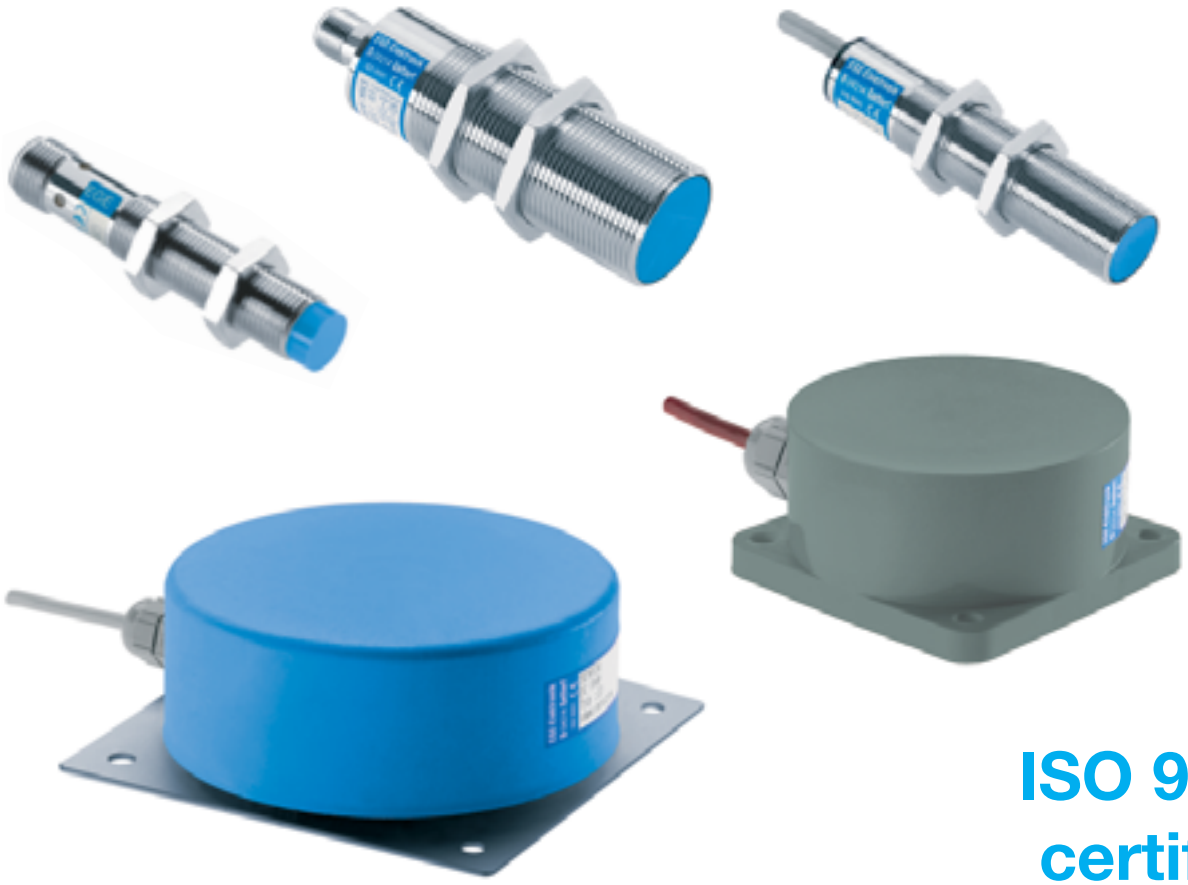
Special-Sensors
for
Automation

Demanding environment

Functional safety at

- **Power supply pulses up to 4 KV**
- **Frequency converter spectra**
- **High frequency radiation up to 30 V/m**



ISO 9001 certified

Demanding environment

Electromagnetic interference

Power supplies to electrical equipment and sensors increasingly employ technologies which generate pulsed currents or voltages, or currents or voltages with superimposed oscillation (so-called pulse-width modulation).

In contrast to sinusoidal waveforms, the voltage or current pulses used have very steep slopes/edges that can generate a very broadband interference spectrum, which can cover a spectrum of up to 30 MHz. High frequency technologies in a frequency range up to 2 GHz, which are used for the wireless transmission of digital signal sequences, are also problematic.

In addition to this electromagnetic noise, communication networks transmitting control signals or data can be a further source of interference, e.g. power lines (digital signal transmission through conventional power supply lines), WLAN (wireless local area networks), or cell phone, TV, and radio networks, which use antennas as repeaters.

These sources can generate interference voltages which wirelessly impair nearby signal lines.

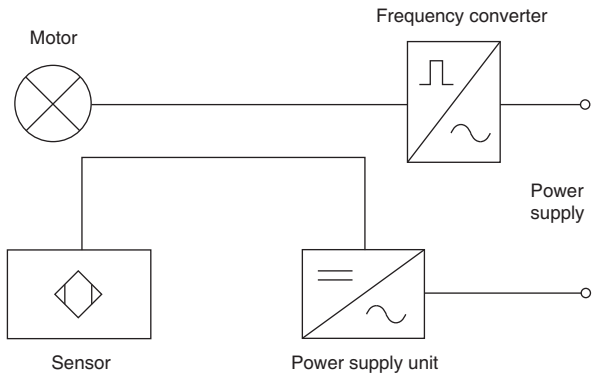


Fig. 1: Parallel power supply lines to motor and sensor

The parallel guide of a sensor supply line and motor power supply can be problematic if the motor is driven by a frequency converter (Fig. 1). For example, when using a 20 m supply line, a 1 kW motor can generate an interference spectrum peak voltage of more than 200 volts in the 20 m line running parallel and in close proximity. (Fig. 2)

The power supply line of a sensor works like a receiving antenna; the same applies to fieldbus lines.

It "collects" the surrounding interference signals and, depending on line length and interference frequency, transfers them directly to the sensor electronics. Depending on interference strength and frequency, they can impair the sensor electronics.

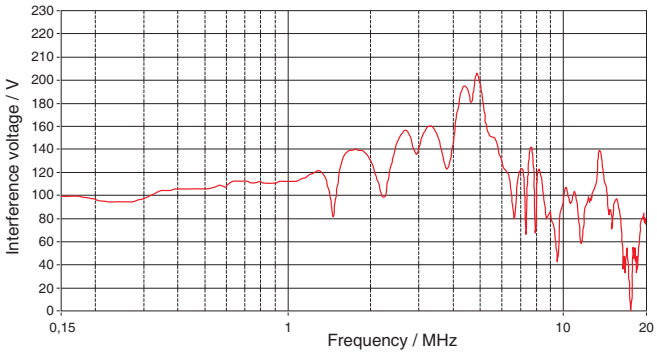


Fig. 2: Interference voltage induced in a sensor supply line, installed parallel to a frequency-converted motor supply line

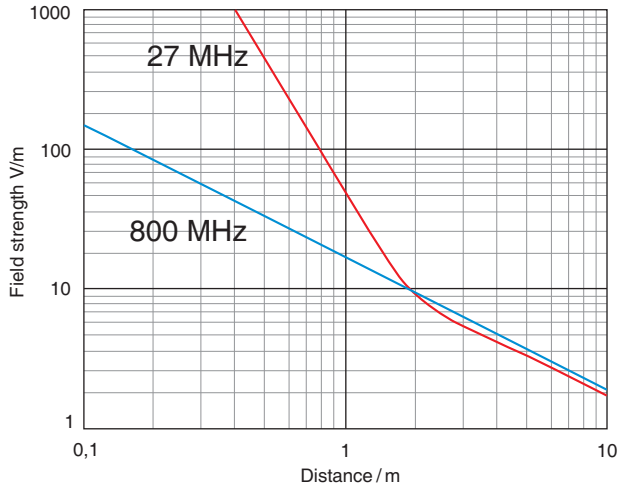


Fig. 3: Progression of the electrical field strength based on distance to transmitting antenna with a transmitter power of 10 watts

Radio transmitters generate very high field strengths near transmitting antennas, which can significantly interfere with sensor functions. Apart from a direct effect on the sensor, the sensor supply line also contributes to this problem since it works like a receiving antenna. The interference potential of the effective field strength is specified in V/m (volt per meter). The EMC standard requires an interference resistance of up to 5 V/m for proximity switches.
Interferences from walkie-talkies or separately installed transmitting antennas can significantly exceed this value (fig. 3).

Demanding environment

The effects of the electromagnetic interferences transmitted to the sensor line can be reduced by selecting high quality power supplies equipped with integrated interference filters.
Sensors used in extreme environmental conditions can also be fitted with rejection filters and suitable components that meet higher demands than those of customary standards.

The “demanding environment” sensors offered by EGE are designed specifically for rugged environments in which sensors are exposed to high electrical, electromagnetic or mechanical stress.

Stress types which typically occur in various industrial environments are often not covered by standard inspection and test methods.

Therefore, EGE has developed special test methods that are adapted to testing sensors for critical applications. This has resulted in sensor designs that are suitable for use in almost any environment.

Table 1 provides an overview of some data on EGE proximity switches that exceed standard requirements.

Interference	Standard	Increased I	Increased II
Needle voltage pulse (burst)	2000 V	4000 V	5000 V
Voltage spikes (surge)	500 V	1000 V	2000 V
Electrostatic voltage pulse (ESD)	4 KV	12 KV	12 KV
High frequency transference to supply line	5 V/HF	20 V/HF	50 V/HF
High frequency radiation to sensor environment	5 V/m	30 V/m	200 V/m
Frequency converter for interference spectra overcoupling	–	200 Vss	400 Vss
Cycled DC power supplies for pulse superimposition	–	100 mV	500 mV

Table 1: Selecting higher requirements for proximity switches

Valid standards

EN 60947-5-2
Control units; low voltage control units, auxiliary switch, proximity switch

EN 61000-6-4
Electromagnetic compatibility (EMC)
Interference emissions in the industrial area

EN 61000-6-2
Electromagnetic compatibility (EMC)
Generic standards immunity for industrial environments

EN 61000-4-2 (ESD)
Electrostatic discharging immunity

EN 61000-4-3 (HF radiated)
Radiated radio-frequency electromagnetic field immunity test

EN 61000-4-4 (Burst)
Electrical fast transient / burst immunity test

EN 61000-4-5 (Surge)
Surge immunity test

EN 60529
Protective systems, IP-designation

EN 60079-0
Electrical apparatus for potentially explosive atmospheres – General requirements

EN 60079-11
Electrical apparatus for potentially explosive atmospheres – Intrinsic safety "i"

EN 61241-0
Electrical apparatus for use in the presence of combustible dust – General requirements

Authorisations

TÜV-cert
TÜV-cert-Zertifizierungsstelle - Deutschland
(technical monitoring certification agency - Germany)

Certification

TÜV-cert ISO 9001:2008

TÜV-cert Quality control production
Attachment IV of the EU-Guidelines 94/9/EG

TÜV Nord Re-cancelling certificate according to EN 10204

Inductive Sensors

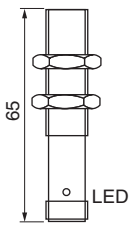
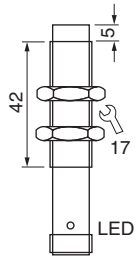
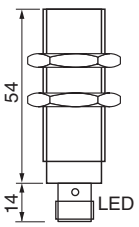
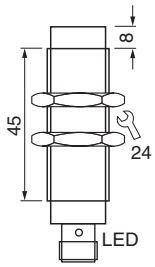
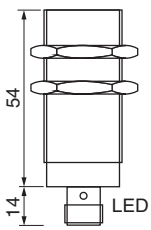
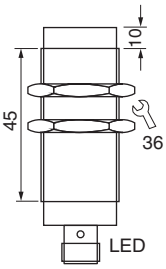
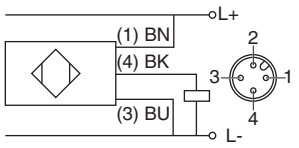
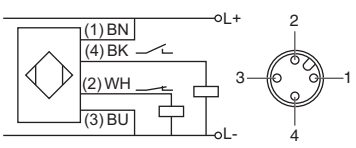
Demanding environment

Series IGM - Proximity switches

M12 / M18 / M30
Metal sleeve

DC 10...48 V

Short form

Design	DC PNP • M12x1		DC PNP • M18x1		DC PNP • M30x1.5	
Dimensions Installation flush (f) non flush (nf)						
Operating distance sn [mm]	2 f	4 nf	5 f	8 nf	10 f	15 nf
Switching output						
ID-No.	P31246	P31247	P31250	P31251	P31254	P31255
Type	IGMU 02 GSP	IGMU 04 GSP	IGMU 05 GSOP	IGMU 08 GSOP	IGMU 10 GSOP	IGMU 15 GSOP
Supply voltage [V]	10...48 DC					
Switching current [mA]	200					
Short circuit proof	•					
Reverse protection	•					
Voltage drop [V]	2					
Current consumption [mA]	2.5					
Switching frequency [Hz]	500					
Ambient temperature [°C]	–25...+75					
EMC-class	A					
Protection [EN 60529]	IP 67					
LED display	•					
Housing material	Br-Ni / PBT					
Connection	M12 connector					
						
Accessories	connecting cable SLG 4-2 (Z00445)					

Inductive Sensors

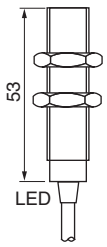
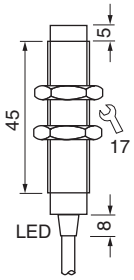
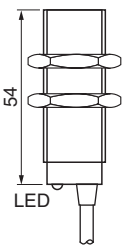
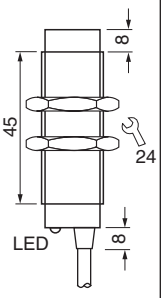
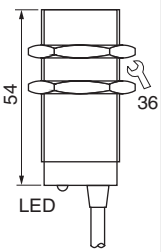
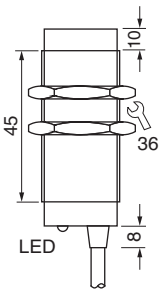
Demanding environment

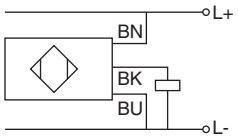
Series IGM - Proximity switches

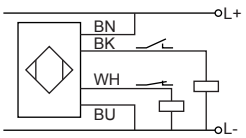
M12 / M18 / M30
Metal sleeve

DC 10...48 V

Short form

Design	DC PNP • M12x1		DC PNP • M18x1		DC PNP • M30x1.5	
Dimensions Installation flush (f) non flush (nf)						
Operating distance sn [mm]	2 f	4 nf	5 f	8 nf	10 f	15 nf
Switching output						
ID-No.	**P31244**	**P31245**	**P31248**	**P31249**	**P31252**	**P31253**
Type	IGM 02 GSP	IGM 04 GSP	IGM 05 GSOP	IGM 08 GSOP	IGM 10 GSOP	IGM 15 GSOP
Supply voltage [V]	10...48 DC					
Switching current [mA]	200					
Short circuit proof	•					
Reverse protection	•					
Voltage drop [V]	2					
Current consumption [mA]	2.5					
Switching frequency [Hz]	500					
Ambient temperature [°C]	–25...+75					
EMC-class	A					
Protection [EN 60529]	IP 67					
LED display	•					
Housing material	Br-Ni / PBT					
Connection	2 m PVC-cable 3x0.34 mm²		2 m PVC-cable 4x0.34 mm²			





Inductive Sensors

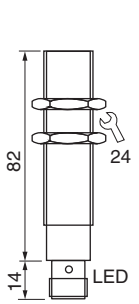
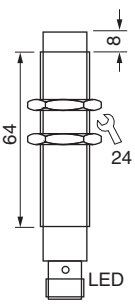
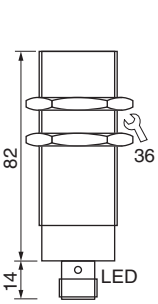
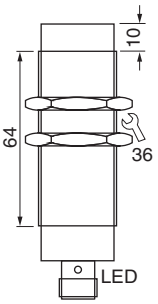
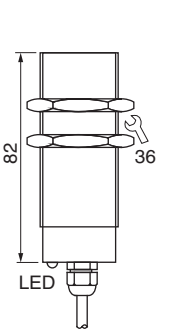
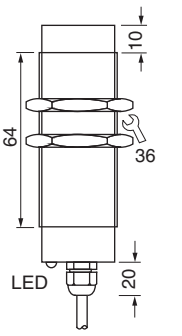
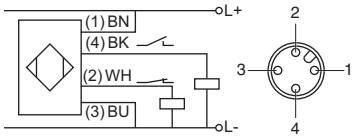
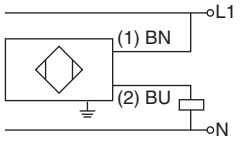
Demanding environment

Series IGM - Proximity switches

M18 / M30
Metal sleeve

DC 10...48 V
AC 20...250 V

Long form

Design	***DC PNP • M18x1***		***DC PNP • M30x1.5***		***AC • M30x1.5*** *programmable*	
Dimensions						
Installation flush (f) non flush (nf)						
Operating distance sn [mm]	5 f	8 nf	10 f	15 nf	10 f	15 nf
Switching output						
ID-No.	**P31258**	**P31259**	**P31262**	**P31263**	**P30015**	**P30019**
Type	IGMU 005 GSOP	IGMU 008 GSOP	IGMU 010 GSOP	IGMU 015 GSOP	IGMS 010 WP	IGMS 015 WP
Supply voltage [V]	10...48 DC				20...250 AC	
Switching current [mA]	200				400	
Short circuit proof	•				3000 mA/10 ms	
Reverse protection	•				–	
Voltage drop [V]	2				6	
Minimum load current [mA]	–				5	
Current consumption [mA]	2.5				2.5	
Switching frequency [Hz]	500				25	
Ambient temperature [°C]	–25...+75				–25...+75	
EMC-class	A				A	
Protection [EN 60529]	IP 67				IP 67	
LED display	•				•	
Housing material	Br-Ni / PBT				Br-Ni / PBT	
Connection	M12 connector				PG-plug connection 2 m PVC-cable 3x0.5 mm²	
						
Accessories	connecting cable SLG 4-2 (Z00445)					

Inductive Sensors

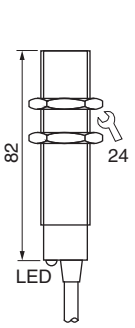
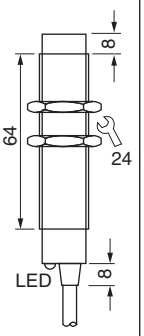
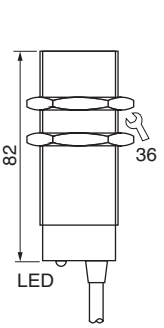
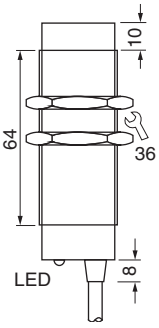
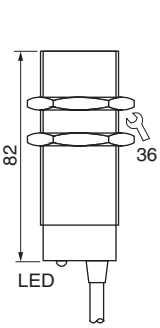
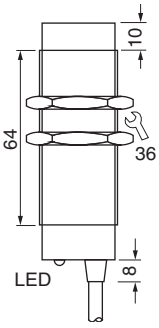
Demanding environment

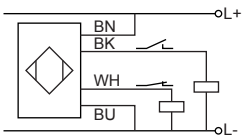
Series IGM - Proximity switches

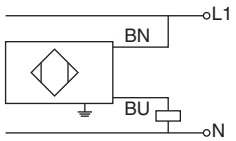
M18 / M30
Metal sleeve

DC 10...48 V
AC 20...250 V

Long form

Design	DC PNP • M18x1		DC PNP • M30x1.5		AC • M30x1.5	
Dimensions						
Installation flush (f) non flush (nf)						
Nennschaltabstand sn [mm]	5 f	8 nf	10 f	15 nf	10 f	15 nf
Switching output						
ID-No.	**P31256**	**P31257**	**P31260**	**P31261**	**P30016**	**P30020**
Type	IGM 005 GSOP	IGM 008 GSOP	IGM 010 GSOP	IGM 015 GSOP	IGM 010 WS	IGM 015 WS
Supply voltage [V]	10...48 DC				20...250 AC	
Switching current [mA]	200				400	
Short circuit proof	•				3000 mA/10 ms	
Reverse protection	•				–	
Voltage drop [V]	2				6	
Minimum load current [mA]	–				5	
Current consumption [mA]	2.5				2.5	
Swiching frequency [Hz]	500				25	
Ambient temperature [°C]	–25...+75				–25...+75	
EMC-class	A				A	
Protection [EN 60529]	IP 67				IP 67	
LED display	•				•	
Housing material	Br-Ni / PBT				Br-Ni / PBT	
Connection	2 m PVC-cable 4x0.34 mm²				2 m PVC-cable 3x0.5 mm²	





Inductive Sensors

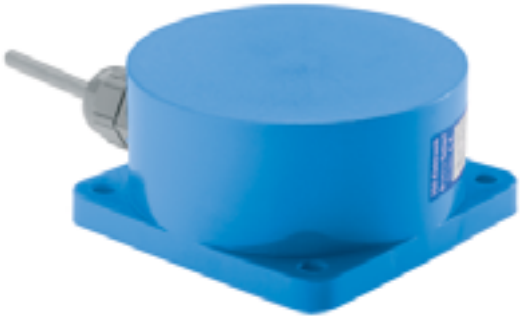
Demanding environment

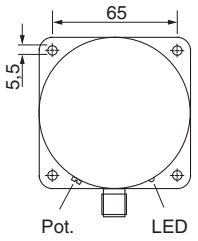
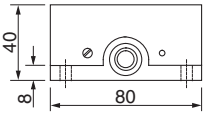
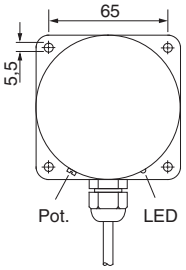
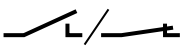
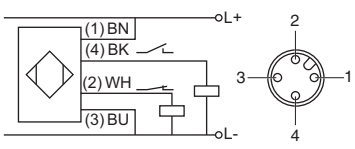
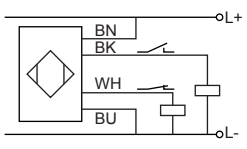
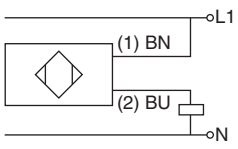
Series ID - Proximity switches

Ø80 mm

DC 10...55 V
AC 20...250 V

Sensing range adjustable



Design	DC PNP Ø80 mm antivalent	DC PNP Ø80 mm antivalent	AC Ø80 mm programmable
Dimensions Installation non flush (nf)			
Operating distance sn [mm] (Adjustable range)	55 nf (25…80)	55 nf (25…80)	55 nf (25…80)
Switching output			
ID-No.	**P31264**	**P31265**	**P31266**
Type	IDU 080 GSOP	ID 080 GSOP	IDS 080 WP
Supply voltage [V]	10...55 DC	10...55 DC	20...250 AC
Switching current [mA]	400	400	400
Short circuit proof	•	•	3000 mA/10 ms
Reverse protection	•	•	–
Voltage drop [V]	2	2	6 eff.
Minimum load current [mA]	–	–	8
Current consumption [mA]	4	4	2.5
Switching frequency [Hz]	20	20	10
Ambient temperature [°C]	–25...+75	–25...+75	–25...+75
EMC-class	A	A	A
Protection [EN 60529]	IP 67	IP 67	IP 67
LED display	•	•	•
Housing material	PBT	PBT	PBT
Connection	M12 connector	2 m PVC-cable, 4x0.5 mm²	PG-plug connection 2 m, 2x0.75 mm², PVC
			
Accessories	connecting cable SLG 4-2 (Z00445)		

Inductive Sensors

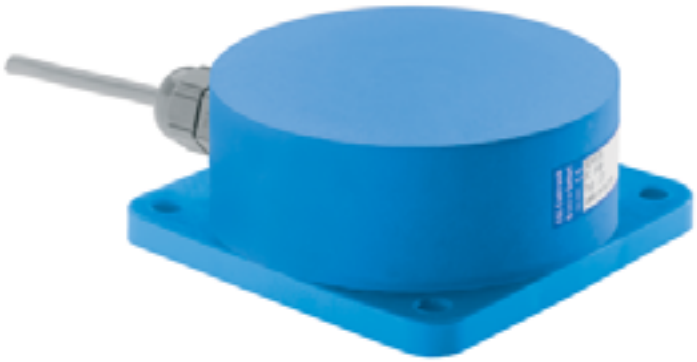
Demanding environment

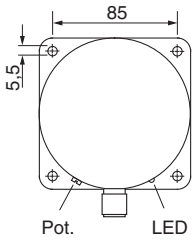
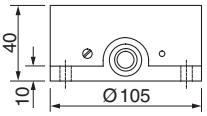
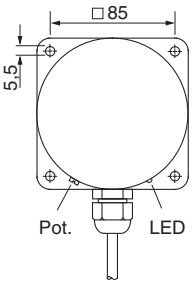
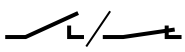
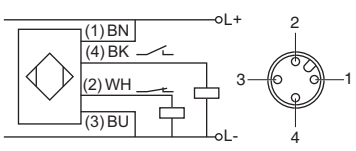
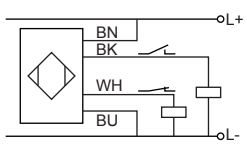
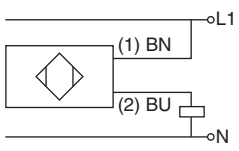
Series ID - Proximity switches

Ø 105 mm

DC 10...55 V
AC 20...250 V

Sensing range adjustable



Design	DC PNP Ø 105 mm antivalent	DC PNP Ø 105 mm antivalent	AC Ø 105 mm programmable
Dimensions Installation non flush (nf)			
Operating distance sn [mm] (Adjustable range)	100 nf (20…110)	100 nf (20…110)	70 nf (20…110)
Switching output			
ID-No.	**P31267**	**P31268**	**P31269**
Type	IDU 100 GSOP	ID 100 GSOP	IDS 100 WP
Supply voltage [V]	10...55 DC	10...55 DC	20...250 AC
Switching current [mA]	400	400	400
Short circuit proof	•	•	3000 mA/10 ms
Reverse protection	•	•	–
Voltage drop [V]	2	2	6 eff.
Minimum load current [mA]	–	–	8
Current consumption [mA]	4	4	2.5
Switching frequency [Hz]	20	20	10
Ambient temperature [°C]	–25...+75	–25...+75	–25...+75
EMC-class	A	A	A
Protection [EN 60529]	IP 67	IP 67	IP 67
LED display	•	•	•
Housing material	PBT	PBT	PBT
Connection	M12 connector	2 m PVC-cable, 4x0.5 mm²	PG-plug connection 2 m, 2x0.75 mm², PVC
			
Accessories	connecting cable SLG 4-2 (Z00445)		

Inductive Sensors

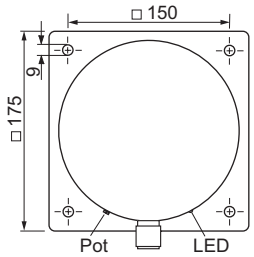
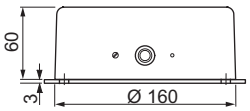
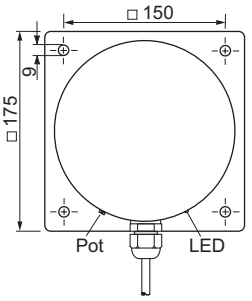
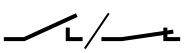
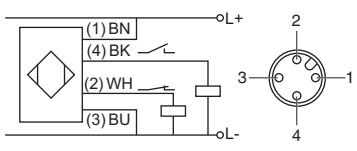
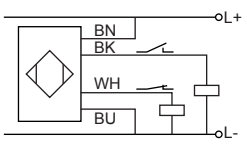
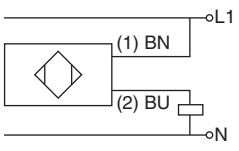
Demanding environment

Series ID - Proximity switches

Ø 160 mm

DC 10...55 V
AC 20...250 V

Sensing range adjustable

Design	DC PNP Ø 160 mm antivalent	DC PNP Ø 160 mm antivalent	AC Ø 160 mm programmable
Dimensions Installation non flush (nf)			
Operating distance sn [mm] (Adjustable range)	120 nf (20…150)	120 nf (20…150)	120 nf (20...150)
Switching output			
ID-No.	**P31270**	**P31271**	**P31272**
Type	IDU 160 GSOP	ID 160 GSOP	IDS 160 WP
Supply voltage [V]	10...55 DC	10...55 DC	20...250 AC
Switching current [mA]	400	400	400
Short circuit proof	•	•	3000 mA/10 ms
Reverse protection	•	•	–
Voltage drop [V]	2	2	6 eff.
Minimum load current [mA]	–	–	8
Current consumption [mA]	4	4	2.5
Switching frequency [Hz]	20	20	10
Ambient temperature [°C]	–25...+75	–25...+75	–25...+75
EMC-class	A	A	A
Protection [EN 60529]	IP 67	IP 67	IP 67
LED display	•	•	•
Housing material	PBT / aluminium	PBT / aluminium	PBT / aluminium
Connection	M12 connector	2 m PVC-cable 4x0.5 mm²	PG-plug connection 2 m, 2x0.75 mm², PVC
			
Accessories	connecting cable SLG 4-2 (Z00445)		

Inductive Sensors

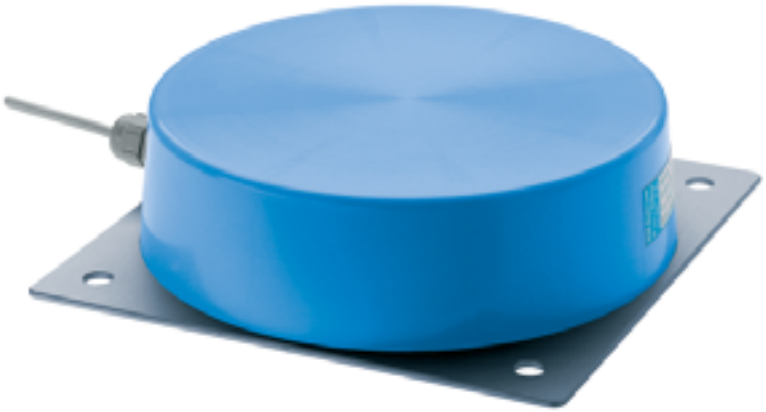
Demanding environment

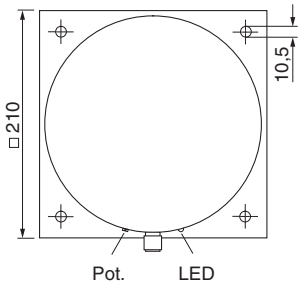
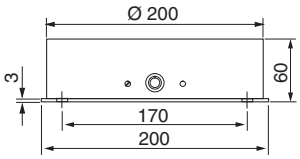
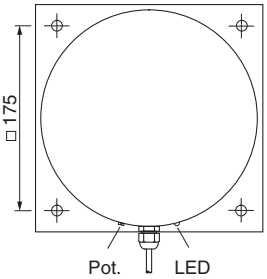
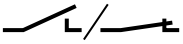
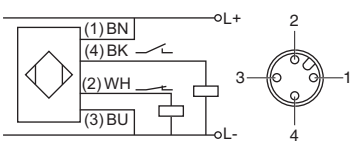
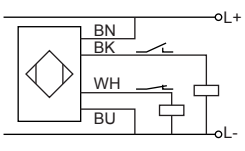
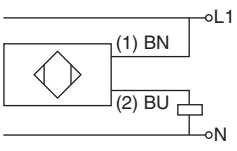
Series ID - Proximity switches

Ø 200 mm

DC 10...55 V
AC 20...250 V

Sensing range adjustable



Design	DC PNP Ø 200 mm antivalent	DC PNP Ø 200 mm antivalent	AC Ø 200 mm programmable
Dimensions Installation non flush (nf)			
Operating distance sn [mm] (Adjustable range)	140 nf (40…170)	140 nf (40…170)	140 nf (40…170)
Switching output			
ID-No.	**P31273**	**P31274**	**P31275**
Type	IDU 200 GSOP	ID 200 GSOP	IDS 200 WP
Supply voltage [V]	10...55 DC	10...55 DC	20...250 AC
Switching current [mA]	400	400	400
Short circuit proof	•	•	3000 mA/10 ms
Reverse protection	•	•	–
Voltage drop [V]	2	2	6 eff.
Minimum load current [mA]	–	–	8
Current consumption [mA]	4	4	2.5
Switching frequency [Hz]	20	20	10
Ambient temperature [°C]	–25...+75	–25...+75	–25...+75
EMC-class	A	A	A
Protection [EN 60529]	IP 67	IP 67	IP 67
LED display	•	•	•
Housing material	PBT / aluminium	PBT / aluminium	PBT / aluminium
Connection	M12 connector	2 m PVC-cable, 4x0,5 mm²	PG-plug connection 2 m, 2x0,75 mm², PVC
			
Accessories	connecting cable SLG 4-2 (Z00445)		

Inductive Sensors

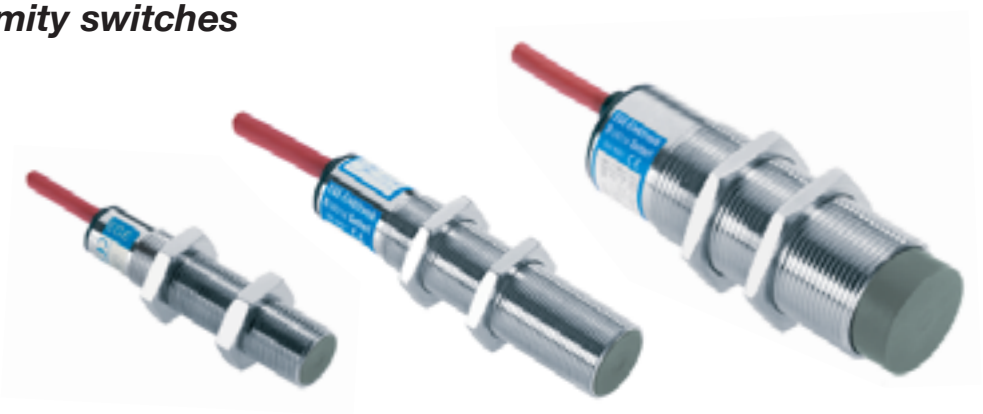
High temperature 120 °C

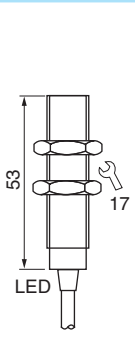
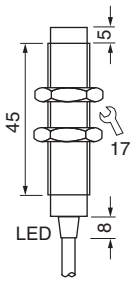
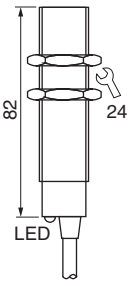
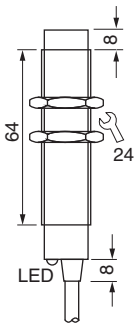
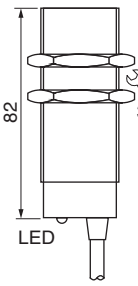
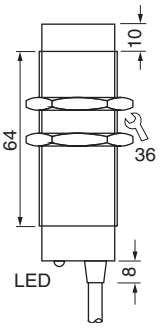
Series IGMT - Proximity switches

M12 / M18 / M30
Metal sleeve

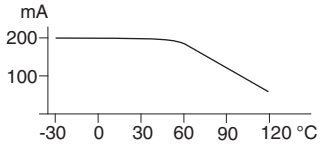
DC 10...48 V

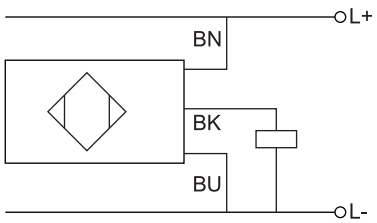
Enhanced temperature range –25 °C...+120 °C



Design	DC PNP • M12x1		DC PNP • M18x1		DC PNP • M30x1.5	
Dimensions						
Installation flush (f) non flush (nf)						
Operating distance sn [mm]	2 f	4 nf	5 f	8 nf	10 f	15 nf
Switching output						
ID-No.	**P31282**	**P31283**	**P31290**	**P31291**	**P31292**	**P31293**
Type	IGMT 02 GSP	IGMT 04 GSP	IGMT 005 GSP	IGMT 008 GSP	IGMT 010 GSP	IGMT 015 GSP
Supply voltage [V]	10...48 DC					
Switching current [mA]	200					
Short circuit proof	•					
Reverse protection	•					
Voltage drop max. [V]	2					
Current consumption [mA]	4					
Switching frequency [Hz]	500					
Ambient temperature [°C]	–25...+120					
EMC-class	A					
Protection [EN 60529]	IP 67					
LED display	•					
Housing material	Br-Ni / PBT					
Connection	2 m Silicone-cable 3x0.34 mm²					

Switching current





Inductive Sensors

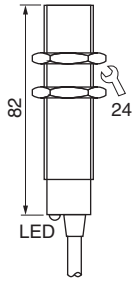
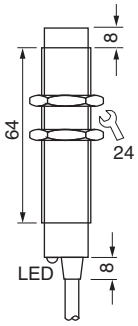
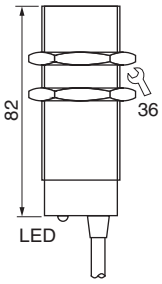
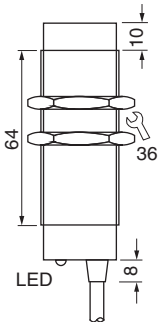
High temperature 120 °C

Series IGMT - Proximity switches

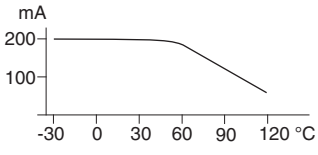
M18 / M30
Metal sleeve

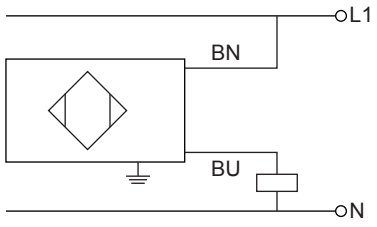
AC 20...250 V

Enhanced temperature range –25 ºC...+120 ºC

Design	AC • M18x1		AC • M30x1.5	
Dimensions				
Installation flush (f) non flush (nf)				
Operating distance sn [mm]	5 f	8 nf	10 f	15 nf
Switching output				
ID-No.	**P31118**	**P31119**	**P31120**	**P31121**
Type	IGMT 005 WS	IGMT 008 WS	IGMT 010 WS	IGMT 015 WS
Supply voltage [V]	20…250 AC			
Switching current [mA]	200			
Short circuit proof	–			
Reverse protection	–			
Voltage drop [V]	5			
Minimum load current [mA]	5			
Current consumption [mA]	2.5			
Switching frequency [Hz]	25			
Ambient temperature [°C]	–25...+120			
EMC-class	A			
Protection [EN 60529]	IP 67			
LED display	•			
Housing material	Br-Ni / PBT			
Connection	2 m Silicone-cable 3x0.75 mm²			

Switching current





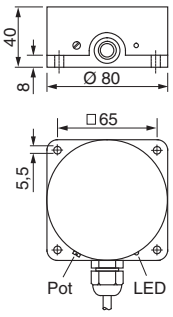
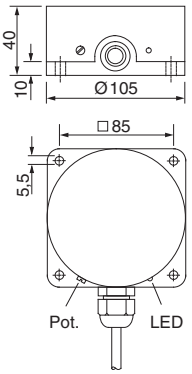
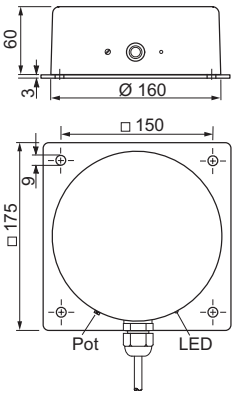
Inductive Sensors

High temperature 120 °C

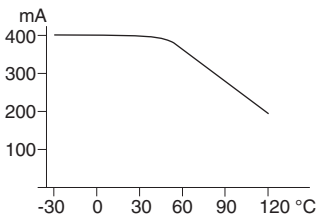
Series IDT - Proximity switches

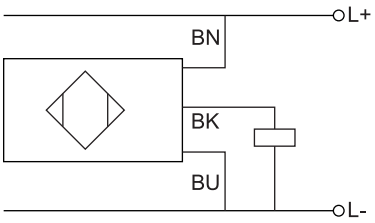
DC 10...55 V

Enhanced sensing range

Design	DC PNP • Ø80 mm	DC PNP • Ø105 mm	DC PNP • Ø160 mm
Dimensions			
Installation non flush (nf)			
Operating distance sn [mm]	50 nf	80 nf	110 nf
Switching output			
ID-No.	**P31276**	**P31277**	**P31278**
Type	IDT 080 GSP	IDT 100 GSP	IDT 160 GSP
Supply voltage [V]	10...55 DC		
Switching current [mA]	400		
Short circuit proof	•		
Reverse protection	•		
Voltage drop [V]	2		
Current consumption [mA]	4		
Switching frequency [Hz]	20		
Ambient temperature [°C]	–25...+120		
EMC-class	A		
Protection [EN 60529]	IP 67		
Housing material	PBT / aluminium		
Connection	2 m Silicone-cable 3x0.5 mm²		

Switching current



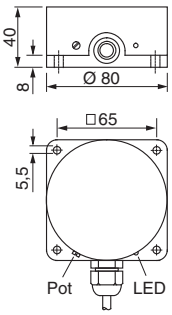
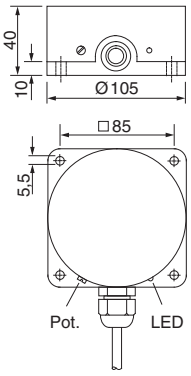
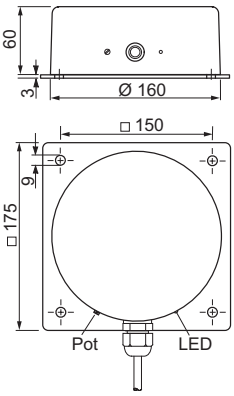


Inductive Sensors

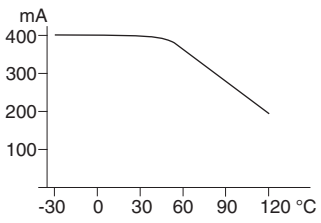
High temperature 120 °C

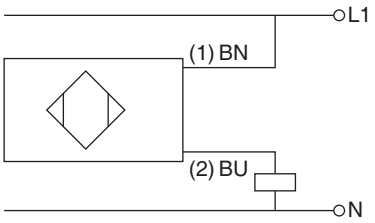
Series IDT - Proximity switches

AC 20...250 V

Design	AC • Ø80 mm	AC • Ø105 mm	AC • Ø160 mm
Dimensions Installation non flush (nf)			
Operating distance sn [mm]	45 nf	60 nf	100 nf
Switching output			
ID-No.	**P31279**	**P31280**	**P31281**
Type	IDT 080 WS	IDT 105 WS	IDT 160 WS
Supply voltage [V]	20...250 AC		
Switching current [mA]	400		
Short circuit proof	–		
Voltage drop approx. [V]	5 eff.		
Minimum load current [mA]	5		
Current consumption [mA]	2.5		
Switching frequency [Hz]	10		
Ambient temperature [°C]	–25...+120		
EMC-class	A		
Protection [EN 60529]	IP 67		
Housing material	PBT / aluminium		
Connection	2 m Silicone-cable 2x0.75 mm²		

Switching current





Headquarters
EGE-Elektronik
Spezial-Sensoren GmbH
Ravensberg 34
D-24214 Gettorf
Tel. +49 (0) 4346 / 41580
Fax +49 (0) 4346 / 5658

Internet: www.ege-elektronik.com

EGE-Elektronik ApS
Forstallé 79
DK-6200 Aabenraa
Tel. +45 70207271
Fax +45 70207272

EGE-Specialsensorer AB
Box 137
S-51223 Svenljunga
Tel. +46 32512060
Fax +46 32512064

Stork AS
Brynsveien 100
N-1352 Kolsås
Tel. +47 67176400
Fax +47 67176401

Woodhead Connectivity s.a.
57, Rue Jacquard - Z.I.
F-77400 Lagny Sur Marne
Tel. +33 164309136
Fax +33 164309105

Cematic-Electric B.V.
Postbus 777
NL-7550 AT Hengelo
Tel. +31 742433422
Fax +31 742913333

ICM Ital Control Meters Srl
Via della Valle 67
I-20048 Carate Brianza (Mi)
Tel. +39 0362 8052 00
Fax +39 0362 8052 01

Bibus Spain, S. L.
Avda. Ricardo Mella, 117D
ES-36330 Vigo
Tel. +34 986 247286
Fax +34 986 209247

Powelectrics Limited
Sandy Hill Park, Sandy Way
Amington, Tamworth
GB-Staffordshire B77 4DU
Tel. +44 1827310666
Fax +44 1827310999

Bachofen AG
Ackerstraße 42
CH-8610 Uster
Tel. +41 449441111
Fax +41 449441233

Trenka Industriebedarf
Handelsgesellschaft mbH
Czeija-Nissl Gasse 7
A-1211 Wien
Tel. +43 12782130-0
Fax +43 12782130-41

EMS Electronics Ltd.
Ballycarney, Green Road
IRL, Carlow
Tel. +353 599141768
Fax +353 599137988

Countapulse Controls
(PTY) LTD.
P.O.B. 40393
ZA-2022 Cleveland
Tel. +27 116157556
Fax +27 116157513

HITECH Ltd.
1-35-2 Simouma, Setagaya,
JPN-Tokyo 154-0002
Tel. +81 35430 2301
Fax +81 35430 2302

Micromax S&A P/L
5 Orangegrove Avenue
AUS-Unanderra NSW 2526
Tel. +61 2 4223 7600
Fax +61 2 4271 8091

Protek Teknik Elektrik Ticaret
ve Sanayi Ltd. Sti.
Okçumusa Cad. Kismet Han 94/2
TR-80020 Karaköy/Istanbul
Tel. +90 2122377982
Fax +90 2122354609

Sircon Controls Ltd.
5359 Timberlea Blvd., Unit 36,
Mississauga
CDN-Ontario L4W 4N5
Tel. +1 9052389505
Fax +1 9052388380

YUDEN ELECTRIC CO., LTD
No. 161, Sec. 2. Wen-Huah Rd.,
Panchiao City
Taipai County, Taiwan 22049
Tel. +886 2 2255 3721
Fax +886 2 2250 6016

Shanghai Beishidetian
Business Trade Co., Ltd.
4F, No. 88-1, Lane 7039,
Zhongchun Rd., Minhang Area
Shanghai City
Tel. +86 21 54887307
Fax +86 21 54887305

CSE-W. Arthur Fischer Ltd.
15 Polaris Place, Greenmount
NZ-East Tamaki, Auckland
Tel. +64 9 271 3810
Fax +64 9 265 1362

Kolektor Synatec d.o.o.
Vojkova ul. 8b,
PO Box 57
SI-5280 Idrija
Tel. +386 5 3720650
Fax +386 5 3720660