

# GARDIX fail-safe inductive sensor ISS/ISN/ISD-15-NB(-GD)

Safety device according to the machine directive 2006/42/EC, short form data sheet

When installing and operating the sensor, it is necessary to take into consideration



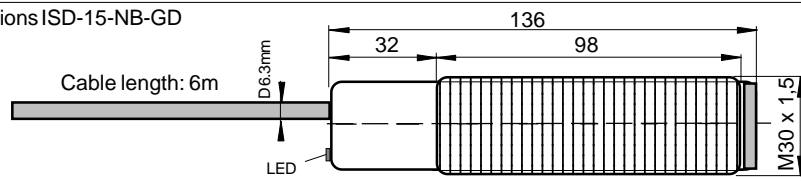
ISD-10-NB-GD:  
II 2G Ex d IIC T5  
II 1/2D Ex tD A20/A21 IP67 T100°C

the complete operating manual.

- Housing M30, NOT embeddable mounting method
- PDDB according to EN 60947-5-3
- Type ISN: For use in Ex Zones 2 and 22
- Type ISD: For use in Ex Zones 1, 2 and 20/21, 22

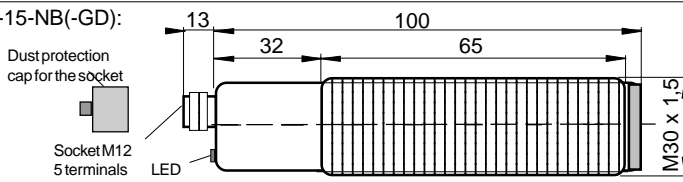
Technical Data	Type	ISS-15-NB	ISN-15-NB-GD	ISD-15-NB-GD
Type		SRP/CS - SREC, fail-safe inductive sensor PDDB, I1A30AP1		
Performance Level (PL), EN 13849-1		PL <sub>e</sub>		
Safety category, EN 13849-1		4		
Safety integrity level, EN 62061		SILCL 3		
Safety-related reliability PFHd [1/h]		2.47 x 10 <sup>-8</sup>		
MTTFd [Years]		100		
DC/CCF/Cat.		99% / 92 / 4		
Type of Ex protection Gas, 2014/34/EU	NONE	II 3G Ex nA IIB T4		II 2G Ex d IIC T5
Type of Ex protection Dust, 2014/34/EU	NONE	II 3D Ex tD A22 IP67 T135°C		II 1/2D Ex tD A20/21 IP67 T100°C
Applicable in Ex zones	NONE	1, 22		1, 2, 20/21, 22
Installation method		not embeddable mountable		
Rated operating distance sn,		15mm, (on steel 37, (sn x 3) <sup>2</sup> x 1mm), at non flush mounting, at EN 60947-2-5		
Enablezone		>=3mm ... <=11mm, (on steel 37, (45mm x 45mm x 1mm)		
Hysteresis		0.5-1.5mm		
Safe switching off distance s(ar)		45mm		
Repeatability		<100um		
Supply voltage U <sub>e</sub>		24VDC +10% (Power supply type PELV at EN 60204, item 6.4.2)		
Absolute maximum supply voltage U <sub>i</sub>		30VDC		
Rated insulation voltage		75VDC/50VAC		
Current consumption		35mA		
Maximum power dissipation		0.98W		
Response time to safety request		20ms		
Power up delay time		200ms		
OSSD		2 x PNP (A1 and A2)		
Output voltage at 24 V		compatible with EN 61131-2 inputs type 1, 2, 3		
Voltage drop		< 2V, (70mA)		
Current rating		70mA		
Short-circuit protection		yes		
Display		LED green (OSSD=ON), LED red (OSSD=OFF)		
Housing		M30, brass, nickel plated / Sensing area: Synthetic, PEEK mod.		
Enclosure rating, EN 60529		IP67		
Ambient working temperature range T <sub>amb</sub>		+5°C < T <sub>amb</sub> < +40°C		
Storage temperature range		-10°C ... +60°C		
EMC, shock and vibration resistance		at EN 60947-5-2		
Connection cable		--		4+PE x 0,5mm <sup>2</sup> , shielded, TPU, leads numbering marked, jacket: TPU, diameter: 6.3mm, length: 6m
Socket		M12, 5-wires, Lumberg RSF-5		
Accessories		- 2x nuts M30. (Optional 1x clamp)		
Accessories, only ISN-15-B-GD, included		- 1x Safety lock device, mount at the cable connection, for locking the connection. - 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, only ISS/ISN-15-B(-GD)		- Single ended cordset, types RKTS 5-298/xx or RKWTH 5-298/xx, Lumberg, NOT INCLUDED		
Options		- Other cable lengths on request - ISD-15-NB-GD-S223: Housing stainless steel 316ss		
Function and LED indication		<p>Object detected, LED green</p>		<p>No object detected, LED red</p>
Output with dynamic test function Object detected, Outputs switched ON		2 x PNP-Outputs, Transistors conducted.		2 x PNP-Outputs, Transistors open. <p>Safe state</p>
+VDC 0V Outputs inactive no object detected				
Installation: Sensors for non flush mounting arrangement have the highest operating distance, but a part of the parasitic lateral electromagnetic field can disturb the safe function. Lateral protection plates or other metallic objects must not influence the Sensor. For safe function a lateral free space around the sensor must be guaranteed. The series IS*-15-NB(-GD), are sensors for <b>not flush (embeddable) mounting</b> . The required lateral free space is (A=15mm).		IS*-15-NB(-GD): For not embeddable installation method	Other sensors for embeddable installation method	
		A=laterale distance: 15mm		A=0mm
ATEX RELATED MARKINGS ON THE SENSOR: CE 0158 Device type Device type Certification number:	Manufacturer with address ISD-15-NB-GD ISN-15-NB-GD BVS 07 ATEX E 044 X	Electrical data according to the chart Date of production: Numbers 5 to 8 of the serial number (Year/Week) II 2G Ex d IIC T5, II 1/2D Ex tD A20/A21 IP67 T100°C II 3G Ex nA IIB T4, II 3D Ex tD A22 IP67 T135°C T <sub>amb</sub> : +5° < T <sub>amb</sub> < +40°C		
Equipotential bonding grounding prescription:	<p>The cable must be protected against damages</p> <p>The end of the cable must be connected outside the hazardous location. Check the reliable, noncorrosive holding of the protection earth connection.</p> <p>The cable shield is to connect to PE in a wide area.</p>			

Dimensions ISD-15-NB-GD



Wire number	ISD-15-NB-GD
1	+24VDC
2	0V
3	OSSD A1
4	OSSD A2
yellow-green	PE/PA
white	Cable shield

Dimensions ISS/ISN-15-NB(-GD):



Wiring ISS/ISN-15-NB(-GD):	Socket-Pin	Function
1/brown		+24VDC
2/white		OSSD A1
3/blue		0V
4/black		OSSD A2
5/grey		PE/PA

**Operating manual, short form / EU/EC-Declaration of Conformity:**

**Accident prevention:**

**Definite Application:**

The PDDB ISS/ISN/ISD-15-NB(-GD) is a fail-safe inductive sensor conform to the machine directive 2006/42/EC. The sensor detects non-contact metallic objects and is provided for the protection of humans and machines. The outputs (OSSD) will be only unblocked, when metallic objects are detected in the enable range. The fail-safe inductive sensor must only be operated with fail-safe relay or other fail-safe equipment. When installing and operating the sensor, it is necessary to take into consideration the complete operating manual. The sensor must be installed, connected and put into operation only by qualified electrician trained in safety technology. The outputs (OSSD) must not be connected direct to the machinery circuit. The outputs (OSSD) of the sensor must only be connected at emergency stop relay or other approved electronic safety devices. The installation must be protected against defeating. The sensor reacts to metal objects, e.g. the frame of a safety door. Other metal objects that are intended to enable the sensor must not be allowed to enable the sensor, either intentionally or unintentionally. Use the sensor only in the specified environmental conditions. The sensor must only be repaired by the manufacturer. Tampering with the sensor is not allowed. Disconnect the sensor externally before handling it. Also disconnect any supplied relay load circuits. The applicable standards for the corresponding application must be complied with. For installations the requirements according to EN 60204 must be observed. After power-up a complete function and safety test must be executed. Also without supply voltage, leaking currents up to 2mA are possible. All connections and installations must be executed at safety fundamental rules. It must be ensured, that the machinery residuals off after a safe switch-off or a defect of the sensor.

**Installation prescriptions for Ex hazardous locations:**

It is necessary to take into consideration the valid international and national rules and regulations (EN 60079-14). Do not exceed the maximum ratings. The local equipotential bonding have to be done. The protective earth (PE/PA) is solid connected with the housing and the cable shielding. 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. The maximum rated input voltage  $U_m = 30VDC$  must not be exceeded.

Type ISD-15-NB-GD: Only for use in Ex zones 1, 2, 20/21, 22. For the zones 20/21 only the front part (sensitive area) can be mounted inside the zone 20. The rear part with the cable must be in the zone 21.

Type ISD-15-NB-GD-S223: Only for use in Ex zones 1, 2, 21, 22.

Type ISN-15-NB-GD: Only for use in Ex zones 2, 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) or RKWTH 5-298/xx (Right angle type), are allowed ONLY. It is necessary to take into consideration the mounting prescription of the connector manufacturer. In dusty locations, the protection cap for the sensor socket must be fitted, when no connection cable is connected.

**Additional safety information related Ex protection:**

BVS 07 ATEX E 044 X: X = The plastic part of the housing (sensitive area) must be protected against direct sunlight and UV irradiation.

**General mounting prescriptions:**

It must be ensured that all requirements of the respective application correspond to the requirements stated in these and the complete operating manual instructions. The sensor can only be NON flush mounted. Because the sensor reacts to metal objects, it must be ensured, that other metal objects not can enable the sensor, either intentionally or unintentionally (EN 1088). A horizontal mounting is to prefer. The distance to lateral protection plates must be greater than 15mm. Electrolytic fluids, graphitized greases or other magnetizable substances can disturb the correct function. All post-switched circuits must also be certificated for the required safety level. 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. The maximum allowed capacitance at the outputs must be  $\leq 470nF$ .

**Function:**

When a metallic object is entering the detection field, both dynamic tested outputs (OSSD) becomes active (switching ON). Is no object detected both outputs becomes inactive (safe state, OFF). If metallic or other permeable objects are positioned near or direct ( $\leq 3mm$ ) on the sensitive

area of the sensor, both outputs are also switching OFF. The fail-safe inductive sensors of the series ISS/ISN/ISD-15-B(-GD) are built in a 2-channel different redundancy. Failures and disturbances results to outputs are switching OFF and the LED is blinking red. The safe-state is the same as no object is detected. (Output is switching OFF). The emergency OFF state is only resettable by separating the supply voltage.

**Chemical resistance:**

The sensor must not be exposed to the following substances: Formic Acid, Chlorosulfonic Acid, Chronic Acid conc., Hydrochloric Acid, Hydrobromic Acid (100%), Oluem, Azotic Acid, Sulphuric Acid, Bromine, Chlorine, Ferric(III)-chlorid, Fluorine, Iodine, Sodium (hot), concentrated Phenol.

**Maintenance:**

The sensor does not require any special maintenance. Magnetic precipitations must be cleared. Equipment must only be repaired or serviced by the manufacturer.

**General notes to the operating distance:**

The nominal operating distance  $s_n$  (EN60947-2-5) does not take into account production tolerances and influences of temperature or voltage. The safe operating distance  $s_a$  is the minimal reachable operating distance on steel 37 (45mmx45mmx1mm) on all mounting arrangements. On other materials or smaller objects a reduction factor must be taken into account.

Material	Reduction factor
Steel 37	1
Stainless steel	0,8
Aluminum	0,4

Safety distance  $s_d$ : An inductive sensor is safe switched OFF, when the distance between sensor and actuator plate is greater than  $3 \times$  nominal distance  $s_n$ .

**General safety instructions:**

Small or bad magnetizable parts, placed direct on or near the sensitive area results not to the near range switching-off.

ISN-15-NB-GD: "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. When installing and operating with the sensor, it is necessary to take into consideration the relevant international and other national regulations: EN 60204, EN 60079-14, single directive 1999/92/EC

The sensors are conform to the following directives and standards: Machine directive: 2006/42/EC, ATEX directive: 2014/34/EU, EMC directive: 2014/30/EU, RoHS directive: 2011/65/EU, EN 60947-5-1/A2:2015-05, EN 60947-5-2:2014-01, EN 60947-5-3:2014-12, EN 13849-1/A1:2013-09, EN 62061/A2:2015-02; EN 60079-0:2006, EN 60079-1:2004, EN 60079-15:2010, IEC 60241-0:2006, EN 61241-1:2004; EN 60529:2014, EN 61326-3-1:2015-06.

**General notes, disposal:**

We reserve the right to modify our equipment. Our equipment is designed in accordance with the RoHS directive. It neither emit or contain any damaging or siliconized substances and use a minimum of energy and resources. No longer usable or irreparable units must be disposed of in accordance with local waste disposal regulations.

**EC/EU Declaration of conformity, short-form**

Fail-safe: PDDB in accordance with EN 60947-5-3. Declaration by manufacturer according to the machinery directive 2006/42/EC.

ATEX type ISD: II 2G Ex d IIC T5, II 1/2D Ex tD A20/A21 IP 67 T100°C. Certification number: BVS 07 ATEX E 044 X, DEKRA EXAM GmbH, Zertifizierungsstelle, Carl-Beyling-Haus, Dinendahlstrasse 9, D-44809 Bochum, CE 0158.

ATEX type ISN: II 3G Ex nA IIB T4, II 3D Ex tD A22 IP67 T135°C. ATEX declaration by manufacturer according to 2014/34/EU. ATEX certification of quality type production of Ex devices according to the ATEX directive 2014/34/EU, CE 0158. Certification No: BVS 15 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 Management System ISO 9001:2008 with the ATEX module "Production", declares:

Hans Bracher, Matrix Elektronik AG

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