Certification of conformity:  
 Type IRN: Declaration by manufacturer at 94/9/EC:  
 TA: -10°C < TA < +40°C  
 Date of construction: Numeral 4 to 7 of the serial number



Manufacturer with address  
 II 2G Ex d IIC T6,  
 II 1/2D Ex tD A20/21 IP67 T90°C  
 II 3G Ex nA IIB T4  
 DMT 99 ATEX E 056  
 Tech File No: AN-MAT-02-EX-E056.  
 Electrical data according to the chart

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

#### Mounting prescriptions

##### Ex protection:

##### General regulations for all types of Ex devices:

It is necessary to take into consideration the valid international and national rules and regulations (EN 60079-14). The maximum rated supply voltage  $U_m = 30VDC$  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. Other then original manufacturer, additional optical lenses are not allowed in hazardous locations. In Ex zones 20/21 and 22, 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.

**Types IRD-2X-GD 10KHZ (S160)** are applicable in Ex zones 1, 2 and 20/21, 22. For the zones 20/21 only the front part (optical lens) can be mounted inside the zone 20. The rear part with the cable must be in the zone 21.

**Types IRN-2X-G 10KHZ (S99 / S160)** are only applicable in the Ex zone 2 hazardous locations. 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 5/8-298/xx (Straight type) RKTW/RKWTH 5/8-298/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 socket must be fitted, when the connection cable is NOT 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 IR.-2X(-GD) 10KHZ (S99, S160)

The sensor works basically as proximity switch on diffuse optical reflections. By changing the polarity of the supply voltage, the output function will be inverted. If the sensor detects reflected light, the LED shows red and the output switches on 0VDC or +24VDC dependent of the polarity of the supply voltage. If no reflected light will be recognized, the LED distinguished and the output switches on +24VDC or 0V dependent of the polarity of the supply voltage. The load must be connected 0V or +24VDC. The sensor will be influenced by other alternating light sources. Protect the sensing area an the sensor against alternating light sources.

##### Sensitivity adjustment with the external potentiometer 1kR, only Type S160

Use the potentiometer to adjust the sensor at different marking discs, POF, mechanical and other arrangements. Set the potentiometer as well, that the output signal will be free of failures over the operating range. The sensor must not be driven without connected potentiometer. If no potentiometer is connected the emitter LED may be destroyed. The maximum rating for the potentiometer is 1 kR. The lead Pot B is internal connected to 0V.

##### 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. The response time is 50us. If only one sensor is activated in the same time, a mutual influence is precluded. The sensor must be activated for  $\geq 100us$ .

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

##### Sensing distance / sensitivity

The nominal range is defined on white paper A4, 80g. The range will be influenced by the color, kind of surface and shape 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 0 and 20 must only be driven by ATEX approved sensors with limited optical output power at DMT 99 ATEX 056!

##### Maintenance

No special maintenance is required. If the lenses becomes dirty, they should be cleaned with a non-aggressive cleaning liquid. Equipment must only be repaired by the manufacturer.

##### Safety instructions

The dismantling of the connector safety lock device while the supply voltage is connected is hazardous! The mounting of the sensor in dusty locations without fixed cordset or protection cap results in a high ignition risk. The sensor IRS/IRN/IRD-.. 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: ATEX118a, EX-RL(BGR104), EleXV, TrbF, TRD, UVV, BetrSichV(ATEX137), Single directive 1999/92/EC Standards met:

- EN 60079-0:2004, EN 60079-1:2004, EN 60079-15, EN 60079-28:2007, EN 60241-0:2004, EN 61241-1:2004;
- EN 60529:2000, EN 60950-1:2006;
- EN 61000-4-2 to EN 61000-4-6, EN 61000-6-1/-2, EN 61000-6-4;
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- Machine Directive: 98/37/EG
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- Low Voltage Directive: 73/23/EWG, 93/68/EWG
- EMC: 89/336/EWG, 91/263/EWG, 92/31/EWG, 93/68/EWG
- Tech. File Ref.: AN-MAT-02-EX-E056

##### General Notes

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

Type IRD-...-GD: EC type certification. No: DMT 99 ATEX E 056  
 Type IRN-...-G: Declaration of conformity by manufacturer at 94/9/EC.  
 Tech File No: AN-MAT-02-EX-E056.

ATEX certification of quality type production of Ex devices at the directive 94/9/EC Certification No: BVS 03 ATEX ZQS / E118  
 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 9001:2000 with the ATEX module "Production", declares:

Hans Bracher, Matrix Elektronik AG