Inductive, photoelectric, capacitive and ultrasonic sensors

GENERAL CATALOG

CONTRINEX

NEW

- Up to 500 bar high-pressure-resistant inductive sensors with long operating distances (series 500P)
- Up to 500 bar high-pressure-resistant inductive miniature sensors (series 500P)
- High-pressure-resistant all-metal sensors (series 700P)
- Color sensor (series 4050)
- Fiber-optic amplifier with digital display & IO-Link (series 3066)
- Photoelectric analog sensors (series 3130)
- High-precision background suppression (series 4050)

INTRODUCTION

CONTRINEX

Contrinex has been manufacturing inductive and photoelectric sensors since its foundation in 1972. From small beginnings, the company has grown, and now employs over 500 people worldwide, including 25 highly qualified R & D engineers. The Swiss multinational is specialized in the development, manufacture and worldwide sales of industrial sensors for factory automation. Contrinex operates production units in Switzerland, Hungary, China and Brazil, has its own sales offices in all the major markets, and is represented in over 60 countries.

SENSORS FOR PEAK PERFORMANCE

Many years ago, Contrinex was the first manufacturer to launch the now widespread **miniature inductive devices** diameter 3 mm to M5, now also available with an improved operating distance of 2.5 mm. The 3 mm diameter model (300 series), is still the smallest self-contained inductive sensor with built-in amplifier, light-emitting diode, protective circuit, etc. available on the market today.

Already in 1982, Contrinex introduced the first inductive devices with **long operating distances** (500 series), which had previously been considered impossible. Today, such devices are available from a number of suppliers, and form an important market segment. However, the new standard for operating distances introduced by Contrinex at that time has remained virtually unmatched by any other supplier.

In the meantime, Contrinex has launched another series of switches with characteristics far superior to those of conventional inductive sensors: **all-metal housings, long operating distances on steel** as well as **on non-ferrous metals** (series 700). These devices are also available for the **food and pharmaceutical industries**, as well as for **sea-water and high-pressure applications**.

For less demanding sensing tasks, Contrinex offers a comprehensive range of **standard devices** of the highest quality.

In addition, Contrinex **photoelectric sensors** set new benchmarks for high performance coupled with small dimensions. Apart from devices with highly efficient **background suppression**, sensors with **analog output** and fiber-optic **amplifiers with digital display**, the range comprises **miniature devices** with cylindrical light beam and well-defined operating range capable of reliable detection through holes and gaps.

For the detection of transparent or colored materials in solid, liquid, granular or powder state, Contrinex offers a large range of **ultrasonic sensors.**

In addition, the catalog includes a wide range of **capacitive sensors** in synthetic or metal housings. They are suitable for the detection of virtually all materials, even through non-metallic dividing walls.

QUALITY

If Contrinex sensors are held in high regard by its worldwide demanding clientele, it is not only because of their technical superiority, but also because of their uncompromising quality and reliability. This is achieved by involving all departments and all management levels in our ISO 9001:2008 and ISO 14001:2004 certified management system.

The strictest quality standards are applied to the manufacture of every Contrinex sensor. Nothing is left to chance. Only suppliers who also manufacture to the highest quality standards are qualified to deliver components. Before each component is released into production, it must pass our rigorous incoming inspection. At each production stage, intermediate testing is carried out. And before packing, highly developed automatic systems perform a comprehensive test on every switch, where all the important parameters are checked, documented and statistically analyzed. In addition, the entire manufacturing process is set up for full traceability using the most up-to-date computer technology. The consistently high quality of Contrinex sensors is certainly not just the result of pure coincidence!

SQS

Certificate

SQS herewith certifies that the company named below has a management system which meets the requirements of the normative bases specified below.

Contrinex AG
CH-1762 Givisiez

Certified area

Whole company

Field of activity

Industrial Electronics

Normative bases

ISO 9001:2008	Quality Management System
ISO 14001:2004	Environmental Management System

Swiss Association for Quality and Management Systems SQS
Bernstrasse 103, CH-3052 Zollikofen
Issue date: March 2, 2010

This SQS Certificate is valid up to and including March 1, 2013
Scope number 19
Registration number 11397

X. Edelmann, President SQS

T. Zahner, Managing Director SQS

SCESm 001

Swiss Made

Partner of IQNet

DOCUMENTATION

Documentation concerning the products in this catalog, detailed data sheets, application details, importable dimensional drawings, presentation of special products and new developments not included in this catalog, additional technical information, information concerning quality, safety and standards, addresses of our representatives, and much more can be found on our website: **www.contrinex.com**, the contents of which are continuously updated and extended.

WORLDWIDE

Contrinex sensors are sold in over 60 countries by experienced agents and well-qualified regional distributors. Well-managed local stocks ensure short delivery times. A list of our representatives is available on request.

RESEARCH AND DEVELOPMENT

Most Contrinex sensors are developed right up to the production stage by ourselves in our modern, well-equipped development laboratories. Amongst others, our facilities include:

- Computer simulators for analog and digital electronic circuits, optical systems, magnetic fields
- Climatic test systems (temperature and humidity)
- EMC test systems (interference generators, measuring instruments, measuring benches)
- Reliability test systems (operating condition simulation, temperature and humidity cycles)

MANUFACTURING

Most Contrinex sensors are manufactured in our own factories by highly trained and qualified staff. The key processes are ASIC technology, SMD assembly, die and wire bonding of semiconductor chips, plasma surface treatment, vacuum potting and ultrasonic welding.

QUALITY CONTROL

Every device undergoes a complete test cycle, using highly sophisticated automatic test systems, before leaving the factory. In addition, each switch is marked with a reference number, ensuring traceability to historical manufacturing and test information over a period of several years.

APPLICATIONS

Contrinex sensors are self-contained, non-contact position sensors. Not only do they not contain parts prone to mechanical wear, but they are also virtually insensitive to environmental influences. They are preferred for applications with exacting requirements, such as reliability, switch-point accuracy, switching frequency, durability, operating speed, etc. According to the physical principle used, a variety of detection possibilities can be realized:

- Inductive sensors react only to metal parts, and are thus insensitive to dirt, which is an advantage in many cases.
- Photoelectric sensors work with light, which results in long operating distances, and react also to non-conducting materials. Furthermore, these devices are best suited for adaption to specific applications.
- Capacitive sensors are suitable for applications where, for instance, non-conducting, transparent objects have to be detected, or where a clear difference in dielectric properties exclusively distinguishes the target from its background.
- Ultrasonic sensors are employed wherever distances have to be measured in air. They detect transparent as well as colored targets in the solid, liquid, granular or powder state.

FOR FURTHER INFORMATION: **WWW.CONTRINEX.COM**

INDUCTIVE SENSORS

HIGHLIGHTS:

- ✓ Analog sensors
- ✓ All-metal sensors for extreme environmental conditions (e.g. food industry, sea-water & high-pressure applications)
- ✓ High-pressure-resistant sensors (500 bar permanent pressure, 1000 bar peak pressure)
- ✓ Sealed sensors
- ✓ Sensors for temperatures up to 230 °C
- ✓ Miniature sensors
- ✓ Sensors with long operating distances

NEW:

- ✓ High-pressure-resistant sensors M12 with 2.5 mm operating distance
- ✓ High-pressure-resistant sensors M5 & M8
- ✓ High-pressure-resistant sensors for temperatures up to 100 °C
- ✓ 2-wire DC and AC/DC sensors

INDUCTIVE SENSORS

PROGRAM OVERVIEW

HOUSING SIZE	OPERATING DISTANCE	OUTPUT				
		PNP	NPN	NAMUR	2-wire (DC)	2-wire (AC/DC)
∅ 3 mm / M4	0.6 mm	✓	✓	✓		
	1 mm	✓	✓			
∅ 4 mm / M5	0.8 mm	✓	✓	✓		
	1.5 mm	✓	✓			
	2.5 mm	✓	✓			
5 x 5 mm	0.8 mm	✓	✓	✓		
	1.5 mm	✓	✓			
∅ 6.5 mm	1.5 mm	✓	✓	✓		
	2 mm	✓	✓			
	3 mm	✓	✓			
	4 mm	✓	✓			
∅ 8 mm / M8	1.5 mm	✓	✓	✓		
	1.5 mm				✓	
	2 mm	✓	✓		✓	
	2.5 mm	✓	✓		✓	
	3 mm	✓	✓			
	4 mm	✓	✓			
	6 mm	✓	✓			
8 x 8 mm	1.5 mm	✓	✓			
	2 mm	✓	✓			
	3 mm	✓	✓			
M12	2 mm	✓	✓		✓	✓
	4 mm	✓	✓		✓	✓
	6 mm	✓	✓			
	8 mm	✓	✓			
	10 mm	✓	✓			
M18	5 mm	✓	✓		✓	✓
	8 mm	✓	✓		✓	✓
	10 mm	✓	✓			
	12 mm	✓	✓			
	20 mm	✓	✓			
M30	10 mm	✓	✓		✓	✓
	15 mm	✓	✓		✓	✓
	20 mm	✓	✓			
	22 mm	✓	✓			
	40 mm	✓	✓			
40 x 40 mm	15 mm	✓	✓		✓	
	20 mm	✓	✓			
	35 mm	✓	✓		✓	
40 x 120 mm	15 mm	✓	✓		✓	
	40 mm	✓				
60 x 80 mm	50 mm	✓				
80 x 100 mm	65 mm	✓				

Detailed data sheets for these products can be found on the Contrinex website:

MOUNTING			SUPPLY VOLTAGE U_B			CONNECTION						PAGE (2-WIRE)
Embeddable	Quasi-embeddable	Non-embeddable	PNP / NPN	NAMUR 2-wire (DC)	2-wire (AC/DC)	Connector S8	Connector S12	Cable	Screw terminal	Single wires	All-metal housing	
✓			10 ... 30 VDC	7,7 ... 9 VDC		✓		✓				18 - 19 (110-111)
✓			10 ... 30 VDC			✓		✓				18 - 20
✓			10 ... 30 VDC	7,7 ... 9 VDC		✓		✓		✓		20 - 22 (111-112)
✓			10 ... 30 VDC			✓		✓				21 - 23
✓			10 ... 30 VDC			✓		✓				21 - 23
✓			10 ... 30 VDC	7,7 ... 9 VDC		✓		✓				24 (112-113)
✓			10 ... 30 VDC			✓		✓				24 - 25
✓			10 ... 30 VDC	7,7 ... 9 VDC		✓	✓	✓				25 - 27 (113)
✓			10 ... 30 VDC			✓	✓	✓				28 - 30
	✓		10 ... 30 VDC			✓	✓	✓				31
		✓	10 ... 30 VDC			✓		✓				31 - 32
✓			10 ... 30 VDC	7,7 ... 9 VDC		✓	✓	✓				32 - 35 (114)
✓				10 ... 65 VDC		✓	✓	✓				(115)
✓			10 ... 30 VDC	10 ... 65 VDC		✓	✓	✓				32, 35-38 (115-116)
		✓	10 ... 30 VDC	10 ... 65 VDC		✓	✓	✓				39 - 40 (116-117)
✓			10 ... 30 VDC			✓	✓	✓			✓	41 - 42
✓		✓	10 ... 30 VDC			✓	✓	✓				42 - 43
		✓	10 ... 30 VDC			✓	✓	✓			✓	44 - 45
✓			10 ... 30 VDC			✓		✓				45 - 46
✓			10 ... 30 VDC			✓		✓				46
	✓		10 ... 30 VDC			✓		✓				47
✓			10 ... 30 VDC	10 ... 65 VDC	20...265 VAC/10...320 VDC		✓*	✓			✓**	47 - 48 (117-119)
✓		✓	10 ... 30 VDC	10 ... 65 VDC	20...265 VAC/10...320 VDC		✓*	✓			✓**	48 - 50 (119-122)
✓	✓		10 ... 30 VDC				✓	✓			✓	50 - 51
	✓	✓	10 ... 30 VDC				✓	✓				51 - 53
		✓	10 ... 30 VDC				✓	✓			✓	53 - 54
✓			10 ... 30 VDC	10 ... 65 VDC	20...265 VAC/10...320 VDC		✓*	✓			✓**	55 (122-124)
	✓	✓	10 ... 30 VDC	10 ... 65 VDC	20...265 VAC/10...320 VDC		✓*	✓			✓**	56 - 58 (124-127)
✓			10 ... 30 VDC				✓	✓			✓	58 - 59
	✓		10 ... 30 VDC				✓	✓				59 - 60
		✓	10 ... 30 VDC				✓	✓			✓	60 - 62
✓			10 ... 30 VDC	10 ... 65 VDC	20...265 VAC/10...320 VDC		✓*	✓			✓**	62 - 63 (127-128)
		✓	10 ... 30 VDC	10 ... 65 VDC	20...265 VAC/10...320 VDC		✓*	✓			✓**	63 - 64 (129-130)
✓			10 ... 30 VDC				✓	✓			✓	64 - 65
	✓		10 ... 30 VDC				✓	✓				65 - 66
		✓	10 ... 30 VDC				✓	✓			✓	66 - 67
✓			15 ... 34 VDC		20...265 VAC/20...320 VDC		✓					68 (131)
✓			15 ... 34 VDC				✓					68
		✓	15 ... 34 VDC		20...265 VAC/20...320 VDC		✓					68 (131)
✓			15 ... 34 VDC		20...265 VAC/20...320 VDC				✓			69 (131)
		✓	10 ... 65 VDC						✓			69
		✓	10 ... 65 VDC						✓			69
		✓	10 ... 65 VDC						✓			69

*Connector 1/2" for 2-wire **on request (3-wire version)

INDUCTIVE SENSORS

PROGRAM OVERVIEW

SPECIAL SENSORS

HOUSING SIZE	OPERATING DISTANCE	OUTPUT			
		PNP	NPN	Analog	Changeover
ANALOG OUTPUT (SERIES 509)					
8 x 8 mm / M8	0 ... 4 mm			✓	
M12	0 ... 6 mm			✓	
M18	0 ... 10 mm			✓	
	0 ... 20 mm			✓	
M30	0 ... 20 mm			✓	
	0 ... 40 mm			✓	
ALL METAL (SERIES 700)					
M8	3 mm	✓	✓		
M8 / M12	6 mm	✓	✓		
M12 / M18	10 mm	✓	✓		
M18 / M30	20 mm	✓	✓		
M30	40 mm	✓	✓		
FOOD & SEA WATER (SERIES 700L)					
M12	6 mm	✓	✓		
M12 / M18	10 mm	✓	✓		
M18 / M30	20 mm	✓	✓		
M30	40 mm	✓	✓		
ALL METAL & HIGH-PRESSURE-RESISTANT (SERIES 700P)					
M12	1.5 mm	✓			
HIGH-PRESSURE-RESISTANT (SERIES 500P)					
M5	1 mm	✓	✓		
M8	1.5 mm	✓	✓		
M12	1.5 mm	✓	✓		✓
M12	2.5 mm	✓	✓		✓
M18	1.5 mm	✓	✓		
P20 (M14)	3.0 mm	✓	✓		
SEALED (SERIES E)					
∅ 4 mm / M5	0.6 mm	✓	✓		
M5	0.8 mm	✓			
M8	1.5 mm	✓			
∅ 6.5 mm / M8	2.5 mm	✓	✓		
HIGH TEMPERATURE					
M8	2 mm	✓	✓		
M12	3 mm	✓	✓		
	4 mm	✓	✓		
M18	5 mm	✓	✓		
	8 mm	✓	✓		
M30	10 mm	✓	✓		
	15 mm	✓	✓		
M50	20 mm	✓	✓		
	25 mm	✓	✓		

Detailed data sheets for these products can be found on the Contrinex website:

MOUNTING			SUPPLY VOLTAGE U_B	CONNECTION				MAX. AMBIENT TEMPERATURE T_A				PAGE (2-W.)
Embeddable	Quasi-emb.	Non-emb.	PNP / NPN	Connector S8	Connector S12	Cable	All-metal housing	100 °C	140 / 150 °C	180 °C	230 °C	
	✓		10 / 15 ... 30 VDC	✓	✓	✓						71 - 72
	✓		10 / 15 ... 30 VDC		✓	✓						72 - 73
	✓		10 / 15 ... 30 VDC		✓	✓						73 - 74
		✓	10 / 15 ... 30 VDC		✓	✓						75
	✓		10 / 15 ... 30 VDC		✓	✓						76 - 77
		✓	10 / 15 ... 30 VDC		✓	✓						77 - 78
✓			10 ... 30 VDC	✓	✓	✓	✓					80
✓		✓	10 ... 30 VDC	✓	✓	✓	✓					81 - 82
✓		✓	10 ... 30 VDC		✓	✓	✓					82 - 83
✓		✓	10 ... 30 VDC		✓	✓	✓					84 - 85
		✓	10 ... 30 VDC		✓	✓	✓					85
✓			10 ... 30 VDC		✓	✓	✓					87
✓		✓	10 ... 30 VDC		✓	✓	✓					87 - 88
✓		✓	10 ... 30 VDC		✓	✓	✓					89
		✓	10 ... 30 VDC		✓	✓	✓					90
✓			10 ... 30 VDC		✓	✓	✓					92
✓			10 ... 30 VDC			✓						94
✓			10 ... 30 VDC			✓		✓				94
✓			10 ... 30 VDC		✓	✓		✓				94 - 97
✓			10 ... 30 VDC		✓			✓				97 - 99
✓			10 ... 30 VDC		✓							99
✓			10 ... 30 VDC		✓	✓						99 - 100
✓			10 ... 30 VDC			✓						102
✓			10 ... 30 VDC			✓						102
✓			10 ... 30 VDC			✓						103
✓			10 ... 30 VDC			✓						103
✓			10 ... 30 VDC			✓			✓			105
✓			10 ... 30 VDC			✓			✓			105
		✓	10 ... 30 VDC			✓			✓			105
✓			10 ... 30 VDC			✓				✓	✓	106
		✓	10 ... 30 VDC			✓				✓		106
✓			10 ... 30 VDC			✓				✓	✓	107
		✓	10 ... 30 VDC			✓				✓	✓	107
	✓		10 ... 30 VDC			✓				✓	✓	108
		✓	10 ... 30 VDC			✓				✓	✓	108 - 109

TECHNOLOGY

Depending on the type, Contrinex inductive devices work according to one of **three different technologies.** All have in common the generation of an alternating magnetic field, which emanates from the sensing face. When a conductive, generally metallic, object enters into this field, the latter is influenced in a way that can be detected and evaluated by the built-in electronics.

OPERATING PRINCIPLES

CLASSIC INDUCTIVE SENSORS

The coil of a conventional circuit oscillator in the sensor generates a high-frequency magnetic field, which emanates from the sensing face. Any metallic object found in this field absorbs some of the energy, which is detected and evaluated by the built-in electronics (Fig. 1).

Ferromagnetic metals (steel, nickel, cobalt) absorb the most energy. The achievable operating distances are therefore greatest with these metals. Good conducting, non-ferromagnetic metals, such as aluminum, absorb less energy. As a result, operating distances are significantly lower (approx. 25...45% of those on steel).

This technology is used in 300, 400, 420, 600 and 620 series devices.

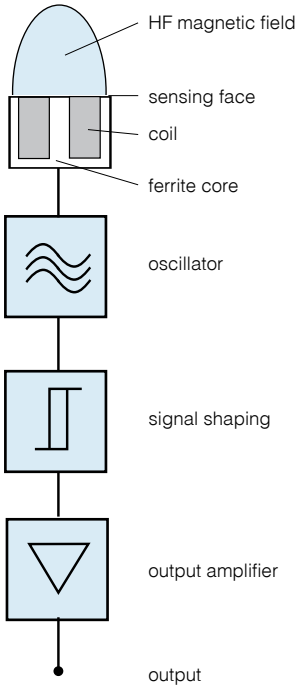


Fig. 1

SENSORS USING CONDIST® TECHNOLOGY

By means of a Contrinex patented **Condist® oscillator**, these sensors also generate a high-frequency magnetic field, which emanates from the sensing face (Fig.2). Again, the resulting effect is that any metallic object entering the field absorbs energy from it.

The oscillator and the subsequent signal evaluation circuit are however completely different, with the objective of achieving a significantly **better stability** with respect to environmental influences, in particular, temperature. The most important contribution to this comes from the Contrinex patented Condist® oscillator.

The improved stability permits the switch point to be further away, leading to **longer operating distances** (Fig. 3). The subsequent assemblies on the other hand are no different from those of sensors with standard operating distances. Material dependency is similar to conventional oscillators.

This technology is used in 500 and 520 series devices.

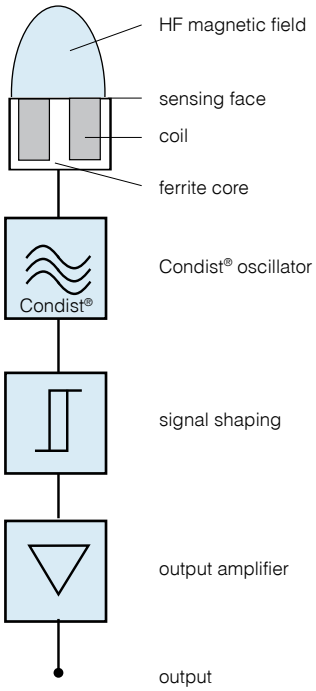


Fig. 2

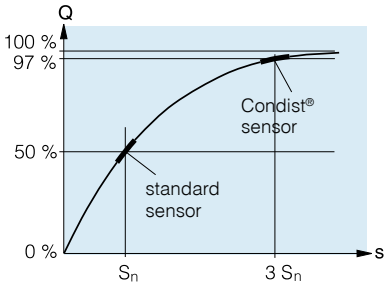


Fig. 3

SENSORS USING CONDET® TECHNOLOGY

These devices also function according to inductive technology. However, the coil which generates the magnetic field is not part of the oscillator (Fig. 4). Instead, the field is generated by periodic, short **transmitter current pulses**, which flow through the coil (Fig. 5). This field induces a voltage in the target, which, in turn, generates a current flow in it. When the transmitter current pulse is switched off, the current in the object dies away, causing a **voltage to be induced** in the transmitting coil (Fig. 6).

This voltage generates the signal required, and is in principle **independent of the field's energy loss**. Therein lies the fundamental advantage of this technology, since the field energy losses, which are evaluated in conventional sensors, are liable to a number of undesirable environmental and material influences.

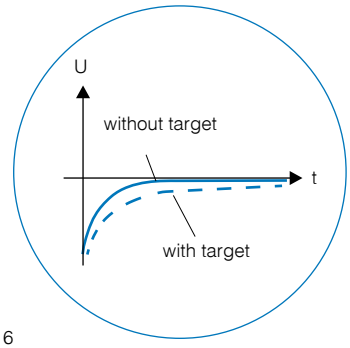


Fig. 6

The coupling between the target and the coil is rather **like a transformer**, and is hence **temperature independent** and only **slightly influenced by the target's material.** Only metals which are non-ferromagnetic and also have poor electrical conductivity give a reduced usable signal.

This technology is used in 700 series devices.

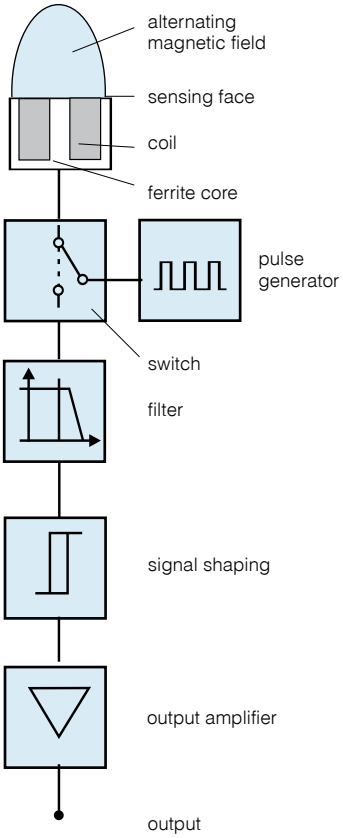


Fig. 4

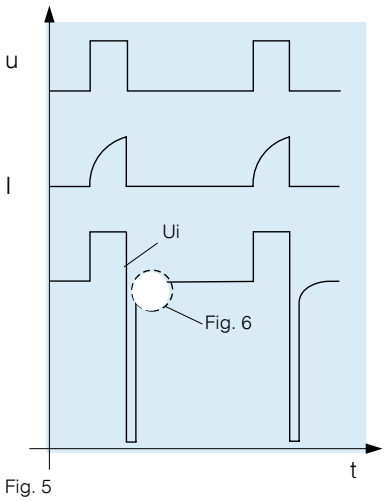
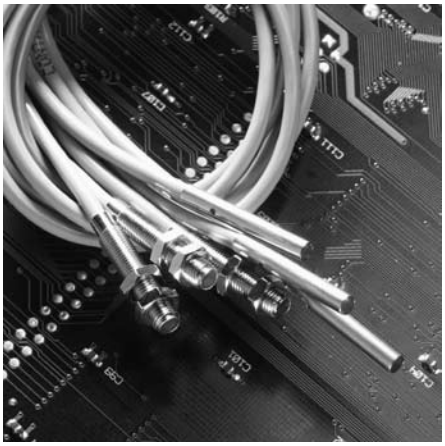


Fig. 5

MINIATURE SENSORS

The small devices operate with conventional (Fig. 1) or Condist® (Fig. 2) technology. They have been so optimized that a particularly **high switching frequency** can be obtained.

The essential differences compared to larger versions lie in their construction and manufacture. Only sub-components with the smallest dimensions possible can be used. The semiconductors are mounted onto the substrate as chips (without housings), i.e. bonded (COB technique). As substrate, exclusively glass-fiber reinforced epoxy resin is used (**no ceramic,** with its undesirable brittleness). The finished electronic assemblies are subsequently potted, using a special vacuum technique, i.e. without any inclusion of air bubbles. In this way, **optimum long-term reliability,** even under difficult operating conditions, can be guaranteed.



SENSORS WITH LONG OPERATING DISTANCES (SERIES 500)

These devices work using Condist® technology (Fig. 2). They are distinguished by their **long operating distances** on ferromagnetic metals, and react particularly well to elongated targets, e.g. rods and wires.

To a great extent, all other properties correspond to those of conventional sensors. Special attention has been paid to **meet the relevant standards as much as possible**, so that easy **interchangeability** with conventional devices is guaranteed. Great emphasis has been placed on a very good EMC resistance and on perfect sealing against liquid penetration.

SENSORS WITH VERY LONG OPERATING DISTANCES (SERIES 520)

These devices also work using Condist® technology (Fig. 2). Available in sizes M8 and M12, they are a further development of the series 500 switches, featuring **even longer operating distances** on ferromagnetic metals than the latter.

STANDARD SENSORS (SERIES 600)

Functioning according to classical technology (Fig. 1), these devices form the backbone amongst position sensors. They are reliable, undemanding, standardized, low-cost, and therefore suitable for many applications where there are **no special requirements.**

STANDARD SENSORS WITH INCREASED OPERATING DISTANCES (SERIES 620)

Functioning also according to classical technology (Fig. 1), these devices basically correspond to those of the 300, 400, 420 and 600 series. Switching-wise, they have been optimized in such a way that an **increased operating distance** can be achieved, especially for small sizes. Users will find them interesting, since with a relatively small markup in price, a valuable increase in operating distance can be obtained.

ALL-METAL SENSORS WITH LONG OPERATING DISTANCES (SERIES 700)

These devices work using Condet® technology (Fig. 4). They are characterized by **long operating distances**, not only on ferromagnetic metals, but also on all other metals having good conductivity, such as **aluminum, copper, brass,** etc. Only metals which are both non-ferromagnetic as well as having poor electrical conductivity result in reduced operating distances. For good results, the target must have a certain surface area, this technology being less suitable for elongated geometries.

A further important characteristic of these devices is the **one-piece stainless steel housing,** sensing face included (Fig. 7). Throughout the whole of their working lives therefore, the 700 series devices are **without reservation impervious** at the sensing face to all liquids and gases which do not corrode stainless steel. The material at the sensing face being relatively thick, the devices are therefore **pressure resistant** to a considerable extent. In addition, thanks to their all-metal housing, they are much **more resistant to mechanical and chemical stresses** in the area of the sensing face than conventional sensors. As a result, important weak spots of conventional devices are eliminated.

All other properties correspond to a great extent to those of conventional sensors found on the market. Special attention has also been paid to **meet the relevant standards as much as possible,** so that **easy interchangeability** with previously used devices is guaranteed.

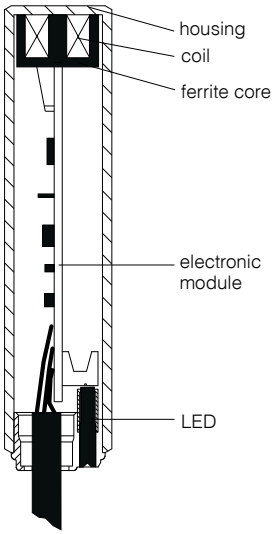


Fig. 7

FOR SPECIAL APPLICATIONS

ANALOG SENSORS

Within the 500 series, a number of devices are available with analog output. At the moment, executions with non-linear transmission behavior (Fig. 8) are available. Models with linear transmission behavior are in preparation.

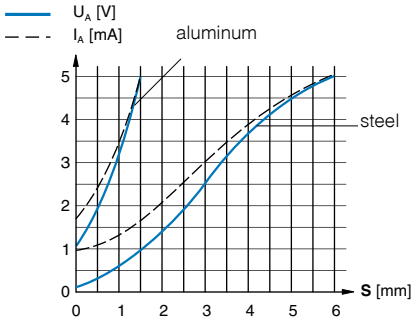


Fig. 8

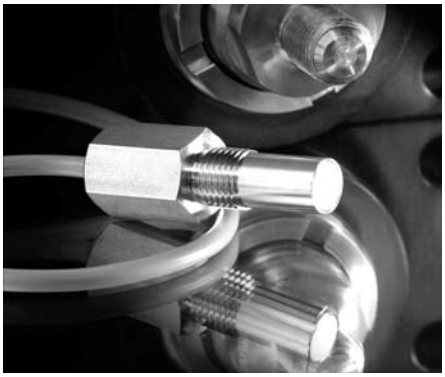
These devices use Condist® technology (Fig. 2). They are characterized by a **very large sensing range**, good accuracy, stability, and repeat accuracy, as well as low specimen scattering.

SEALED SENSORS (SERIES E)

The sealed series E is equipped with a **stainless steel** housing, an imperviously bonded **sapphire or ceramic disk** at the sensing face, and polyurethane cable. In order to benefit from optimum impermeability, the LED and connector versions have been dispensed with.

HIGH-PRESSURE-RESISTANT SENSORS (SERIES P)

The main problem of any pressure-resistant sensor is that, in order to achieve pressure resistance, a thick cover (usually of a ceramic material) on the sensing face is necessary. The thickness of this cover reduces the device's normal operating distance, so that only a small usable operating distance, or even none at all, remains. Because of this, devices are available on the market which have the oscillator coil on the high-



pressure side. On top of this, the sensing face is sometimes made of plastic. As a result, when used in normal operating environments (hydraulic oils, high temperature, cyclic pressure stress), reliability problems are unavoidable with this type of sensor. Contrinex devices are constructed entirely differently, and such problems do not occur. Using Condist® technology, the electronic modules are inserted into thick-walled stainless steel housings. Thanks to their very long operating distance, it is possible to employ a simple, robust, sufficiently **thick ceramic disk** at the sensing face, without any support construction or other artificial tricks. The whole **electronic unit,** ferrite core and coil included, is thus found on the **no-pressure side**. The remaining usable operating distance is more than sufficient. The assembly is shown in Fig. 9.

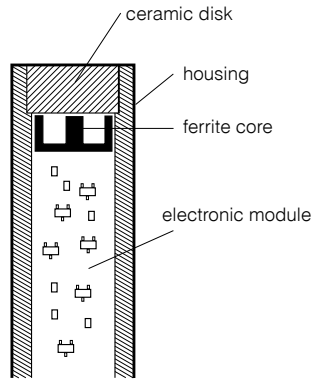


Fig. 9

The housing is heat shrunk onto the ceramic disk. Without any further measures, such as additional sealing, the union produced by this force fit is mechanically very resistant and **exceptionally impervious.** This technology results in devices which are outstanding for applications where there is **high dynamic pressure stress.**

HIGH-TEMPERATURE SENSORS

These devices are suitable for applications up to 140°C, 150°C, 180°C (built-in amplifier) and 230°C (external amplifier).

ALL-METAL SENSORS FOR FOOD, SEA-WATER & HIGH-PRESSURE APPLICATIONS

These devices work using Condet® technology (Fig. 4) and are a further development of the series 700 all-metal switches. They are **pressure resistant, food safe** and **corrosion resistant** (V4A/ AISI 316L) and feature **IP 68 + IP 69K**.

PRODUCT OVERVIEW

SERIES 300

The delivery program includes sizes diameter 3 mm smooth and M4 in embeddable execution. These are the **smallest self-contained inductive sensors available on the market** with fully integrated evaluation electronics. These sizes, introduced by Contrinex, are not yet standardized.

All devices are available in 3-wire DC, NPN and PNP executions. Additionally, the range contains devices with 2 wires according to NAMUR (DIN/EN 19234). All 3-wire models are available in N.O. and N.C. configurations; a LED output state indicator is standard. In addition, all the important protection functions are built in, such as short-circuit and overload protection, full polarity reversal protection, induction protection, EMC protection, power-on reset, etc. (only partially for NAMUR devices). CE conformity is achieved **without** the external protective circuit authorized according to the standard (EN 60947-5-2 / 7.2.3.1).

SERIES 400

The delivery program includes sizes diameter 4 mm smooth, M5 threaded, as well as the 5 x 5 x 25 mm cuboid **with through holes** for fixing, all in embeddable execution. A further device with 4 mm diameter is distinguished by its very short length of only 10 mm (only in NAMUR execution). **Also introduced by Contrinex, these sizes** are now standardized for the most part.

All devices are available in 3-wire DC, NPN and PNP executions. Additionally, the range contains devices with 2 wires according to NAMUR (DIN/EN 19234). All 3-wire models are available in N.O. and N.C. configurations; a LED output state indicator is standard. In addition, all the important protection functions are built in, such as short-circuit and overload protection, full polarity reversal protection, induction protection, EMC protection, power-on reset, etc. (only partially for NAMUR devices). CE conformity is achieved **without** the external protective circuit authorized according to the standard (EN 60947-5-2 / 7.2.3.1).

SERIES 420

The delivery program includes sizes diameter 6.5 mm smooth and M8. These devices are distinguished by their **extremely short lengths**. The execution with right-angled cable exit permits a **further reduction** in length. Introduced by Contrinex, these sizes correspond to all relevant standards, with the exception of their length.

All devices are available in 3-wire DC, NPN and PNP executions. Additionally, the range contains devices with 2 wires according to NAMUR (DIN / EN 19234). All 3-wire models are available in N.O. and N.C. configurations; a LED output state indicator is standard. In addition, all the important protection functions are built in, such as short-circuit and overload protection, full polarity reversal protection, induction protection, EMC protection, power-on reset, etc. (only partially for NAMUR devices). CE conformity is achieved **without** the external protective circuit authorized according to the standard (EN 60947-5-2 / 7.2.3.1).

SERIES 500

The delivery program includes sizes from diameter 4 mm to M30 in (quasi-)embeddable (∅ 4 mm, M5 and M8 embeddable) and non-embeddable executions. These sizes are standardized. Varying from the standard, the series 500 offers however **greater operating distances** (2.2 ... 3 times the standard values).

The devices are available in 3-wire DC NPN and PNP executions, in either N.O. or N.C. configuration; a LED output state indicator is standard. In addition, all the important protection functions are built in, such as short-circuit and overload protection, full polarity reversal protection, induction protection, EMC protection, power-on reset, etc.

The range additionally includes devices with **analog output**. For most models, a voltage output (0 ... 5 V or 0 ... 10 V) and a current output (1 ... 5 mA or 4 ... 20 mA) are simultaneously available. For the moment, analog devices are available in sizes C8, M8, M12, M18, and M30 quasi-embeddable, as well as M18 and M30 non-embeddable.

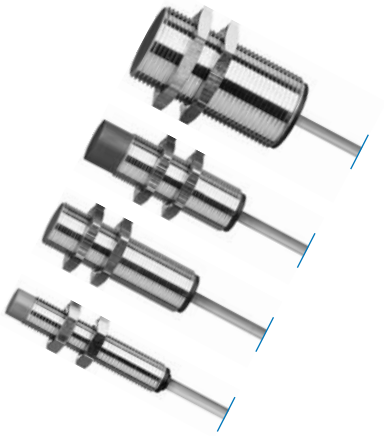
SERIES 520

The 520 series devices are a further development of the 500 series. In addition to the previously existing properties, they feature even longer operating distances. For the moment, sizes M8 embeddable and M12 quasi-embeddable are available.

SERIES 600

CYLINDRICAL HOUSINGS

This range of sensors comprises all widely used sizes from 6.5 mm smooth to M30, according to the standards IEC 60947-5-2 / EN 60947-5-2 and VDE 0660 part 208. All switches are available in 3-wire DC PNP and NPN versions, with cable or connector. Sizes M12, M18 and M30 are also available as 2-wire AC/DC models as well as 2-wire DC execution. A LED output state indicator is standard. All switches are available in either N.O. or N.C. configuration with all the important protection functions, such as short-circuit and overload protection, full polarity reversal protection, induction protection, EMC protection, etc.



CUBOID HOUSINGS

In addition to the cylindrical models, series 600 also includes cuboid types in sizes 40 x 120 mm (IEC I1C40 / I2C40), 60 x 80 mm and 80 x 100 mm (IEC I2D80). These are equipped with screw terminals for easy connection. All types are available as 3-wire DC PNP models, and some also as NPN models or as 2-wire UC (AC/DC) versions. In addition, there are cubic models 40 x 40 x 40 mm with connector S12, available as 4-wire PNP or NPN, as well as 2-wire UC (AC/DC). LED and protection circuitry are as for cylindrical types. High-quality plastic housings (mostly glass-fiber reinforced PBTP) ensure the excellent mechanical stability of these switches.

SERIES 620

These sensors are a further development of the series 300, 400, 420 and 600 models, but having increased operating distances. Sizes 3 mm smooth to M18, including C5 and C8 cuboids, are currently available.

SERIES 700

At the present time, the delivery program includes sizes M8, M12, M18, and M30 in embeddable and non-embeddable executions. Further sizes are in preparation. The available sizes are basically standardized. Varying from the standard, the series 700 offers however **long operating distances**. These operating distances are moreover also achieved on the most important **non-ferrous metals.** Of further particular interest is the **one-piece** stainless steel housing, sensing face included.

The range includes devices of food-safe and corrosion-resistant stainless steel (V4A / AISI 316L / DIN 1.4435), featuring IP 68 + IP 69K degree of protection, for the **food and pharmaceutical industries**, as well as for **sea-water applications**.

All devices are available in 3-wire DC NPN and PNP executions. They are available in N.O. and N.C. configurations; a LED output state indicator is standard. In addition, all the important protection functions are built in, such as short-circuit and overload protection, full polarity reversal protection, induction protection, EMC protection, power-on reset, etc.

SEALED SENSORS (SERIES E)

At the present time, the delivery program includes sizes from 4 mm smooth to M8. The devices are intended for **difficult environmental conditions**. They are equipped with a **stainless steel housing** imperviously bonded to a **sapphire or ceramic disk** on the sensing face. Connection is by means of a highly flexible cable with a polyurethane sleeve. The electrical properties are equivalent to those of the corresponding series 400, 600 and 500 devices. However, due to the thickness of the disk, the operating distances are somewhat shorter.

HIGH-PRESSURE-RESISTANT SENSORS (SERIES 500P)

The delivery program includes different size devices for **permanent operating pressures of 100 ... 500 bar** and **peak pressures up to 1000 bar.** Their main applications are in high-pressure hydraulic systems. They have a **stainless steel housing** imperviously shrunk onto a ceramic disk at the sensing face (Fig. 9). Connection is by means of either a highly flexible cable with a polyurethane sleeve, or an integrated connector. The electric properties are equivalent to those of the corresponding series 500 devices.

HIGH-PRESSURE-RESISTANT ALL-METAL SENSORS (SERIES 700P)

The series 700P is a further development of the series 700L in a high-pressure and corrosion-resistant one-piece stainless steel housing (V4A / AISI 316L / DIN 1.4404). The sensing face of these devices resists permanent pressures of up to 500 bar. These devices are therefore particularly suited for hydraulic offshore or under-water applications. They guarantee excellent detection of ferromagnetic and non-ferromagnetic metals with good conductivity. Connection is by means of either a highly flexible cable with a polyurethane sleeve, or an integrated connector. The electric properties are equivalent to those of the corresponding series 700 devices.

HIGH-TEMPERATURE SENSORS

The delivery program includes sizes from M8 to M50 in embeddable and non-embeddable executions. The devices are intended for demanding applications in high-temperature areas, and are respectively suitable for ambient temperatures of up to **140 °C, 150 °C, 180 °C and 230 °C**. Executions up to 180 °C feature built-in amplifiers, and connection by means of a 2 m silicone or Teflon cable is standard. For 230 °C types, the amplifiers are built into an M12 stainless-steel housing, which is connected by means of a standard 3 m Teflon cable, and thus removed from the hot area.

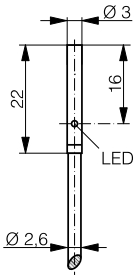
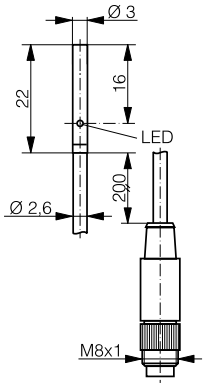
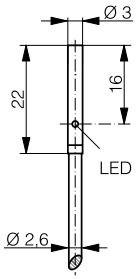
SPECIAL EXECUTIONS

In addition to the types described in this catalog, a number of special executions are available, in particular devices with different cable lengths, different cable types (e.g. with oil-resistant, highly flexible PUR insulation, or silicone cables), or different housing materials (e.g. stainless steel).

CE MARK

The inductive sensors in this catalog comply with the requirements of European standards EN 60947-1 and EN 60947-5-2 and therefore correspond to the EMC guideline 2004/108/EC as well as the low-voltage guideline 2006/95/EC.

They are therefore provided throughout with the **CE mark.** CE

HOUSING SIZE	Ø 3		
OPERATING DISTANCE MM	0.6	0.6	1.0
			
			INCREASED DISTANCE
			

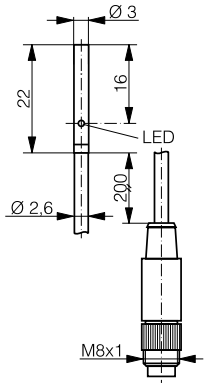
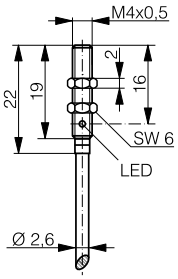
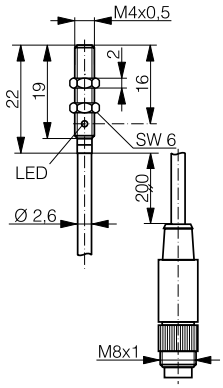
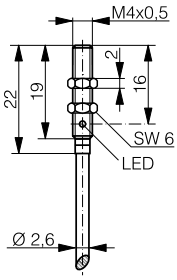
[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA

Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection [1]	PUR cable type 1	PUR cable type 1 / Connector S8	PUR cable type 1
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5,000 Hz	5,000 Hz	3,000 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 100 mA	≤ 100 mA	≤ 100 mA
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

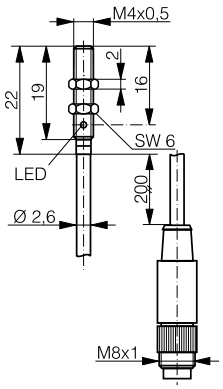
PART REFERENCES: (**BOLD:** PREFERRED TYPES)

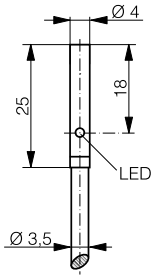
NPN N.O.	**DW-AD-301-03**	**DW-AV-301-03-276**	**DW-AD-621-03**
NPN N.C.	DW-AD-302-03	DW-AV-302-03-276	DW-AD-622-03
PNP N.O.	**DW-AD-303-03**	**DW-AV-303-03-276**	**DW-AD-623-03**
PNP N.C.	DW-AD-304-03	DW-AV-304-03-276	DW-AD-624-03
Compatible connectors [4]		A, B	

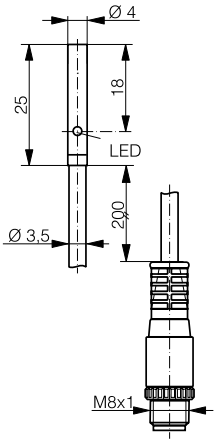
Ø 3	M4		
1.0	0.6	0.6	1.0
			
INCREASED DISTANCE			INCREASED DISTANCE
			
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PUR cable type 1 / Connector S8	PUR cable type 1	PUR cable type 1 / Connector S8	PUR cable type 1
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
3,000 Hz	5,000 Hz	5,000 Hz	3,000 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 100 mA	≤ 100 mA	≤ 100 mA	≤ 100 mA
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS
DW-AV-621-03-276	**DW-AD-301-M4**	**DW-AV-301-M4-276**	**DW-AD-621-M4**
DW-AV-622-03-276	DW-AD-302-M4	DW-AV-302-M4-276	DW-AD-622-M4
DW-AV-623-03-276	**DW-AD-303-M4**	**DW-AV-303-M4-276**	**DW-AD-623-M4**
DW-AV-624-03-276	DW-AD-304-M4	DW-AV-304-M4-276	DW-AD-624-M4
A, B		A, B	

HOUSING SIZE	M4	Ø 4	
OPERATING DISTANCE MM	1.0	0.8	0.8

INCREASED DISTANCE







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

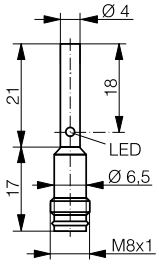
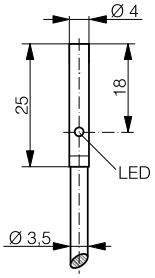
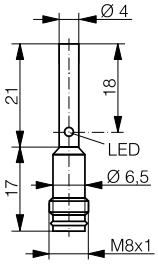
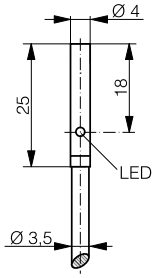
TECHNICAL DATA

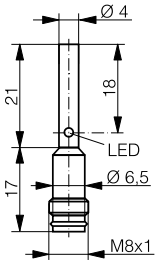
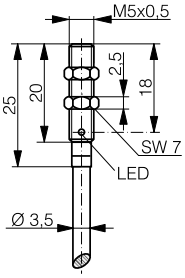
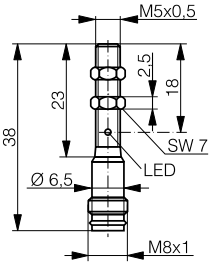
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection [1]	PUR cable type 1 / Connector S8	PVC cable type 2	PVC cable type 2 / Connector S8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	3,000 Hz	5,000 Hz	5,000 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 100 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AV-621-M4-276**	**DW-AD-401-04**	
NPN N.C.	DW-AV-622-M4-276	DW-AD-402-04	
PNP N.O.	**DW-AV-623-M4-276**	**DW-AD-403-04**	**DW-AV-403-04-236**
PNP N.C.	DW-AV-624-M4-276	DW-AD-404-04	DW-AV-404-04-236
Compatible connectors [4]	A, B		A, B

Ø 4

0.8	1.5	1.5	2.5
			
	INCREASED DISTANCE	INCREASED DISTANCE	LONG DISTANCE
			
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Nickel silver
Connector S8	PVC cable type 2	Connector S8	PVC cable type 2
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
5,000 Hz	3,000 Hz	3,000 Hz	800 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS
DW-AS-401-04	**DW-AD-621-04**	**DW-AS-621-04**	**DW-AD-501-04**
DW-AS-402-04	DW-AD-622-04	DW-AS-622-04	DW-AD-502-04
DW-AS-403-04	**DW-AD-623-04**	**DW-AS-623-04**	**DW-AD-503-04**
DW-AS-404-04	DW-AD-624-04	DW-AS-624-04	DW-AD-504-04
A, B		A, B	

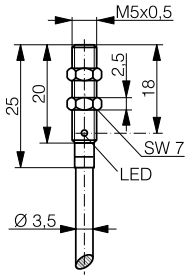
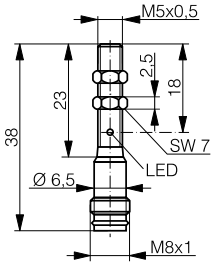
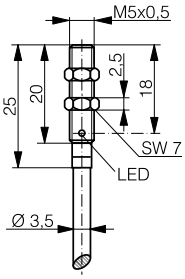
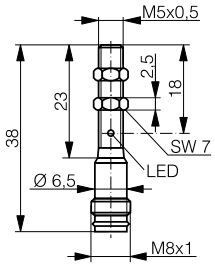
HOUSING SIZE	Ø 4	M5	
OPERATING DISTANCE MM	2.5	0.8	0.8
			
	LONG DISTANCE		
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA			
Housing material	Nickel silver	Stainless steel V2A	Stainless steel V2A
Connection [1]	Connector S8	PVC cable type 2	Connector S8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	800 Hz	5,000 Hz	5,000 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

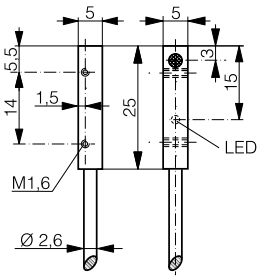
PART REFERENCES: (**BOLD:** PREFERRED TYPES)			
NPN N.O.	**DW-AS-501-04**	**DW-AD-401-M5**	**DW-AS-401-M5**
NPN N.C.	DW-AS-502-04	DW-AD-402-M5	DW-AS-402-M5
PNP N.O.	**DW-AS-503-04**	**DW-AD-403-M5**	**DW-AS-403-M5**
PNP N.C.	DW-AS-504-04	DW-AD-404-M5	DW-AS-404-M5
Compatible connectors [4]	A, B		A, B

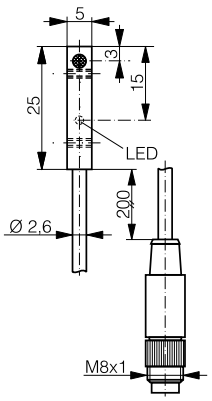
M5

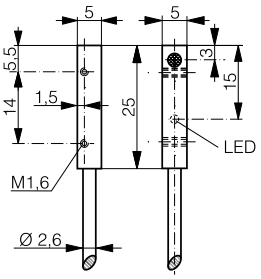
1.5	1.5	2.5	2.5
			
INCREASED DISTANCE	**INCREASED DISTANCE**	**LONG DISTANCE**	**LONG DISTANCE**
			
Stainless steel V2A	Stainless steel V2A	Nickel silver	Nickel silver
PVC cable type 2	Connector S8	PVC cable type 2	Connector S8
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
3,000 Hz	3,000 Hz	800 Hz	800 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS
DW-AD-621-M5	**DW-AS-621-M5**	**DW-AD-501-M5**	**DW-AS-501-M5**
DW-AD-622-M5	DW-AS-622-M5	DW-AD-502-M5	DW-AS-502-M5
DW-AD-623-M5	**DW-AS-623-M5**	**DW-AD-503-M5**	**DW-AS-503-M5**
DW-AD-624-M5	DW-AS-624-M5	DW-AD-504-M5	DW-AS-504-M5
	A, B		A, B

HOUSING SIZE	⌀ 5 X 5		
OPERATING DISTANCE MM	0.8	0.8	1.5

INCREASED DISTANCE







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA

Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	PUR cable type 1	PUR cable type 1 / Connector S8	PUR cable type 1
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5,000 Hz	5,000 Hz	3,000 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

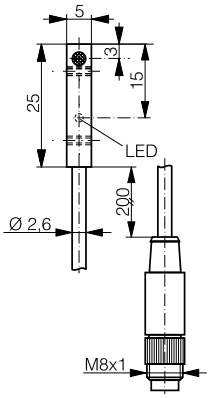
PART REFERENCES: (**BOLD:** PREFERRED TYPES)

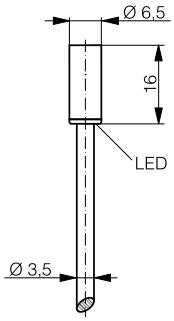
NPN N.O.	**DW-AD-401-C5**	**DW-AV-401-C5-276**	**DW-AD-621-C5**
NPN N.C.	DW-AD-402-C5	DW-AV-402-C5-276	DW-AD-622-C5
PNP N.O.	**DW-AD-403-C5**	**DW-AV-403-C5-276**	**DW-AD-623-C5**
PNP N.C.	DW-AD-404-C5	DW-AV-404-C5-276	DW-AD-624-C5
Compatible connectors [4]		A, B	

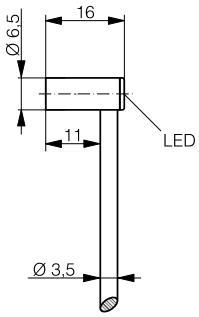
⧄ 5 X 5	Ø 6.5		
1.5	1.5	1.5	1.5

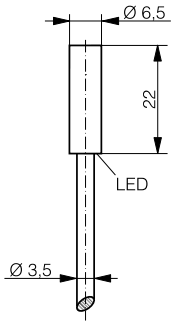



INCREASED DISTANCE





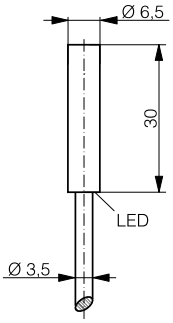


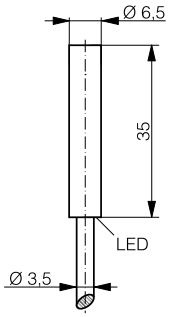


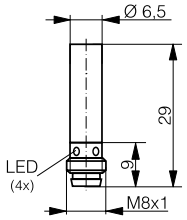
Chrome-plated brass	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PUR cable type 1 / Connector S8	PVC cable type 2	PVC cable type 2	PVC cable type 2
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
3,000 Hz	5,000 Hz	5,000 Hz	5,000 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, CCC, UL, RoHS

DW-AV-621-C5-276	**DW-AD-421-065**	**DW-AD-421-065-400**	**DW-AD-601-065-121**
DW-AV-622-C5-276	DW-AD-422-065	DW-AD-422-065-400	DW-AD-602-065-121
DW-AV-623-C5-276	**DW-AD-423-065**	**DW-AD-423-065-400**	**DW-AD-603-065-121**
DW-AV-624-C5-276	DW-AD-424-065	DW-AD-424-065-400	DW-AD-604-065-121
A, B			

HOUSING SIZE	Ø 6.5		
OPERATING DISTANCE MM	1.5	1.5	1.5







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

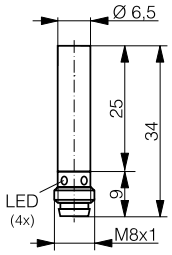
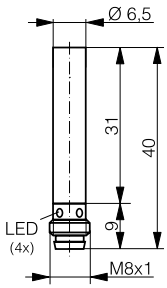
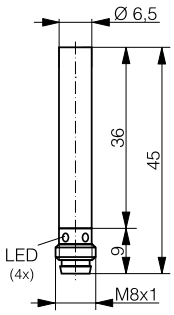
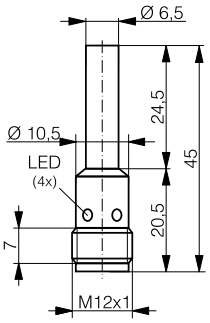
TECHNICAL DATA

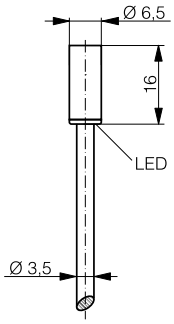
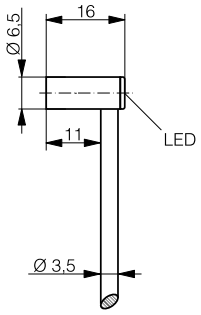
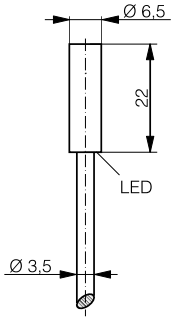
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection [1]	PVC cable type 2	PVC cable type 2	Connector S8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5,000 Hz	5,000 Hz	5,000 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AD-601-065-122**	**DW-AD-601-065**	**DW-AS-421-065-001**
NPN N.C.	DW-AD-602-065-122	DW-AD-602-065	DW-AS-422-065-001
PNP N.O.	**DW-AD-603-065-122**	**DW-AD-603-065**	**DW-AS-423-065-001**
PNP N.C.	DW-AD-604-065-122	DW-AD-604-065	DW-AS-424-065-001
Compatible connectors [4]			A, B

Ø 6.5

1.5	1.5	1.5	1.5
			
			
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connector S8	Connector S8	Connector S8	Connector S12
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
5,000 Hz	5,000 Hz	5,000 Hz	5,000 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 2
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS
DW-AS-601-065-123	**DW-AS-601-065-124**	**DW-AS-601-065-001**	**DW-AS-601-065**
DW-AS-602-065-123	DW-AS-602-065-124	DW-AS-602-065-001	DW-AS-602-065
DW-AS-603-065-123	**DW-AS-603-065-124**	**DW-AS-603-065-001**	**DW-AS-603-065**
DW-AS-604-065-123	DW-AS-604-065-124	DW-AS-604-065-001	DW-AS-604-065
A, B	A, B	A, B	G, H, M, N (N.O.); M, N (N.C.)

HOUSING SIZE	Ø 6.5		
OPERATING DISTANCE MM	2	2	2
			
	INCREASED DISTANCE	INCREASED DISTANCE	INCREASED DISTANCE
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

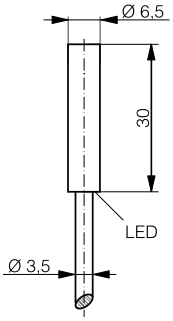
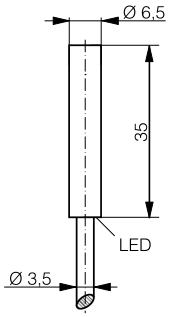
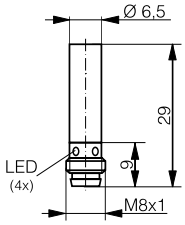
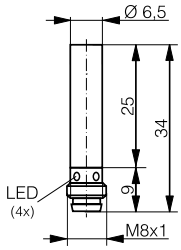
TECHNICAL DATA

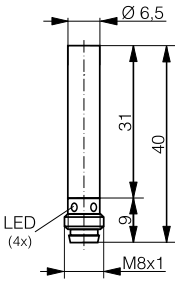
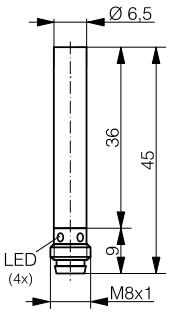
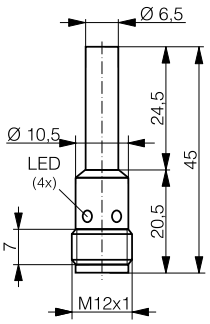
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection [1]	PVC cable type 2	PVC cable type 2	PVC cable type 2
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5,000 Hz	5,000 Hz	5,000 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AD-621-065-120**	**DW-AD-621-065-400**	**DW-AD-621-065-121**
NPN N.C.	DW-AD-622-065-120	DW-AD-622-065-400	DW-AD-622-065-121
PNP N.O.	**DW-AD-623-065-120**	**DW-AD-623-065-400**	**DW-AD-623-065-121**
PNP N.C.	DW-AD-624-065-120	DW-AD-624-065-400	DW-AD-624-065-121
Compatible connectors [4]			

Ø 6.5

2	2	2	2
			
INCREASED DISTANCE	INCREASED DISTANCE	INCREASED DISTANCE	INCREASED DISTANCE
			
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PVC cable type 2	PVC cable type 2	Connector S8	Connector S8
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
5,000 Hz	5,000 Hz	5,000 Hz	5,000 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS
DW-AD-621-065-122	**DW-AD-621-065**	**DW-AS-621-065-129**	**DW-AS-621-065-123**
DW-AD-622-065-122	DW-AD-622-065	DW-AS-622-065-129	DW-AS-622-065-123
DW-AD-623-065-122	**DW-AD-623-065**	**DW-AS-623-065-129**	**DW-AS-623-065-123**
DW-AD-624-065-122	DW-AD-624-065	DW-AS-624-065-129	DW-AS-624-065-123
		A, B	A, B

HOUSING SIZE	Ø 6.5		
OPERATING DISTANCE MM	2	2	2
			
	INCREASED DISTANCE	INCREASED DISTANCE	INCREASED DISTANCE
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

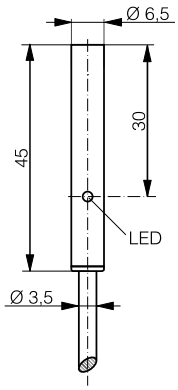
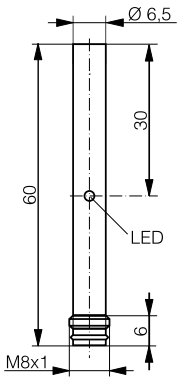
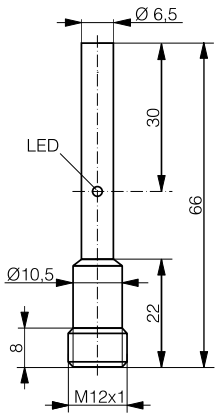
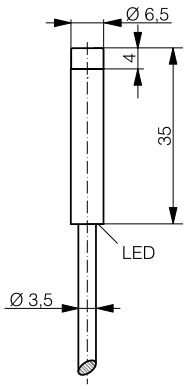
TECHNICAL DATA

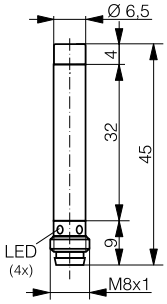
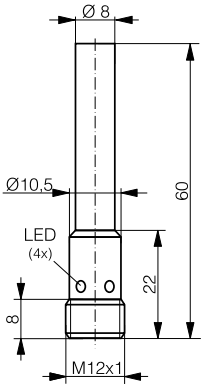
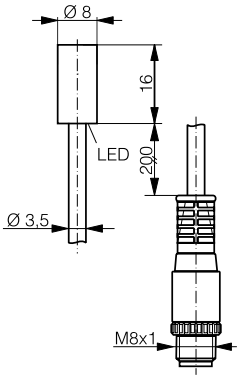
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection [1]	Connector S8	Connector S8	Connector S12
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5,000 Hz	5,000 Hz	5,000 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 2
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AS-621-065-124**	**DW-AS-621-065-001**	**DW-AS-621-065**
NPN N.C.	DW-AS-622-065-124	DW-AS-622-065-001	DW-AS-622-065
PNP N.O.	**DW-AS-623-065-124**	**DW-AS-623-065-001**	**DW-AS-623-065**
PNP N.C.	DW-AS-624-065-124	DW-AS-624-065-001	DW-AS-624-065
Compatible connectors [4]	A, B	A, B	G, H, M, N (N.O.); M, N (N.C.)

Ø 6.5

3	3	3	4
			
LONG DISTANCE	**LONG DISTANCE**	**LONG DISTANCE**	**INCREASED DISTANCE**
			
Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Stainless steel V2A
PVC cable type 2	Connector S8	Connector S12	PVC cable type 2
IP 67	IP 67	IP 67	IP 67
Quasi-embeddable	Quasi-embeddable	Quasi-embeddable	Non-embeddable
1,000 Hz	1,000 Hz	1,000 Hz	3,500 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 2	Diagram 1
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, CCC, UL, RoHS
DW-AD-501-065	**DW-AS-501-065-001**	**DW-AS-501-065**	**DW-AD-631-065**
DW-AD-502-065	DW-AS-502-065-001	DW-AS-502-065	DW-AD-632-065
DW-AD-503-065	**DW-AS-503-065-001**	**DW-AS-503-065**	**DW-AD-633-065**
DW-AD-504-065	DW-AS-504-065-001	DW-AS-504-065	DW-AD-634-065
	A, B	G, H, M, N (N.O.); M, N (N.C.)	

HOUSING SIZE	Ø 6.5	Ø 8	
OPERATING DISTANCE MM	4	1.5	2
			
	INCREASED DISTANCE		INCREASED DISTANCE
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

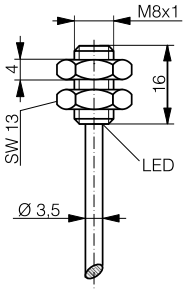
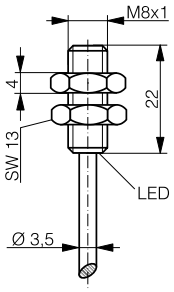
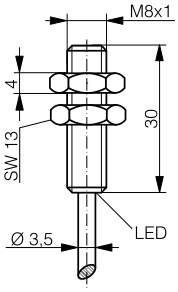
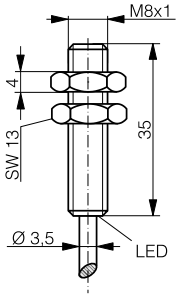
TECHNICAL DATA

Housing material	Stainless steel V2A	Stainless steel V2A	Chrome-plated brass
Connection [1]	Connector S8	Connector S12	PVC cable type 2 / Connector S8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Non-embeddable	Embeddable	Embeddable
Max. switching frequency	3,500 Hz	5,000 Hz	3,000 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 2	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, CCC, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

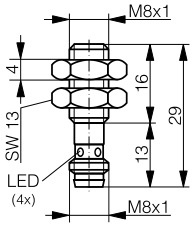
NPN N.O.	**DW-AS-631-065-001**		
NPN N.C.	DW-AS-632-065-001		
PNP N.O.	**DW-AS-633-065-001**	**DW-AS-603-080-168**	**DW-AV-623-080-236**
PNP N.C.	DW-AS-634-065-001		
Compatible connectors [4]	A, B	G, H, M, N	A, B

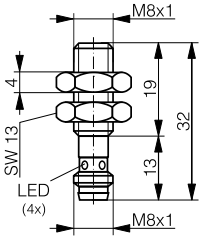
M8

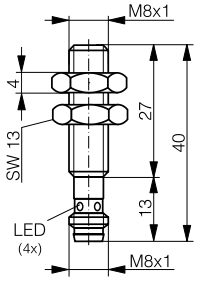
1.5	1.5	1.5	1.5
			
			
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PVC cable type 2	PVC cable type 2	PVC cable type 2	PVC cable type 2
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
5,000 Hz	5,000 Hz	5,000 Hz	5,000 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS
DW-AD-421-M8	**DW-AD-601-M8-121**	**DW-AD-601-M8-122**	**DW-AD-601-M8**
DW-AD-422-M8	DW-AD-602-M8-121	DW-AD-602-M8-122	DW-AD-602-M8
DW-AD-423-M8	**DW-AD-603-M8-121**	**DW-AD-603-M8-122**	**DW-AD-603-M8**
DW-AD-424-M8	DW-AD-604-M8-121	DW-AD-604-M8-122	DW-AD-604-M8

HOUSING SIZE	M8		
OPERATING DISTANCE MM	1.5	1.5	1.5
			

[1] Standard cable length 2 m.
Non-standard cable lengths and types on request.
Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268







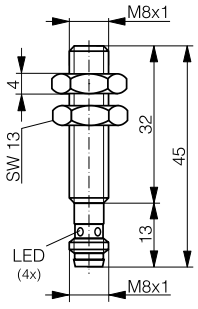
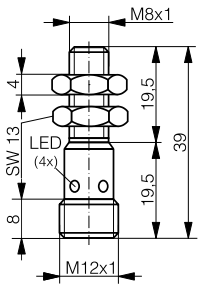
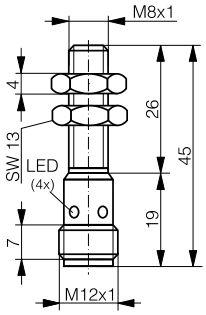
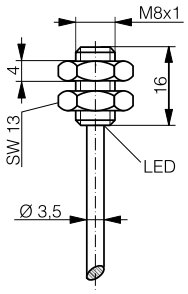
TECHNICAL DATA

Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection [1]	Connector S8	Connector S8	Connector S8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5,000 Hz	5,000 Hz	5,000 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

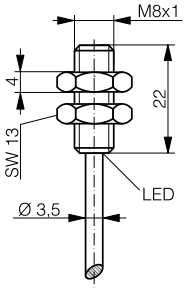
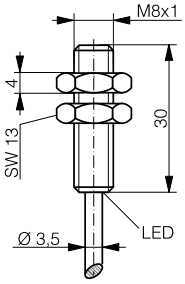
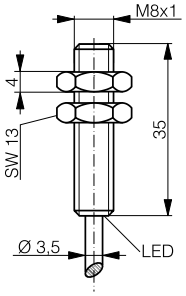
NPN N.O.	**DW-AS-421-M8-001**	**DW-AS-601-M8-123**	**DW-AS-601-M8-124**
NPN N.C.	DW-AS-422-M8-001	DW-AS-602-M8-123	DW-AS-602-M8-124
PNP N.O.	**DW-AS-423-M8-001**	**DW-AS-603-M8-123**	**DW-AS-603-M8-124**
PNP N.C.	DW-AS-424-M8-001	DW-AS-604-M8-123	DW-AS-604-M8-124
Compatible connectors [4]	A, B	A, B	A, B

M8

1.5	1.5	1.5	2
			
			INCREASED DISTANCE
			

Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connector S8	Connector S12	Connector S12	PVC cable type 2
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
5,000 Hz	5,000 Hz	5,000 Hz	5,000 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 2	Diagram 2	Diagram 1
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

DW-AS-601-M8-001	**DW-AS-601-M8-120**	**DW-AS-601-M8**	**DW-AD-621-M8-120**
DW-AS-602-M8-001		DW-AS-602-M8	DW-AD-622-M8-120
DW-AS-603-M8-001	**DW-AS-603-M8-120**	**DW-AS-603-M8**	**DW-AD-623-M8-120**
DW-AS-604-M8-001		DW-AS-604-M8	DW-AD-624-M8-120
A, B	G, H, M, N	G, H, M, N (N.O.); M, N (N.C.)	

HOUSING SIZE	M8		
OPERATING DISTANCE MM	2	2	2
			
	INCREASED DISTANCE	INCREASED DISTANCE	INCREASED DISTANCE
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

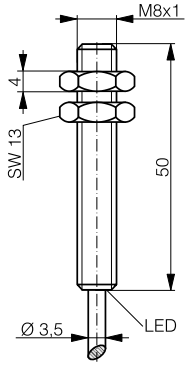
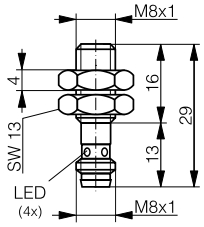
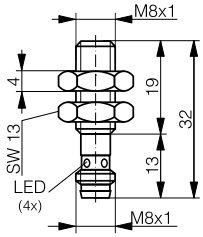
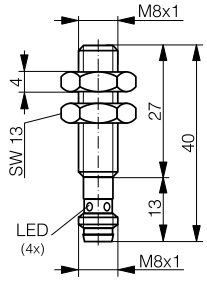
TECHNICAL DATA

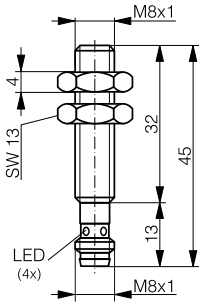
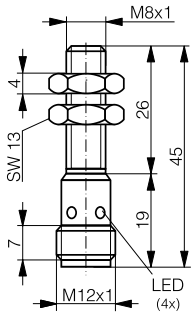
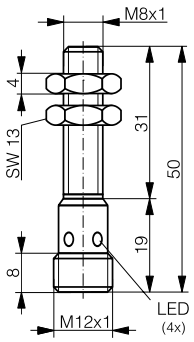
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection [1]	PVC cable type 2	PVC cable type 2	PVC cable type 2
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5,000 Hz	5,000 Hz	5,000 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AD-621-M8-121**	**DW-AD-621-M8-122**	**DW-AD-621-M8**
NPN N.C.	DW-AD-622-M8-121	DW-AD-622-M8-122	DW-AD-622-M8
PNP N.O.	**DW-AD-623-M8-121**	**DW-AD-623-M8-122**	**DW-AD-623-M8**
PNP N.C.	DW-AD-624-M8-121	DW-AD-624-M8-122	DW-AD-624-M8
Compatible connectors [4]			

M8

2	2	2	2
			
INCREASED DISTANCE	INCREASED DISTANCE	INCREASED DISTANCE	INCREASED DISTANCE
			
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PVC cable type 2	Connector S8	Connector S8	Connector S8
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
5,000 Hz	5,000 Hz	5,000 Hz	5,000 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS
DW-AD-621-M8-177	**DW-AS-621-M8-129**	**DW-AS-621-M8-123**	**DW-AS-621-M8-124**
DW-AD-622-M8-177	DW-AS-622-M8-129	DW-AS-622-M8-123	DW-AS-622-M8-124
DW-AD-623-M8-177	**DW-AS-623-M8-129**	**DW-AS-623-M8-123**	**DW-AS-623-M8-124**
DW-AD-624-M8-177	DW-AS-624-M8-129	DW-AS-624-M8-123	DW-AS-624-M8-124
	A, B	A, B	A, B

HOUSING SIZE	M8		
OPERATING DISTANCE MM	2	2	2
			
	INCREASED DISTANCE	INCREASED DISTANCE	INCREASED DISTANCE
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

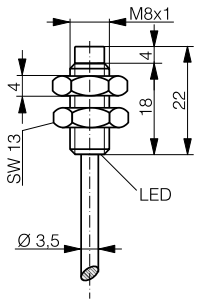
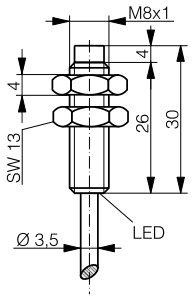
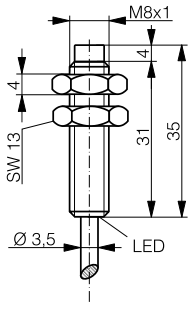
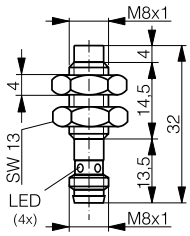
TECHNICAL DATA

Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection [1]	Connector S8	Connector S12	Connector S12
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5,000 Hz	5,000 Hz	5,000 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 2	Diagram 2
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

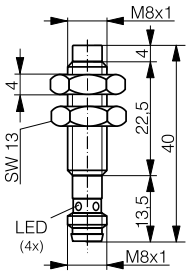
PART REFERENCES: (**BOLD:** PREFERRED TYPES)

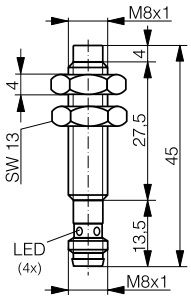
NPN N.O.	**DW-AS-621-M8-001**	**DW-AS-621-M8**	**DW-AS-621-M8-193**
NPN N.C.	DW-AS-622-M8-001	DW-AS-622-M8	DW-AS-622-M8-193
PNP N.O.	**DW-AS-623-M8-001**	**DW-AS-623-M8**	**DW-AS-623-M8-193**
PNP N.C.	DW-AS-624-M8-001	DW-AS-624-M8	DW-AS-624-M8-193
Compatible connectors [4]	A, B	G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)

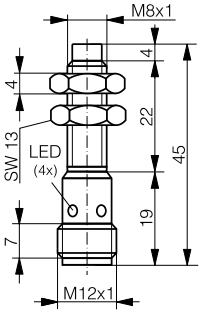
M8

2.5	2.5	2.5	2.5
			
			
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PVC cable type 2	PVC cable type 2	PVC cable type 2	Connector S8
IP 67	IP 67	IP 67	IP 67
Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
4,500 Hz	4,500 Hz	4,500 Hz	4,500 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS
DW-AD-611-M8-121	**DW-AD-611-M8-122**	**DW-AD-611-M8**	**DW-AS-611-M8-123**
DW-AD-612-M8-121	DW-AD-612-M8-122	DW-AD-612-M8	DW-AS-612-M8-123
DW-AD-613-M8-121	**DW-AD-613-M8-122**	**DW-AD-613-M8**	**DW-AS-613-M8-123**
DW-AD-614-M8-121	DW-AD-614-M8-122	DW-AD-614-M8	DW-AS-614-M8-123
			A, B

HOUSING SIZE	M8		
OPERATING DISTANCE MM	2.5	2.5	2.5







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

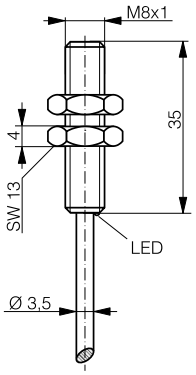
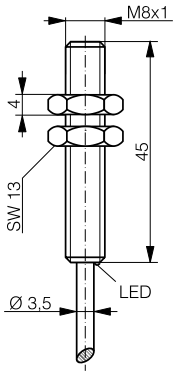
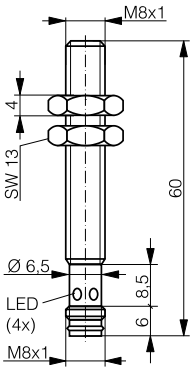
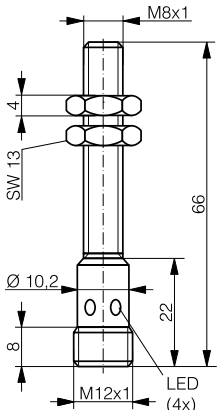
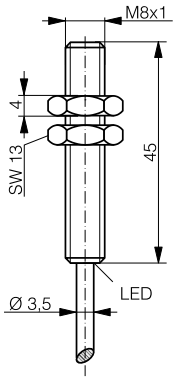
TECHNICAL DATA

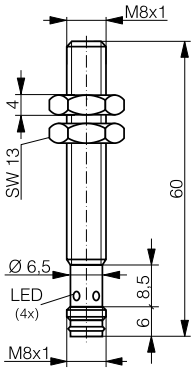
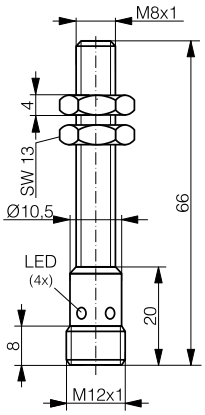
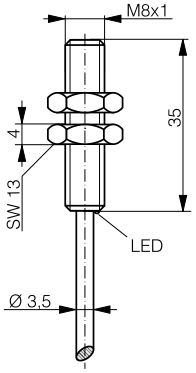
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection [1]	Connector S8	Connector S8	Connector S12
Degree of protection	IP 67	IP 67	IP 67
Mounting	Non-embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	4,500 Hz	4,500 Hz	4,500 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 2
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AS-611-M8-124**	**DW-AS-611-M8-001**	**DW-AS-611-M8**
NPN N.C.	DW-AS-612-M8-124	DW-AS-612-M8-001	DW-AS-612-M8
PNP N.O.	**DW-AS-613-M8-124**	**DW-AS-613-M8-001**	**DW-AS-613-M8**
PNP N.C.	DW-AS-614-M8-124	DW-AS-614-M8-001	DW-AS-614-M8
Compatible connectors [4]	A, B	A, B	G, H, M, N (N.O.); M, N (N.C.)

M8

3	3	3	3	3
				
LONG DISTANCE	LONG DISTANCE	LONG DISTANCE	LONG DISTANCE	ALL-METAL / 100 BAR
				
Cr-plated nickel silver	Cr-plated nickel silver	Cr-plated nickel silver	Cr-plated nickel silver	Stainless steel V2A
PVC cable type 2	PVC cable type 2	Connector S8	Connector S12	PUR cable type 3
IP 67	IP 67	IP 67	IP 67	IP 68
Embeddable	Embeddable	Embeddable	Embeddable	Embeddable
1,000 Hz	1,000 Hz	1,000 Hz	1,000 Hz	1,000 Hz
Table 1	Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 2	Diagram 1
Built-in	Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS
DW-AD-501-M8-750	**DW-AD-501-M8**	**DW-AS-501-M8-001**	**DW-AS-501-M8**	**DW-AD-701-M8**
DW-AD-502-M8-750	DW-AD-502-M8	DW-AS-502-M8-001	DW-AS-502-M8	DW-AD-702-M8
DW-AD-503-M8-750	**DW-AD-503-M8**	**DW-AS-503-M8-001**	**DW-AS-503-M8**	**DW-AD-703-M8**
DW-AD-504-M8-750	DW-AD-504-M8	DW-AS-504-M8-001	DW-AS-504-M8	DW-AD-704-M8
		A, B	G, H, M, N (N.O.); M, N (N.C.)	

HOUSING SIZE	M8		
OPERATING DISTANCE MM	3	3	4
			
	ALL-METAL / 100 BAR	ALL-METAL / 100 BAR	4 X DISTANCE
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

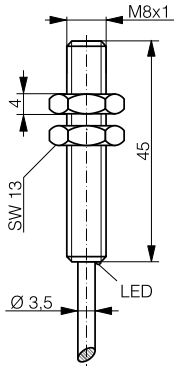
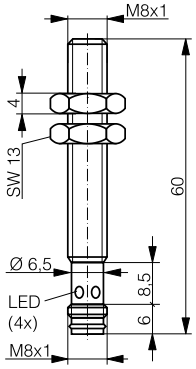
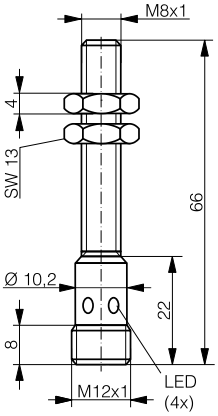
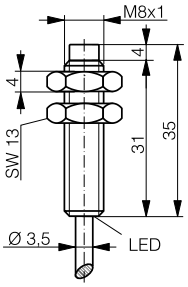
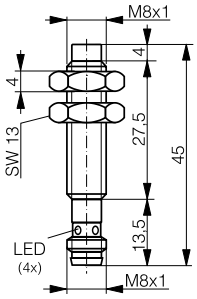
TECHNICAL DATA

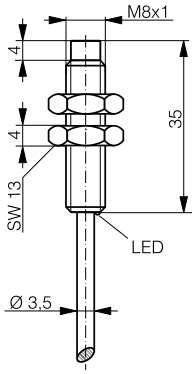
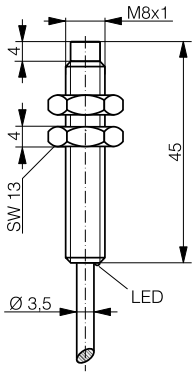
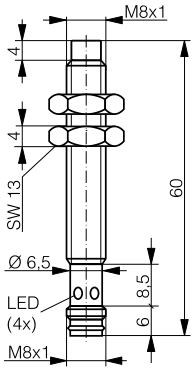
Housing material	Stainless steel V2A	Stainless steel V2A	Cr-plated nickel silver
Connection [1]	Connector S8	Connector S12	PVC cable type 2
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	1,000 Hz	1,000 Hz	500 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 2	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AS-701-M8-001**	**DW-AS-701-M8**	**DW-AD-521-M8-750**
NPN N.C.	DW-AS-702-M8-001	DW-AS-702-M8	DW-AD-522-M8-750
PNP N.O.	**DW-AS-703-M8-001**	**DW-AS-703-M8**	**DW-AD-523-M8-750**
PNP N.C.	DW-AS-704-M8-001	DW-AS-704-M8	DW-AD-524-M8-750
Compatible connectors [4]	A, B	G, H, M, N (N.O.); M, N (N.C.)	

M8

4	4	4	4	4
				
4 X DISTANCE	**4 X DISTANCE**	**4 X DISTANCE**	**INCREASED DISTANCE**	**INCREASED DISTANCE**
				
Cr-plated nickel silver	Cr-plated nickel silver	Cr-plated nickel silver	Stainless steel V2A	Stainless steel V2A
PVC cable type 2	Connector S8	Connector S12	PVC cable type 2	Connector S8
IP 67	IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Non-embeddable	Non-embeddable
500 Hz	500 Hz	500 Hz	3,500 Hz	3,500 Hz
Table 1	Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 2	Diagram 1	Diagram 1
Built-in	Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS
DW-AD-521-M8	**DW-AS-521-M8-001**	**DW-AS-521-M8**	**DW-AD-631-M8**	**DW-AS-631-M8-001**
DW-AD-522-M8	DW-AS-522-M8-001	DW-AS-522-M8	DW-AD-632-M8	DW-AS-632-M8-001
DW-AD-523-M8	**DW-AS-523-M8-001**	**DW-AS-523-M8**	**DW-AD-633-M8**	**DW-AS-633-M8-001**
DW-AD-524-M8	DW-AS-524-M8-001	DW-AS-524-M8	DW-AD-634-M8	DW-AS-634-M8-001
	A, B	G, H, M, N (N.O.); M, N (N.C.)		A, B

HOUSING SIZE	M8		
OPERATING DISTANCE MM	6	6	6
			
	LONG DISTANCE	LONG DISTANCE	LONG DISTANCE
			

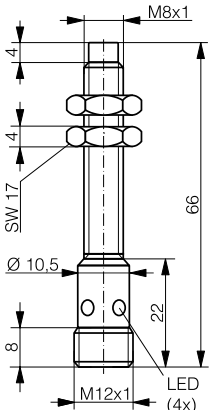
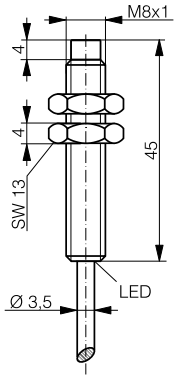
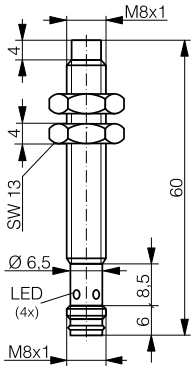
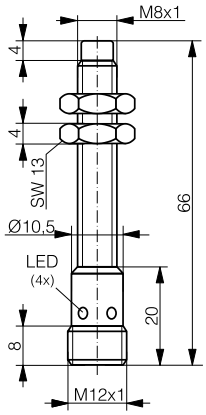
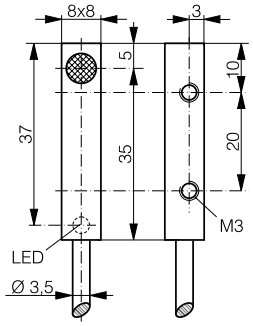
[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

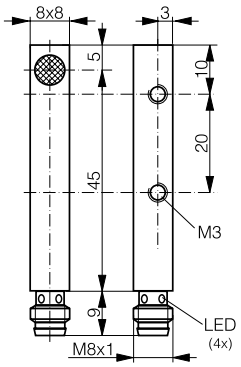
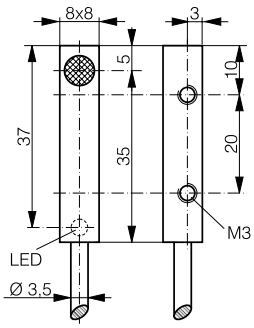
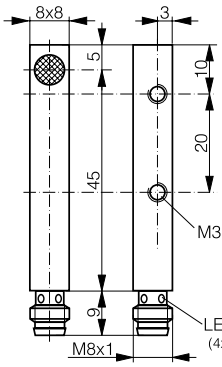
TECHNICAL DATA

Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	PVC cable type 2	PVC cable type 2	Connector S8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Non-embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	500 Hz	500 Hz	500 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AD-511-M8-750**	**DW-AD-511-M8**	**DW-AS-511-M8-001**
NPN N.C.	DW-AD-512-M8-750	DW-AD-512-M8	DW-AS-512-M8-001
PNP N.O.	**DW-AD-513-M8-750**	**DW-AD-513-M8**	**DW-AS-513-M8-001**
PNP N.C.	DW-AD-514-M8-750	DW-AD-514-M8	DW-AS-514-M8-001
Compatible connectors [4]			A, B

M8				8 X 8
6	6	6	6	1.5
				
LONG DISTANCE	ALL-METAL / 100 BAR	ALL-METAL / 100 BAR	ALL-METAL / 100 BAR	
				
Chrome-plated brass	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Nickel-plated brass
Connector S12	PUR cable type 3	Connector S8	Connector S12	PVC cable type 2
IP 67	IP 68	IP 67	IP 67	IP 67
Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable	Embeddable
500 Hz	700 Hz	700 Hz	700 Hz	5,000 Hz
Table 1	Table 1	Table 1	Table 1	Table 1
Diagram 2	Diagram 1	Diagram 1	Diagram 2	Diagram 1
Built-in	Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS
DW-AS-511-M8	**DW-AD-711-M8**	**DW-AS-711-M8-001**	**DW-AS-711-M8**	**DW-AD-601-C8**
DW-AS-512-M8	DW-AD-712-M8	DW-AS-712-M8-001	DW-AS-712-M8	DW-AD-602-C8
DW-AS-513-M8	**DW-AD-713-M8**	**DW-AS-713-M8-001**	**DW-AS-713-M8**	**DW-AD-603-C8**
DW-AS-514-M8	DW-AD-714-M8	DW-AS-714-M8-001	DW-AS-714-M8	DW-AD-604-C8
G, H, M, N (N.O.); M, N (N.C.)		A, B	G, H, M, N (N.O.); M, N (N.C.)	

HOUSING SIZE	⌀ 8 X 8		
OPERATING DISTANCE MM	1.5	2	2
			
		INCREASED DISTANCE	INCREASED DISTANCE
			

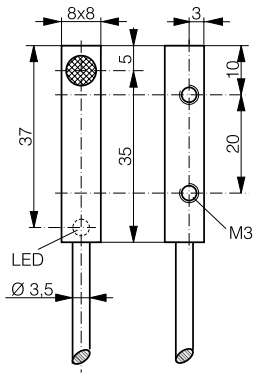
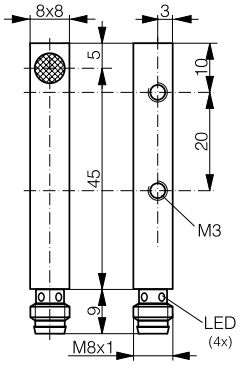
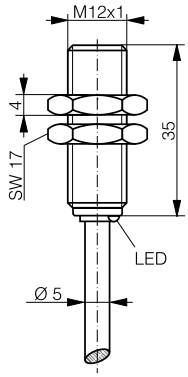
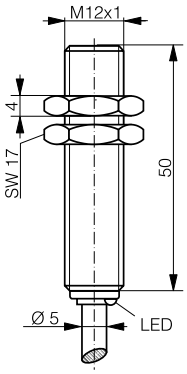
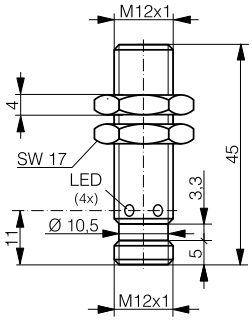
[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA

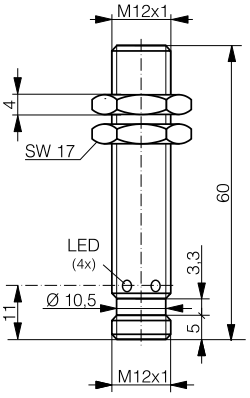
Housing material	Nickel-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	Connector S8	PVC cable type 2	Connector S8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5,000 Hz	3,000 Hz	3,000 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

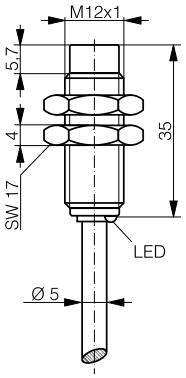
PART REFERENCES: (**BOLD:** PREFERRED TYPES)

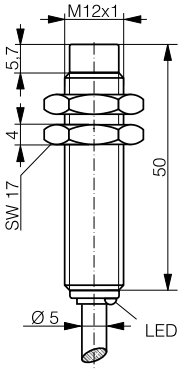
NPN N.O.	**DW-AS-601-C8-001**	**DW-AD-621-C8**	**DW-AS-621-C8-001**
NPN N.C.	DW-AS-602-C8-001	DW-AD-622-C8	DW-AS-622-C8-001
PNP N.O.	**DW-AS-603-C8-001**	**DW-AD-623-C8**	**DW-AS-623-C8-001**
PNP N.C.	DW-AS-604-C8-001	DW-AD-624-C8	DW-AS-624-C8-001
Compatible connectors [4]	A, B		A, B

⌀ 8 X 8		M12		
3	3	2	2	2
				
LONG DISTANCE	LONG DISTANCE			
				
Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
PVC cable type 2	Connector S8	PVC cable type 8	PVC cable type 8	Connector S12
IP 67	IP 67	IP 67	IP 67	IP 67
Quasi-embeddable	Quasi-embeddable	Embeddable	Embeddable	Embeddable
1,000 Hz	1,000 Hz	3,000 Hz	3,000 Hz	3,000 Hz
Table 1	Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1	Diagram 2
Built-in	Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, UL, RoHS	CE, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS
DW-AD-501-C8	**DW-AS-501-C8**	**DW-AD-601-M12-120**	**DW-AD-601-M12**	**DW-AS-601-M12-120**
DW-AD-502-C8	DW-AS-502-C8	DW-AD-602-M12-120	DW-AD-602-M12	DW-AS-602-M12-120
DW-AD-503-C8	**DW-AS-503-C8**	**DW-AD-603-M12-120**	**DW-AD-603-M12**	**DW-AS-603-M12-120**
DW-AD-504-C8	DW-AS-504-C8	DW-AD-604-M12-120	DW-AD-604-M12	DW-AS-604-M12-120
	A, B			G, H, M, N (N.O.); M, N (N.C.)

HOUSING SIZE	M12		
OPERATING DISTANCE MM	2	4	4







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

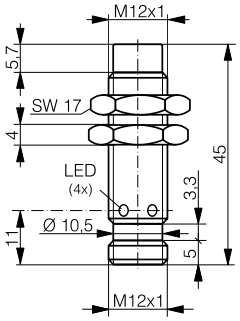
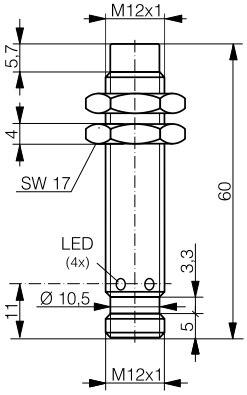
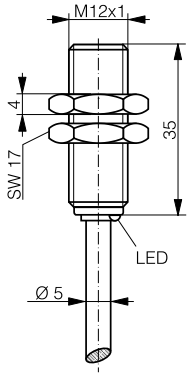
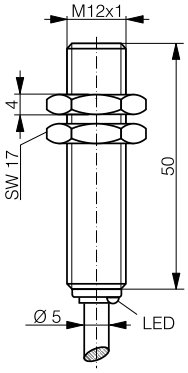
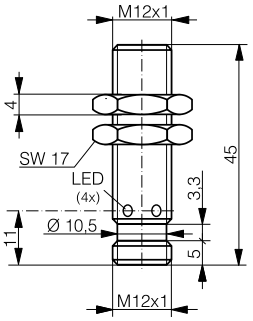
TECHNICAL DATA

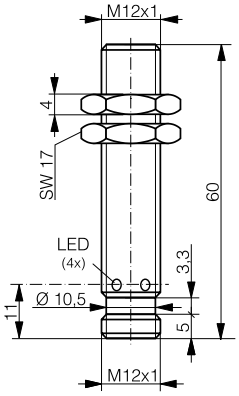
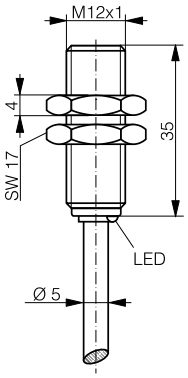
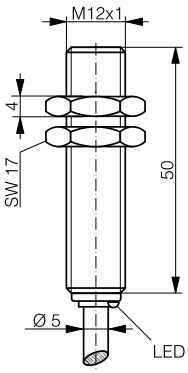
Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	Connector S12	PVC cable type 8	PVC cable type 8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	3,000 Hz	2,000 Hz	2,000 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 2	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AS-601-M12**	**DW-AD-611-M12-120**	**DW-AD-611-M12**
NPN N.C.	DW-AS-602-M12	DW-AD-612-M12-120	DW-AD-612-M12
PNP N.O.	**DW-AS-603-M12**	**DW-AD-613-M12-120**	**DW-AD-613-M12**
PNP N.C.	DW-AS-604-M12	DW-AD-614-M12-120	DW-AD-614-M12
Compatible connectors [4]	G, H, M, N (N.O.); M, N (N.C.)		

M12

4	4	4	4	4
				
		INCREASED DISTANCE	INCREASED DISTANCE	INCREASED DISTANCE
				
Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connector S12	Connector S12	PVC cable type 8	PVC cable type 8	Connector S12
IP 67	IP 67	IP 67	IP 67	IP 67
Non-embeddable	Non-embeddable	Embeddable	Embeddable	Embeddable
2,000 Hz	2,000 Hz	2,500 Hz	2,500 Hz	2,500 Hz
Table 1	Table 1	Table 1	Table 1	Table 1
Diagram 2	Diagram 2	Diagram 1	Diagram 1	Diagram 2
Built-in	Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS
DW-AS-611-M12-120	**DW-AS-611-M12**	**DW-AD-621-M12-120**	**DW-AD-621-M12**	**DW-AS-621-M12-120**
DW-AS-612-M12-120	DW-AS-612-M12	DW-AD-622-M12-120	DW-AD-622-M12	DW-AS-622-M12-120
DW-AS-613-M12-120	**DW-AS-613-M12**	**DW-AD-623-M12-120**	**DW-AD-623-M12**	**DW-AS-623-M12-120**
DW-AS-614-M12-120	DW-AS-614-M12	DW-AD-624-M12-120	DW-AD-624-M12	DW-AS-624-M12-120
G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)			G, H, M, N (N.O.); M, N (N.C.)

HOUSING SIZE	M12		
OPERATING DISTANCE MM	4	6	6
			
	INCREASED DISTANCE	LONG DISTANCE	LONG DISTANCE
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

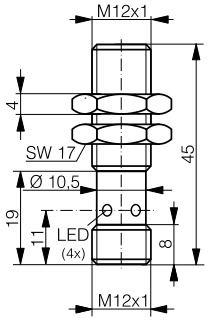
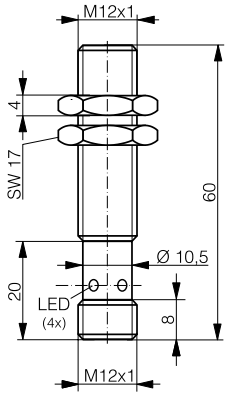
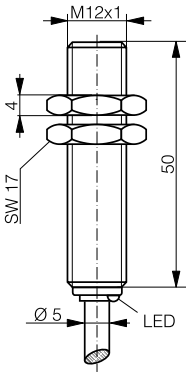
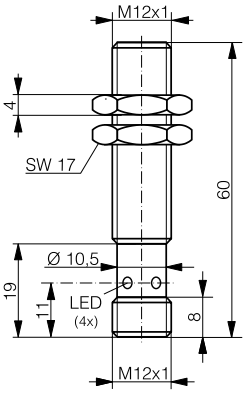
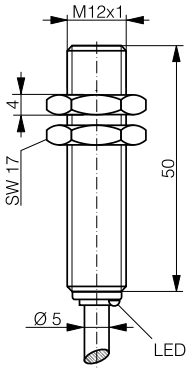
TECHNICAL DATA

Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	Connector S12	PVC cable type 8	PVC cable type 8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Quasi-embeddable	Quasi-embeddable
Max. switching frequency	2,500 Hz	800 Hz	800 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 2	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, CCC, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

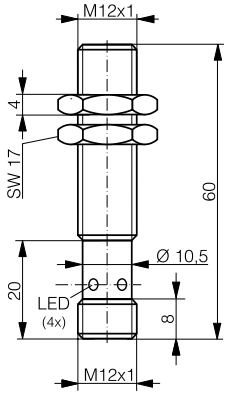
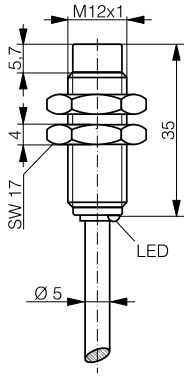
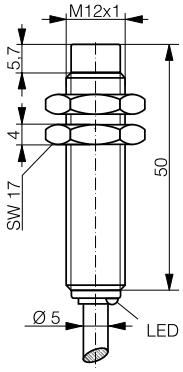
PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AS-621-M12**	**DW-AD-501-M12-120**	**DW-AD-501-M12**
NPN N.C.	DW-AS-622-M12	DW-AD-502-M12-120	DW-AD-502-M12
PNP N.O.	**DW-AS-623-M12**	**DW-AD-503-M12-120**	**DW-AD-503-M12**
PNP N.C.	DW-AS-624-M12	DW-AD-504-M12-120	DW-AD-504-M12
Compatible connectors [4]	G, H, M, N (N.O.); M, N (N.C.)		

M12

6	6	6*	6*	8**
				
LONG DISTANCE	**LONG DISTANCE**	**ALL-METAL / 80 BAR**	**ALL-METAL / 80 BAR**	**4 X DISTANCE**
				
Chrome-plated brass	Chrome-plated brass	Stainless steel V2A	Stainless steel V2A	Chrome-plated brass
Connector S12	Connector S12	PUR cable type 11	Connector S12	PVC cable type 8
IP 67	IP 67	IP 68 & IP 69K	IP 68 & IP 69K	IP 67
Quasi-embeddable	Quasi-embeddable	Embeddable	Embeddable	Quasi-embeddable
800 Hz	800 Hz	600 Hz	600 Hz	400 Hz
Table 1	Table 1	Table 1	Table 1	Table 1
Diagram 2	Diagram 2	Diagram 1	Diagram 2	Diagram 1
Built-in	Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS
DW-AS-501-M12-120	**DW-AS-501-M12**	**DW-AD-701-M12**	**DW-AS-701-M12**	**DW-AD-521-M12**
DW-AS-502-M12-120	DW-AS-502-M12	DW-AD-702-M12	DW-AS-702-M12	DW-AD-522-M12
DW-AS-503-M12-120	**DW-AS-503-M12**	**DW-AD-703-M12**	**DW-AS-703-M12**	**DW-AD-523-M12**
DW-AS-504-M12-120	DW-AS-504-M12	DW-AD-704-M12	DW-AS-704-M12	DW-AD-524-M12
G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)		G, H, M, N (N.O.); M, N (N.C.)	

* versions with 2 mm operating distance on request ** short version in preparation

HOUSING SIZE	M12		
OPERATING DISTANCE MM	8*	8	8
			
	4 X DISTANCE	INCREASED DISTANCE	INCREASED DISTANCE
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA

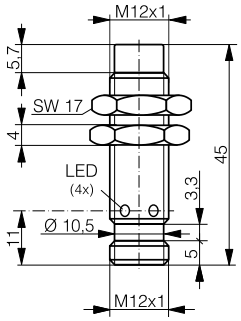
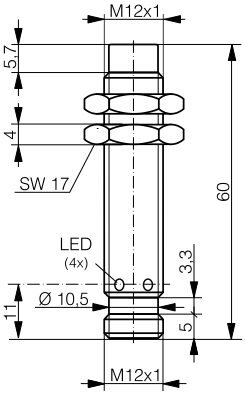
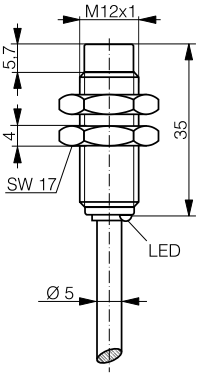
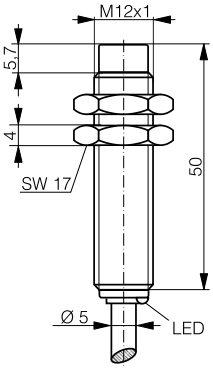
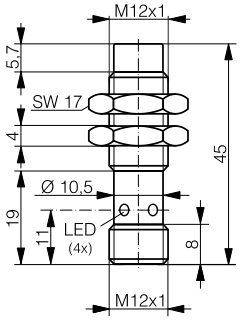
Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	Connector S12	PVC cable type 8	PVC cable type 8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Quasi-embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	400 Hz	1,400 Hz	1,400 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 2	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AS-521-M12**	**DW-AD-631-M12-120**	**DW-AD-631-M12**
NPN N.C.	DW-AS-522-M12	DW-AD-632-M12-120	DW-AD-632-M12
PNP N.O.	**DW-AS-523-M12**	**DW-AD-633-M12-120**	**DW-AD-633-M12**
PNP N.C.	DW-AS-524-M12	DW-AD-634-M12-120	DW-AD-634-M12
Compatible connectors [4]	G, H, M, N (N.O.); M, N (N.C.)		

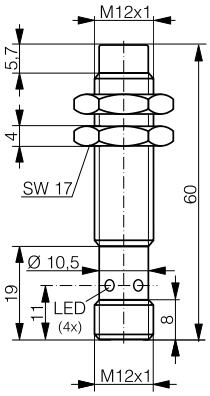
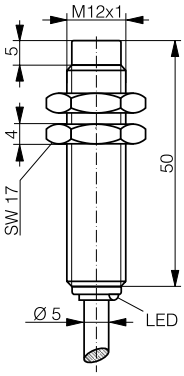
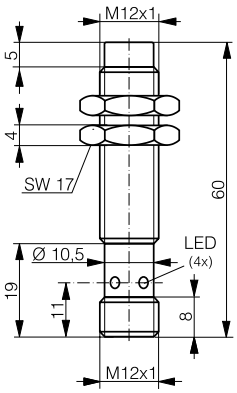
* short version in preparation

M12

8	8	10	10	10
				
INCREASED DISTANCE	INCREASED DISTANCE	LONG DISTANCE	LONG DISTANCE	LONG DISTANCE
				

Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connector S12	Connector S12	PVC cable type 8	PVC cable type 8	Connector S12
IP 67	IP 67	IP 67	IP 67	IP 67
Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
1,400 Hz	1,400 Hz	400 Hz	400 Hz	400 Hz
Table 1	Table 1	Table 1	Table 1	Table 1
Diagram 2	Diagram 2	Diagram 1	Diagram 1	Diagram 2
Built-in	Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

DW-AS-631-M12-120	**DW-AS-631-M12**	**DW-AD-511-M12-120**	**DW-AD-511-M12**	**DW-AS-511-M12-120**
DW-AS-632-M12-120	DW-AS-632-M12	DW-AD-512-M12-120	DW-AD-512-M12	DW-AS-512-M12-120
DW-AS-633-M12-120	**DW-AS-633-M12**	**DW-AD-513-M12-120**	**DW-AD-513-M12**	**DW-AS-513-M12-120**
DW-AS-634-M12-120	DW-AS-634-M12	DW-AD-514-M12-120	DW-AD-514-M12	DW-AS-514-M12-120
G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)			G, H, M, N (N.O.); M, N (N.C.)

HOUSING SIZE	M12		
OPERATING DISTANCE MM	10	10*	10*
			
	LONG DISTANCE	ALL-METAL / 80 BAR	ALL-METAL / 80 BAR
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA

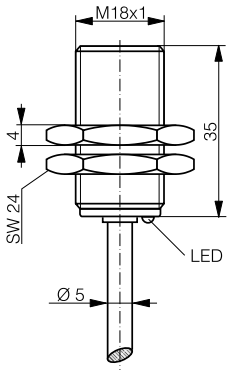
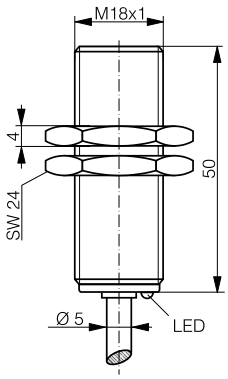
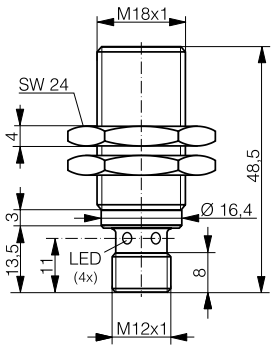
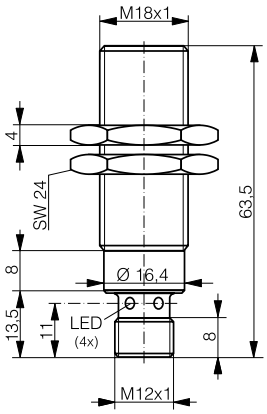
Housing material	Chrome-plated brass	Stainless steel V2A	Stainless steel V2A
Connection [1]	Connector S12	PUR cable type 11	Connector S12
Degree of protection	IP 67	IP 68 & IP 69K	IP 68 & IP 69K
Mounting	Non-embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	400 Hz	400 Hz	400 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 2	Diagram 1	Diagram 2
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

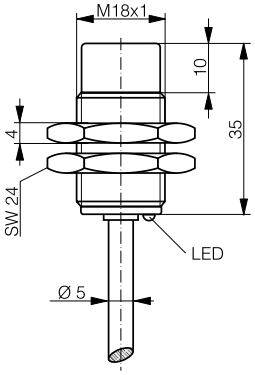
NPN N.O.	**DW-AS-511-M12**	**DW-AD-711-M12**	**DW-AS-711-M12**
NPN N.C.	DW-AS-512-M12	DW-AD-712-M12	DW-AS-712-M12
PNP N.O.	**DW-AS-513-M12**	**DW-AD-713-M12**	**DW-AS-713-M12**
PNP N.C.	DW-AS-514-M12	DW-AD-714-M12	DW-AS-714-M12
Compatible connectors [4]	G, H, M, N (N.O.); M, N (N.C.)		G, H, M, N (N.O.); M, N (N.C.)

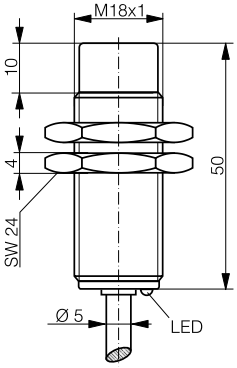
* versions with 4 mm operating distance on request

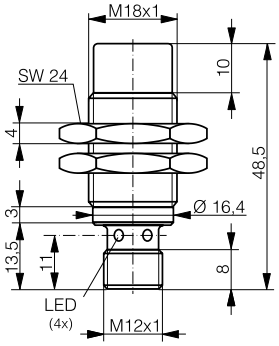
M18

5	5	5	5
			
			
Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
PVC cable type 8	PVC cable type 8	Connector S12	Connector S12
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
2,000 Hz	2,000 Hz	2,000 Hz	2,000 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 2	Diagram 2
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS
DW-AD-601-M18-120	**DW-AD-601-M18**	**DW-AS-601-M18-120**	**DW-AS-601-M18-002**
DW-AD-602-M18-120	DW-AD-602-M18	DW-AS-602-M18-120	DW-AS-602-M18-002
DW-AD-603-M18-120	**DW-AD-603-M18**	**DW-AS-603-M18-120**	**DW-AS-603-M18-002**
DW-AD-604-M18-120	DW-AD-604-M18	DW-AS-604-M18-120	DW-AS-604-M18-002
		G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)

HOUSING SIZE	M18		
OPERATING DISTANCE MM	8	8	8







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

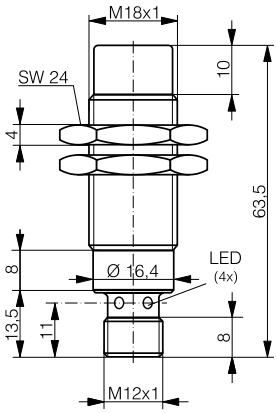
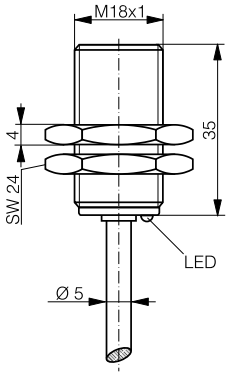
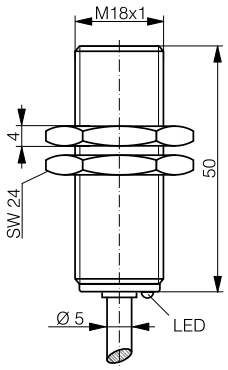
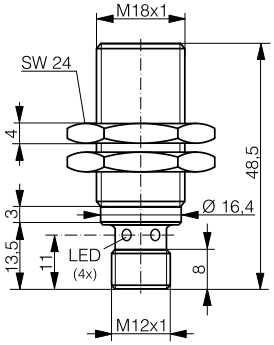
TECHNICAL DATA

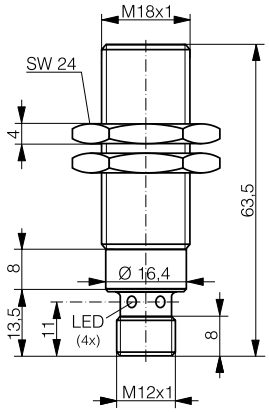
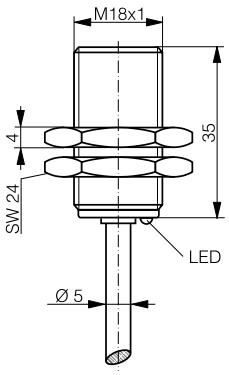
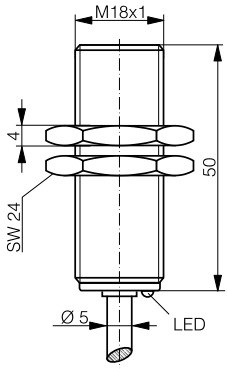
Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	PVC cable type 8	PVC cable type 8	Connector S12
Degree of protection	IP 67	IP 67	IP 67
Mounting	Non-embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	2,000 Hz	2,000 Hz	2,000 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 2
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AD-611-M18-120**	**DW-AD-611-M18**	**DW-AS-611-M18-120**
NPN N.C.	DW-AD-612-M18-120	DW-AD-612-M18	DW-AS-612-M18-120
PNP N.O.	**DW-AD-613-M18-120**	**DW-AD-613-M18**	**DW-AS-613-M18-120**
PNP N.C.	DW-AD-614-M18-120	DW-AD-614-M18	DW-AS-614-M18-120
Compatible connectors [4]			G, H, M, N (N.O.); M, N (N.C.)

M18

8	8	8	8
			
	INCREASED DISTANCE	INCREASED DISTANCE	INCREASED DISTANCE
			
Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connector S12	PVC cable type 8	PVC cable type 8	Connector S12
IP 67	IP 67	IP 67	IP 67
Non-embeddable	Quasi-embeddable	Quasi-embeddable	Quasi-embeddable
2,000 Hz	1,500 Hz	1,500 Hz	1,500 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 2	Diagram 1	Diagram 1	Diagram 2
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS
DW-AS-611-M18-002	**DW-AD-621-M18-120**	**DW-AD-621-M18**	**DW-AS-621-M18-120**
DW-AS-612-M18-002	DW-AD-622-M18-120	DW-AD-622-M18	DW-AS-622-M18-120
DW-AS-613-M18-002	**DW-AD-623-M18-120**	**DW-AD-623-M18**	**DW-AS-623-M18-120**
DW-AS-614-M18-002	DW-AD-624-M18-120	DW-AD-624-M18	DW-AS-624-M18-120
G, H, M, N (N.O.); M, N (N.C.)			G, H, M, N (N.O.); M, N (N.C.)

HOUSING SIZE	M18		
OPERATING DISTANCE MM	8	10	10*
			
	INCREASED DISTANCE	ALL-METAL / 60 BAR	ALL-METAL / 60 BAR
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA

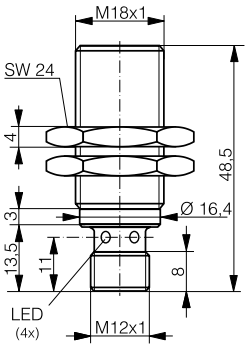
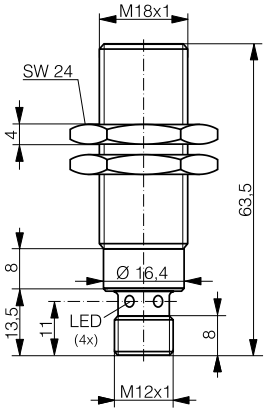
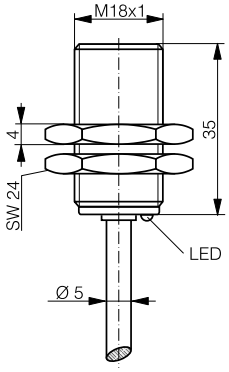
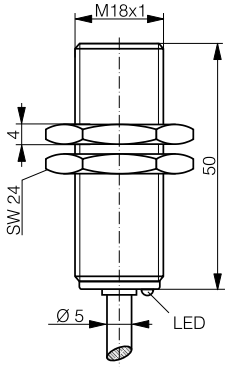
Housing material	Chrome-plated brass	Stainless steel V2A	Stainless steel V2A
Connection [1]	Connector S12	PUR cable type 11	PUR cable type 11
Degree of protection	IP 67	IP 68 & IP 69K	IP 68 & IP 69K
Mounting	Quasi-embeddable	Embeddable	Embeddable
Max. switching frequency	1,500 Hz	200 Hz	200 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 2	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, CCC, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

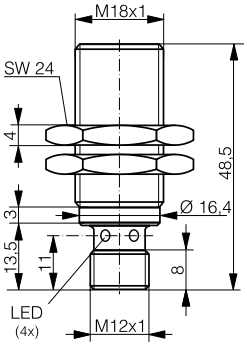
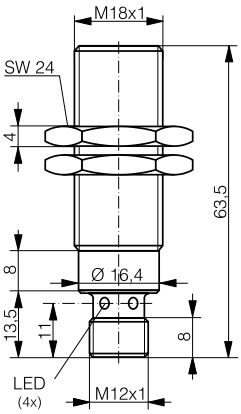
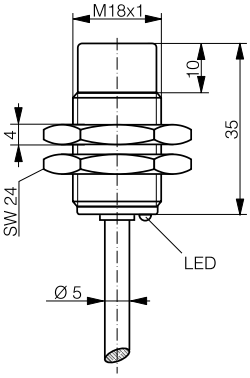
NPN N.O.	**DW-AS-621-M18-002**	**DW-AD-701-M18-120**	**DW-AD-701-M18**
NPN N.C.	DW-AS-622-M18-002	DW-AD-702-M18-120	DW-AD-702-M18
PNP N.O.	**DW-AS-623-M18-002**	**DW-AD-703-M18-120**	**DW-AD-703-M18**
PNP N.C.	DW-AS-624-M18-002	DW-AD-704-M18-120	DW-AD-704-M18
Compatible connectors [4]	G, H, M, N (N.O.); M, N (N.C.)		

* versions with 5 mm operating distance on request

M18

10	10*	12	12
			
ALL-METAL / 60 BAR	**ALL-METAL / 60 BAR**	**LONG DISTANCE**	**LONG DISTANCE**
			
Stainless steel V2A	Stainless steel V2A	Chrome-plated brass	Chrome-plated brass
Connector S12	Connector S12	PVC cable type 8	PVC cable type 8
IP 68 & IP 69K	IP 68 & IP 69K	IP 67	IP 67
Embeddable	Embeddable	Quasi-embeddable	Quasi-embeddable
200 Hz	200 Hz	500 Hz	500 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 2	Diagram 2	Diagram 1	Diagram 1
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS
DW-AS-701-M18-120	**DW-AS-701-M18-002**	**DW-AD-501-M18-120**	**DW-AD-501-M18**
DW-AS-702-M18-120	DW-AS-702-M18-002	DW-AD-502-M18-120	DW-AD-502-M18
DW-AS-703-M18-120	**DW-AS-703-M18-002**	**DW-AD-503-M18-120**	**DW-AD-503-M18**
DW-AS-704-M18-120	DW-AS-704-M18-002	DW-AD-504-M18-120	DW-AD-504-M18
G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)		

* versions with 5 mm operating distance on request

HOUSING SIZE	M18		
OPERATING DISTANCE MM	12	12	20
			
	LONG DISTANCE	LONG DISTANCE	LONG DISTANCE
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

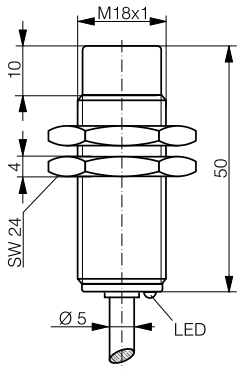
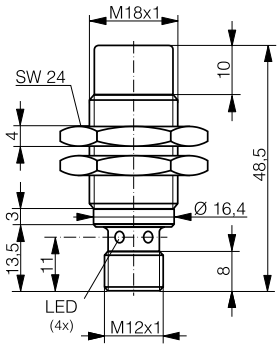
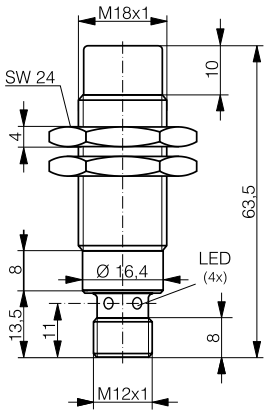
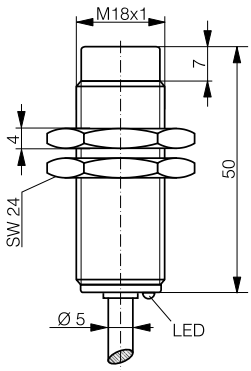
TECHNICAL DATA

Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	Connector S12	Connector S12	PVC cable type 8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Quasi-embeddable	Quasi-embeddable	Non-embeddable
Max. switching frequency	500 Hz	500 Hz	200 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 2	Diagram 2	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AS-501-M18-120**	**DW-AS-501-M18-002**	**DW-AD-511-M18-120**
NPN N.C.	DW-AS-502-M18-120	DW-AS-502-M18-002	DW-AD-512-M18-120
PNP N.O.	**DW-AS-503-M18-120**	**DW-AS-503-M18-002**	**DW-AD-513-M18-120**
PNP N.C.	DW-AS-504-M18-120	DW-AS-504-M18-002	DW-AD-514-M18-120
Compatible connectors [4]	G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)	

M18

20	20	20	20*
			
LONG DISTANCE	LONG DISTANCE	LONG DISTANCE	ALL-METAL / 60 BAR
			

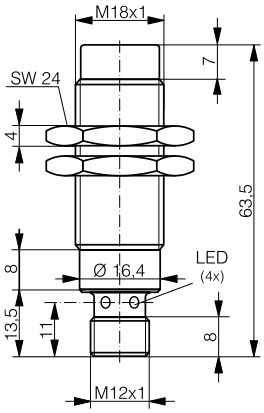
Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Stainless steel V2A
PVC cable type 8	Connector S12	Connector S12	PUR cable type 11
IP 67	IP 67	IP 67	IP 68 & IP 69K
Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
200 Hz	200 Hz	200 Hz	200 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 2	Diagram 2	Diagram 1
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

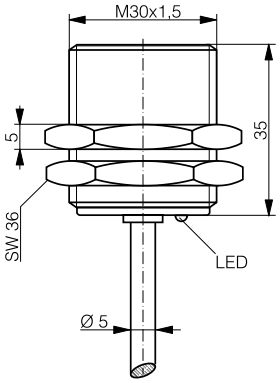
DW-AD-511-M18	**DW-AS-511-M18-120**	**DW-AS-511-M18-002**	**DW-AD-711-M18**
DW-AD-512-M18	DW-AS-512-M18-120	DW-AS-512-M18-002	DW-AD-712-M18
DW-AD-513-M18	**DW-AS-513-M18-120**	**DW-AS-513-M18-002**	**DW-AD-713-M18**
DW-AD-514-M18	DW-AS-514-M18-120	DW-AS-514-M18-002	DW-AD-714-M18
	G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)	

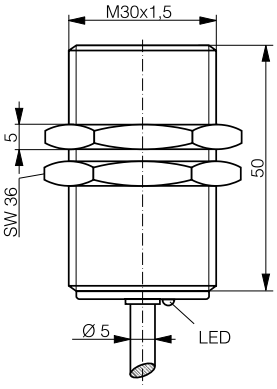
* versions with 8 mm operating distance on request

HOUSING SIZE	M18	M30	
OPERATING DISTANCE MM	20*	10	10

ALL-METAL / 60 BAR







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA

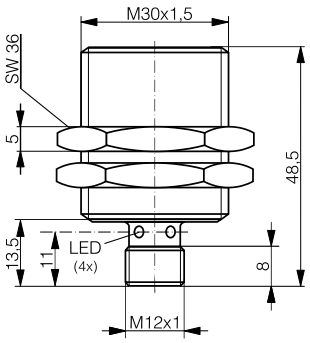
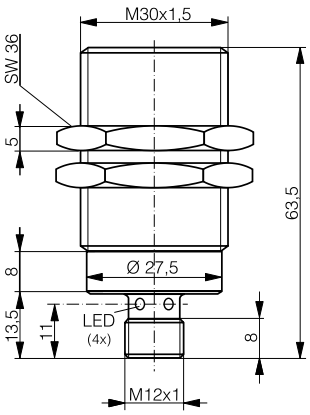
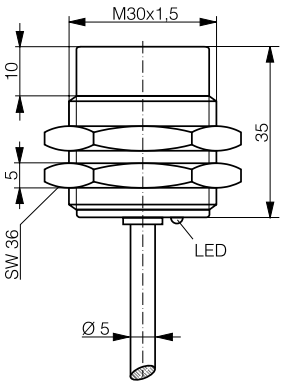
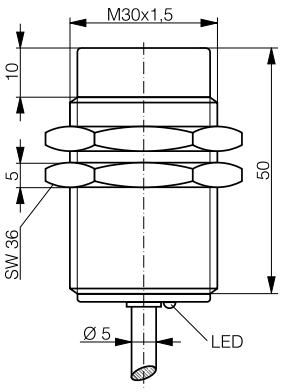
Housing material	Stainless steel V2A	Chrome-plated brass	Chrome-plated brass
Connection [1]	Connector S12	PVC cable type 8	PVC cable type 8
Degree of protection	IP 68 & IP 69K	IP 67	IP 67
Mounting	Non-embeddable	Embeddable	Embeddable
Max. switching frequency	200 Hz	1,200 Hz	1,200 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 2	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AS-711-M18-002**	**DW-AD-601-M30-120**	**DW-AD-601-M30**
NPN N.C.	DW-AS-712-M18-002	DW-AD-602-M30-120	DW-AD-602-M30
PNP N.O.	**DW-AS-713-M18-002**	**DW-AD-603-M30-120**	**DW-AD-603-M30**
PNP N.C.	DW-AS-714-M18-002	DW-AD-604-M30-120	DW-AD-604-M30
Compatible connectors [4]	G, H, M, N (N.O.); M, N (N.C.)		

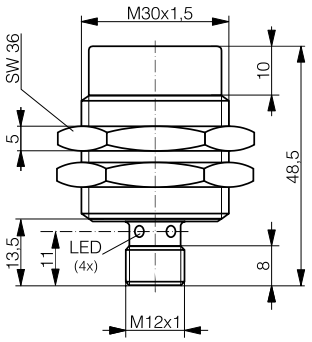
* versions with 8 mm operating distance on request

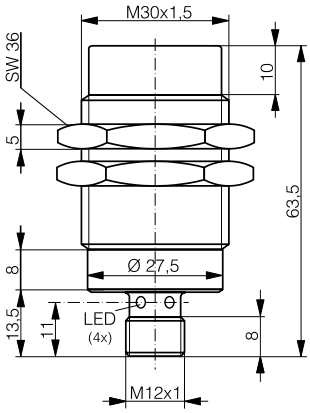
M30

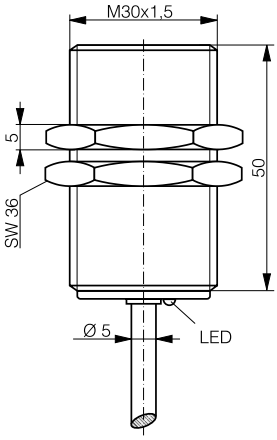
10	10	15	15
			
			
Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connector S12	Connector S12	PVC cable type 8	PVC cable type 8
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Non-embeddable	Non-embeddable
1,200 Hz	1,200 Hz	700 Hz	700 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 2	Diagram 2	Diagram 1	Diagram 1
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS
DW-AS-601-M30-120	**DW-AS-601-M30-002**	**DW-AD-611-M30-120**	**DW-AD-611-M30**
DW-AS-602-M30-120	DW-AS-602-M30-002	DW-AD-612-M30-120	DW-AD-612-M30
DW-AS-603-M30-120	**DW-AS-603-M30-002**	**DW-AD-613-M30-120**	**DW-AD-613-M30**
DW-AS-604-M30-120	DW-AS-604-M30-002	DW-AD-614-M30-120	DW-AD-614-M30
G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)		

HOUSING SIZE	M30		
OPERATING DISTANCE MM	15	15	20*

ALL-METAL / 40 BAR







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA

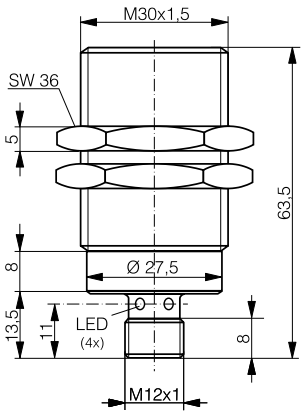
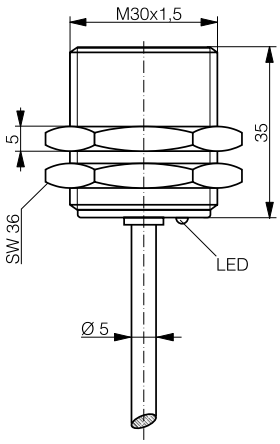
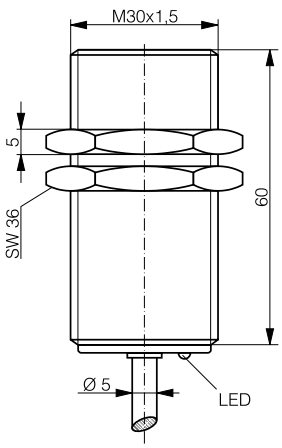
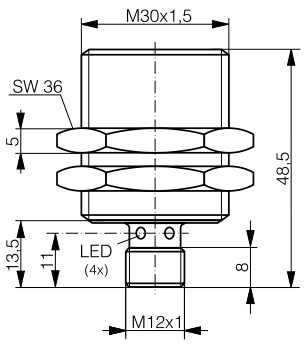
Housing material	Chrome-plated brass	Chrome-plated brass	Stainless steel V2A
Connection [1]	Connector S12	Connector S12	PUR cable type 11
Degree of protection	IP 67	IP 67	IP 68 & IP 69K
Mounting	Non-embeddable	Non-embeddable	Embeddable
Max. switching frequency	700 Hz	700 Hz	100 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 2	Diagram 2	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AS-611-M30-120**	**DW-AS-611-M30-002**	**DW-AD-701-M30**
NPN N.C.	DW-AS-612-M30-120	DW-AS-612-M30-002	DW-AD-702-M30
PNP N.O.	**DW-AS-613-M30-120**	**DW-AS-613-M30-002**	**DW-AD-703-M30**
PNP N.C.	DW-AS-614-M30-120	DW-AS-614-M30-002	DW-AD-704-M30
Compatible connectors [4]	G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)	

* versions with 10 mm operating distance on request

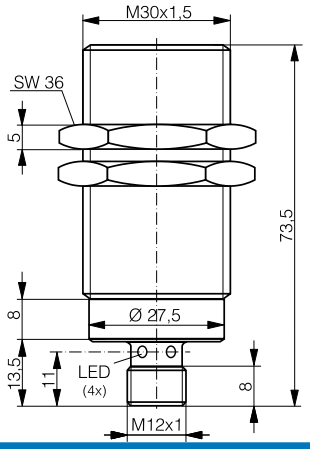
M30

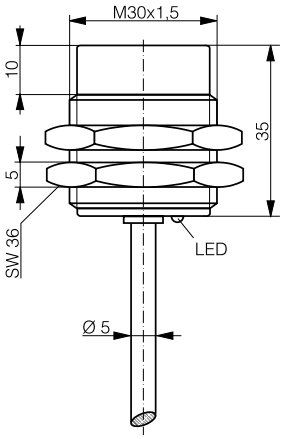
20*	22	22	22
			
ALL-METAL / 40 BAR	**LONG DISTANCE**	**LONG DISTANCE**	**LONG DISTANCE**
			
Stainless steel V2A	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connector S12	PVC cable type 8	PVC cable type 8	Connector S12
IP 68 & IP 69K	IP 67	IP 67	IP 67
Embeddable	Quasi-embeddable	Quasi-embeddable	Quasi-embeddable
100 Hz	200 Hz	200 Hz	200 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 2	Diagram 1	Diagram 1	Diagram 2
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS
DW-AS-701-M30-002	DW-AD-501-M30-120	**DW-AD-501-M30**	DW-AS-501-M30-120
DW-AS-702-M30-002	DW-AD-502-M30-120	DW-AD-502-M30	DW-AS-502-M30-120
DW-AS-703-M30-002	DW-AD-503-M30-120	**DW-AD-503-M30**	DW-AS-503-M30-120
DW-AS-704-M30-002	DW-AD-504-M30-120	DW-AD-504-M30	DW-AS-504-M30-120
G, H, M, N (N.O.); M, N (N.C.)			G, H, M, N (N.O.); M, N (N.C.)

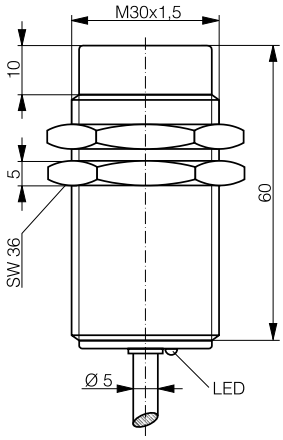
* versions with 10 mm operating distance on request

HOUSING SIZE	M30		
OPERATING DISTANCE MM	22	40	40

	LONG DISTANCE	LONG DISTANCE	LONG DISTANCE







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

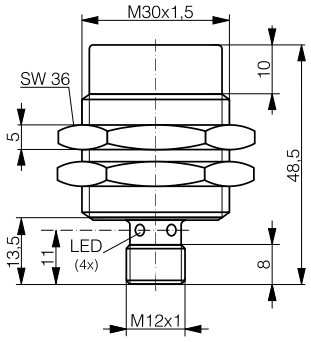
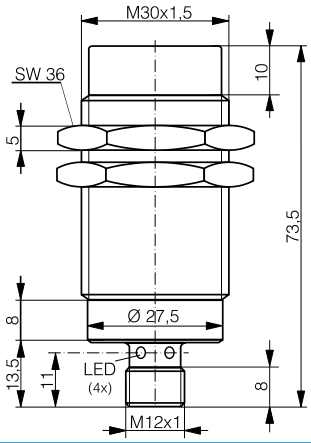
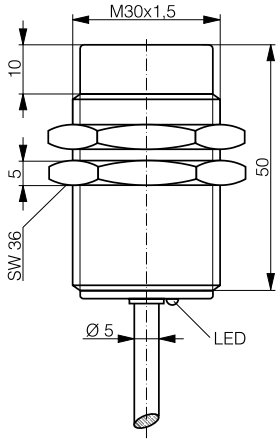
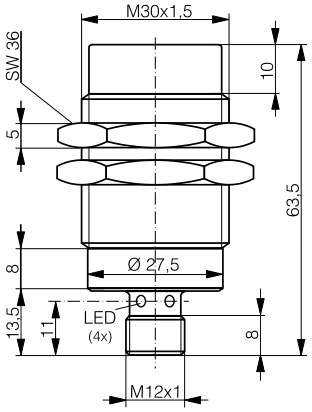
TECHNICAL DATA

Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	Connector S12	PVC cable type 8	PVC cable type 8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Quasi-embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	200 Hz	100 Hz	100 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 2	Diagram 1	Diagram 1
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

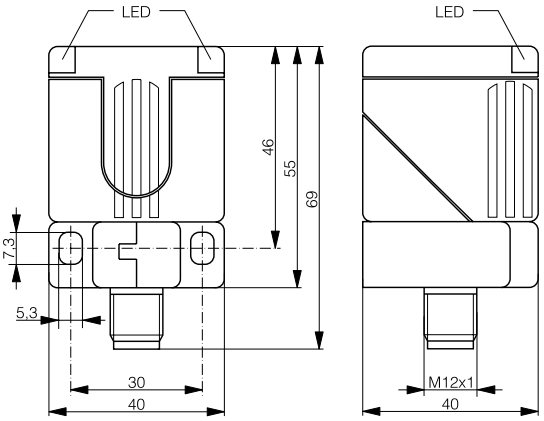
NPN N.O.	**DW-AS-501-M30-002**	DW-AD-511-M30-120	**DW-AD-511-M30**
NPN N.C.	DW-AS-502-M30-002	DW-AD-512-M30-120	DW-AD-512-M30
PNP N.O.	**DW-AS-503-M30-002**	DW-AD-513-M30-120	**DW-AD-513-M30**
PNP N.C.	DW-AS-504-M30-002	DW-AD-514-M30-120	DW-AD-514-M30
Compatible connectors [4]	G, H, M, N (N.O.); M, N (N.C.)		

M30

40	40	40*	40*
			
LONG DISTANCE	**LONG DISTANCE**	**ALL-METAL / 40 BAR**	**ALL-METAL / 40 BAR**
			
Chrome-plated brass	Chrome-plated brass	Stainless steel V2A	Stainless steel V2A
Connector S12	Connector S12	PUR cable type 11	Connector S12
IP 67	IP 67	IP 68 & IP 69K	IP 68 & IP 69K
Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
100 Hz	100 Hz	90 Hz	90 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 2	Diagram 2	Diagram 1	Diagram 2
Built-in	Built-in	Built-in	Built-in
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS
DW-AS-511-M30-120	**DW-AS-511-M30-002**	**DW-AD-711-M30**	**DW-AS-711-M30-002**
DW-AS-512-M30-120	DW-AS-512-M30-002	DW-AD-712-M30	DW-AS-712-M30-002
DW-AS-513-M30-120	**DW-AS-513-M30-002**	**DW-AD-713-M30**	**DW-AS-713-M30-002**
DW-AS-514-M30-120	DW-AS-514-M30-002	DW-AD-714-M30	DW-AS-714-M30-002
G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)		G, H, M, N (N.O.); M, N (N.C.)

* versions with 15 mm operating distance on request

HOUSING SIZE	⧄ 40 X 40		
OPERATING DISTANCE MM	15	20	35



Sensing face can be rotated to 5 different sides.

[1] Standard cable length 2 m. Non-standard cable lengths and types on request.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA

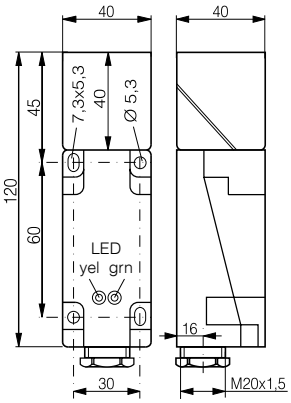
Housing material	PBTP	PBTP	PBTP
Connection [1]	Connector S12	Connector S12	Connector S12
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Non-embeddable
Max. switching frequency	50 Hz	30 Hz	30 Hz
Additional technical data [2]	Table 8	Table 8	Table 8
Wiring [3]	Diagram 6	Diagram 6	Diagram 6
LED	Built-in	Built-in	Built-in
Supply voltage range	15 ... 34 VDC	15 ... 34 VDC	15 ... 34 VDC
Ambient temperature range	-25 ... +85 °C	-25 ... +85 °C	-25 ... +85 °C
Output current	≤ 200 mA / ≤ 150 mA*	≤ 200 mA / ≤ 150 mA*	≤ 200 mA / ≤ 150 mA*
Approvals	CE, RoHS	CE, RoHS	CE, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

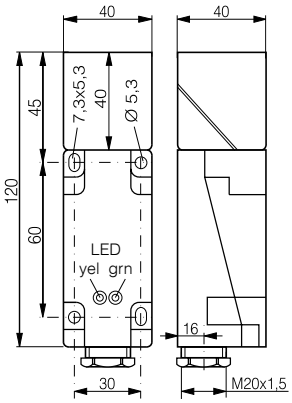
NPN N.O. + N.C.	**DW-AS-601-C44**	**DW-AS-601-C44-304**	**DW-AS-611-C44**
NPN N.O.			
PNP N.O. + N.C.	**DW-AS-603-C44**	**DW-AS-603-C44-304**	**DW-AS-613-C44**
PNP N.O.			
Compatible connectors [4]	M, N	M, N	M, N

* 50 °C / 85 °C

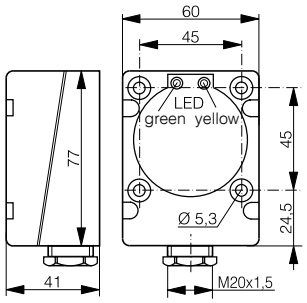
Ø 40 X 120		Ø 60 X 80	Ø 80 X 100
15	40	50	65

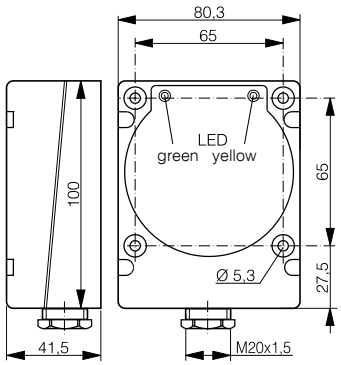


Sensing face can be rotated to 5 different sides.



Sensing face can be rotated to 5 different sides.





PBTP	PBTP	PBTP	PBTP
Screw terminal	Screw terminal	Screw terminal	Screw terminal
IP 65	IP 65	IP 65	IP 65
Embeddable	Non-embeddable	Non-embeddable	Non-embeddable
100 Hz	20 Hz	20 Hz	10 Hz
Table 2	Table 3	Table 3	Table 3
Diagram 2	Diagram 2	Diagram 2	Diagram 2
Built-in	Built-in	Built-in	Built-in
15 ... 34 VDC	10 ... 65 VDC	10 ... 65 VDC	10 ... 65 VDC
-25 ... +85 °C	-25 ... +85 °C	-25 ... +85 °C	-25 ... +85 °C
≤ 200 mA / ≤ 150 mA*	≤ 300 mA	≤ 300 mA	≤ 300 mA
CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS
DW-AD-601-C40			
DW-AD-603-C40	**DW-AD-613-C40****	**DW-AD-613-C60****	**DW-AD-613-C80****

* 50 °C / 85 °C

** N.O. / N.C. switchable

INDUCTIVE SENSORS: ANALOG OUTPUT SERIES 509

- ✓ Sensing range up to **40 mm**
- ✓ Resolution in **µm** range
- ✓ Excellent **temperature stability**
- ✓ Very good **repeat accuracy**
- ✓ **Current & voltage outputs**
- ✓ **Several switch points** with a single device

TECHNICAL DATA

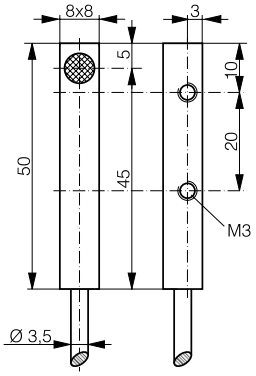
(according to IEC 60947-5-2)	
Housing material	Chrome-plated brass
Degree of protection	IP 67
Max. ripple content	≤ 20 % U_B
No-load supply current	≤ 10 mA
Output voltage, damped	0 VDC
Output voltage, non-damped	5 VDC / 10 VDC (-320/-39#)
Temperature drift % s_r	≤ 5 % (0...+70 °C); ≤ 10 % (-25...+0 °C)
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

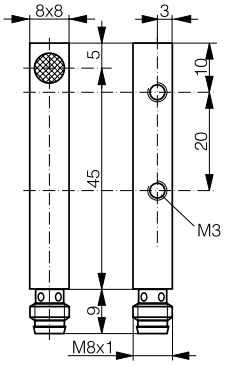
Inductive sensors with analog output for continuous measuring from 0 to 40 mm with very high detection accuracy (µm range). High resolution and temperature stability as well as excellent repeat accuracy. Voltage (all models) and current outputs (M12, M18 and M30) in the same device. Particularly suited for

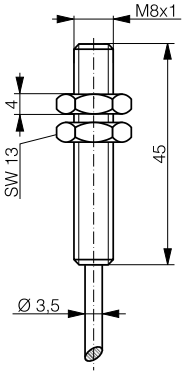
- ✓ regulated approach of **elevators** to end positions
- ✓ **vibration monitoring**
- ✓ **rotation monitoring**
- ✓ **angle detection**
- ✓ detection of **pedal positions** in vehicles
- ✓ **position monitoring** of parts on conveyor belts
- ✓ **sheet-metal forming**
- ✓ **metal-sorting systems**

HOUSING SIZE	⌀ 8 X 8		M8
SENSING RANGE MM	0 ... 4	0 ... 4	0 ... 4

ANALOG OUTPUT / LARGE SENSING RANGE







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 133
[3] see page 268

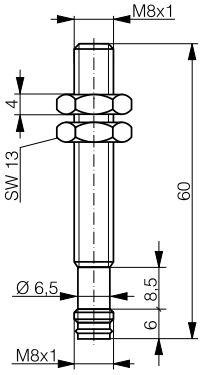
TECHNICAL DATA			
Connection [1]	PUR cable type 3	Connector S8	PUR cable type 3
Bandwidth (-3 dB)	1,600 Hz (at s = 2 mm)	1,600 Hz (at s = 2 mm)	1,600 Hz (at s = 2 mm)
Mounting	Quasi-embeddable	Quasi-embeddable	Quasi-embeddable
Voltage output	0 ... 10 V	0 ... 10 V	0 ... 5 V / 0 ... 10 V
Current output	---	---	---
Wiring [2]	Diagram 5	Diagram 5	Diagram 5
Supply voltage range	15 ... 30 VDC	15 ... 30 VDC	10 ... 30 / 15 ... 30 VDC*
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

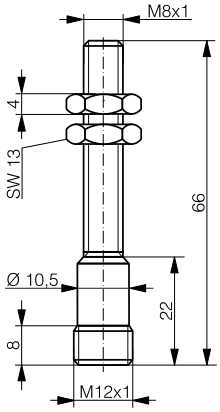
PART REFERENCES: (**BOLD:** PREFERRED TYPES)			
Non-linearized:			
Outputs 0 ... 5 V / 1 ... 5 mA			**DW-AD-509-M8*** **
Outputs 0 ... 10 V / 4 ... 20 mA	**DW-AD-509-C8-390*** **	**DW-AS-509-C8-390*** **	**DW-AD-509-M8-390*** **
Compatible connectors [3]		A, B	

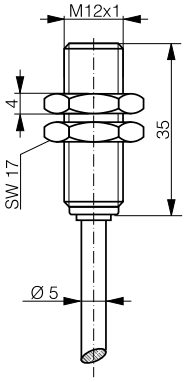
* DW-A#-509-M##-320/39# ** Depending on operating conditions, limited temperature range for DW-A#-509-M##-320/390 (see data sheets) *** without current output

HOUSING SIZE	M8		M12
SENSING RANGE MM	0 ... 4	0 ... 4	0 ... 6

ANALOG OUTPUT / LARGE SENSING RANGE







[1] Standard cable length 2 m.
Non-standard cable lengths and types on request.
Cable type see page 271.
[2] see page 133
[3] see page 268

TECHNICAL DATA

Connection [1]	Connector S8	Connector S12	PUR cable type 7
Bandwidth (-3 dB)	1,600 Hz (at s = 2 mm)	1,600 Hz (at s = 2 mm)	1,000 Hz (at s = 3 mm)
Mounting	Quasi-embeddable	Quasi-embeddable	Quasi-embeddable
Voltage output	0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V
Current output	---	---	1 ... 5 mA
Wiring [2]	Diagram 5	Diagram 5	Diagram 5
Supply voltage range	10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

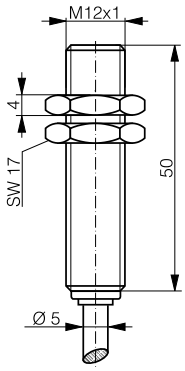
PART REFERENCES: (**BOLD:** PREFERRED TYPES)

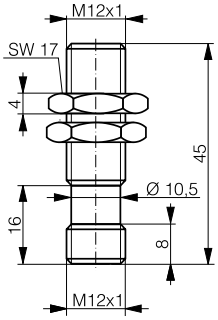
Non-linearized:			
Outputs 0 ... 5 V / 1 ... 5 mA	**DW-AS-509-M8-001*** **	**DW-AS-509-M8*** **	**DW-AD-509-M12-120**
Outputs 0 ... 10 V / 4 ... 20 mA	**DW-AS-509-M8-390*** **	**DW-AS-509-M8-393*** **	**DW-AD-509-M12-320*** **
Compatible connectors [3]	A, B	G, H, M, N	

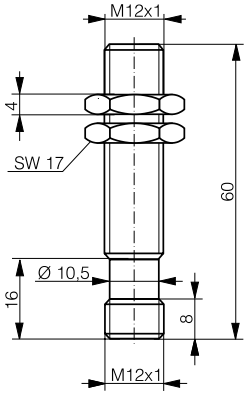
* DW-A#-509-M##-320/39# ** Depending on operating conditions, limited temperature range for DW-A#-509-M##-320/390 (see data sheets) *** without current output

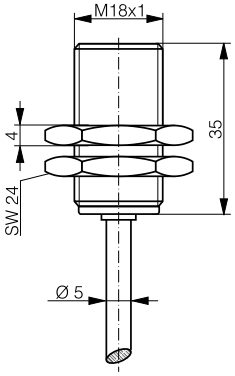
M12			M18
0 ... 6	0 ... 6	0 ... 6	0 ... 10
			

ANALOG OUTPUT / LARGE SENSING RANGE









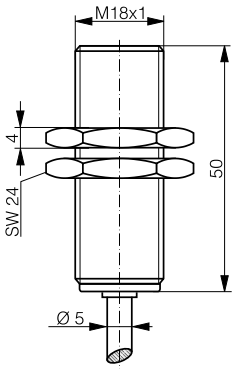
PUR cable type 7	Connector S12	Connector S12	PUR cable type 7
1,000 Hz (at s = 3 mm)	1,000 Hz (at s = 3 mm)	1,000 Hz (at s = 3 mm)	500 Hz (at s = 5 mm)
Quasi-embeddable	Quasi-embeddable	Quasi-embeddable	Quasi-embeddable
0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V
1 ... 5 mA / 4 ... 20 mA	1 ... 5 mA	1 ... 5 mA / 4 ... 20 mA	1 ... 5 mA / 4 ... 20 mA
Diagram 5	Diagram 5	Diagram 5	Diagram 5
10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*
-25 ... +70 °C**	-25 ... +70 °C	-25 ... +70 °C**	-25 ... +70 °C**
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

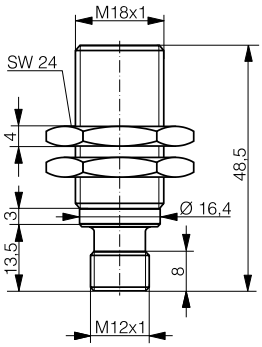
DW-AD-509-M12	**DW-AS-509-M12-120**	**DW-AS-509-M12**	**DW-AD-509-M18-120**
DW-AD-509-M12-390	**DW-AS-509-M12-320*** **	**DW-AS-509-M12-390**	**DW-AD-509-M18-320**
	M, N	M, N	

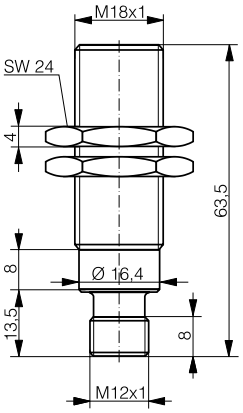
* DW-A#-509-M##-320/39# ** Depending on operating conditions, limited temperature range for DW-A#-509-M##-320/390 (see data sheets) *** without current output

HOUSING SIZE	M18		
SENSING RANGE MM	0 ... 10	0 ... 10	0 ...10

ANALOG OUTPUT / LARGE SENSING RANGE







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 133
[3] see page 268

TECHNICAL DATA

Connection [1]	PUR cable type 7	Connector S12	Connector S12
Bandwidth (-3 dB)	500 Hz (at s = 5 mm)	500 Hz (at s = 5 mm)	500 Hz (at s = 5 mm)
Mounting	Quasi-embeddable	Quasi-embeddable	Quasi-embeddable
Voltage output	0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V
Current output	1 ... 5 mA / 4 ... 20 mA	1 ... 5 mA / 4 ... 20 mA	1 ... 5 mA / 4 ... 20 mA
Wiring [2]	Diagram 5	Diagram 5	Diagram 5
Supply voltage range	10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*
Ambient temperature range	-25 ... +70 °C**	-25 ... +70 °C**	-25 ... +70 °C**
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

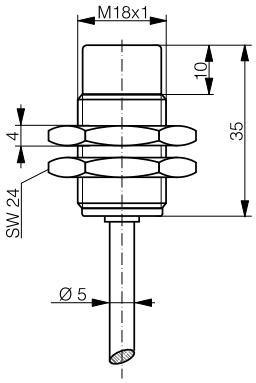
Non-linearized:			
Outputs 0 ... 5 V / 1 ... 5 mA	**DW-AD-509-M18**	**DW-AS-509-M18-120**	**DW-AS-509-M18-002**
Outputs 0 ... 10 V / 4 ... 20 mA	**DW-AD-509-M18-390**	**DW-AS-509-M18-320**	**DW-AS-509-M18-390**
Compatible connectors [3]		M, N	M, N

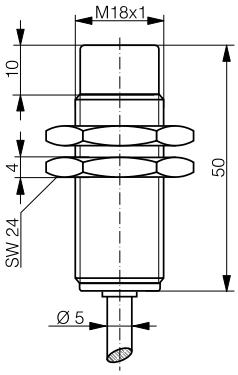
* DW-A#-509-M##-320/39# ** Depending on operating conditions, limited temperature range for DW-A#-509-M##-320/390 (see data sheets)

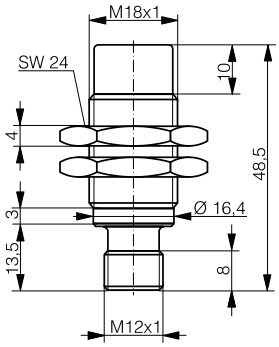
M18

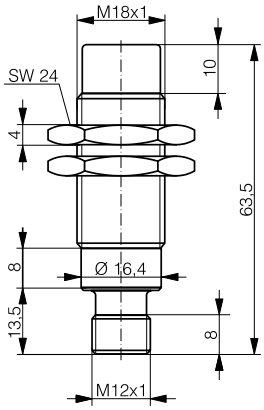
0 ... 20	0 ... 20	0 ... 20	0 ... 20
			

ANALOG OUTPUT / LARGE SENSING RANGE









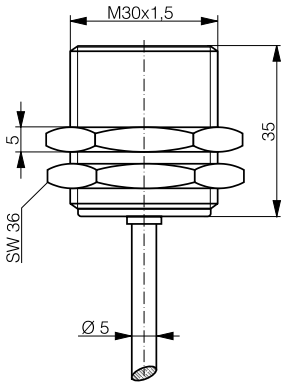
PUR cable type 7	PUR cable type 7	Connector S12	Connector S12
250 Hz (at s = 10 mm)	250 Hz (at s = 10 mm)	250 Hz (at s = 10 mm)	250 Hz (at s = 10 mm)
Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V
1 ... 5 mA / 4 ... 20 mA	1 ... 5 mA / 4 ... 20 mA	1 ... 5 mA / 4 ... 20 mA	1 ... 5 mA / 4 ... 20 mA
Diagram 5	Diagram 5	Diagram 5	Diagram 5
10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*
-25 ... +70 °C**	-25 ... +70 °C**	-25 ... +70 °C**	25 ... +70 °C**
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

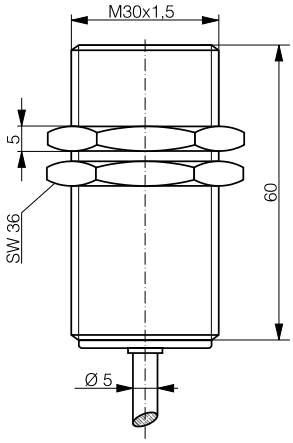
DW-AD-519-M18-120	**DW-AD-519-M18**	**DW-AS-519-M18-120**	**DW-AS-519-M18-002**
DW-AD-519-M18-320	**DW-AD-519-M18-390**	**DW-AS-519-M18-320**	**DW-AS-519-M18-390**
		M, N	M, N

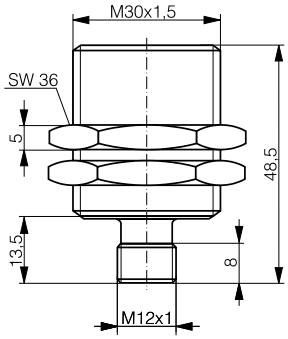
* DW-A#-519-M##-320/39# ** Depending on operating conditions, limited temperature range for DW-A#-519-M##-320/390 (see data sheets)

HOUSING SIZE	M30		
SENSING RANGE MM	0 ... 20	0 ... 20	0 ... 20

ANALOG OUTPUT / LARGE SENSING RANGE







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 133
[3] see page 268

TECHNICAL DATA

Connection [1]	PUR cable type 7	PUR cable type 7	Connector S12
Bandwidth (-3 dB)	200 Hz (at s = 10 mm)	200 Hz (at s = 10 mm)	200 Hz (at s = 10 mm)
Mounting	Quasi-embeddable	Quasi-embeddable	Quasi-embeddable
Voltage output	0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V
Current output	1 ... 5 mA / 4 ... 20 mA	1 ... 5 mA / 4 ... 20 mA	1 ... 5 mA / 4 ... 20 mA
Wiring [2]	Diagram 5	Diagram 5	Diagram 5
Supply voltage range	10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*
Ambient temperature range	-25 ... +70 °C**	-25 ... +70 °C**	-25 ... +70 °C**
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

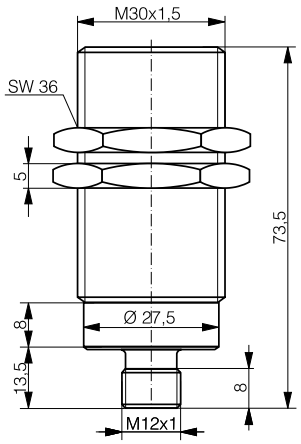
Non-linearized:			
Outputs 0 ... 5 V / 1 ... 5 mA	DW-AD-509-M30-120	**DW-AD-509-M30**	DW-AS-509-M30-120
Outputs 0 ... 10 V / 4 ... 20 mA	DW-AD-509-M30-320	**DW-AD-509-M30-390**	DW-AS-509-M30-320
Compatible connectors [3]			M, N

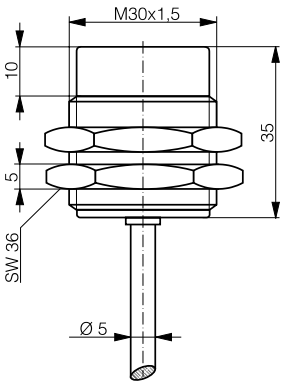
* DW-A#-509-M##-320/39# ** Depending on operating conditions, limited temperature range for DW-A#-509-M##-320/390 (see data sheets)

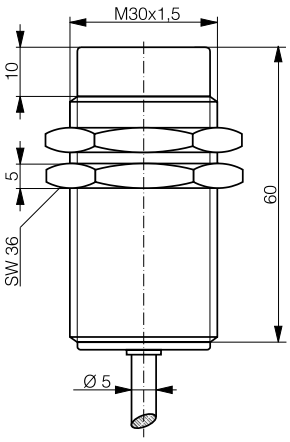
M30

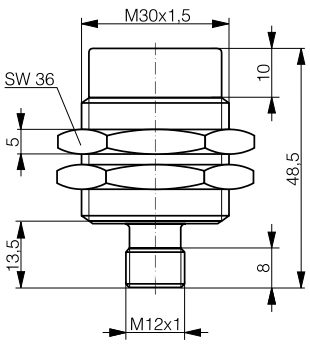
0 ... 20	0 ... 40	0 ... 40	0 ... 40

ANALOG OUTPUT / LARGE SENSING RANGE









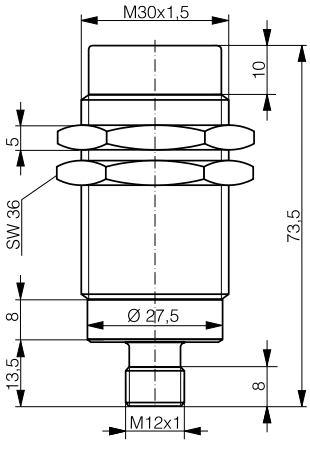
Connector S12	PUR cable type 7	PUR cable type 7	Connector S12
200 Hz (at s = 10 mm)	100 Hz (at s = 20 mm)	100 Hz (at s = 20 mm)	100 Hz (at s = 20 mm)
Quasi-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V	0 ... 5 V / 0 ... 10 V
1 ... 5 mA / 4 ... 20 mA	1 ... 5 mA / 4 ... 20 mA	1 ... 5 mA / 4 ... 20 mA	1 ... 5 mA / 4 ... 20 mA
Diagram 5	Diagram 5	Diagram 5	Diagram 5
10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*	10 ... 30 / 15 ... 30 VDC*
-25 ... +70 °C**	-25 ... +70 °C**	-25 ... +70 °C**	-25 ... +70 °C**
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

DW-AS-509-M30-002	DW-AD-519-M30-120	**DW-AD-519-M30**	DW-AS-519-M30-120
DW-AS-509-M30-390	DW-AD-519-M30-320	**DW-AD-519-M30-390**	DW-AS-519-M30-320
M, N			M, N

* DW-A#-509-M##-320/39# ** Depending on operating conditions, limited temperature range for DW-A#-509-M##-320/390 (see data sheets)

HOUSING SIZE	M30		
SENSING RANGE MM	0 ... 40		

ANALOG OUTPUT / LARGE SENSING RANGE



[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 133
[3] see page 268

TECHNICAL DATA

Connection [1]	Connector S12		
Bandwidth (-3 dB)	100 Hz (at s = 20 mm)		
Mounting	Non-embeddable		
Voltage output	0 ... 5 V / 0 ... 10 V		
Current output	1 ... 5 mA / 4 ... 20 mA		
Wiring [2]	Diagram 5		
Supply voltage range	10 ... 30 / 15 ... 30 VDC*		
Ambient temperature range	-25 ... +70 °C**		
Approvals	CE, UL, RoHS		

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

Non-linearized:			
Outputs 0 ... 5 V / 1 ... 5 mA	**DW-AS-519-M30-002**		
Outputs 0 ... 10 V / 4 ... 20 mA	**DW-AS-519-M30-390**		
Compatible connectors [3]	M, N		

* DW-A#-519-M##-320/39# ** Depending on operating conditions, limited temperature range for DW-A#-519-M##-320/390 (see data sheets)

INDUCTIVE SENSORS: ALL-METAL SERIES 700

- ✓ Mechanically and chemically **rugged**
- ✓ **All-metal housing** (incl. sensing face) in stainless steel **V2A**
- ✓ Impervious: **IP 68 & IP 69K**
- ✓ Pressure-resistant up to **100 bar**
- ✓ Long operating distances up to **40 mm**
- ✓ **Factor 1:** identical operating distances on steel and aluminum

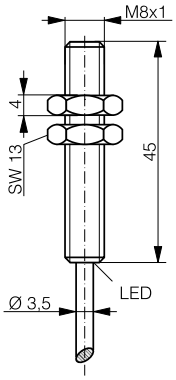
TECHNICAL DATA

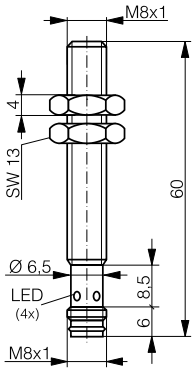
(according to IEC 60947-5-2)	
Housing material	V2A
Degree of protection	IP 68 & IP 69K (M12, M18, M30)
Supply voltage range U_B	10 ... 30 VDC
Ambient temperature	-25 ... +70 °C
Output current	200 mA
Max. ripple content	≤ 20 % U_B
No-load supply current	≤ 10 mA
Leakage current at output	≤ 0,1 mA
Voltage drop, switched state	≤ 2,0 V
Temperature drift % s_r	≤ 10 %
Hysteresis % s_r	≤ 15 %
Repeat accuracy % s_r	≤ 5 %
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

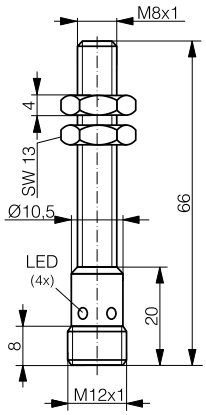
Mechanically and chemically very rugged all-metal sensors in V2A (incl. sensing face) for considerably reduced downtimes in extremely rough environments. Impervious (IP 68 & IP 69K) and pressure-resistant up to 100 bar. Factor 1: long operating distances on ferromagnetic and non-ferromagnetic metals with good conductivity as well as identical operating distances on steel and aluminum. Particularly suited for

- ✓ **automotive industry**
- ✓ **chemical industry**
- ✓ **oil-rigs**
- ✓ **harbor cranes**
- ✓ **ships**
- ✓ **machine tool manufacturing**
- ✓ **industrial laundries**
- ✓ **utility vehicles**
- ✓ **ski lifts**
- ✓ **military transporters**
- ✓ **cable detection**
- ✓ **wood & paper industry**
- ✓ **EDM machines**

HOUSING SIZE	M8		
OPERATING DISTANCE MM	3	3	3
			
	ALL-METAL / 100 BAR	ALL-METAL / 100 BAR	ALL-METAL / 100 BAR







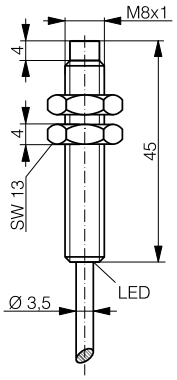
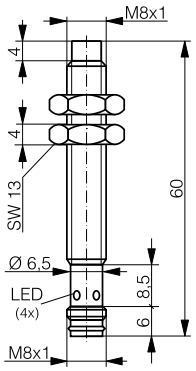
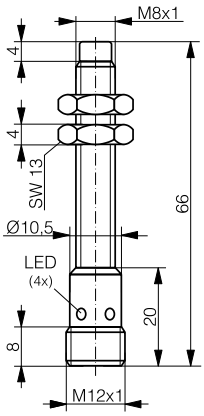
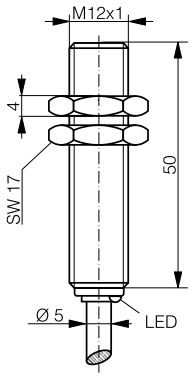
[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 133
[3] see page 268

TECHNICAL DATA

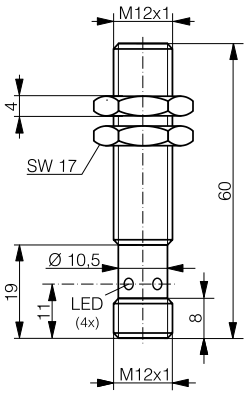
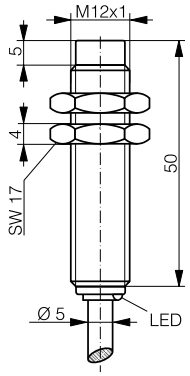
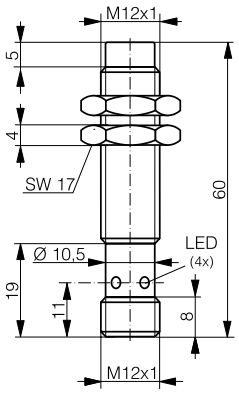
Connection [1]	PUR cable type 3	Connector S8	Connector S12
Degree of protection	IP 68	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	1,000 Hz	1,000 Hz	1,000 Hz
Wiring [2]	Diagram 1	Diagram 1	Diagram 2
LED	Built-in	Built-in	Built-in
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AD-701-M8**	**DW-AS-701-M8-001**	**DW-AS-701-M8**
NPN N.C.	DW-AD-702-M8	DW-AS-702-M8-001	DW-AS-702-M8
PNP N.O.	**DW-AD-703-M8**	**DW-AS-703-M8-001**	**DW-AS-703-M8**
PNP N.C.	DW-AD-704-M8	DW-AS-704-M8-001	DW-AS-704-M8
Compatible connectors [3]		A, B	G, H, M, N (N.O.); M, N (N.C.)

M8			M12
6	6	6	6*
			
ALL-METAL / 100 BAR	ALL-METAL / 100 BAR	ALL-METAL / 100 BAR	ALL-METAL / 80 BAR
			
PUR cable type 3	Connector S8	Connector S12	PUR cable type 11
IP 68	IP 67	IP 67	IP 68 & IP 69K
Non-embeddable	Non-embeddable	Non-embeddable	Embeddable
700 Hz	700 Hz	700 Hz	600 Hz
Diagram 1	Diagram 1	Diagram 2	Diagram 1
Built-in	Built-in	Built-in	Built-in
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS
DW-AD-711-M8	**DW-AS-711-M8-001**	**DW-AS-711-M8**	**DW-AD-701-M12**
DW-AD-712-M8	DW-AS-712-M8-001	DW-AS-712-M8	DW-AD-702-M12
DW-AD-713-M8	**DW-AS-713-M8-001**	**DW-AS-713-M8**	**DW-AD-703-M12**
DW-AD-714-M8	DW-AS-714-M8-001	DW-AS-714-M8	DW-AD-704-M12
	A, B	G, H, M, N (N.O.); M, N (N.C.)	

* versions with 2 mm operating distance on request

HOUSING SIZE	M12		
OPERATING DISTANCE MM	6*	10**	10**
			
	ALL-METAL / 80 BAR	ALL-METAL / 80 BAR	ALL-METAL / 80 BAR
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 133
[3] see page 268

TECHNICAL DATA

Connection [1]	Connector S12	PUR cable type 11	Connector S12
Degree of protection	IP 68 & IP 69K	IP 68 & IP 69K	IP 68 & IP 69K
Mounting	Embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	600 Hz	400 Hz	400 Hz
Wiring [2]	Diagram 2	Diagram 1	Diagram 2
LED	Built-in	Built-in	Built-in
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

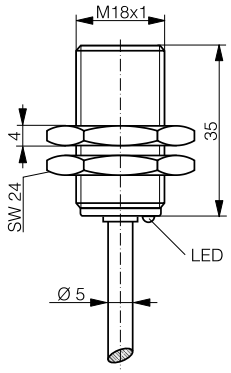
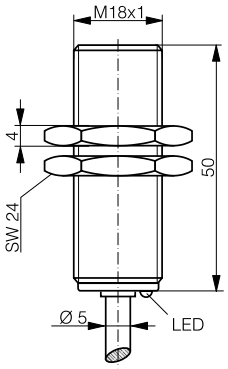
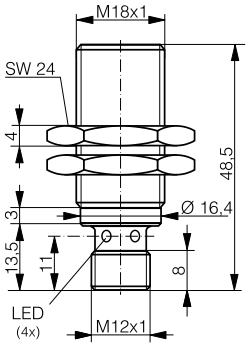
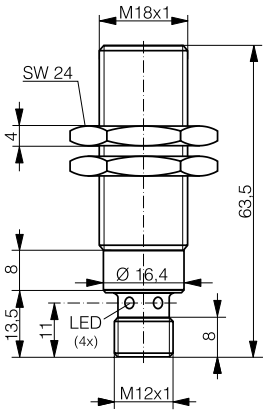
PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AS-701-M12**	**DW-AD-711-M12**	**DW-AS-711-M12**
NPN N.C.	DW-AS-702-M12	DW-AD-712-M12	DW-AS-712-M12
PNP N.O.	**DW-AS-703-M12**	**DW-AD-713-M12**	**DW-AS-713-M12**
PNP N.C.	DW-AS-704-M12	DW-AD-714-M12	DW-AS-714-M12
Compatible connectors [3]	G, H, M, N (N.O.); M, N (N.C.)		G, H, M, N (N.O.); M, N (N.C.)

* versions with 2 mm operating distance on request

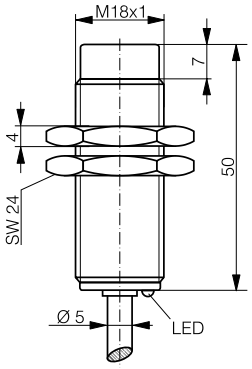
** versions with 4 mm operating distance on request

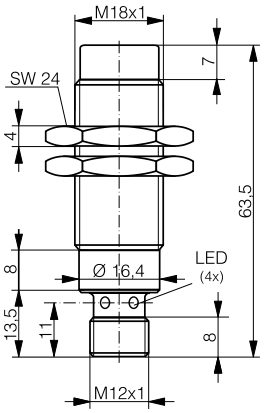
M18

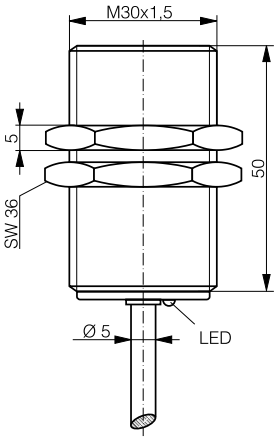
10	10*	10	10*
			
ALL-METAL / 60 BAR	ALL-METAL / 60 BAR	ALL-METAL / 60 BAR	ALL-METAL / 60 BAR
			
PUR cable type 11	PUR cable type 11	Connector S12	Connector S12
IP 68 & IP 69K	IP 68 & IP 69K	IP 68 & IP 69K	IP 68 & IP 69K
Embeddable	Embeddable	Embeddable	Embeddable
200 Hz	200 Hz	200 Hz	200 Hz
Diagram 1	Diagram 1	Diagram 2	Diagram 2
Built-in	Built-in	Built-in	Built-in
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS
DW-AD-701-M18-120	**DW-AD-701-M18**	**DW-AS-701-M18-120**	**DW-AS-701-M18-002**
DW-AD-702-M18-120	DW-AD-702-M18	DW-AS-702-M18-120	DW-AS-702-M18-002
DW-AD-703-M18-120	**DW-AD-703-M18**	**DW-AS-703-M18-120**	**DW-AS-703-M18-002**
DW-AD-704-M18-120	DW-AD-704-M18	DW-AS-704-M18-120	DW-AS-704-M18-002
		G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)

* versions with 5 mm operating distance on request

HOUSING SIZE	M18		M30
OPERATING DISTANCE MM	20*	20*	20**
			
	ALL-METAL / 60 BAR	ALL-METAL / 60 BAR	ALL-METAL / 40 BAR







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 133
[3] see page 268

TECHNICAL DATA			
Connection [1]	PUR cable type 11	Connector S12	PUR cable type 11
Degree of protection	IP 68 & IP 69K	IP 68 & IP 69K	IP 68 & IP 69K
Mounting	Non-embeddable	Non-embeddable	Embeddable
Max. switching frequency	200 Hz	200 Hz	100 Hz
Wiring [2]	Diagram 1	Diagram 2	Diagram 1
LED	Built-in	Built-in	Built-in
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

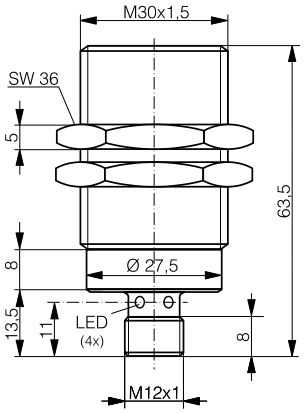
PART REFERENCES: (**BOLD:** PREFERRED TYPES)			
NPN N.O.	**DW-AD-711-M18**	**DW-AS-711-M18-002**	**DW-AD-701-M30**
NPN N.C.	DW-AD-712-M18	DW-AS-712-M18-002	DW-AD-702-M30
PNP N.O.	**DW-AD-713-M18**	**DW-AS-713-M18-002**	**DW-AD-703-M30**
PNP N.C.	DW-AD-714-M18	DW-AS-714-M18-002	DW-AD-704-M30
Compatible connectors [3]		G, H, M, N (N.O.); M, N (N.C.)	

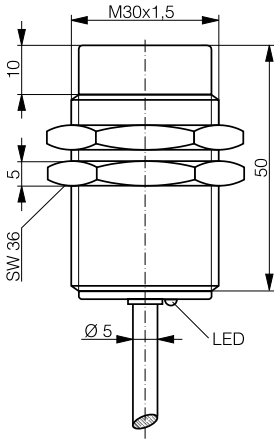
* versions with 8 mm operating distance on request

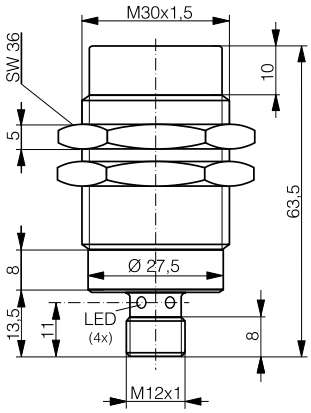
** versions with 10 mm operating distance on request

M30

20*	40**	40**	
			
ALL-METAL / 40 BAR	**ALL-METAL / 40 BAR**	**ALL-METAL / 40 BAR**	







Connector S12	PUR cable type 11	Connector S12	
IP 68 & IP 69K	IP 68 & IP 69K	IP 68 & IP 69K	
Embeddable	Non-embeddable	Non-embeddable	
100 Hz	90 Hz	90 Hz	
Diagram 2	Diagram 1	Diagram 2	
Built-in	Built-in	Built-in	
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	

DW-AS-701-M30-002	**DW-AD-711-M30**	**DW-AS-711-M30-002**	
DW-AS-702-M30-002	DW-AD-712-M30	DW-AS-712-M30-002	
DW-AS-703-M30-002	**DW-AD-713-M30**	**DW-AS-713-M30-002**	
DW-AS-704-M30-002	DW-AD-714-M30	DW-AS-714-M30-002	
G, H, M, N (N.O.); M, N (N.C.)		G, H, M, N (N.O.); M, N (N.C.)	

* versions with 10 mm operating distance on request

** versions with 15 mm operating distance on request

INDUCTIVE SENSORS: FOOD & SEA WATER SERIES 700L

- ✓ **Corrosion resistant**
- ✓ **Food safe (V4A/AISI 316L)**
- ✓ **IP 68 & IP 69K, sea-water resistant**
- ✓ Mechanically and chemically **rugged**
- ✓ **All-metal housing** (incl. sensing face)
- ✓ **Factor 1:** operating distances up to **40 mm**

TECHNICAL DATA

(according to IEC 60947-5-2)	
Housing material	V4A/AISI 316L/DIN 1.4435 (food safe)
Degree of protection	IP 68 & IP 69K
Supply voltage range U_B	10 ... 30 VDC
Ambient temperature	-25 ... +85 °C
Output current	200 mA
Max. ripple content	≤ 20 % U_B
No-load supply current	≤ 10 mA
Leakage current at output	≤ 0,1 mA
Voltage drop, switched state	≤ 2,0 V
Temperature drift % s_r	≤ 10 %
Hysteresis % s_r	≤ 15 %
Repeat accuracy % s_r	≤ 5 %
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

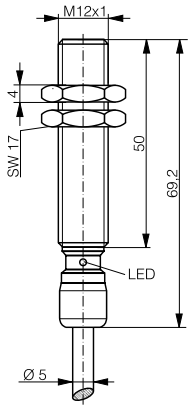
Corrosion-resistant and food-safe all-metal sensors in V4A (incl. sensing face). ECOLAB tested: fully impervious, resistant to cleaning and high-pressure water jets (IP 68 & IP 69K). Pressure resistant up to 80 bar and thus usable down to depths of 800 m. Factor 1: long operating distances on ferromagnetic and non-ferromagnetic metals with good conductivity as well as identical operating distances on steel and aluminum. Particularly suited for

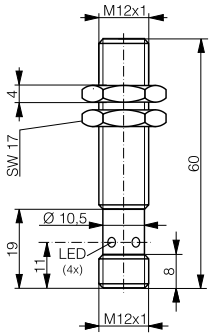
- ✓ **dairies**
- ✓ **food processing**
- ✓ **beverage manufacture & filling machines**
- ✓ **winery machines**
- ✓ **slaughterhouses & meat processing**
- ✓ **animal farming**
- ✓ **gastronomy machines**
- ✓ **ships & submarines**
- ✓ **harbor installations**
- ✓ **locks & docks**
- ✓ **offshore installations**
- ✓ **wave energy power plants**
- ✓ **fish processing**
- ✓ **sewage treatment plants**

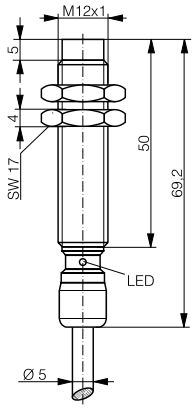
HOUSING SIZE	M12		
OPERATING DISTANCE MM	6	6	10



ALL-METAL FOOD SAFE & CORROSION RESISTANT / IP 68 + IP 69K







[1] Standard cable length 2 m.
Non-standard cable lengths and types on request.
Cable type see page 271.
[2] see page 133
[3] see page 269

TECHNICAL DATA

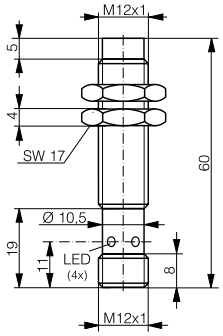
Connection [1]	TPE-S cable type 13	Connector S12	TPE-S cable type 13
Degree of protection	IP 68 + IP 69K	IP 68 + IP 69K	IP 68 + IP 69K
Max. operating pressure	80 bar	80 bar	80 bar
Mounting	Embeddable	Embeddable	Non-embeddable
Max. switching frequency	600 Hz	600 Hz	400 Hz
Wiring [2]	Diagram 1	Diagram 2	Diagram 1
LED	Built-in	Built-in	Built-in
Approvals	CE, RoHS, Ecolab	CE, RoHS, Ecolab	CE, RoHS, Ecolab

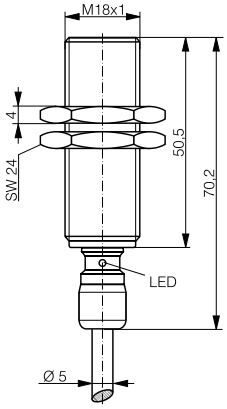
PART REFERENCES: (**BOLD:** PREFERRED TYPES)

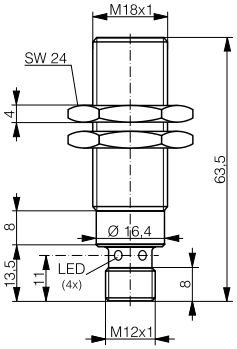
NPN N.O.	**DW-LD-701-M12**	**DW-LS-701-M12**	**DW-LD-711-M12**
NPN N.C.	DW-LD-702-M12	DW-LS-702-M12	DW-LD-712-M12
PNP N.O.	**DW-LD-703-M12**	**DW-LS-703-M12**	**DW-LD-713-M12**
PNP N.C.	DW-LD-704-M12	DW-LS-704-M12	DW-LD-714-M12
Compatible connectors [3]		U	

HOUSING SIZE	M12	M18	
OPERATING DISTANCE MM	10	10	10

ALL-METAL FOOD SAFE & CORROSION RESISTANT / IP 68 + IP 69K







[1] Standard cable length 2 m.
Non-standard cable lengths and types on request.
Cable type see page 271.
[2] see page 133
[3] see page 269

TECHNICAL DATA

Connection [1]	Connector S12	TPE-S cable type 13	Connector S12
Degree of protection	IP 68 + IP 69K	IP 68 + IP 69K	IP 68 + IP 69K
Max. operating pressure	80 bar	60 bar	60 bar
Mounting	Non-embeddable	Embeddable	Embeddable
Max. switching frequency	400 Hz	300 Hz	300 Hz
Wiring [2]	Diagram 2	Diagram 1	Diagram 2
LED	Built-in	Built-in	Built-in
Approvals	CE, RoHS, Ecolab	CE, RoHS, Ecolab	CE, RoHS, Ecolab

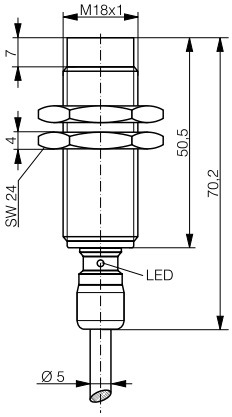
PART REFERENCES: (**BOLD:** PREFERRED TYPES)

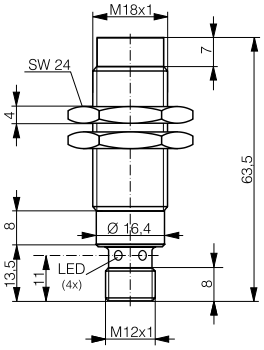
NPN N.O.	**DW-LS-711-M12**	**DW-LD-701-M18**	**DW-LS-701-M18-002**
NPN N.C.	DW-LS-712-M12	DW-LD-702-M18	DW-LS-702-M18-002
PNP N.O.	**DW-LS-713-M12**	**DW-LD-703-M18**	**DW-LS-703-M18-002**
PNP N.C.	DW-LS-714-M12	DW-LD-704-M18	DW-LS-704-M18-002
Compatible connectors [3]	U		U

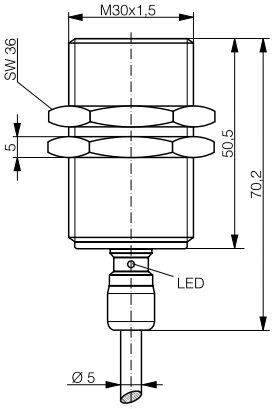
M18		M30	
20	20	20	20

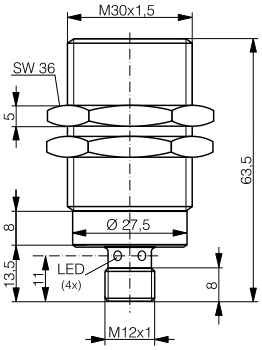



ALL-METAL FOOD SAFE & CORROSION RESISTANT / IP 68 + IP 69K







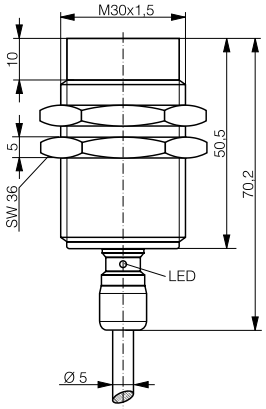


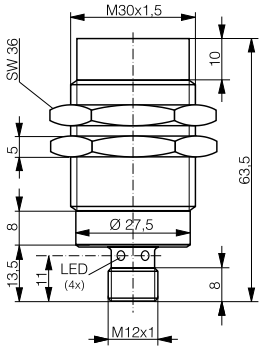
TPE-S cable type 13	Connector S12	TPE-S cable type 13	Connector S12
IP 68 + IP 69K	IP 68 + IP 69K	IP 68 + IP 69K	IP 68 + IP 69K
60 bar	60 bar	40 bar	40 bar
Non-embeddable	Non-embeddable	Embeddable	Embeddable
200 Hz	200 Hz	100 Hz	100 Hz
Diagram 1	Diagram 2	Diagram 1	Diagram 2
Built-in	Built-in	Built-in	Built-in
CE, RoHS, Ecolab	CE, RoHS, Ecolab	CE, RoHS, Ecolab	CE, RoHS, Ecolab

DW-LD-711-M18	**DW-LS-711-M18-002**	**DW-LD-701-M30**	**DW-LS-701-M30-002**
DW-LD-712-M18	DW-LS-712-M18-002	DW-LD-702-M30	DW-LS-702-M30-002
DW-LD-713-M18	**DW-LS-713-M18-002**	**DW-LD-703-M30**	**DW-LS-703-M30-002**
DW-LD-714-M18	DW-LS-714-M18-002	DW-LD-704-M30	DW-LS-704-M30-002
	U		U

HOUSING SIZE	M30		
OPERATING DISTANCE MM	40	40	

ALL-METAL FOOD SAFE & CORROSION RESISTANT / IP 68 + IP 69K





[1] Standard cable length 2 m.
Non-standard cable lengths and types on request.
Cable type see page 271.
[2] see page 133
[3] see page 269

TECHNICAL DATA

Connection [1]	TPE-S cable type 13	Connector S12	
Degree of protection	IP 68 + IP 69K	IP 68 + IP 69K	
Max. operating pressure	40 bar	40 bar	
Mounting	Non-embeddable	Non-embeddable	
Max. switching frequency	90 Hz	90 Hz	
Wiring [2]	Diagram 1	Diagram 2	
LED	Built-in	Built-in	
Approvals	CE, RoHS, Ecolab	CE, RoHS, Ecolab	

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-LD-711-M30**	**DW-LS-711-M30-002**	
NPN N.C.	DW-LD-712-M30	DW-LS-712-M30-002	
PNP N.O.	**DW-LD-713-M30**	**DW-LS-713-M30-002**	
PNP N.C.	DW-LD-714-M30	DW-LS-714-M30-002	
Compatible connectors [3]		U	

INDUCTIVE SENSORS: ALL-METAL & HIGH-PRESSURE RESISTANT, SERIES 700P

- ✓ **500 bar** high-pressure resistant
- ✓ **Corrosion resistant**
- ✓ **IP 68 & IP 69K**
- ✓ **Sea-water resistant**, usable down to **depths of 1000 m**
- ✓ Mechanically and chemically **rugged**
- ✓ **All-metal housing** (incl. sensing face)
- ✓ Excellent detection of **metals with good conductivity**

TECHNICAL DATA

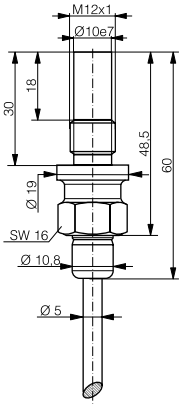
(according to IEC 60947-5-2)	
Housing material	V4A / AISI 316L / DIN 1.4404
Degree of protection	IP 68 & IP 69K
Supply voltage range U_B	10 ... 30 VDC
Ambient temperature	-25 ... +70 °C
Output current	200 mA
Max. ripple content	≤ 20 % U_B
No-load supply current	≤ 10 mA
Leakage current at output	≤ 0,1 mA
Voltage drop, switched state	≤ 2,0 V
Temperature drift % s_r	≤ 10 %
Hysteresis % s_r	≤ 15 %
Repeat accuracy % s_r	≤ 5 %
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

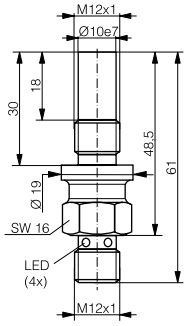
Rugged, corrosion and up to 500 bar high-pressure-resistant all-metal sensors in V4A. Impervious (IP 68) and sea-water resistant. Usable down to depths of 1000 m. Excellent detection of ferromagnetic and non-ferromagnetic metals with good conductivity. Particularly suited for

- ✓ **underwater applications**
- ✓ **hydraulic pumps**
- ✓ **hydraulic cylinders**
- ✓ **hydraulic valves**
- ✓ **lubrication systems**
- ✓ **construction machinery**
- ✓ **offshore installations**
- ✓ **harbor cranes**
- ✓ **concrete pumps & mixers**
- ✓ **plastic injection machines**

HOUSING SIZE	M12		
OPERATING DISTANCE MM	1.5	1.5	

ALL-METAL & HIGH-PRESSURE RESISTANT UP TO 500 BAR / IP 68 + IP 69K





[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 133
[3] see page 269

TECHNICAL DATA

Connection [1]	PUR cable type 11	Connector S12	
Degree of protection	IP 68 + IP 69K	IP 68 + IP 69K	
Max. operating pressure	500 bar / 100 bar (cable exit)	500 bar (sensing face)	
Mounting	Embeddable	Embeddable	
Max. switching frequency	1,000 Hz	1,000 Hz	
Wiring [2]	Diagram 1	Diagram 2	
LED	---	---	
Approvals	CE, RoHS	CE, RoHS	

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.			
NPN N.C.			
PNP N.O.	**DW-LD-703-P12G-003***	**DW-LS-703-P12G***	
PNP N.C.	DW-LD-704-P12G-003*	DW-LS-704-P12G*	
Compatible connectors [3]		U	

* available 4Q/2010

INDUCTIVE SENSORS: HIGH-PRESSURE RESISTANT SERIES 500P

- ✓ **500 bar** high-pressure resistant
- ✓ **1 million pressure cycles**
- ✓ Fail-safe for peak pressures of up to **1000 bar**
- ✓ Temperature resistant **up to 100 °C**
- ✓ Long operating distances of up to **3 mm**
- ✓ Stainless steel housing with **solid ceramic disk**
- ✓ Sensing face **gas tight & IP 68**

TECHNICAL DATA

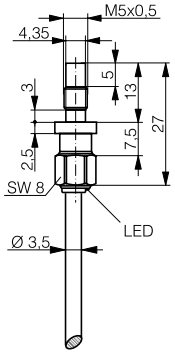
(according to IEC 60947-5-2)	
Max. operating pressure	500 bar
Peak pressure	1000 bar
Sensing face	Ceramic ZrO_2
Supply voltage range U_B	10 ... 30 VDC
Output current	≤ 200 mA
Max. ripple content	≤ 20 % U_B
No-load supply current	≤ 10 mA / ≤ 12 mA (changeover)
Leakage current at output	≤ 0,1 mA
Voltage drop, switched state	≤ 2,0 V
Temperature drift % s_r	≤ 15 %
Hysteresis % s_r	8 % typical
Repeat accuracy	≤ 5 % s_r
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

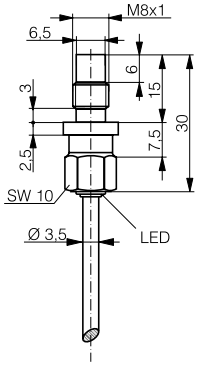
Rugged high-pressure-resistant sensors for permanent operating pressures of up to 500 bar and peak pressures of up to 1000 bar. Temperature resistant up to 100 °C with gas-tight and IP 68 sensing face. Operating distances of up to 3 mm. Particularly suited for

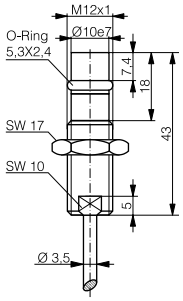
- ✓ **hydraulic pumps**
- ✓ **hydraulic cylinders**
- ✓ **hydraulic valves**
- ✓ **lubrication systems**
- ✓ **construction machinery**
- ✓ **offshore installations**
- ✓ **harbor cranes**
- ✓ **concrete pumps & mixers**
- ✓ **plastic injection machines**
- ✓ **water-jet cutting machines**
- ✓ **high-vacuum pumps**

HOUSING SIZE	M5	M8	M12
OPERATING DISTANCE MM	1.0	1.5	1.5

500 BAR (TESTED AT 1000 BAR)







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 133
[3] see page 268

TECHNICAL DATA			
Housing material	Stainless steel Phynox	Stainless steel V4A	Stainless steel V2A
Connection [1]	PUR cable type 3	PUR cable type 3	PUR cable type 3
Degree of protection	IP 68	IP 68	IP 68
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	600 Hz	800 Hz	600 Hz
Wiring [2]	Diagram 1	Diagram 1	Diagram 1
LED	Built-in	Built-in	---
Ambient temperature range	-25 ... +80 °C	-25 ... +100 °C	-25 ... +80 °C
Approvals	CE, RoHS	CE, RoHS	CE, RoHS

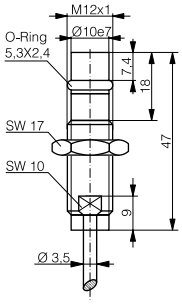
PART REFERENCES: (**BOLD:** PREFERRED TYPES)			
NPN N.O.	**DW-AD-501-P5***	**DW-AD-501-P8**	**DW-AD-501-P12-639**
NPN N.C.			
PNP N.O.	**DW-AD-503-P5***	**DW-AD-503-P8**	**DW-AD-503-P12-639**
PNP N.C.			
NPN changeover			
PNP changeover			
Compatible connectors [3]			

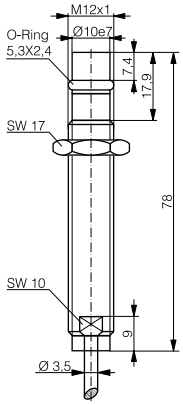
* available 4Q/2010

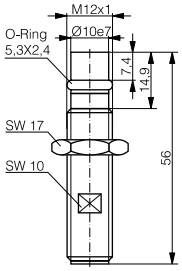
M12

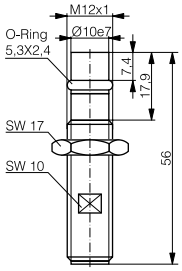
1.5	1.5	1.5	1.5
			

500 BAR (TESTED AT 1000 BAR)









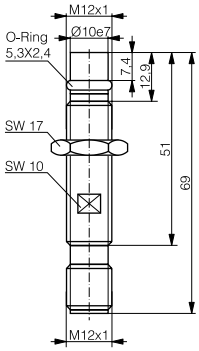
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PUR cable type 3	PUR cable type 3	Connector S12	Connector S12
IP 68	IP 68	IP 68	IP 68
Embeddable	Embeddable	Embeddable	Embeddable
600 Hz	600 Hz	600 Hz	600 Hz
Diagram 1	Diagram 1	Diagram 2	Diagram 2
---	---	---	---
-25 ... +80 °C	-25 ... +80 °C	-25...+80 °C / -25...+100 °C*	-25...+80 °C / -25...+100 °C*
CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS

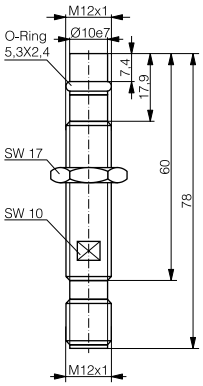
DW-AD-501-P12-625	**DW-AD-501-P12-627**	**DW-AS-501-P12-624**	**DW-AS-501-P12-630**
			DW-AS-502-P12-630
DW-AD-503-P12-625	**DW-AD-503-P12-627**	**DW-AS-503-P12-624**	**DW-AS-503-P12-630**
			DW-AS-504-P12-630
		DW-AS-50B-P12-624	**DW-AS-50B-P12-630**
		DW-AS-50A-P12-624	**DW-AS-50A-P12-630**
		G, H, M, N; M, N (changeover)	G,H,M,N (N.O.); M,N (N.C.); M,N*

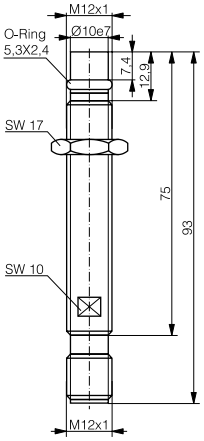
* changeover

HOUSING SIZE	M12		
OPERATING DISTANCE MM	1.5	1.5	1.5

500 BAR (TESTED AT 1000 BAR)







[1] Standard cable length 2 m.
Non-standard cable lengths and types on request.
Cable type see page 271.
[2] see page 133
[3] see page 268

TECHNICAL DATA

Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection [1]	Connector S12	Connector S12	Connector S12
Degree of protection	IP 68	IP 68	IP 68
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	600 Hz	600 Hz	600 Hz
Wiring [2]	Diagram 2	Diagram 2	Diagram 2
LED	---	---	---
Ambient temperature range	-25...+80 °C / -25...+100 °C*	-25...+80 °C / -25...+100 °C*	-25...+80 °C / -25...+100 °C*
Approvals	CE, RoHS	CE, RoHS	CE, RoHS

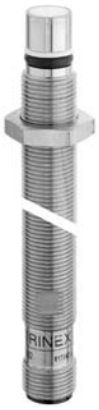
PART REFERENCES: (**BOLD:** PREFERRED TYPES)

NPN N.O.	**DW-AS-501-P12**	**DW-AS-501-P12-627**	**DW-AS-501-P12-621**
NPN N.C.	DW-AS-502-P12		
PNP N.O.	**DW-AS-503-P12**	**DW-AS-503-P12-627**	**DW-AS-503-P12-621**
PNP N.C.	DW-AS-504-P12		
NPN changeover	**DW-AS-50B-P12**	**DW-AS-50B-P12-627**	**DW-AS-50B-P12-621**
PNP changeover	**DW-AS-50A-P12**	**DW-AS-50A-P12-627**	**DW-AS-50A-P12-621**
Compatible connectors [3]	G,H,M,N (N.O.); M,N (N.C.); M,N*	G, H, M, N; M, N (changeover)	G, H, M, N; M, N (changeover)

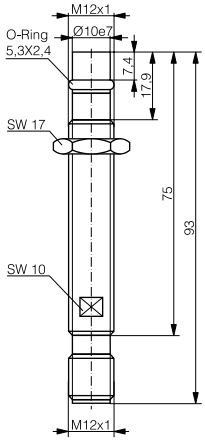
* changeover

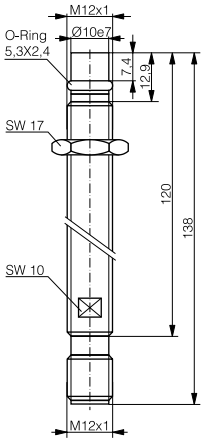
M12

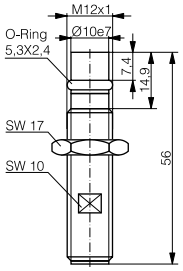
1.5	1.5	2.5	2.5

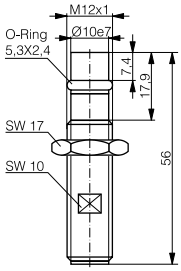



500 BAR (TESTED AT 1000 BAR)		LONG OPERATING DISTANCE / 500 BAR (TESTED AT 1000 BAR)	









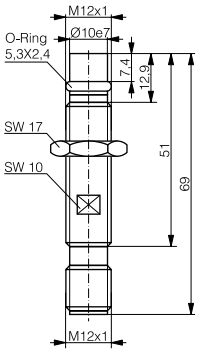
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connector S12	Connector S12	Connector S12	Connector S12
IP 68	IP 68	IP 68	IP 68
Embeddable	Embeddable	Embeddable	Embeddable
600 Hz	600 Hz	600 Hz	600 Hz
Diagram 2	Diagram 2	Diagram 2	Diagram 2
---	---	---	---
-25...+80 °C / -25...+100 °C*	-25...+80 °C / -25...+100 °C*	-25...+100 °C	-25...+100 °C
CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS

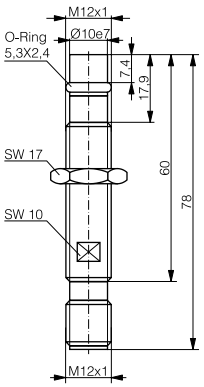
DW-AS-501-P12-635	**DW-AS-501-P12-622**	**DW-AS-521-P12-624**	**DW-AS-521-P12-630**
DW-AS-503-P12-635	**DW-AS-503-P12-622**	**DW-AS-523-P12-624**	**DW-AS-523-P12-630**
DW-AS-50B-P12-635	**DW-AS-50B-P12-622**	**DW-AS-52B-P12-624**	**DW-AS-52B-P12-630**
DW-AS-50A-P12-635	**DW-AS-50A-P12-622**	**DW-AS-52A-P12-624**	**DW-AS-52A-P12-630**
G, H, M, N; M, N (changeover)	G, H, M, N; M, N (changeover)	G, H, M, N; M, N (changeover)	G, H, M, N; M, N (changeover)

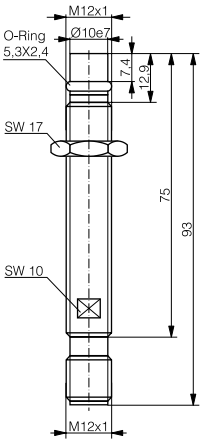
* changeover

HOUSING SIZE	M12		
OPERATING DISTANCE MM	2.5	2.5	2.5

LONG OPERATING DISTANCE / 500 BAR (TESTED AT 1000 BAR)







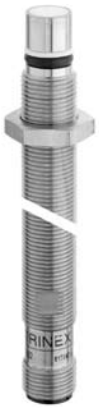
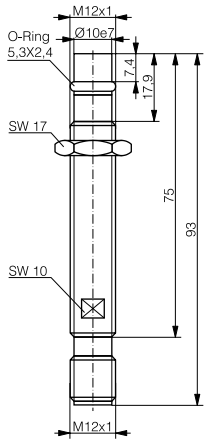
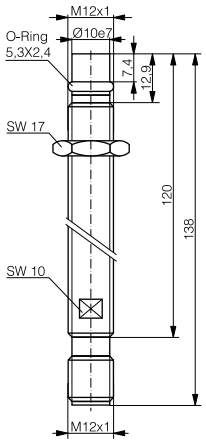
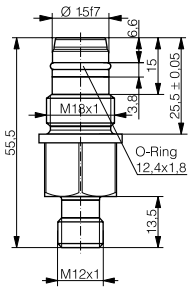
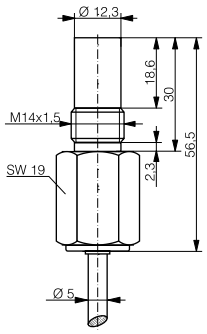
[1] Standard cable length 2 m.
Non-standard cable lengths and types on request.
Cable type see page 271.
[2] see page 133
[3] see page 268

TECHNICAL DATA

Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection [1]	Connector S12	Connector S12	Connector S12
Degree of protection	IP 68	IP 68	IP 68
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	600 Hz	600 Hz	600 Hz
Wiring [2]	Diagram 2	Diagram 2	Diagram 2
LED	---	---	---
Ambient temperature range	-25 ... +100 °C	-25 ... +100 °C	-25 ... +100 °C
Approvals	CE, RoHS	CE, RoHS	CE, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

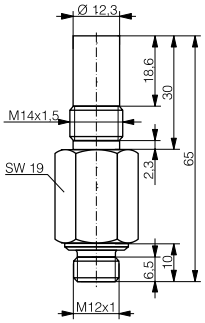
NPN N.O.	**DW-AS-521-P12**	**DW-AS-521-P12-627**	**DW-AS-521-P12-621**
NPN N.C.			
PNP N.O.	**DW-AS-523-P12**	**DW-AS-523-P12-627**	**DW-AS-523-P12-621**
PNP N.C.			
NPN changeover	**DW-AS-52B-P12**	**DW-AS-52B-P12-627**	**DW-AS-52B-P12-621**
PNP changeover	**DW-AS-52A-P12**	**DW-AS-52A-P12-627**	**DW-AS-52A-P12-621**
Compatible connectors [3]	G, H, M, N; M, N (changeover)	G, H, M, N; M, N (changeover)	G, H, M, N; M, N (changeover)

M12		M18	P20 (M14)
2.5	2.5	1.5	3.0
			
LONG OPERATING DISTANCE / 500 BAR (TESTED AT 1000 BAR)		500 BAR (TESTED AT 1000 BAR)	LONG OP. DISTANCE / 500 BAR*
			
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V4A
Connector S12	Connector S12	Connector S12	PUR cable type 11
IP 68	IP 68	IP 68	IP 68
Embeddable	Embeddable	Embeddable	Embeddable
600 Hz	600 Hz	800 Hz	500 Hz
Diagram 2	Diagram 2	Diagram 2	Diagram 1
---	---	---	---
-25 ... +100 °C	-25 ... +100 °C	-25 ... +80 °C	-25 ... +80 °C
CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS
DW-AS-521-P12-635	**DW-AS-521-P12-622**	**DW-AS-501-P18**	**DW-AD-501-P20**
		DW-AS-502-P18	DW-AD-502-P20
DW-AS-523-P12-635	**DW-AS-523-P12-622**	**DW-AS-503-P18**	**DW-AD-503-P20**
			DW-AD-504-P20
DW-AS-52B-P12-635	**DW-AS-52B-P12-622**		
DW-AS-52A-P12-635	**DW-AS-52A-P12-622**		
G, H, M, N; M, N (changeover)	G, H, M, N; M, N (changeover)	G, H, M, N (N.O.); M, N (N.C.)	

* tested at 1000 bar

HOUSING SIZE	P20 (M14)		
OPERATING DISTANCE MM	3.0		

LONG OPERATING DISTANCE / 500 BAR (TESTED AT 1000 BAR)



[1] Standard cable length 2 m.
Non-standard cable lengths and types on request.
Cable type see page 271.
[2] see page 133
[3] see page 268

TECHNICAL DATA			
Housing material	Stainless steel V4A		
Connection [1]	Connector S12		
Degree of protection	IP 68		
Mounting	Embeddable		
Max. switching frequency	500 Hz		
Wiring [2]	Diagram 2		
LED	---		
Ambient temperature range	-25 ... +80 °C		
Approvals	CE, RoHS		

PART REFERENCES: (**BOLD:** PREFERRED TYPES)			
NPN N.O.	**DW-AS-501-P20**		
NPN N.C.	DW-AS-502-P20		
PNP N.O.	**DW-AS-503-P20**		
PNP N.C.	DW-AS-504-P20		
NPN changeover			
PNP changeover			
Compatible connectors [3]	G, H, M, N (N.O.); M, N (N.C.)		

INDUCTIVE SENSORS: SEALED, SERIES E

- ✓ **Miniature devices**
- ✓ **100 bar** permanent pressure resistant
- ✓ Usable down to **water depths of 1000 m**
- ✓ Operating distances of up to **2.5 mm**
- ✓ **Ceramic** or **sapphire-glass** sensing face
- ✓ **Stainless steel housing**
- ✓ **IP 68**

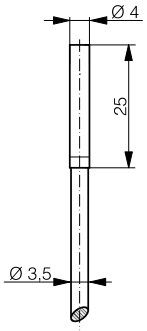
TECHNICAL DATA

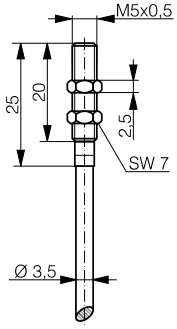
(according to IEC 60947-5-2)	
Housing material	Stainless steel V2A
Degree of protection	IP 68
Supply voltage range U_B	10 ... 30 VDC
Ambient temperature	-25 ... +70 °C
Output current	≤ 200 mA
Max. ripple content	≤ 20 % U_B
No-load supply current	≤ 10 mA
Leakage current at output	≤ 0,1 mA
Voltage drop, switched state	≤ 2,0 V
Temperature drift % s_r	≤ 10 %
Hysteresis % s_r	≤ 10 %
Repeat accuracy	≤ 5 % s_r
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

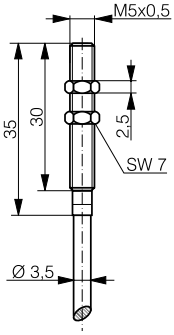
Pressure resistant miniature sensors in stainless steel housings with ceramic or sapphire-glass sensing face. For demanding environments with permanent pressures of up to 100 bar (sensing face). Usable down to water depths of 1000 m. Particularly suited for

- ✓ **offshore installations**
- ✓ **lubrication systems of motors**
- ✓ **chemical industry**
- ✓ **atomic power plants:** fuel element monitoring
- ✓ **vacuum applications**

HOUSING SIZE	Ø 4	M5	
OPERATING DISTANCE MM	0.6	0.6	0.8
			
	IP 68 / 20 BAR	IP 68 / 20 BAR	IP 68 / 100 BAR



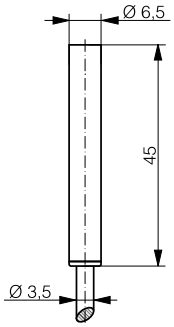
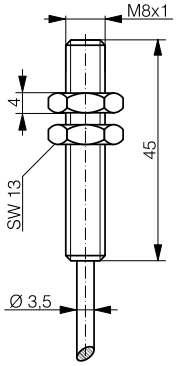
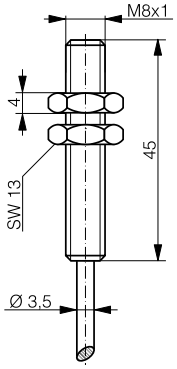




[1] Standard cable length 2 m.
Non-standard cable lengths and types on request.
Cable type see page 271.
[2] see page 133
[3] see page 268

TECHNICAL DATA			
Max. operating pressure	20 bar	20 bar	100 bar
Sensing face	Sapphire glass	Sapphire glass	Ceramic ZrO_2
Connection [1]	PUR cable type 3	PUR cable type 3	PUR cable type 3
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5,000 Hz	5,000 Hz	3,000 Hz
Wiring [2]	Diagram 1	Diagram 1	Diagram 1
LED	---	---	---
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)			
NPN N.O.	**DW-AD-401-04E**	**DW-AD-401-M5E**	
NPN N.C.	DW-AD-402-04E	DW-AD-402-M5E	
PNP N.O.	**DW-AD-403-04E**	**DW-AD-403-M5E**	**DW-AD-603-M5E-652**
PNP N.C.	DW-AD-404-04E	DW-AD-404-M5E	DW-AD-604-M5E-652
Compatible connectors [3]			

Ø 6.5	M8	
2.5	1.5	2.5
		
IP 68 / 20 BAR	IP 68 / 100 BAR	IP 68 / 20 BAR
		
20 bar	100 bar	20 bar
Ceramic ZrO_2	Ceramic ZrO_2	Ceramic ZrO_2
PUR cable type 3	PUR cable type 3	PUR cable type 3
Embeddable	Embeddable	Embeddable
1,000 Hz	3,000 Hz	1,000 Hz
Diagram 1	Diagram 1	Diagram 1
---	---	---
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS
DW-AD-501-065E		**DW-AD-501-M8E**
DW-AD-502-065E		DW-AD-502-M8E
DW-AD-503-065E	**DW-AD-603-M8E-652**	**DW-AD-503-M8E**
DW-AD-504-065E	DW-AD-604-M8E-652	DW-AD-504-M8E

INDUCTIVE SENSORS: HIGH-TEMPERATURE

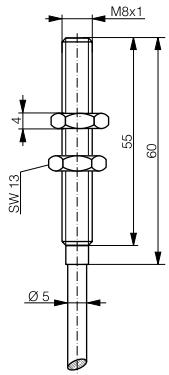
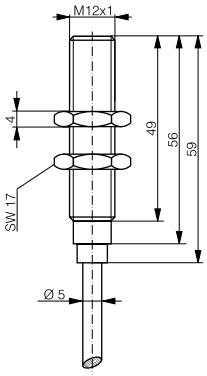
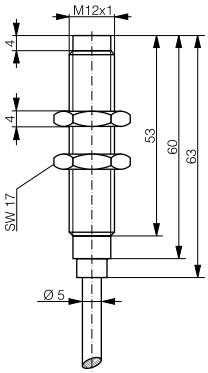
- ✓ For ambient temperatures of up to **+230 °C**
- ✓ With **integrated electronics**, up to +180 °C
- ✓ With **external electronics**, up to +230 °C
- ✓ Excellent **long-term reliability**

TECHNICAL DATA

(according to IEC 60947-5-2)	
Housing material	Stainless steel V2A
Degree of protection	IP 67
Max. ripple content	≤ 15 % U_B / ≤ 20 % U_B (amplifier)
No-load supply current	≤ 10 mA / ≤ 5 mA (amplifier)
Leakage current at output	≤ 0,1 mA
Voltage drop, switched state	≤ 2,0 V
Temperature drift % s_r	≤ 15 %
Hysteresis % s_r	see data sheets
Repeat accuracy	≤ 0,02 mm
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	---

Sensors for ambient temperatures of up to +230 °C with high long-term reliability, even in difficult operating conditions. Models for temperatures of up to +180 °C with integrated electronics; for devices up to +230 °C, electronics are built into a separate housing, and thus removed from the hot area. Particularly suited for

- ✓ **galvanizing**
- ✓ **Paint shops in automotive industry**
- ✓ **glass manufacturing**
- ✓ **brick factories**
- ✓ **bakery machines**
- ✓ **carbon-fiber production**
- ✓ **food processing**

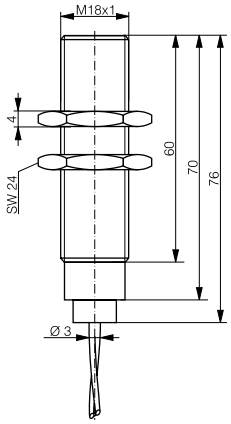
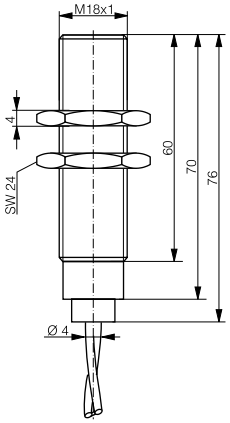
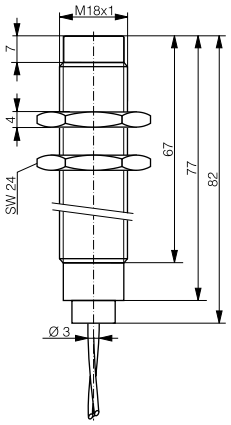
HOUSING SIZE	M8	M12	
OPERATING DISTANCE MM	2	3	4
			
	0 ... +140 °C	0 ... +150 °C	0 ... +150 °C
			

[1] Non-standard cable lengths and types on request.
[2] see page 133
[3] see page 268

TECHNICAL DATA			
Connection [1]	Silicone cable 2 m*	Silicone cable 2 m*	Silicone cable 2 m*
Amplifier	Built-in	Built-in	Built-in
Mounting	Embeddable	Embeddable	Non-embeddable
Max. switching frequency	600 Hz	500 Hz	500 Hz
Wiring [2]	Diagram 1	Diagram 1	Diagram 1
LED	---	---	---
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	0 ... +140 °C	0 ... +150 °C	0 ... +150 °C
Output current	120mA (≤100°C)/80mA (>100°C)	120mA (≤100°C)/70mA (>100°C)	120mA (≤100°C)/70mA (>100°C)
Approvals	CE, RoHS	CE, RoHS	CE, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)			
NPN N.O.	**DW-HD-621-M8-100**	**DW-HD-601-M12-200**	**DW-HD-611-M12-200**
NPN N.C.			
PNP N.O.	**DW-HD-623-M8-100**	**DW-HD-603-M12-200**	**DW-HD-613-M12-200**
PNP N.C.			
Compatible connectors [3]			

* Teflon cable on request

HOUSING SIZE	M18		
OPERATING DISTANCE MM	5	5	8
			
	0 ... +180 °C	0 ... +230 °C	0 ... +180 °C
			

[1] Non-standard cable lengths and types on request.
[2] see page 133
[3] see page 268

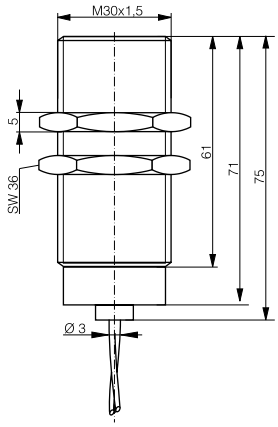
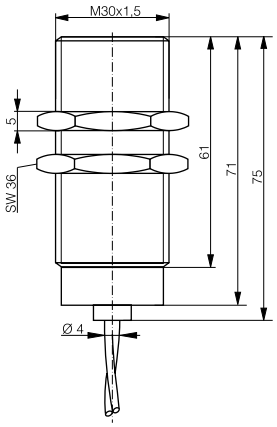
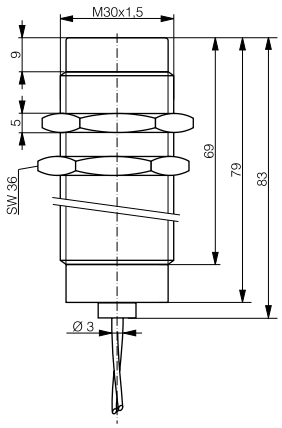
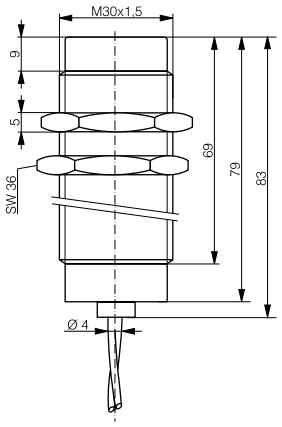
TECHNICAL DATA

Connection [1]	Teflon cable 2 m	Teflon cable 3 m + PUR 2 m	Teflon cable 2 m
Amplifier	Built-in	In cable	Built-in
Mounting	Embeddable	Embeddable	Non-embeddable
Max. switching frequency	400 Hz	300 Hz	400 Hz
Wiring [2]	Diagram 1	Diagram 1	Diagram 1
LED	---	Yellow (amplifier)	---
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC (amplifier)	10 ... 30 VDC
Ambient temperature range	0 ... +180 °C	0 ... +230 °C	0 ... +180 °C
Output current	≤ 150 mA	≤ 200 mA (amplifier)	≤ 150 mA
Approvals	CE, RoHS	CE, RoHS	CE, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

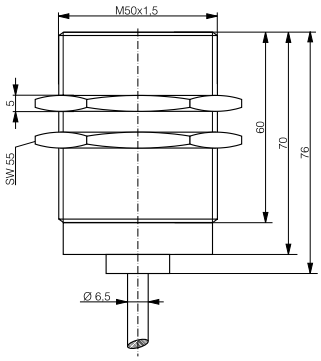
NPN N.O.	**DW-HD-601-M18-310**	**DW-HD-601-M18-411**	**DW-HD-611-M18-310**
NPN N.C.			
PNP N.O.	**DW-HD-603-M18-310**	**DW-HD-603-M18-411**	**DW-HD-613-M18-310**
PNP N.C.			
Compatible connectors [3]			

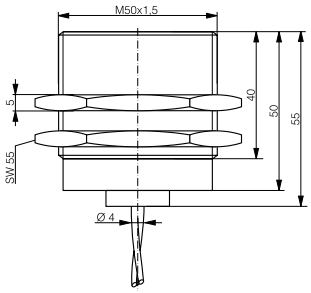
M30

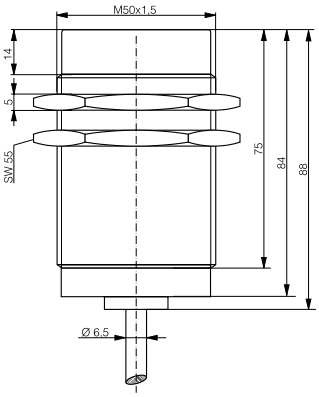
10	10	15	15
			
0 ... +180 °C	0 ... +230 °C	0 ... +180 °C	0 ... +230 °C
			
Teflon cable 2 m	Teflon cable 3 m + PUR 2 m	Teflon cable 2 m	Teflon cable 3 m + PUR 2 m
Built-in	In cable	Built-in	In cable
Embeddable	Embeddable	Non-embeddable	Non-embeddable
200 Hz	200 Hz	200 Hz	150 Hz
Diagram 1	Diagram 1	Diagram 1	Diagram 1
---	Yellow (amplifier)	---	Yellow (amplifier)
10 ... 30 VDC	10 ... 30 VDC (amplifier)	10 ... 30 VDC	10 ... 30 VDC (amplifier)
0 ... +180 °C	0 ... +230 °C	0 ... +180 °C	0 ... +230 °C
≤ 150 mA	≤ 200 mA (amplifier)	≤ 150 mA	≤ 200 mA (amplifier)
CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS
DW-HD-601-M30-310	**DW-HD-601-M30-411**	**DW-HD-611-M30-310**	**DW-HD-611-M30-411**
DW-HD-603-M30-310	**DW-HD-603-M30-411**	**DW-HD-613-M30-310**	**DW-HD-613-M30-411**

HOUSING SIZE	M50		
OPERATING DISTANCE MM	20	20	25

0 ... +180 °C	0 ... +230 °C	0 ... +180 °C







[1] Non-standard cable lengths and types on request.
[2] see page 133
[3] see page 268

TECHNICAL DATA

Connection [1]	Silicone cable 2 m*	Teflon cable 3 m + PUR 2 m	Silicone cable 2 m*
Amplifier	Built-in	In cable	Built-in
Mounting	Quasi-embeddable	Quasi-embeddable	Non-embeddable
Max. switching frequency	100 Hz	150 Hz	100 Hz
Wiring [2]	Diagram 1	Diagram 1	Diagram 1
LED	---	Yellow (amplifier)	---
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC (amplifier)	10 ... 30 VDC
Ambient temperature range	0 ... +180 °C	0 ... +230 °C	0 ... +180 °C
Output current	≤ 150 mA	≤ 200 mA (amplifier)	≤ 150 mA
Approvals	CE, RoHS	CE, RoHS	CE, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

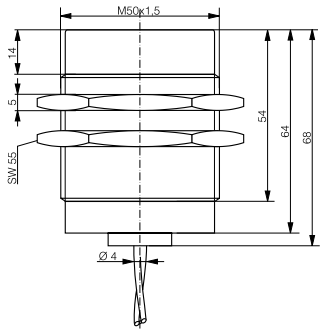
NPN N.O.	**DW-HD-601-M50-300**	**DW-HD-601-M50-411**	**DW-HD-611-M50-300**
NPN N.C.			
PNP N.O.	**DW-HD-603-M50-300**	**DW-HD-603-M50-411**	**DW-HD-613-M50-300**
PNP N.C.			
Compatible connectors [3]			

* Teflon cable on request

M50

25			

0 ... +230 °C



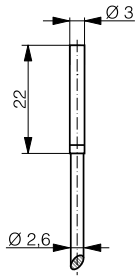
Teflon cable 3 m + PUR 2 m			
In cable			
Non-embeddable			
150 Hz			
Diagram 1			
Yellow (amplifier)			
10 ... 30 VDC (amplifier)			
0 ... +230 °C			
≤ 200 mA (amplifier)			
CE, RoHS			

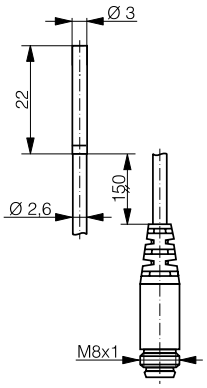
DW-HD-611-M50-411			
DW-HD-613-M50-411			

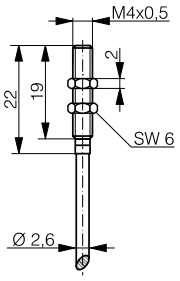
HOUSING SIZE	Ø 3		M4
OPERATING DISTANCE MM	0.6	0.6	0.6

INDUCTIVE SENSORS: NAMUR

NAMUR







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA			
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection [1]	PUR cable type 1	PUR cable type 1 / Connector S8	PUR cable type 1
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	10,000 Hz	10,000 Hz	10,000 Hz
Additional technical data [2]	Table 5	Table 5	Table 5
Wiring [3]	Diagram 4	Diagram 4	Diagram 4
LED	---	---	---
Supply voltage range	7.7 ... 9 VDC	7.7 ... 9 VDC	7.7 ... 9 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 1 / ≥ 2.2 mA*	≤ 1 / ≥ 2.2 mA*	≤ 1 / ≥ 2.2 mA*
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

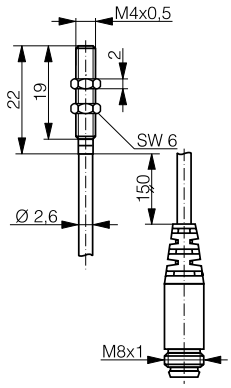
PART REFERENCES: (**BOLD:** PREFERRED TYPES)			
NAMUR	**DW-AD-305-03**	DW-AS-305-03	**DW-AD-305-M4**
Compatible connectors [4]		A, B	

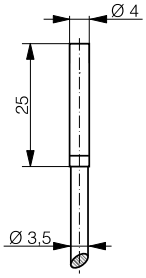
* damped / non-damped

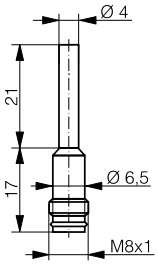
M4	Ø 4		
0.6	0.8	0.8	0.8

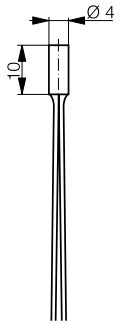



NAMUR









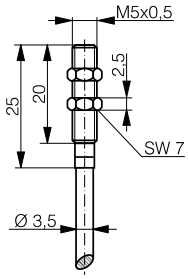
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PUR cable type 1 / Connector S8	PVC cable type 2	Connector S8	Single wires
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
10,000 Hz	10,000 Hz	10,000 Hz	10,000 Hz
Table 5	Table 5	Table 5	Table 5
Diagram 4	Diagram 4	Diagram 4	Diagram 4
---	---	---	---
7.7 ... 9 VDC	7.7 ... 9 VDC	7.7 ... 9 VDC	7.7 ... 9 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 1 / ≥ 2.2 mA*	≤ 1 / ≥ 2.2 mA*	≤ 1 / ≥ 2.2 mA*	≤ 1 / ≥ 2.2 mA*
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

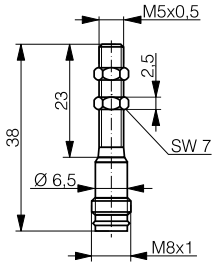
DW-AS-305-M4	**DW-AD-405-04**	**DW-AS-405-04**	**DW-AD-405-04K**
A, B		A, B	

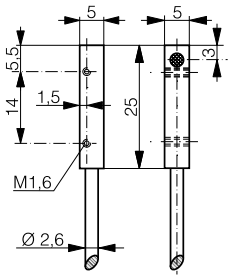
* damped / non-damped

HOUSING SIZE	M5		5 X 5
OPERATING DISTANCE MM	0.8	0.8	0.8

NAMUR







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA

Housing material	Stainless steel V2A	Stainless steel V2A	Chrome-plated brass
Connection [1]	PVC cable type 2	Connector S8	PUR cable type 2
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	10,000 Hz	10,000 Hz	10,000 Hz
Additional technical data [2]	Table 5	Table 5	Table 5
Wiring [3]	Diagram 4	Diagram 4	Diagram 4
LED	---	---	---
Supply voltage range	7.7 ... 9 VDC	7.7 ... 9 VDC	7.7 ... 9 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 1 / ≥ 2.2 mA*	≤ 1 / ≥ 2.2 mA*	≤ 1 / ≥ 2.2 mA*
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

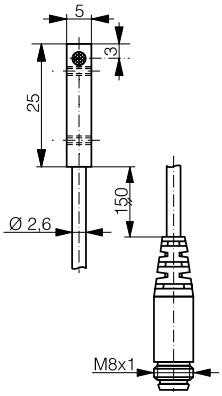
NAMUR	**DW-AD-405-M5**	**DW-AS-405-M5**	**DW-AD-405-C5**
Compatible connectors [4]		A, B	

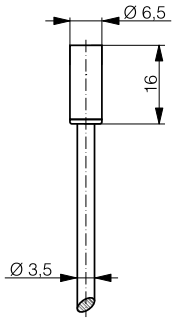
* damped / non-damped

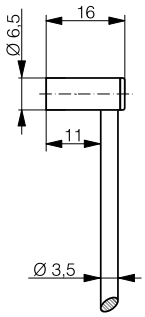
⧄ 5 X 5	Ø 6.5		
0.8	1.5	1.5	1.5

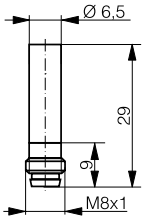



NAMUR









Chrome-plated brass	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PUR cable type 1 / Connector S8	PVC cable type 2	PVC cable type 2	Connector S8
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
10,000 Hz	10,000 Hz	10,000 Hz	10,000 Hz
Table 5	Table 5	Table 5	Table 5
Diagram 4	Diagram 4	Diagram 4	Diagram 4
---	---	---	---
7.7 ... 9 VDC	7.7 ... 9 VDC	7.7 ... 9 VDC	7.7 ... 9 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 1 / ≥ 2.2 mA*	≤ 1 / ≥ 2.2 mA*	≤ 1 / ≥ 2.2 mA*	≤ 1 / ≥ 2.2 mA*
CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS

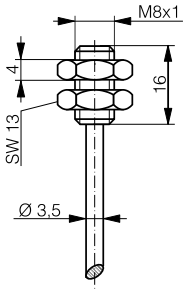
DW-AS-405-C5	**DW-AD-425-065**	DW-AD-425-065-400	DW-AS-425-065-001
A, B			A, B

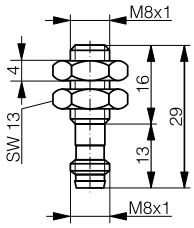
* damped / non-damped

HOUSING SIZE	M8		HOUSING SIZE
OPERATING DISTANCE MM	1.5	1.5	OPERATING DISTANCE MM

INDUCTIVE SENSORS: 2-WIRE

NAMUR





[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA

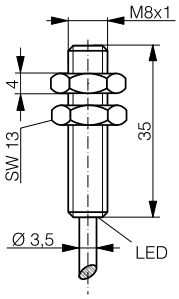
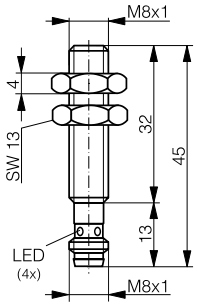
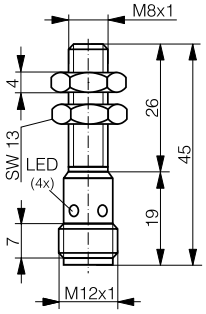
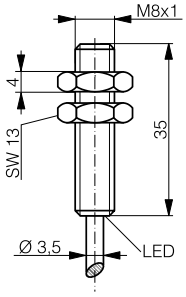
Housing material	Stainless steel V2A	Stainless steel V2A	Housing material
Connection [1]	PVC cable type 2	Connector S8	Connection [1]
Degree of protection	IP 67	IP 67	Degree of protection
Mounting	Embeddable	Embeddable	Mounting
Max. switching frequency	10,000 Hz	10,000 Hz	Max. switching frequency
Additional technical data [2]	Table 5	Table 5	Additional technical data [2]
Wiring [3]	Diagram 4	Diagram 4	Wiring [3]
LED	---	---	LED
Supply voltage range	7.7 ... 9 VDC	7.7 ... 9 VDC	Supply voltage range
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	Ambient temperature range
Output current	≤ 1 / ≥ 2.2 mA*	≤ 1 / ≥ 2.2 mA*	Output current
Approvals	CE, UL, RoHS	CE, UL, RoHS	Approvals

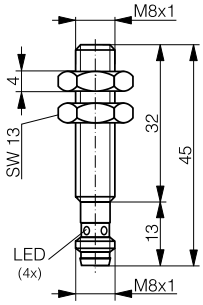
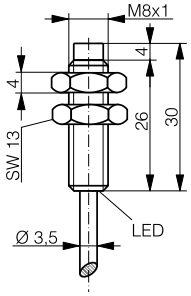
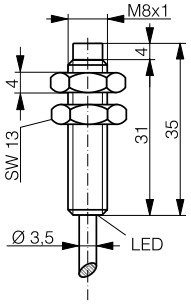
PART REFERENCES: (**BOLD:** PREFERRED TYPES)

			DC 2-wire N.O.
NAMUR	**DW-AD-425-M8**	**DW-AS-425-M8-001**	DC 2-wire N.C.
			AC / DC 2-wire N.O.
			AC / DC 2-wire N.C.
Compatible connectors [4]		A, B	Compatible connectors [4]

* damped / non-damped

M8

1.5	1.5	1.5	2
			
2-WIRE DC			2-WIRE DC / INCREASED OP. DIST.
			
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PVC cable type 2	Connector S8	Connector S12	PVC cable type 2
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
5,000 Hz	5,000 Hz	5,000 Hz	5,000 Hz
Table 9	Table 9	Table 9	Table 9
Diagram 7	Diagram 7	Diagram 7	Diagram 7
Built-in	Built-in	Built-in	Built-in
10 ... 65 VDC	10 ... 65 VDC	10 ... 65 VDC	10 ... 65 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 100 mA	≤ 100 mA	≤ 100 mA	≤ 100 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS
DW-DD-605-M8	**DW-DS-605-M8-001**	**DW-DS-605-M8**	**DW-DD-625-M8**
DW-DD-606-M8	DW-DS-606-M8-001	DW-DS-606-M8	DW-DD-626-M8
	A, B	G, H, M, N (N.O.); M, N (N.C.)	

HOUSING SIZE	M8		
OPERATING DISTANCE MM	2	2.5	2.5
			
	2-WIRE DC / INCREASED OP. DIST.	2-WIRE DC	
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA

Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection [1]	Connector S8	PVC cable type 2	PVC cable type 2
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	5,000 Hz	5,000 Hz	5,000 Hz
Additional technical data [2]	Table 9	Table 9	Table 9
Wiring [3]	Diagram 7	Diagram 7	Diagram 7
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 65 VDC	10 ... 65 VDC	10 ... 65 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 100 mA	≤ 100 mA	≤ 100 mA
Approvals	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

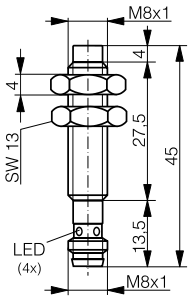
PART REFERENCES: (**BOLD:** PREFERRED TYPES)

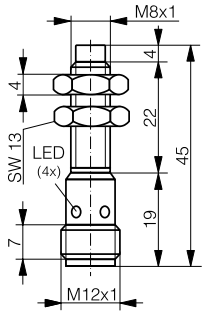
DC 2-wire N.O.	**DW-DS-625-M8-001**	**DW-DD-615-M8-122**	**DW-DD-615-M8**
DC 2-wire N.C.	DW-DS-626-M8-001	DW-DD-616-M8-122	DW-DD-616-M8
AC / DC 2-wire N.O.			
AC / DC 2-wire N.C.			
Compatible connectors [4]	A, B		

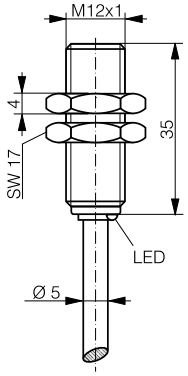
M8		M12	
2.5	2.5	2	2

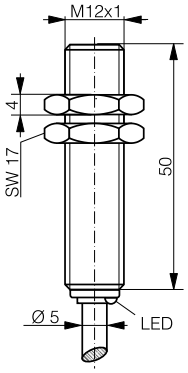



2-WIRE DC







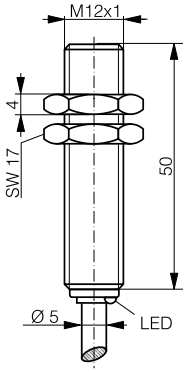


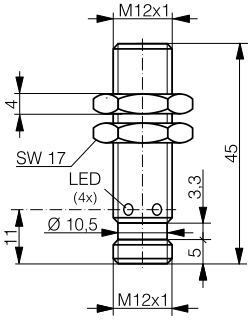
Stainless steel V2A	Stainless steel V2A	Chrome-plated brass	Chrome-plated brass
Connector S8	Connector S12	PVC cable type 14	PVC cable type 14
IP 67	IP 67	IP 67	IP 67
Non-embeddable	Non-embeddable	Embeddable	Embeddable
5,000 Hz	5,000 Hz	3,000 Hz	3,000 Hz
Table 9	Table 9	Table 9	Table 9
Diagram 7	Diagram 7	Diagram 7	Diagram 7
Built-in	Built-in	Built-in	Built-in
10 ... 65 VDC	10 ... 65 VDC	10 ... 65 VDC	10 ... 65 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 100 mA	≤ 100 mA	≤ 100 mA	≤ 100 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

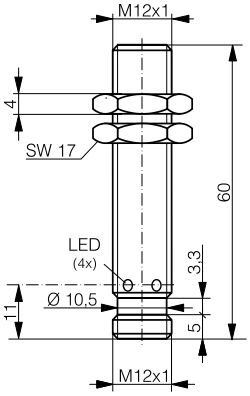
DW-DS-615-M8-001	**DW-DS-615-M8**	**DW-DD-605-M12-120**	**DW-DD-605-M12**
DW-DS-616-M8-001	DW-DS-616-M8	DW-DD-606-M12-120	DW-DD-606-M12
A, B	G, H, M, N (N.O.); M, N (N.C.)		

HOUSING SIZE	M12		
OPERATING DISTANCE MM	2	2	2

	2-WIRE AC/DC	2-WIRE DC	





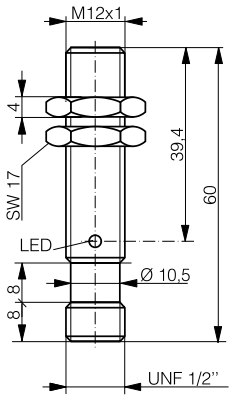
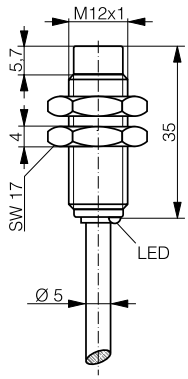
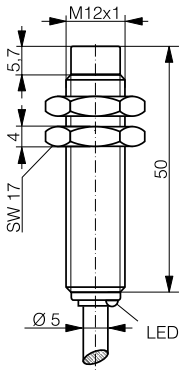
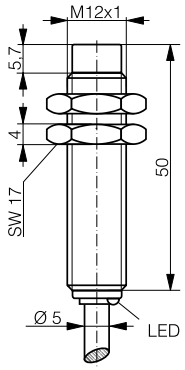


[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA			
Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	PVC cable type 14	Connector S12	Connector S12
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	25 Hz (AC) / 3,000 Hz (DC)	3,000 Hz	3,000 Hz
Additional technical data [2]	Table 6	Table 9	Table 9
Wiring [3]	Diagram 3	Diagram 7	Diagram 7
LED	Built-in	Built-in	Built-in
Supply voltage range	20 ... 265 VAC / 10 ... 320 VDC	10 ... 65 VDC	10 ... 65 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 100 mA	≤ 100 mA
Approvals	CE, CCC, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

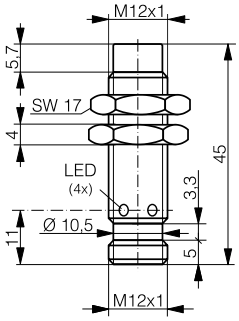
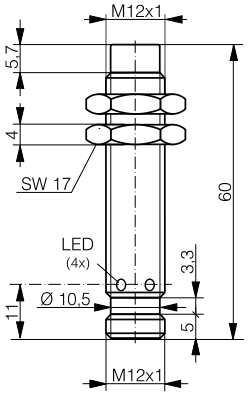
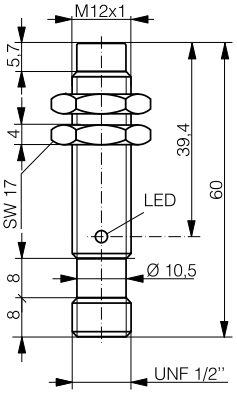
PART REFERENCES: (**BOLD:** PREFERRED TYPES)			
DC 2-wire N.O.		**DW-DS-605-M12-120**	**DW-DS-605-M12**
DC 2-wire N.C.		DW-DS-606-M12-120	DW-DS-606-M12
AC / DC 2-wire N.O.	**DW-AD-607-M12**		
AC / DC 2-wire N.C.	DW-AD-608-M12		
Compatible connectors [4]		G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)

M12

2	4	4	4
			
2-WIRE AC/DC	**2-WIRE DC**		**2-WIRE AC/DC**
			

Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connector 1/2"	PVC cable type 14	PVC cable type 14	PVC cable type 14
IP 67	IP 67	IP 67	IP 67
Embeddable	Non-embeddable	Non-embeddable	Non-embeddable
25 Hz (AC) / 3,000 Hz (DC)	2,500 Hz	2,500 Hz	25 Hz (AC) / 2,000 Hz (DC)
Table 6	Table 9	Table 9	Table 6
Diagram 3	Diagram 7	Diagram 7	Diagram 3
Built-in	Built-in	Built-in	Built-in
20 ... 265 VAC / 10 ... 320 VDC	10 ... 65 VDC	10 ... 65 VDC	20 ... 265 VAC / 10 ... 320 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 100 mA	≤ 100 mA	≤ 200 mA
CE, CCC, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, RoHS

	DW-DD-615-M12-120	**DW-DD-615-M12**	
	DW-DD-616-M12-120	DW-DD-616-M12	
DW-AS-607-M12-069			**DW-AD-617-M12**
DW-AS-608-M12-069			DW-AD-618-M12
Q, R			

HOUSING SIZE	M12		
OPERATING DISTANCE MM	4	4	4
			
	2-WIRE DC	2-WIRE DC	2-WIRE AC/DC
			

[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

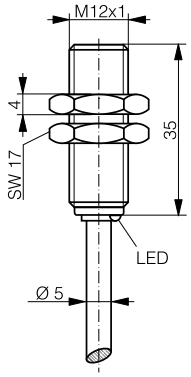
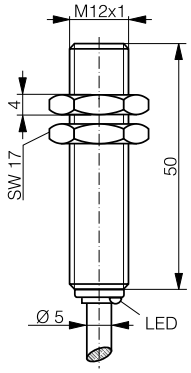
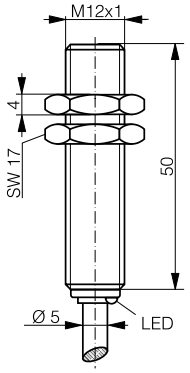
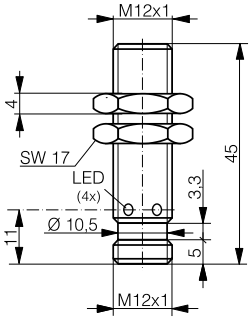
TECHNICAL DATA

Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	Connector S12	Connector S12	Connector 1/2"
Degree of protection	IP 67	IP 67	IP 67
Mounting	Non-embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	2,500 Hz	2,500 Hz	25 Hz (AC) / 2,000 Hz (DC)
Additional technical data [2]	Table 9	Table 9	Table 6
Wiring [3]	Diagram 7	Diagram 7	Diagram 3
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 65 VDC	10 ... 65 VDC	20 ... 265 VAC / 10 ... 320 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 100 mA	≤ 100 mA	≤ 200 mA
Approvals	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

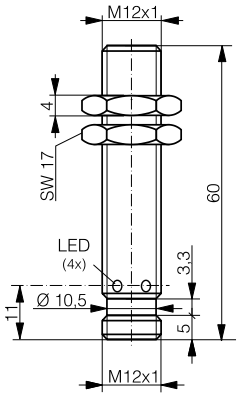
DC 2-wire N.O.	**DW-DS-615-M12-120**	**DW-DS-615-M12**	
DC 2-wire N.C.	DW-DS-616-M12-120	DW-DS-616-M12	
AC / DC 2-wire N.O.			**DW-AS-617-M12-069**
AC / DC 2-wire N.C.			DW-AS-618-M12-069
Compatible connectors [4]	G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)	Q, R

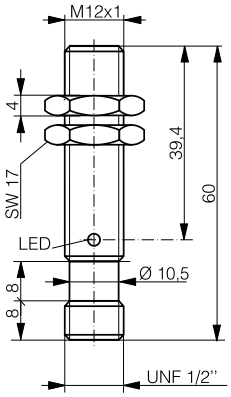
M12

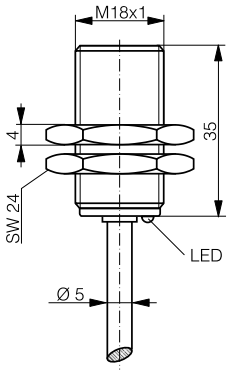
4	4	4	4
			
2-WIRE DC / INCREASED OPERATING DISTANCE		**2-WIRE AC/DC / INCREASED OP. DIST.**	**2-WIRE DC / INCREASED OP. DIST.**
			
Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
PVC cable type 14	PVC cable type 14	PVC cable type 14	Connector S12
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
2,000 Hz	2,000 Hz	25 Hz (AC) / 2,000 Hz (DC)	2,000 Hz
Table 9	Table 9	Table 6	Table 9
Diagram 7	Diagram 7	Diagram 3	Diagram 7
Built-in	Built-in	Built-in	Built-in
10 ... 65 VDC	10 ... 65 VDC	20 ... 265 VAC / 10 ... 320 VDC	10 ... 65 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 100 mA	≤ 100 mA	≤ 200 mA	≤ 100 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, RoHS	CE, CCC, UL, RoHS
DW-DD-625-M12-120	**DW-DD-625-M12**		**DW-DS-625-M12-120**
DW-DD-626-M12-120	DW-DD-626-M12		DW-DS-626-M12-120
		DW-AD-627-M12	
		DW-AD-628-M12	
			G, H, M, N (N.O.); M, N (N.C.)

HOUSING SIZE	M12		M18
OPERATING DISTANCE MM	4	4	5

	2-WIRE DC / INCREASED OP.DIST.	2-WIRE AC/DC / INCREASED OP. DIST.	2-WIRE DC







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

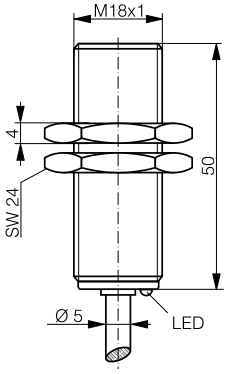
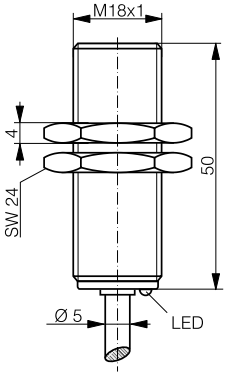
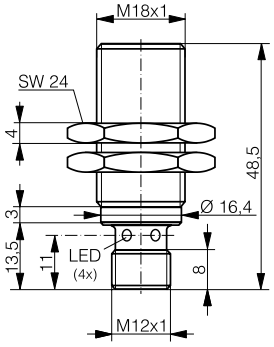
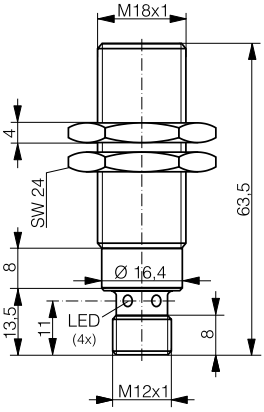
TECHNICAL DATA

Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	Connector S12	Connector 1/2"	PVC cable type 14
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	2,000 Hz	25 Hz (AC) / 2,000 Hz (DC)	1,500 Hz
Additional technical data [2]	Table 9	Table 6	Table 9
Wiring [3]	Diagram 7	Diagram 3	Diagram 7
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 65 VDC	20 ... 265 VAC / 10 ... 320 VDC	10 ... 65 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 100 mA	≤ 200 mA	≤ 100 mA
Approvals	CE, CCC, UL, RoHS	CE, CCC, RoHS	CE, CCC, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

DC 2-wire N.O.	**DW-DS-625-M12**		**DW-DD-605-M18-120**
DC 2-wire N.C.	DW-DS-626-M12		DW-DD-606-M18-120
AC / DC 2-wire N.O.		**DW-AS-627-M12-069**	
AC / DC 2-wire N.C.		DW-AS-628-M12-069	
Compatible connectors [4]	G, H, M, N (N.O.); M, N (N.C.)	Q, R	

M18

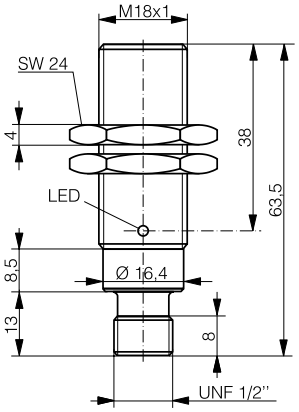
5	5	5	5
			
2-WIRE DC	**2-WIRE AC/DC**	**2-WIRE DC**	
			

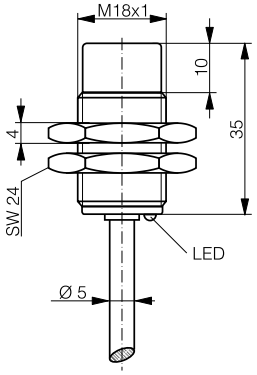
Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
PVC cable type 14	PVC cable type 14	Connector S12	Connector S12
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
1,500 Hz	25 Hz (AC) / 1,500 Hz (DC)	1,500 Hz	1,500 Hz
Table 9	Table 6	Table 9	Table 9
Diagram 7	Diagram 3	Diagram 7	Diagram 7
Built-in	Built-in	Built-in	Built-in
10 ... 65 VDC	20 ... 265 VAC / 10 ... 320 VDC	10 ... 65 VDC	10 ... 65 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 100 mA	≤ 200 mA	≤ 100 mA	≤ 100 mA
CE, CCC, UL, RoHS	CE, CCC, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

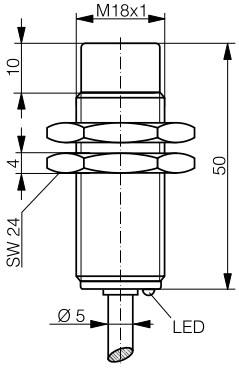
DW-DD-605-M18		**DW-DS-605-M18-120**	**DW-DS-605-M18-002**
DW-DD-606-M18		DW-DS-606-M18-120	DW-DS-606-M18-002
	DW-AD-607-M18		
	DW-AD-608-M18		
		G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)

HOUSING SIZE	M18		
OPERATING DISTANCE MM	5	8	8

	2-WIRE AC/DC	2-WIRE DC	







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

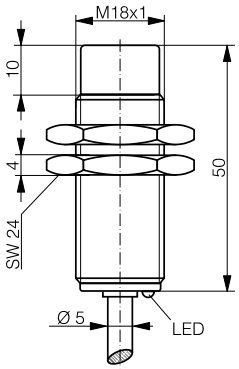
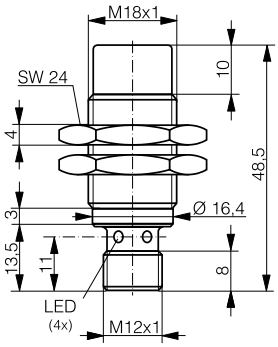
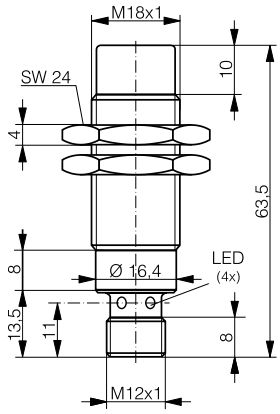
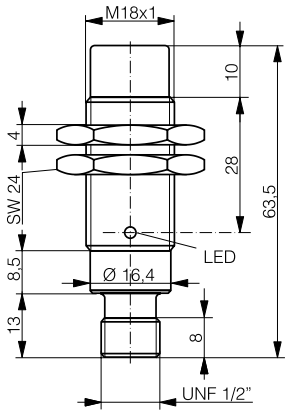
TECHNICAL DATA

Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	Connector 1/2"	PVC cable type 14	PVC cable type 14
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	25 Hz (AC) / 1,500 Hz (DC)	1,200 Hz	1,200 Hz
Additional technical data [2]	Table 6	Table 9	Table 9
Wiring [3]	Diagram 3	Diagram 7	Diagram 7
LED	Built-in	Built-in	Built-in
Supply voltage range	20 ... 265 VAC / 10 ... 320 VDC	10 ... 65 VDC	10 ... 65 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 200 mA	≤ 100 mA	≤ 100 mA
Approvals	CE, CCC, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

DC 2-wire N.O.		**DW-DD-615-M18-120**	**DW-DD-615-M18**
DC 2-wire N.C.		DW-DD-616-M18-120	DW-DD-616-M18
AC / DC 2-wire N.O.	**DW-AS-607-M18-069**		
AC / DC 2-wire N.C.	DW-AS-608-M18-069		
Compatible connectors [4]	Q, R		

M18

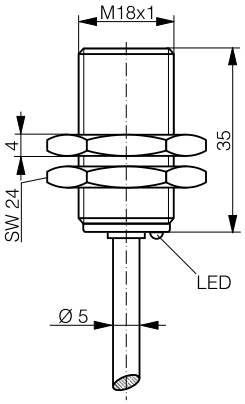
8	8	8	8
			
2-WIRE AC/DC	**2-WIRE DC**		**2-WIRE AC/DC**
			

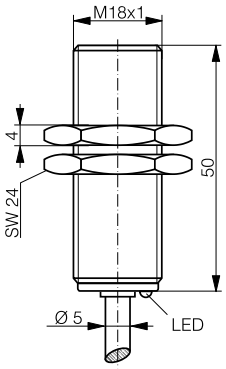
Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
PVC cable type 14	Connector S12	Connector S12	Connector 1/2"
IP 67	IP 67	IP 67	IP 67
Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
25 Hz (AC) / 1,200 Hz (DC)	1,200 Hz	1,200 Hz	25 Hz (AC) / 1,200 Hz (DC)
Table 6	Table 9	Table 9	Table 6
Diagram 3	Diagram 7	Diagram 7	Diagram 3
Built-in	Built-in	Built-in	Built-in
20 ... 265 VAC / 10 ... 320 VDC	10 ... 65 VDC	10 ... 65 VDC	20 ... 265 VAC / 10 ... 320 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 200 mA	≤ 100 mA	≤ 100 mA	≤ 200 mA
CE, CCC, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, RoHS

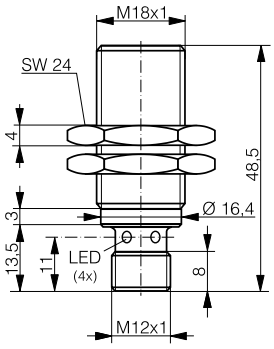
	DW-DS-615-M18-120	**DW-DS-615-M18-002**	
	DW-DS-616-M18-120	DW-DS-616-M18-002	
DW-AD-617-M18			**DW-AS-617-M18-069**
DW-AD-618-M18			DW-AS-618-M18-069
	G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)	Q, R

HOUSING SIZE	M18		
OPERATING DISTANCE MM	8	8	8

2-WIRE DC / INCREASED OPERATING DISTANCE







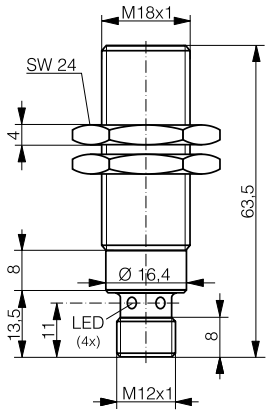
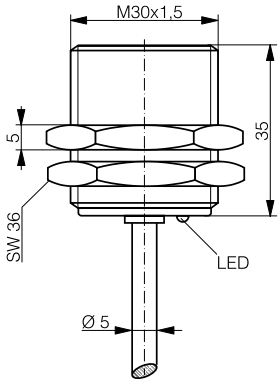
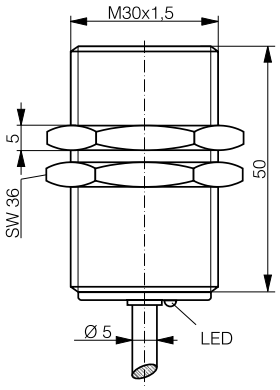
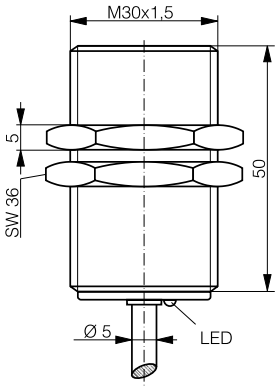
[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA

Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	PVC cable type 14	PVC cable type 14	Connector S12
Degree of protection	IP 67	IP 67	IP 67
Mounting	Quasi-embeddable	Quasi-embeddable	Quasi-embeddable
Max. switching frequency	1,000 Hz	1,000 Hz	1,000 Hz
Additional technical data [2]	Table 9	Table 9	Table 9
Wiring [3]	Diagram 7	Diagram 7	Diagram 7
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 65 VDC	10 ... 65 VDC	10 ... 65 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 100 mA	≤ 100 mA	≤ 100 mA
Approvals	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS

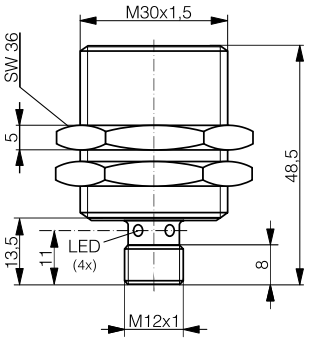
PART REFERENCES: (**BOLD:** PREFERRED TYPES)

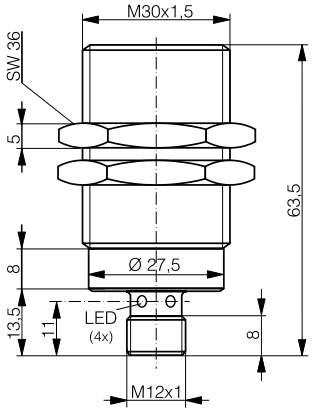
DC 2-wire N.O.	**DW-DD-625-M18-120**	**DW-DD-625-M18**	**DW-DS-625-M18-120**
DC 2-wire N.C.	DW-DD-626-M18-120	DW-DD-626-M18	DW-DS-626-M18-120
AC / DC 2-wire N.O.			
AC / DC 2-wire N.C.			
Compatible connectors [4]			G, H, M, N (N.O.); M, N (N.C.)

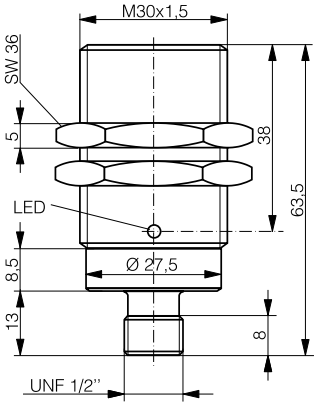
M18	M30		
8	10	10	10
			
2-WIRE DC / INCREASED OP. DIST.	2-WIRE DC		2-WIRE AC/DC
			
Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connector S12	PVC cable type 14	PVC cable type 14	PVC cable type 14
IP 67	IP 67	IP 67	IP 67
Quasi-embeddable	Embeddable	Embeddable	Embeddable
1,000 Hz	600 Hz	600 Hz	25 Hz (AC) / 600 Hz (DC)
Table 9	Table 9	Table 9	Table 6
Diagram 7	Diagram 7	Diagram 7	Diagram 3
Built-in	Built-in	Built-in	Built-in
10 ... 65 VDC	10 ... 65 VDC	10 ... 65 VDC	20 ... 265 VAC / 10 ... 320 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 100 mA	≤ 100 mA	≤ 100 mA	≤ 200 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, RoHS
DW-DS-625-M18-002	**DW-DD-605-M30-120**	**DW-DD-605-M30**	
DW-DS-626-M18-002	DW-DD-606-M30-120	DW-DD-606-M30	
			DW-AD-607-M30
			DW-AD-608-M30
G, H, M, N (N.O.); M, N (N.C.)			

HOUSING SIZE	M30		
OPERATING DISTANCE MM	10	10	10


	2-WIRE DC	2-WIRE DC	2-WIRE AC/DC







[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

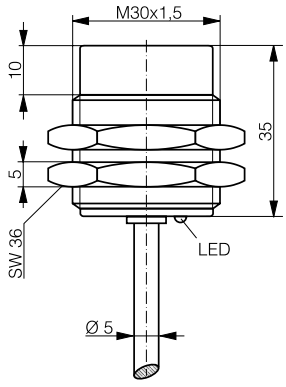
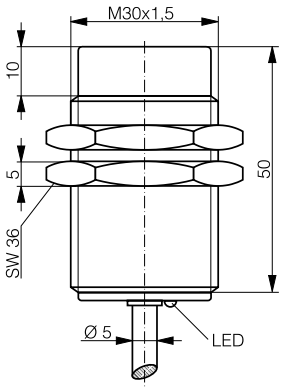
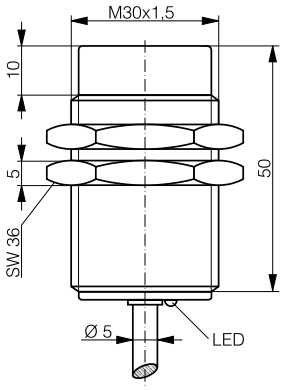
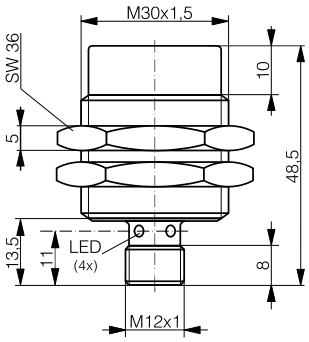
TECHNICAL DATA

Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection [1]	Connector S12	Connector S12	Connector 1/2"
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	600 Hz	600 Hz	25 Hz (AC) / 600 Hz (DC)
Additional technical data [2]	Table 9	Table 9	Table 6
Wiring [3]	Diagram 7	Diagram 7	Diagram 3
LED	Built-in	Built-in	Built-in
Supply voltage range	10 ... 65 VDC	10 ... 65 VDC	20 ... 265 VAC / 10 ... 320 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 100 mA	≤ 100 mA	≤ 200 mA
Approvals	CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, RoHS

PART REFERENCES: (**BOLD:** PREFERRED TYPES)

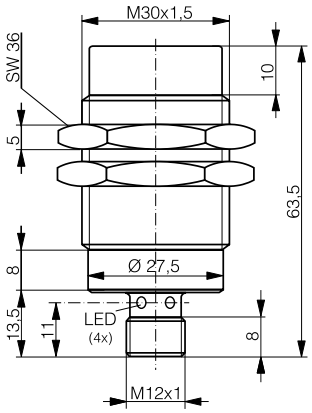
DC 2-wire N.O.	**DW-DS-605-M30-120**	**DW-DS-605-M30-002**	
DC 2-wire N.C.	DW-DS-606-M30-120	DW-DS-606-M30-002	
AC / DC 2-wire N.O.			**DW-AS-607-M30-069**
AC / DC 2-wire N.C.			DW-AS-608-M30-069
Compatible connectors [4]	G, H, M, N (N.O.); M, N (N.C.)	G, H, M, N (N.O.); M, N (N.C.)	Q, R

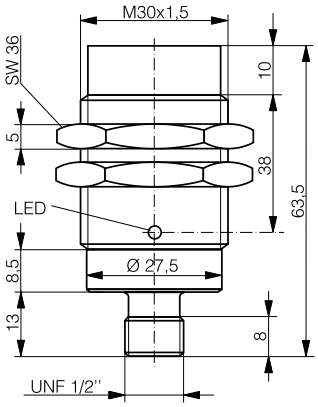
M30

15	15	15	15
			
2-WIRE DC		2-WIRE AC/DC	2-WIRE DC
			
Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
PVC cable type 14	PVC cable type 14	PVC cable type 14	Connector S12
IP 67	IP 67	IP 67	IP 67
Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
500 Hz	500 Hz	25 Hz (AC) / 500 Hz (DC)	500 Hz
Table 9	Table 9	Table 6	Table 9
Diagram 7	Diagram 7	Diagram 3	Diagram 7
Built-in	Built-in	Built-in	Built-in
10 ... 65 VDC	10 ... 65 VDC	20 ... 265 VAC / 10 ... 320 VDC	10 ... 65 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 100 mA	≤ 100 mA	≤ 200 mA	≤ 100 mA
CE, CCC, UL, RoHS	CE, CCC, UL, RoHS	CE, CCC, RoHS	CE, CCC, UL, RoHS
DW-DD-615-M30-120	**DW-DD-615-M30**		**DW-DS-615-M30-120**
DW-DD-616-M30-120	DW-DD-616-M30		DW-DS-616-M30-120
		DW-AD-617-M30	
		DW-AD-618-M30	
			G, H, M, N (N.O.); M, N (N.C.)

HOUSING SIZE	M30		
OPERATING DISTANCE MM	15	15	

	2-WIRE DC	2-WIRE AC/DC	





[1] Standard cable length 2 m. Non-standard cable lengths and types on request. Cable type see page 271.
[2] see page 132
[3] see page 133
[4] see page 268

TECHNICAL DATA

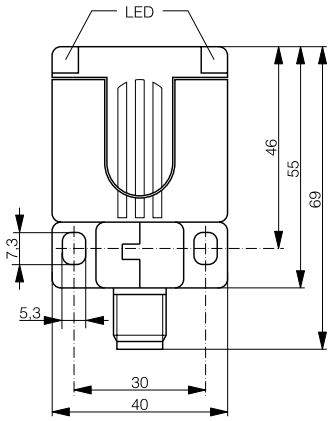
Housing material	Chrome-plated brass	Chrome-plated brass	
Connection [1]	Connector S12	Connector 1/2"	
Degree of protection	IP 67	IP 67	
Mounting	Non-embeddable	Non-embeddable	
Max. switching frequency	500 Hz	25 Hz (AC) / 500 Hz (DC)	
Additional technical data [2]	Table 9	Table 6	
Wiring [3]	Diagram 7	Diagram 3	
LED	Built-in	Built-in	
Supply voltage range	10 ... 65 VDC	20 ... 265 VAC / 10 ... 320 VDC	
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	
Output current	≤ 100 mA	≤ 200 mA	
Approvals	CE, CCC, UL, RoHS	CE, CCC, RoHS	

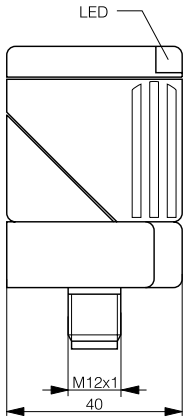
PART REFERENCES: (**BOLD:** PREFERRED TYPES)

DC 2-wire N.O.	**DW-DS-615-M30-002**		
DC 2-wire N.C.	DW-DS-616-M30-002		
AC / DC 2-wire N.O.		**DW-AS-617-M30-069**	
AC / DC 2-wire N.C.		DW-AS-618-M30-069	
Compatible connectors [4]	G, H, M, N (N.O.); M, N (N.C.)	Q, R	

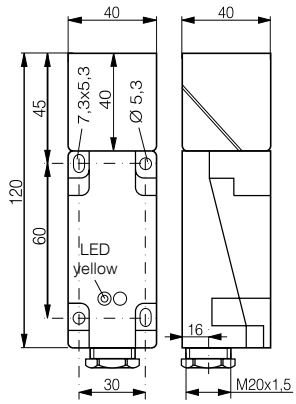
⌀ 40 X 40		⌀ 40 X 120
15	35	15

2-WIRE AC/DC





Sensing face can be rotated to 5 different sides.



Sensing face can be rotated to 5 different sides.

PBTP	PBTP	PBTP
Connector S12	Connector S12	Screw terminal
IP 67	IP 67	IP 65
Embeddable	Non-embeddable	Embeddable
25 Hz (AC) / 50 Hz (DC)	25 Hz (AC) / 30 Hz (DC)	25 Hz (AC) / 150 Hz (DC)
Table 8	Table 8	Table 4
Diagram 8	Diagram 8	Diagram 8
Built-in	Built-in	Built-in
20 ... 265 VAC / 20 ... 320 VDC	20 ... 265 VAC / 20 ... 320 VDC	20 ... 265 VAC / 20 ... 320 VDC
-25 ... +85 °C	-25 ... +85 °C	-25 ... +85 °C
≤ 300 mA	≤ 300 mA	≤ 300 mA
CE, RoHS	CE, RoHS	CE, RoHS
DW-AS-607-C44	**DW-AS-617-C44**	**DW-AD-607-C40***
G, H, M, N	G, H, M, N	

* N.O. / N.C. switchable

TECHNICAL DATA

	Table 1	Table 2	Table 3	Table 4	Table 5
Permissible ripple content	≤ 20 %	≤ 20 %	≤ 20 %	---	≤ 20 %
No-load supply current	≤ 10 mA	≤ 17 mA (24V) /	≤ 20 mA	≤ 1.5 mA	---
		≤ 30 mA (34V)			
Leakage current at output	≤ 0.1 mA	≤ 0.1 mA	≤ 0.1 mA	---	---
Voltage drop, switched state	≤ 2.0 V	≤ 2.5 V	≤ 2.5 V	≤ 8 V	---
Temperature drift % s_r	≤ 10 %	≤ 10 %	≤ 10 %	≤ 10 %	≤ 10 %
Hysteresis % s_r	1...15% (10% typ.)	≤ 20 %	≤ 20 %	≤ 20 %	---
Repeat accuracy	≤ 5 % s_r	≤ 5 % s_r	≤ 5 % s_r	≤ 5 % s_r	≤ 5 % s_r
(according to IEC 60947-5-2)					
Short-circuit protection	Built-in	Built-in	Built-in	---	Built-in
Polarity reversal protection	Built-in	Built-in	Built-in	Built-in	---
Power-on reset	Built-in	Built-in	Built-in	Built-in	---

	Table 6	Table 7	Table 8	Table 9	
Permissible ripple content	---	≤ 10 %	---	≤ 20 %	
No-load supply current	≤ 1.0 mA	30 mA (24 VDC)	Typ. 1.5 mA (24 V)	≤ 0.6 mA	
		40 mA (34 VDC)	≤ 2.0 mA (U_{max})		
Leakage current at output	---	0.01 mA	≤ 2.0 mA	---	
Min. output current	2.0 mA	---	---	---	
Voltage drop, switched state	≤ 6.0 V	≤ 2.5 V	≤ 8 V	≤ 5.0 V	
Temperature drift % s_r	≤ 10 %	≤ 10 %	≤ 10 %	≤ 10 %	
Hysteresis % s_r	1...15% (10% typ.)	1 ... 15 %	1 ... 15 %	1...15% (10% typ.)	
Repeat accuracy	≤ 5 % s_r	≤ 5 % s_r	≤ 5 % s_r	≤ 5 % s_r	
(according to IEC 60947-5-2)					
Short-circuit protection	Built-in	Built-in	---	Built-in	
Polarity reversal protection	---*	Built-in	---	---*	
Power-on reset	Built-in	Built-in	Built-in	Built-in	

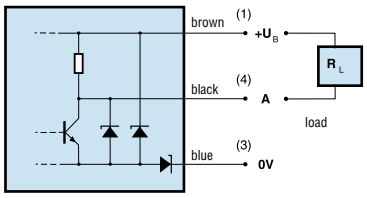
* non-polarized devices

Further data can be obtained from individual data sheets, which may be retrieved from the Contrinex website (www.contrinex.com).

WIRING DIAGRAMS

Diagram 1

NPN normally open (N.O.) / normally closed (N.C.)



PNP normally open (N.O.) / normally closed (N.C.)

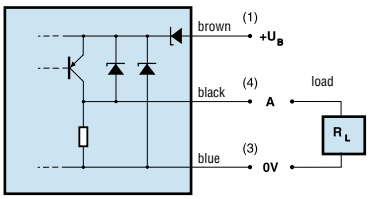
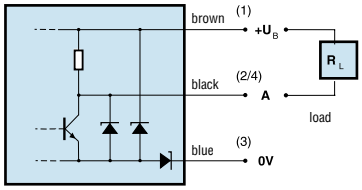


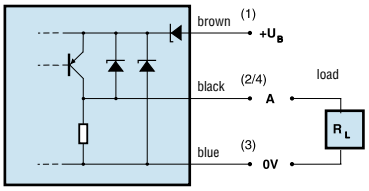
Diagram 2

NPN normally open (N.O.) / normally closed (N.C.)



2 N.C. / 4 N.O.

PNP normally open (N.O.) / normally closed (N.C.)



2 N.C. / 4 N.O.

Diagram 3

2-wire AC/DC N.O. / N.C.

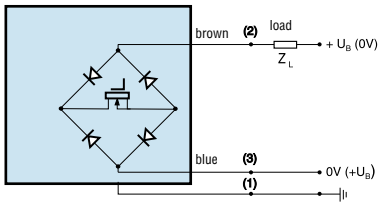


Diagram 4

2-wire NAMUR

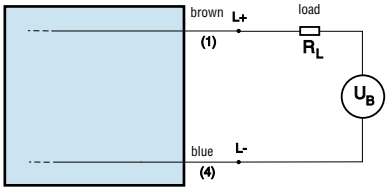
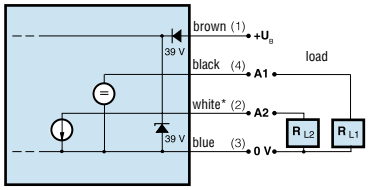


Diagram 5

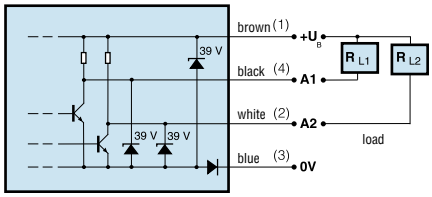
Analog output



* only for models with current output

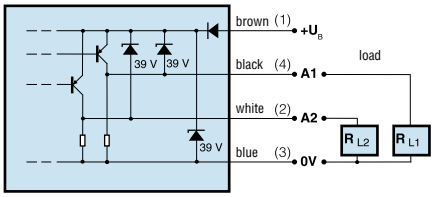
Diagram 6

NPN normally open (N.O.) + normally closed (N.C.)



2 N.C. / 4 N.O.

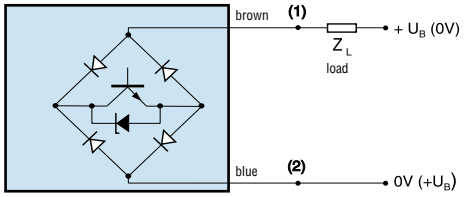
PNP normally open (N.O.) + normally closed (N.C.)



2 N.C. / 4 N.O.

Diagram 7

2-wire DC normally closed (N.C.)



2-wire DC normally open (N.O.)

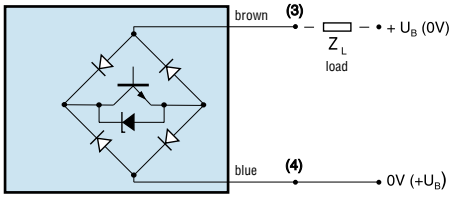
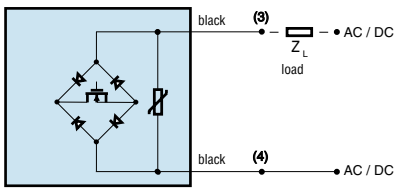


Diagram 8

2-wire AC/DC normally open (N.O.)



FOR FURTHER INFORMATION: **WWW.CONTRINEX.COM**

PHOTOELECTRIC SENSORS

HIGHLIGHTS:

- ✓ Sub-miniature sensors
- ✓ Precise background suppression
- ✓ Fiber-optic solutions
- ✓ Right-angle and spherical optics for precise detection
- ✓ Laser devices
- ✓ IO-Link
- ✓ Teach-in

NEW:

- ✓ Color sensor
- ✓ Fiber-optic amplifier with digital display (IO-Link)
- ✓ Sensors with analog output
- ✓ Excellent background suppression

PROGRAM OVERVIEW

HOUSING SIZE	SENSING RANGE	OUTPUT			
	1 mm – 10 mm – 100 mm – 1,000 mm – 10,000 mm – 100,000 mm	PNP	NPN	AC/DC relay	Analog
DIFFUSE SENSORS					
∅ 4 mm / M5	10 mm	✓	✓		
∅ 4 mm / M5	20 mm	✓	✓		
∅ 4 mm / M5	50 mm	✓	✓		
5 x 7 mm	20 mm	✓	✓		
5 x 7 mm	50 mm	✓	✓		
5 x 7 mm	90 mm	✓	✓		
M12	300 mm	✓	✓		
M18 (M18W)	600 mm	✓	✓		
M18 ⚠	40...250 mm*	✓	✓		
M18 ⚠	60 ... 600 mm*	✓	✓		
30 x 30 mm	600 mm	✓	✓		
30 x 30 mm	1200 mm	✓	✓		
40 x 40 mm	2000 mm	✓	✓		
40 x 50 mm	30 ... 1200 mm*	✓	✓		
50 x 50 mm (DC)	300 mm	✓	✓		
50 x 50 mm (AC/DC)	300 mm			✓	
50 x 50 mm (DC)	800 mm	✓	✓		
50 x 50 mm (AC/DC)	800 mm			✓	
65 x 83 mm (DC)	2000 mm	✓	✓		
65 x 83 mm (AC/DC)	2000 mm			✓	
BACKGROUND SUPPRESSION					
M18 (M18W)	10 ... 120 mm*	✓	✓		
30 x 30 mm	15 ... 200 mm*	✓	✓		
40 x 50 mm	20 ... 500 mm*	✓	✓		
65 x 83 mm (DC)	50 ... 1000 mm*	✓	✓		
65 x 83 mm (AC/DC)	50 ... 1000 mm*			✓	
REFLEX SENSORS					
M12	1500 mm	✓	✓		
M18 (M18W)	2000 mm	✓	✓		
30 x 30 mm	2000 mm	✓	✓		
30 x 30 mm	4000 mm	✓	✓		
40 x 40 mm	6000 mm	✓	✓		
40 x 50 mm	4000 mm	✓	✓		
40 x 50 mm	8000 mm	✓	✓		
50 x 50 mm (DC)	4000 mm	✓	✓		
50 x 50 mm (AC/DC)	4000 mm			✓	
65 x 83 mm (DC)	6000 mm	✓	✓		
65 x 83 mm (AC/DC)	6000 mm			✓	
ANALOG SENSORS					
M12	10 ... 100 mm*				✓
30 x 30 mm	10 ... 100 mm*				✓

* setting range

Detailed data sheets for these products can be found on the Contrinex website:

Light-ON	Dark-ON	Light-/dark-ON switchable	Changeover	Excess-gain**	Polarized (LR)	Relay	Timer	Teach-in	Blue light	High switching frequency	SUPPLY VOLTAGE U_B	Connector S8	Connector S12	Cable	Screw terminal	PBTP	ABS	Metal	PAGE
✓											10 ... 30 VDC	✓		✓				✓	147, 148
✓											10 ... 30 VDC	✓		✓				✓	147, 148
✓											10 ... 30 VDC	✓		✓				✓	145, 146
✓	✓										10 ... 30 VDC			✓				✓	149
✓	✓										10 ... 30 VDC			✓				✓	149
✓	✓										10 ... 30 VDC			✓				✓	149
✓											10 ... 36 VDC		✓	✓				✓	151
✓			✓	✓							10 ... 36 VDC		✓	✓				✓	158 (160)
✓			✓	✓							10 ... 36 VDC		✓	✓				✓	163
✓			✓	✓							10 ... 36 VDC		✓	✓				✓	163
✓											10 ... 36 VDC	✓		✓		✓			168
✓			✓	✓							10 ... 36 VDC	✓		✓		✓			165
✓			✓	✓							10 ... 36 VDC	✓		✓		✓			173
✓			✓	✓							10 ... 36 VDC		✓			✓			177
✓			✓	✓							10 ... 36 VDC	✓		✓			✓		183
✓						✓					20...250 VAC/20...300 VDC			✓			✓		183
✓			✓	✓							10 ... 36 VDC	✓		✓			✓		183
✓						✓					20...250 VAC/20...300 VDC			✓			✓		183
		✓	✓	✓			✓				10 ... 36 VDC		✓		✓	✓			193
✓		✓		✓		✓	✓				20...265 VAC/20...320 VDC		✓		✓	✓			193
✓											10 ... 36 VDC		✓	✓				✓	157 (159)
✓			✓	✓							10 ... 36 VDC	✓		✓		✓			165, 168
✓			✓	✓							10 ... 36 VDC		✓			✓			177
		✓	✓	✓			✓				10 ... 36 VDC		✓		✓	✓			193
✓		✓		✓		✓	✓				20...265 VAC/20...320 VDC		✓		✓	✓			193
	✓				✓						10 ... 36 VDC		✓	✓				✓	151
	✓				✓						10 ... 36 VDC		✓	✓				✓	157 (159)
	✓				✓						10 ... 36 VDC	✓		✓		✓			169
✓			✓	✓	✓						10 ... 36 VDC	✓		✓		✓			166
✓			✓	✓	✓						10 ... 36 VDC	✓		✓		✓			173
✓			✓	✓	✓						10 ... 36 VDC		✓			✓			178
✓			✓	✓	✓						10 ... 36 VDC		✓			✓			178
✓			✓	✓							10 ... 36 VDC	✓		✓			✓		184
✓					✓	✓					20...250 VAC/20...300 VDC			✓			✓		184
		✓	✓	✓	✓		✓				10 ... 36 VDC		✓		✓	✓			194
✓		✓		✓	✓	✓	✓				20...265 VAC/20...320 VDC		✓		✓	✓			194
											10 ... 30 VDC			✓				✓	153
											10 / 15 ... 30 VDC	✓		✓		✓			171

** For LH: Reception indication

PROGRAM OVERVIEW

HOUSING SIZE	SENSING RANGE (1 mm / 10 mm / 100 mm / 1,000 mm / 10,000 mm / 100,000 mm)	OUTPUT PNP	NPN	AC/DC relay	IO-Link
THROUGH-BEAM SENSORS					
∅ 4 mm / M5	250 mm	✓	✓		
M12	10,000 mm	✓	✓		
M12 ⚠	50,000 mm	✓	✓		
M18 (M18W)	20,000 mm	✓	✓		
M18 ⚠	50,000 mm	✓	✓		
30 x 30 mm	6,000 mm	✓	✓		
30 x 30 mm	12,000 mm	✓	✓		
40 x 40 mm	15,000 mm	✓	✓		
40 x 50 mm	50,000 mm	✓	✓		
50 x 50 mm (DC)	15,000 mm	✓	✓		
50 x 50 mm (AC/DC)	15,000 mm			✓	
50 x 50 mm (DC)	50,000 mm	✓	✓		
50 x 50 mm (AC/DC)	50,000 mm			✓	
65 x 83 mm (DC)	50,000 mm	✓	✓		
65 x 83 mm (AC/DC)	50,000 mm			✓	
FIBER-OPTIC AMPLIFIERS					
30 x 30 mm	60 mm	✓	✓		
30 x 30 mm	120 mm	✓	✓		
40 x 40 mm	150 mm	✓	✓		
31 x 60 mm	100 mm	✓	✓		
31 x 60 mm	140 mm	✓	✓		
31 x 60 mm	200 mm	✓	✓		✓
COLOR SENSOR					
40 x 50 mm	30 ... 40 mm*	✓	✓		

* operating range

Light-ON	Dark-ON	Light-/dark-ON switchable	Changeover	Excess-gain	Relay	Timer	Teach-in	Blue light	High switching frequency	SUPPLY VOLTAGE U_B	Connector S8	Connector S12	Cable	Screw terminal	PBTP	ABS	Metal	PAGE
	✓									10 ... 30 VDC	✓		✓				✓	145, 146
✓	✓									10 ... 36 VDC		✓	✓				✓	152
✓	✓									10 ... 36 VDC		✓	✓				✓	155
✓			✓	✓						10 ... 36 VDC		✓	✓				✓	158 (160)
✓			✓	✓						10 ... 36 VDC		✓	✓				✓	163
	✓									10 ... 36 VDC	✓		✓		✓			169
✓			✓	✓						10 ... 36 VDC	✓		✓		✓			166
✓			✓	✓						10 ... 36 VDC	✓		✓		✓			174
✓			✓	✓						10 ... 36 VDC		✓			✓			179
✓			✓	✓						10 ... 36 VDC	✓		✓			✓		185
✓					✓					20...250 VAC/20...300 VDC			✓			✓		185
✓			✓	✓						10 ... 36 VDC	✓		✓			✓		185
✓					✓					20...250 VAC/20...300 VDC			✓			✓		185
		✓	✓	✓		✓				10 ... 36 VDC		✓		✓	✓			194
✓		✓		✓	✓	✓				20...265 VAC/20...320 VDC		✓		✓	✓			194
✓	✓									10 ... 36 VDC	✓		✓		✓			170
✓			✓	✓						10 ... 36 VDC	✓		✓		✓			167
✓			✓	✓						10 ... 36 VDC	✓		✓		✓			174
		✓		✓		✓	✓	✓		10 ... 30 VDC	✓		✓		✓			188,190
		✓		✓		✓	✓		✓	10 ... 30 VDC	✓		✓		✓			187,189
		✓		✓		✓	✓			10 ... 30 VDC	✓		✓		✓			187,189,191
✓							✓			10 ... 30 VDC		✓			✓			181

OPERATING PRINCIPLE

The light-emitting diode (LED) emits a beam of modulated light towards the target. This beam is interrupted by the target, causing partial reflection. A part of the reflected light reaches the sensing face of the receiver. Depending on the operating principle, either the interrupted beam or the reflected light is used for further processing.

Fig. 10 shows the essential functional blocks of a photoelectric sensor.

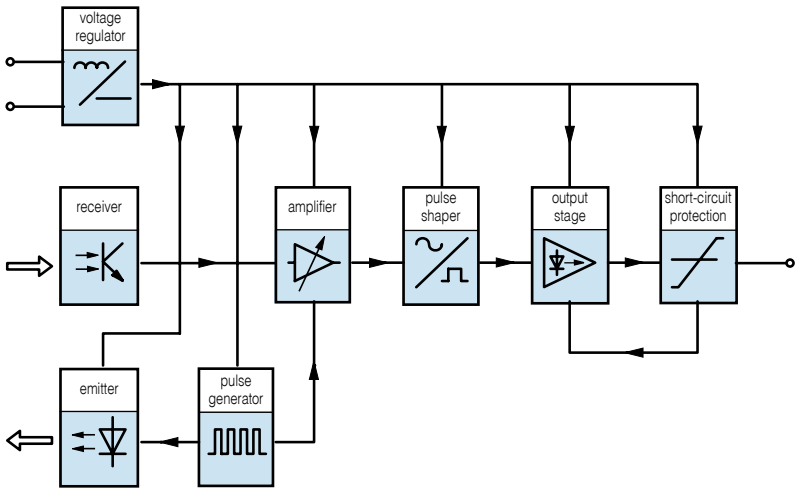


Fig. 10

AVAILABLE MODELS

The Contrinex photoelectric program includes energetic diffuse sensors, diffuse sensors with background suppression, reflex sensors, through-beam sensors and fiber-optic amplifiers.

DIFFUSE SENSORS, ENERGETIC

The pulsed light from the emitting diode falls on an object of any shape or color. It is reflected in a diffuse manner, and part of it reaches the light receiver located in the same unit (Fig. 11). If the intensity of the received light is sufficient, the output is switched. The attainable sensing range depends on the target size and color, as well as its surface structure, and can be adjusted within a wide range by means of the built-in potentiometer.

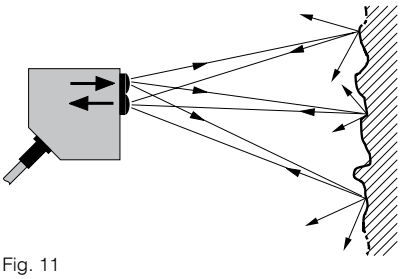


Fig. 11

This range also contains models with analog output.

DIFFUSE SENSORS WITH BACKGROUND SUPPRESSION

These devices basically function in an identical manner to energetic diffuse sensors, but using the angle of incidence, rather than the amount, of reflected light. For this reason, the sensing range depends to only a slight extent on target size, color, or surface structure. The target can therefore be accurately recognized, even on a light background.

REFLEX SENSORS

The pulsed light from the emitting diode is focused by means of a lens, and directed via a polarization filter at a reflector (principle of a 3-way mirror - Fig. 12). Part of the reflected light passes through a further polarization filter, before reaching the receiver. The filters are selected and adjusted in such a way that only light returning from the reflector reaches the receiver. This ensures reliable detection results, even with bright and shiny targets, which otherwise would not be detected, due to a strong direct reflection. Furthermore, thanks to the optics used, the sensing range is increased considerably.

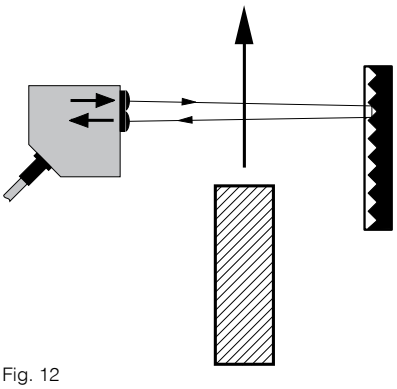


Fig. 12

An object interrupting the light beam which passes from the emitter via the reflector to the receiver causes the output to switch. For reliable operation, the target size should be at least equal to the diameter of the reflector.

Series 4050 also includes executions that work with non-polarized light. While these devices feature very long sensing ranges, they are not suitable for the detection of bright and shiny targets.

THROUGH-BEAM SENSORS

These devices consist of an emitter and a receiver in separate housings. The emitter is aligned so that the greatest possible amount of pulsed light from its diode reaches the receiver (Fig. 13). The receiver processes the incoming light in such a way that it is clearly separated from ambient and other light sources. Any interruption of the light beam between emitter and receiver causes the output to be switched. For reliable operation, the target must be completely opaque, and its size should be at least equal to the diameter of the receiver's aperture.

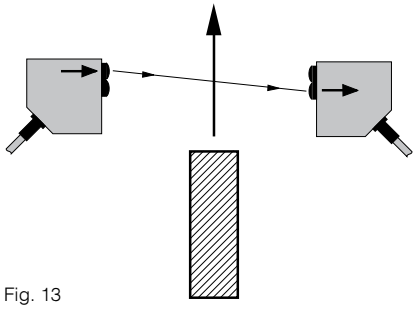


Fig. 13

FIBER-OPTIC AMPLIFIERS

Optical fibers are fitted in front of the emitter and receiver (the basic operation is identical for both glass and synthetic optical fibers). These fibers work as the extended "eye" of the photo sensor. As optical fiber conductors are very small and flexible, they provide a truly practical solution to the problem of sensing in highly inaccessible places. Furthermore, they do not carry any electrical potential, and sensing operations are therefore possible without special safety measures, even in areas where there is an explosion risk, or in the presence of strong electrical and magnetic fields (high-voltage equipment, electrical welding equipment). Even the tiniest objects can be detected by using appropriately thin fibers. Optical fibers can act as both through-beam (Fig. 14) and diffuse sensors (Fig. 15).

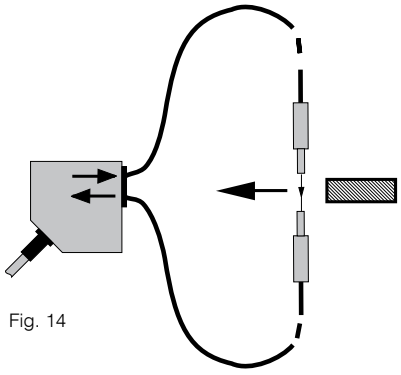


Fig. 14

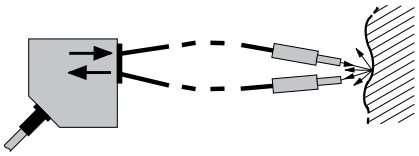


Fig. 15

COLOR SENSOR

The Contrinex color sensors are well suited for color control as well as for use in color sorting processes. The devices feature 3 teachable color channels with independent outputs, which allow for three color tones to be programmed. For teaching, 5 different switching tolerance levels may be selected. Whereas small tolerances allow for minimal color differences to be recognized, larger tolerances permit a certain color variation.

SPECIAL EXECUTIONS

In addition to the types described in this catalog, a number of special executions are available, in particular devices with different cable lengths, different cable types (e.g. with oil-resistant, highly flexible PUR insulation), and different housing materials (e.g. stainless steel).

PRODUCT OVERVIEW

SERIES 1000

This series features a great variety of sizes and functions in widely used standardized cylindrical housings (smooth and threaded types). The program includes devices in sizes diameter 4 mm, M5, M12, M18 and M18W for right-angle sensing. The ∅ 4 mm and M5 devices are the smallest self-contained photoelectric sensors on the market, and are now also available with cylindrical light beam and well-defined operating range. They replace larger models in case of space problems, and optical fibers if the latter do not prove satisfactory. In addition, they can also be used instead of inductive sensors of equal size if their operating distances are insufficient.

The series 1000 now also includes a M12-device with analog output as well as laser devices in sizes M12 and M18, which compared to conventional LED sensors, are distinguished by a narrowly collimated red laser beam. The latter allows for the detection of very small objects across a large distance.

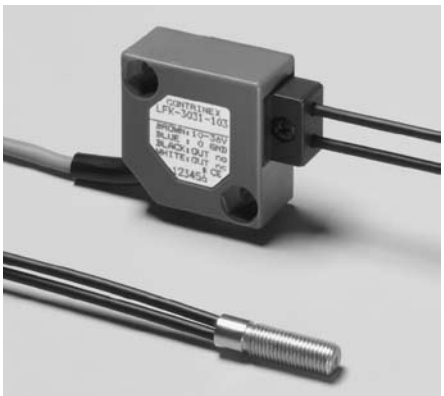
SERIES 0507

These rectangular miniature diffuse sensors (5 x 7 x 40 mm) feature a narrowly focused, virtually cylindrical light beam. The latter allows for vertical and horizontal mounting directly on the supporting surface as well as for reliable detection of objects through holes and gaps.

SERIES 3030 / 3130

This series combines high performance with small size (30 x 30 x 15 mm housing). Available types include energetic diffuse sensors, diffuse sensors with background suppression, reflex sensors, diffuse sensors with analog output, through-beam sensors and fiber-optic amplifiers. Despite their small size, they feature all the usual protection functions, are robust and can be used for demanding industrial applications.

SERIES 3031 / 3131



This series combines good performance with moderate cost. It is intended for general use, particularly where small size is required (housing 30 x 30 x 15 mm). The program includes energetic diffuse sensors, diffuse sensors with background suppression, reflex sensors, through-beam sensors and fiber-optic amplifiers. These robust devices are suitable for industrial use, and feature all the usual protection functions.

SERIES 4040

Maximum performance in a 40 x 40 x 19 mm housing. These devices are ideally suited for demanding applications, thanks to sensing ranges of 2 m (diffuse sensor) and 6 m (reflex sensor). As a result of a built-in power saving module, these values are attained using very little energy. Available types include diffuse sensors, reflex sensors, through-beam sensors and fiber-optic amplifiers for glass fibers.

SERIES 4050

Series 4050 devices feature high performance in a compact standard 40 x 50 x 15 mm housing. The range includes diffuse sensors, diffuse sensors with precise background suppression, polarized and non-polarized reflex sensors, as well as through-beam sensors.

The series also comprises color sensors featuring 3 teachable color channels and 5 switching tolerance levels.

SERIES 5050

This series of photoelectric sensors in the universally used rectangular size 50 x 50 mm offers top quality, designed to cost. The range includes diffuse, through-beam, and reflex sensors in DC and AC/DC execution with relay output.

SERIES 3060 / 3065 / 3066

The fiber-optic amplifiers for DIN-rail mounting (DIN/EN 50022) feature long sensing ranges, outstanding detection properties for both long and very short ranges, high temperature stability and durability, thanks to stabilized light power (teach-in model only), and high switching frequency. For the teach-in versions, built-in adjustable pulse delay and stretching are standard. The housing width of only 10 mm allows for optimum stacking of even a large number of switches. In addition, the devices are optimized for simple and easily understandable operation. Presently, the series offers distance setting by means of potentiometer and teach-in; the latter with additional manual fine adjustment. According to choice, Teach 1 (only on background), Teach 2 (first on target, then on background), or "Dynamic Teach" may be used. The teach process can be launched from a distance via a separate input. The devices are available as blue and red-light, as well as high-frequency models, in cable and connector executions.

SERIES 6080

This series is suitable for conveyors and other applications where extremely robust devices in large housings are required. It offers an extensive functional program contained in a 65 x 83 x 25 mm housing. Available models include energetic diffuse sensors, diffuse sensors with background suppression, reflex sensors, and through-beam sensors.

All models are available in DC or combined AC/DC (20…265 VAC, 20…320 VDC) execution with relay output. Connection is via connector or screw terminal. All variations can be delivered with a timer.

GLASS OPTICAL FIBERS

A large range of glass optical fibers is available for the 4040 series, and partially for the 3030 / 3031 series. The program includes types suitable for the most difficult operating conditions and the widest range of sensing applications. Moreover, custom-made models are available at a low extra cost, even for small order quantities.

SYNTHETIC OPTICAL FIBERS

For 3030 / 3031 and 3060 / 3065 / 3066 series switches, this catalog includes a comprehensive range of synthetic optical fibers for the detection of smallest objects, and for use in highly inaccessible areas. The fibers can be cut on site to the length required for a specific application.

PHOTOELECTRIC SENSORS: SUB-MINIATURE SERIES 1040/50 & 0507

- ✓ **Sub-miniature sensors**
- ✓ Rugged **metal housing**
- ✓ **Accurate target detection** due to cylindrical light beam
- ✓ Rugged sapphire-glass or glass sensing face, **scratch & chemically resistant**
- ✓ **Shock & vibration resistant** due to fully vacuum-potted electronics
- ✓ **High system reserves** (excess gain)
- ✓ **Pre-failure warning** (pollution monitoring)

TECHNICAL DATA

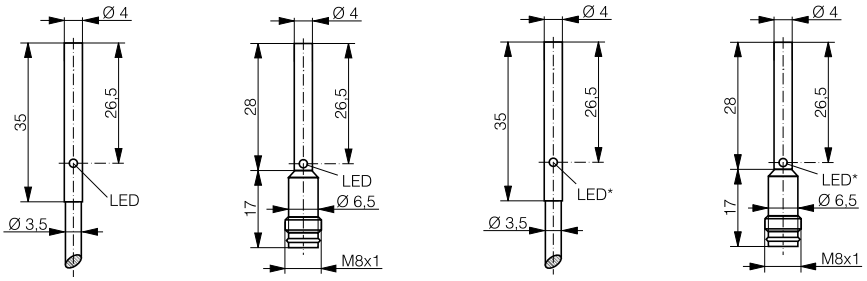
(according to IEC 60947-5-2)	
Housing material	Stainless steel V2A
Hysteresis	10% typ.
Supply voltage range U_B	10 ... 30 VDC
Max. ripple content	20 %
Output current	≤ 100 mA
Output voltage drop	≤ 2.0 V at 100 mA
Max. switching frequency	250 Hz
Switching time (↑ and ↓)	2.5 msec
Max. ambient light:	
halogen	5,000 Lux
sun	10,000 Lux
Ambient temperature range	0 ... +55 °C
Degree of protection	IP 67
EMC protection:	
IEC 60947-5-2 (7.2.3.1)	1 kV
IEC 61000-4-2	Level 2
IEC 61000-4-3	Level 3
IEC 61000-4-4	Level 2
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

Rugged sub-miniature sensors Ø 4 mm, M5, ⍁ 5 x 7 mm in metal housings for precise target detection in limited spaces. Shock and vibration, scratch and chemically resistant with high system reserves (excess gain). Pollution monitoring (blinking LED) in case of reduced system reserves prevents downtime caused by pollution. Particularly suited for rough industrial environments and where space is limited:

- ✓ **semiconductor industry**
- ✓ **printed circuit board production**
- ✓ **electronics industry**
- ✓ **gripper arms on handling machines**
- ✓ **solar module manufacturing**
- ✓ **vending machines**

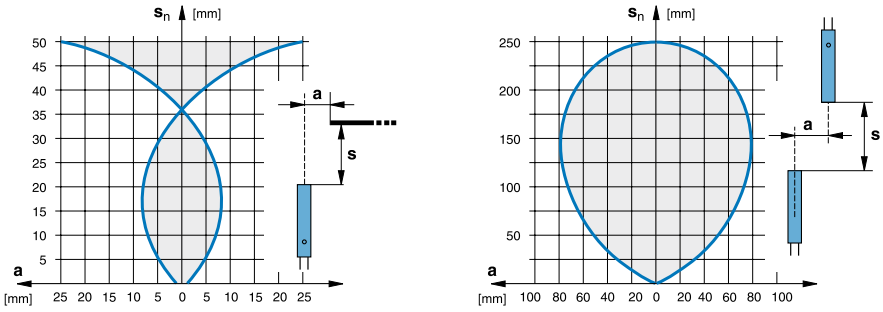
HOUSING SIZE	Ø 4	
SENSING RANGE	**DIFFUSE SENSOR 50 mm**	**THROUGH-BEAM SENSOR 250 mm**

Dimensions:



* receiver only

Response curves:



TECHNICAL DATA

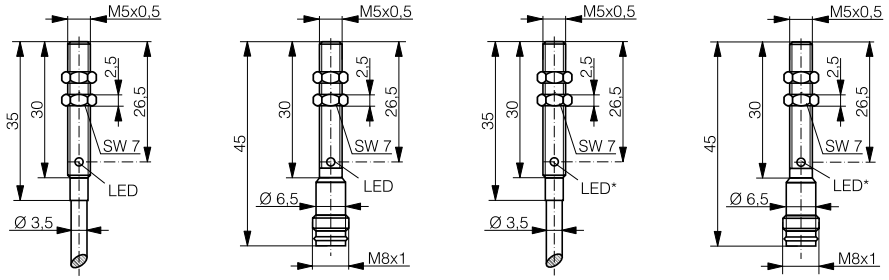
Sensing range	50 mm	250 mm
Standard target	100 x 100 mm white	---
No-load supply current	≤ 15 mA	≤ 5 mA (R) / ≤ 10 mA (E)
Emitter	IR LED 880 nm	IR LED 880 nm
Lens material	Glass	Glass
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight (cable / connector model)	35 / 3 g	66 / 6 g (R and E)

PART REFERENCES

(**bold:** preferred types)		**(R)** receiver / **(E)** emitter
NPN light-ON / cable	**LTK-1040-301**	---
NPN dark-ON / cable	---	**LLK-1040-202 (R) / LLK-1040-200 (E)**
NPN light-ON / connector S8	**LTS-1040-301**	---
NPN dark-ON / connector S8	---	**LLS-1040-202 (R) / LLS-1040-200 (E)**
PNP light-ON / cable	**LTK-1040-303**	---
PNP dark-ON / cable	---	**LLK-1040-204 (R) / LLK-1040-200 (E)**
PNP light-ON / connector S8	**LTS-1040-303**	---
PNP dark-ON / connector S8	---	**LLS-1040-204 (R) / LLS-1040-200 (E)**
Compatible connectors (page 268)	A, B	A, B
Wiring (pages 198-199)	Diagram 1	Diagram 1 (R) / 4 (E)

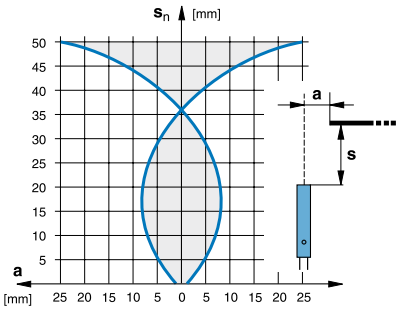
HOUSING SIZE	M5	
SENSING RANGE	**DIFFUSE SENSOR 50 mm**	**THROUGH-BEAM SENSOR 250 mm**

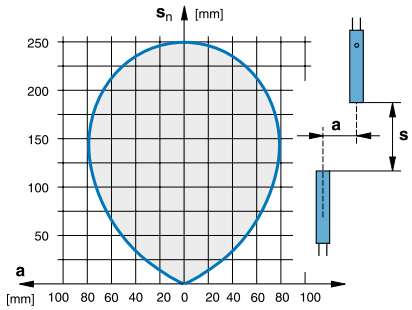
Dimensions:



* receiver only

Response curves:





TECHNICAL DATA

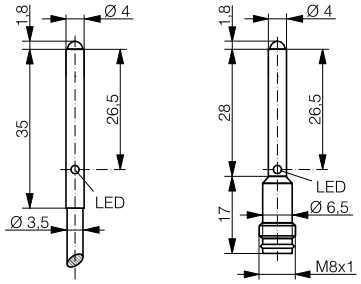
Sensing range	50 mm	250 mm
Standard target	100 x 100 mm white	---
No-load supply current	≤ 15 mA	≤ 5 mA (R) / ≤ 10 mA (E)
Emitter	IR LED 880 nm	IR LED 880 nm
Lens material	Glass	Glass
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight (cable / connector model)	35 / 4 g	68 / 8 g (R and E)

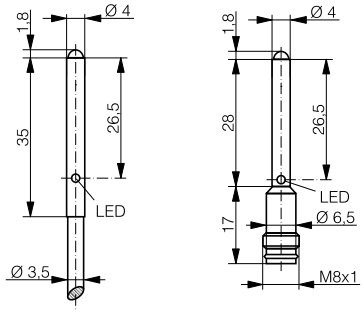
PART REFERENCES

(**bold:** preferred types)		**(R)** receiver / **(E)** emitter
NPN light-ON / cable	**LTK-1050-301**	---
NPN dark-ON / cable	---	**LLK-1050-202 (R) / LLK-1050-200 (E)**
NPN light-ON / connector S8	**LTS-1050-301**	---
NPN dark-ON / connector S8	---	**LLS-1050-202 (R) / LLS-1050-200 (E)**
PNP light-ON / cable	**LTK-1050-303**	---
PNP dark-ON / cable	---	**LLK-1050-204 (R) / LLK-1050-200 (E)**
PNP light-ON / connector S8	**LTS-1050-303**	---
PNP dark-ON / connector S8	---	**LLS-1050-204 (R) / LLS-1050-200 (E)**
Compatible connectors (page 268)	A, B	A, B
Wiring (pages 198-199)	Diagram 1	Diagram 1 (R) / 4 (E)

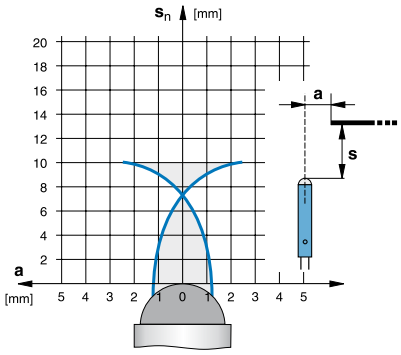
HOUSING SIZE	Ø 4 WITH CYLINDRICAL LIGHT BEAM	
SENSING RANGE	DIFFUSE SENSOR 10 mm	DIFFUSE SENSOR 20 mm

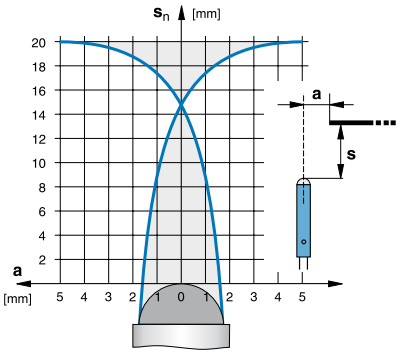
Dimensions:





Response curves:





TECHNICAL DATA

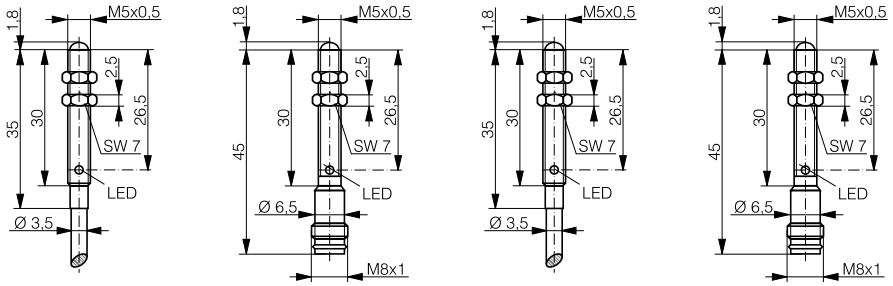
Sensing range	10 mm	20 mm
Standard target	100 x 100 mm white	100 x 100 mm white
No-load supply current	≤ 15 mA	≤ 15 mA
Emitter	IR LED 880 nm	IR LED 880 nm
Lens material	Sapphire glass	Sapphire glass
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight (cable / connector model)	28 / 3 g	28 / 3 g

PART REFERENCES

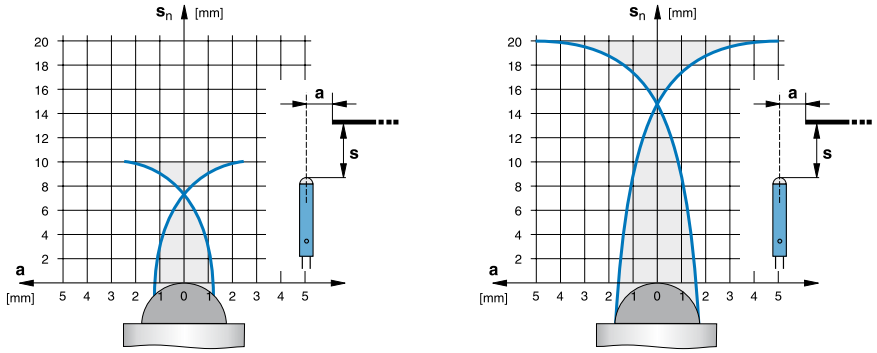
(**bold:** preferred types)		
NPN light-ON / cable	**LTK-1040-301-505**	**LTK-1040-301-506**
NPN dark-ON / cable	---	---
NPN light-ON / connector S8	**LTS-1040-301-505**	**LTS-1040-301-506**
NPN dark-ON / connector S8	---	---
PNP light-ON / cable	**LTK-1040-303-505**	**LTK-1040-303-506**
PNP dark-ON / cable	---	---
PNP light-ON / connector S8	**LTS-1040-303-505**	**LTS-1040-303-506**
PNP dark-ON / connector S8	---	---
Compatible connectors (page 268)	A, B	A, B
Wiring (pages 198-199)	Diagram 1	Diagram 1

HOUSING SIZE	M5 WITH CYLINDRICAL LIGHT BEAM	
SENSING RANGE	DIFFUSE SENSOR 10 mm	DIFFUSE SENSOR 20 mm

Dimensions:



Response curves:



TECHNICAL DATA

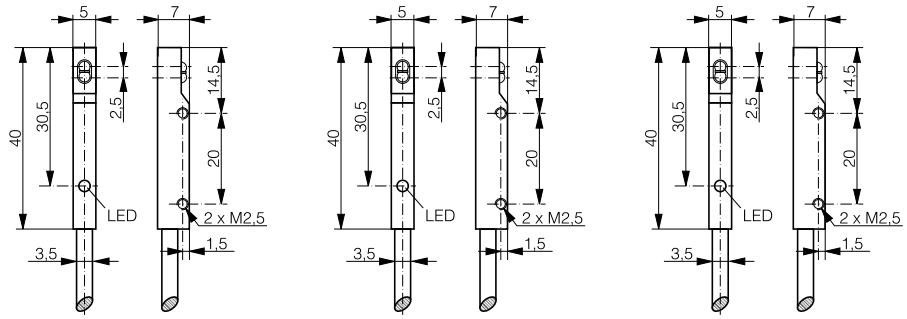
Sensing range	10 mm	20 mm
Standard target	100 x 100 mm white	100 x 100 mm white
No-load supply current	≤ 15 mA	≤ 15 mA
Emitter	IR LED 880 nm	IR LED 880 nm
Lens material	Sapphire glass	Sapphire glass
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight (cable / connector model)	30 / 5 g	30 / 5 g

PART REFERENCES

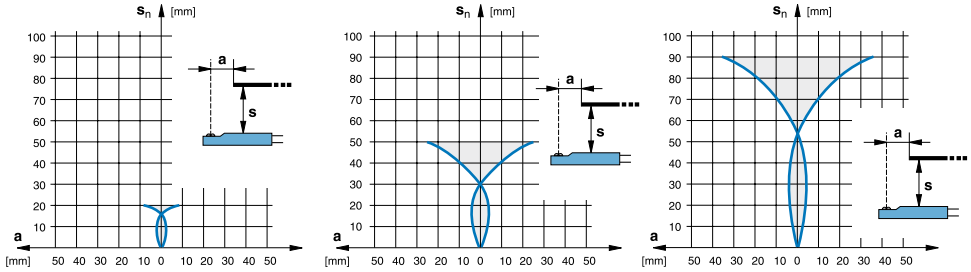
(**bold:** preferred types)		
NPN light-ON / cable	**LTK-1050-301-505**	**LTK-1050-301-506**
NPN dark-ON / cable	---	---
NPN light-ON / connector S8	**LTS-1050-301-505**	**LTS-1050-301-506**
NPN dark-ON / connector S8	---	---
PNP light-ON / cable	**LTK-1050-303-505**	**LTK-1050-303-506**
PNP dark-ON / cable	---	---
PNP light-ON / connector S8	**LTS-1050-303-505**	**LTS-1050-303-506**
PNP dark-ON / connector S8	---	---
Compatible connectors (page 268)	A, B	A, B
Wiring (pages 198-199)	Diagram 1	Diagram 1

HOUSING SIZE	⌀ 5 X 7 X 40 WITH CYLINDRICAL LIGHT BEAM		
SENSING RANGE	**DIFFUSE SENSOR 20 mm**	**DIFFUSE SENSOR 50 mm**	**DIFFUSE SENSOR 90 mm**

Dimensions:



Response curves:



TECHNICAL DATA

Sensing range	20 mm*	50 mm	90 mm
Standard target	100 x 100 mm white	100 x 100 mm white	100 x 100 mm white
No-load supply current	≤ 15 mA	≤ 15 mA	≤ 15 mA
Emitter	IR LED 880 nm	IR LED 880 nm	IR LED 880 nm
Lens material	Sapphire glass	Sapphire glass	Sapphire glass
Approvals	CE, RoHS	CE, RoHS	CE, RoHS
Weight	40 g	40 g	40 g

PART REFERENCES

(**bold:** preferred types)			
NPN light-ON / cable	**LTK-0507-301-501**	**LTK-0507-301**	**LTK-0507-301-502**
NPN dark-ON / cable	**LTK-0507-302-501**	**LTK-0507-302**	**LTK-0507-302-502**
NPN light-ON / connector S8	---	---	---
NPN dark-ON / connector S8	---	---	---
PNP light-ON / cable	**LTK-0507-303-501**	**LTK-0507-303**	**LTK-0507-303-502**
PNP dark-ON / cable	**LTK-0507-304-501**	**LTK-0507-304**	**LTK-0507-304-502**
PNP light-ON / connector S8	---	---	---
PNP dark-ON / connector S8	---	---	---
Compatible connectors (page 268)	---	---	---
Wiring (pages 198-199)	Diagram 1	Diagram 1	Diagram 1

* calibrated between 20 and 25 mm

PHOTOELECTRIC SENSORS: SERIES 1120

- ✓ M12 **miniature sensor series**
- ✓ Rugged **metal housing**
- ✓ **Accurate & speed-independent target detection**; response time 0.5 msec
- ✓ **Shock & vibration resistant** due to fully vacuum-potted electronics
- ✓ **High system reserves** (excess gain)
- ✓ **Pre-failure warning** (pollution monitoring)
- ✓ **Easy adjustment** (due to visible red light)
- ✓ Accurate **analog sensor** (10 ... 100 mm)

TECHNICAL DATA

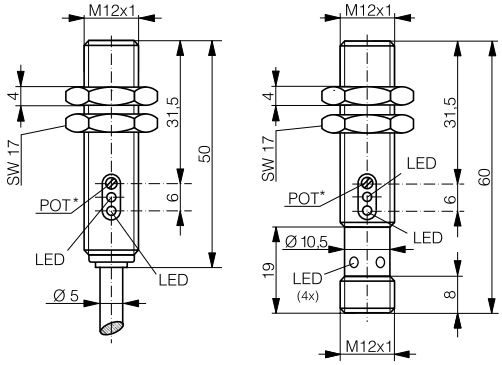
(according to IEC 60947-5-2)	
Housing material	Chrome-plated brass
Hysteresis	10 % typ. / --- (LA)
Supply voltage range U_B	10 ... 36 VDC / 10 ... 30 VDC (LA)
Max. ripple content	20 %
Output current	≤ 200 mA / --- (LA)
Output voltage drop	≤ 2.0 V at 200 mA / --- (LA)
Max. switching frequency / Bandwidth (-3dB)	1,000 Hz / 100 Hz at s = 50 mm (LA)
Switching time (↑ and ↓)	0.5 msec / --- (LA)
Max. ambient light:	
halogen	5,000 Lux
sun	10,000 Lux
Ambient temperature range	-25 ... +55 °C / 0 ... +55 °C (LA)
Degree of protection	IP 67
EMC protection:	
IEC 60947-5-2 (7.2.3.1)	1 kV
IEC 61000-4-2	Level 2
IEC 61000-4-3	Level 3 / Level 2 (LA)
IEC 61000-4-4	Level 3
IEC 61000-4-6	Level 2 (LA)
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in / --- (LA)

Rugged M12 miniature sensors in metal housings for accurate and speed-independent target detection. Shock and vibration, scratch and chemically resistant with high system reserves (excess gain). Pollution monitoring (green LED) in case of reduced system reserves prevents downtime caused by pollution. Easy adjustment due to visible red light. Particularly suited for rough industrial environments and where space is limited:

- ✓ **packaging machines**
- ✓ **printing industry**
- ✓ **automation equipment**
- ✓ **handling systems**
- ✓ **conveyor systems**
- ✓ **special machinery**
- ✓ **machine tool industry (in combination with inductive sensors)**
- ✓ **inserters & sorting machines**

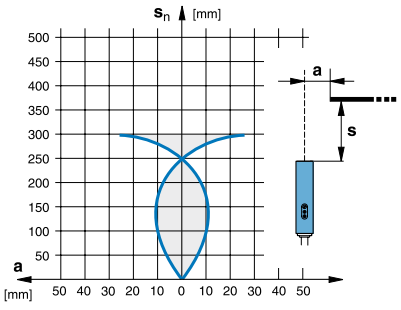
HOUSING SIZE	M12	
SENSING RANGE	**DIFFUSE SENSOR 300 mm**	**REFLEX SENSOR (POLARIZED) 1,500 mm**

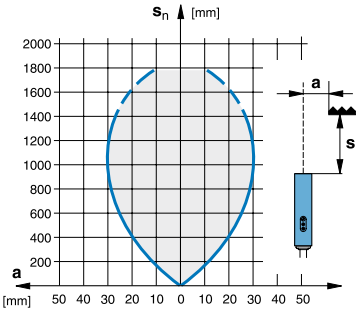
Dimensions:



* diffuse sensor only

Response curves:





TECHNICAL DATA

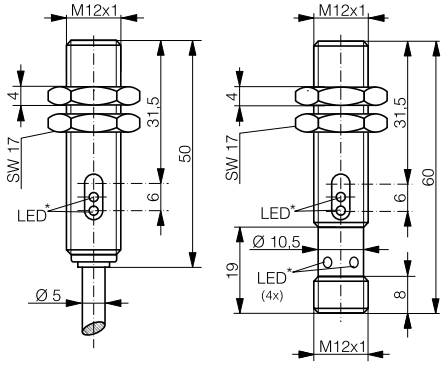
Sensing range (setting range)	300 mm (70 ... 300 mm)	1,500 mm
Standard target / reflector (page 197)	100 x 100 mm white	Reflector type 3
No-load supply current	≤ 15 mA	≤ 15 mA
Emitter	LED red 660 nm	LED red polarized 660 nm
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight (cable / connector model)	100 / 20 g	100 / 20 g

PART REFERENCES

(**bold:** preferred types)		
NPN light-ON / cable	**LTK-1120-301**	---
NPN dark-ON / cable	---	**LRK-1120-302**
NPN light-ON / connector S12	**LTS-1120-301**	---
NPN dark-ON / connector S12	---	**LRS-1120-302**
PNP light-ON / cable	**LTK-1120-303**	---
PNP dark-ON / cable	---	**LRK-1120-304**
PNP light-ON / connector S12	**LTS-1120-303**	---
PNP dark-ON / connector S12	---	**LRS-1120-304**
Compatible connectors (page 268)	G, H	G, H
Wiring (pages 198-199)	Diagram 1	Diagram 1

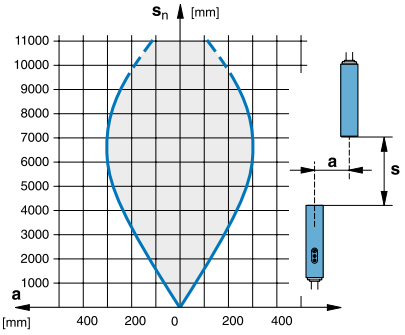
HOUSING SIZE	M12
SENSING RANGE	THROUGH-BEAM SENSOR 10,000 mm

Dimensions:



* receiver only

Response curve:



TECHNICAL DATA

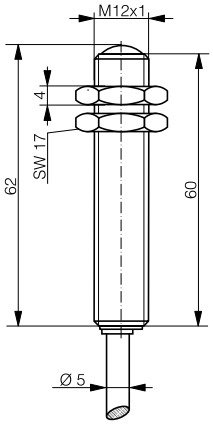
Sensing range	10,000 mm
Standard target	---
No-load supply current	≤ 15 mA (R) / ≤ 15 mA (E)
Emitter	LED red 660 nm
Approvals	CE, UL, RoHS
Weight (cable / connector model)	200 / 65 g (R and E)

PART REFERENCES

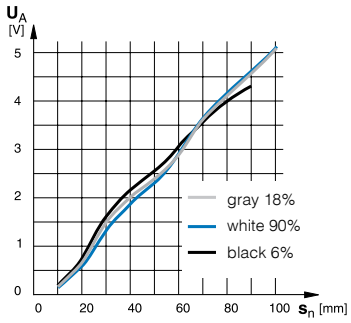
(**bold:** preferred types)	**(R)** receiver / **(E)** emitter
NPN light-ON / cable	LLK-1120-201 (R) / **LLK-1120-200 (E)**
NPN dark-ON / cable	**LLK-1120-202 (R) / LLK-1120-200 (E)**
NPN light-ON / connector S12	LLS-1120-201 (R) / **LLS-1120-200 (E)**
NPN dark-ON / connector S12	**LLS-1120-202 (R) / LLS-1120-200 (E)**
PNP light-ON / cable	LLK-1120-203 (R) / **LLK-1120-200 (E)**
PNP dark-ON / cable	**LLK-1120-204 (R) / LLK-1120-200 (E)**
PNP light-ON / connector S12	LLS-1120-203 (R) / **LLS-1120-200 (E)**
PNP dark-ON / connector S12	**LLS-1120-204 (R) / LLS-1120-200 (E)**
Compatible connectors (page 268)	M, N
Wiring (pages 198-199)	Diagram 1 (R) / 4 (E)

HOUSING SIZE	M12 WITH ANALOG OUTPUT
SENSING RANGE	DIFFUSE SENSOR 10 ... 100 mm

Dimensions:



Response curve:



TECHNICAL DATA

Sensing range	10 ... 100 mm
Standard target	100 x 100 mm white
No-load supply current	≤ 25 mA
Emitter	LED red 660 nm
Approvals	CE, RoHS
Weight	85 g

PART REFERENCES

(**bold:** preferred types)	
Analog output 0 ... 5 V	**LAK-1120-309**
Compatible connectors (page 268)	---
Wiring (pages 198-199)	Diagram 8

PHOTOELECTRIC SENSORS: LASER SERIES 1121L

- ✓ M12 **miniature laser sensors**
- ✓ **Accurate detection** of smallest targets
- ✓ **Accurate & speed-independent target detection**; response time 0.1 msec
- ✓ **Sensing range up to 50 m**
- ✓ **Easy adjustment** (due to visible red laser light)
- ✓ **Shock & vibration resistant** due to fully vacuum-potted electronics
- ✓ **Laser protection class 2**

TECHNICAL DATA

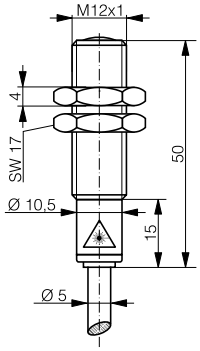
(according to IEC 60947-5-2)	
Housing material	Stainless steel V2A
Supply voltage range U_B	10 ... 36 VDC
Max. ripple content	20 %
Output current	≤ 200 mA
Output voltage drop	≤ 2.0 V at 200 mA
Max. switching frequency	5,000 Hz
Switching time (↑ and ↓)	0.1 msec
Max. ambient light:	
halogen	5,000 Lux
sun	10,000 Lux
Ambient temperature range	-10 ... +50 °C
Degree of protection	IP 67
Laser protection class	2
EMC protection:	
IEC 60947-5-2 (7.2.3.1)	1 kV
IEC 61000-4-2	Level 2
IEC 61000-4-3	Level 3
IEC 61000-4-4	Level 3
IEC 61000-4-6	Level 2
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

Rugged M12 miniature laser sensors (laser protection class 2) in metal housings with long sensing range of 50 m for accurate and speed-independent detection of smallest targets. Shock and vibration, scratch and chemically resistant with high system reserves (excess gain). Pollution monitoring (green LED) in case of reduced system reserves prevents downtime caused by pollution. Easy adjustment due to visible red laser light. Particularly suited for rough industrial environments and where space is limited:

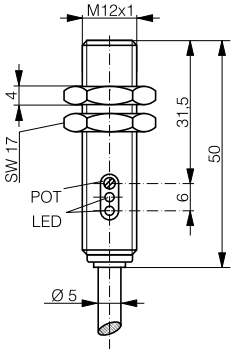
- ✓ **automation equipment**
- ✓ **special machinery**
- ✓ **handling systems**
- ✓ **machine tool industry**
- ✓ **printing industry**
- ✓ **automotive industry**

HOUSING SIZE	M12 LASER
SENSING RANGE	THROUGH-BEAM SENSOR 50,000 mm

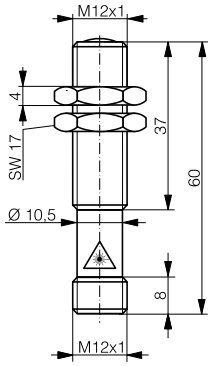
Dimensions:



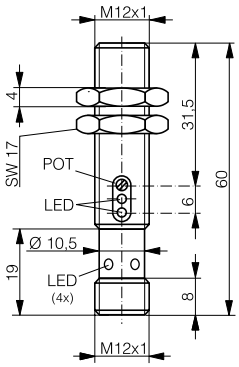
Emitter



Receiver



Emitter



Receiver

TECHNICAL DATA

Sensing range	50,000 mm
Standard target	---
No-load supply current	≤ 10 mA
Emitter	Laser red pulsed 660 nm
Approvals	CE, UL, RoHS
Weight (cable / connector model)	180 / 50 g (R and E)

PART REFERENCES

(**bold:** preferred types)	**(R)** receiver / **(E)** emitter
NPN light-ON / cable	LLK-1121L-201 (R) / **LLK-1121L-200 (E)**
NPN dark-ON / cable	**LLK-1121L-202 (R) / LLK-1121L-200 (E)**
NPN light-ON / connector S12	LLS-1121L-201 (R) / **LLS-1121L-200 (E)**
NPN dark-ON / connector S12	**LLS-1121L-202 (R) / LLS-1121L-200 (E)**
PNP light-ON / cable	LLK-1121L-203 (R) / **LLK-1121L-200 (E)**
PNP dark-ON / cable	**LLK-1121L-204 (R) / LLK-1121L-200 (E)**
PNP light-ON / connector S12	LLS-1121L-203 (R) / **LLS-1121L-200 (E)**
PNP dark-ON / connector S12	**LLS-1121L-204 (R) / LLS-1121L-200 (E)**
Compatible connectors (page 268)	M, N
Wiring (pages 198-199)	Diagram 1 (R) / 4 (E)

PHOTOELECTRIC SENSORS: SERIES 1180 & 1180W

- ✓ **Compact sensors** M18
- ✓ Models for **lateral sensing**
- ✓ Rugged **metal housing**
- ✓ **Accurate & speed-independent target detection**
- ✓ Diffuse sensors with **background suppression**
- ✓ **Shock & vibration resistant** due to fully vacuum-potted electronics
- ✓ **High system reserves** (excess gain)
- ✓ **Pre-failure warning** (pollution monitoring)
- ✓ **Easy adjustment** (due to visible red light)

TECHNICAL DATA

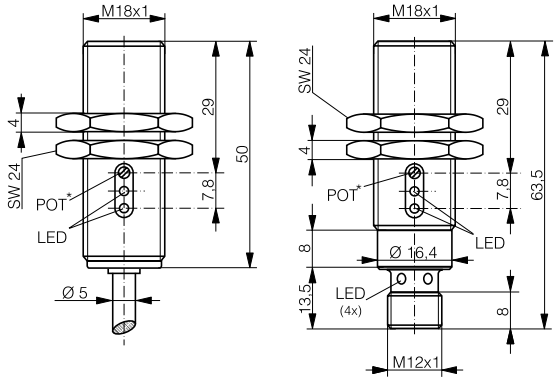
(according to IEC 60947-5-2)	
Housing material	Chrome-plated brass
Hysteresis	10 % typ.
Supply voltage range U_B	10 ... 36 VDC
Max. ripple content	20 %
Output current	≤ 200 mA
Output voltage drop	≤ 2.0 V at 200 mA
Max. switching frequency	1,000 Hz / 500 Hz (LH)
Switching time (↑ and ↓)	0.5 msec / 1 msec (LH)
Max. ambient light:	
halogen	5,000 Lux
sun	10,000 Lux
Ambient temperature range	-25 ... +55 °C
Degree of protection	IP 67
EMC protection:	
IEC 60947-5-2 (7.2.3.1)	1 kV
IEC 61000-4-2	Level 2
IEC 61000-4-3	Level 3
IEC 61000-4-4	Level 3
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

Rugged compact M18 sensors in metal housings for axial or lateral sensing and accurate as well as speed-independent target detection. Diffuse sensors with background suppression. Shock and vibration, scratch and chemically resistant with high system reserves (excess gain). Pollution monitoring (green LED) in case of reduced system reserves prevents downtime caused by pollution. Easy adjustment due to visible red light. Particularly suited for rough industrial environments and where space is limited (1180W):

- ✓ **automation equipment**
- ✓ **stock & conveyor systems**
- ✓ **special machinery**
- ✓ **machine tool industry**
- ✓ **filling systems**
- ✓ **packaging machines**
- ✓ **woodworking machines**
- ✓ **logistics automation**
- ✓ **cigarette manufacturing**
- ✓ **palletizer & wrapping machines**
- ✓ **automotive industry**

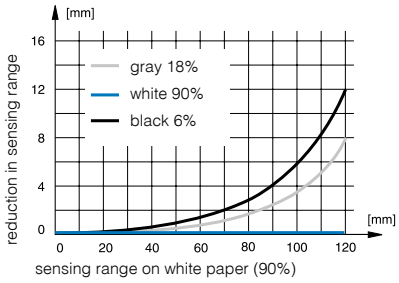
HOUSING SIZE	M18	
SENSING RANGE	DIFFUSE SENSOR WITH BACKGROUND SUPPRESSION 120 mm	REFLEX SENSOR (POLARIZED) 2,000 mm

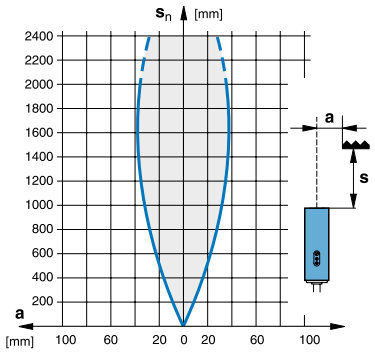
Dimensions:



*diffuse sensor with background suppression only

Response curves:





TECHNICAL DATA

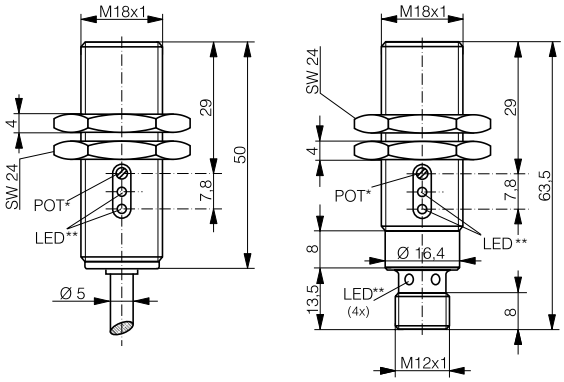
Sensing range (setting range)	120 mm (10 ... 120 mm)	2,000 mm
Standard target / reflector (page 197)	100 x 100 mm white	Reflector type 3
No-load supply current	≤ 25 mA	≤ 15 mA
Emitter	LED red 660 nm	LED red polarized 660 nm
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight (cable / connector model)	121 / 53 g	121 / 53 g

PART REFERENCES

(**bold:** preferred types)		
NPN light-ON / cable	**LHK-1180-301**	---
NPN dark-ON / cable	---	**LRK-1180-302**
NPN light-ON / connector S12	**LHS-1180-301**	---
NPN dark-ON / connector S12	---	**LRS-1180-302**
PNP light-ON / cable	**LHK-1180-303**	---
PNP dark-ON / cable	---	**LRK-1180-304**
PNP light-ON / connector S12	**LHS-1180-303**	---
PNP dark-ON / connector S12	---	**LRS-1180-304**
Compatible connectors (page 268)	G, H	G, H
Wiring (pages 198-199)	Diagram 1	Diagram 1

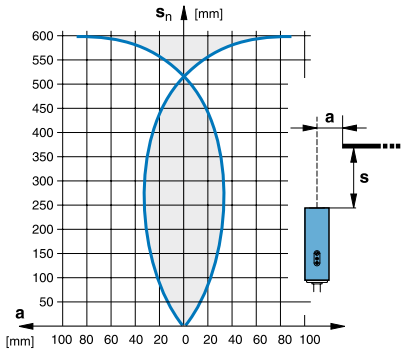
HOUSING SIZE	M18	
SENSING RANGE	**DIFFUSE SENSOR 600 mm**	**THROUGH-BEAM SENSOR 20,000 mm**

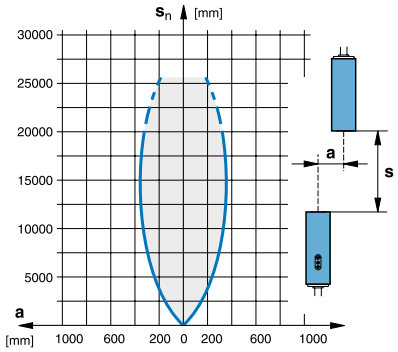
Dimensions:



* diffuse sensor only
** receiver only

Response curves:





TECHNICAL DATA

Sensing range (setting range)	600 mm (40 ... 600 mm)	20,000 mm
Standard target	200 x 200 mm white	---
No-load supply current	≤ 20 mA	≤ 10 mA (R) / ≤ 15 mA (E)
Emitter	LED red 660 nm	LED red 660 nm
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight (cable / connector model)	121 / 53 g	230 / 80 g (R and E)

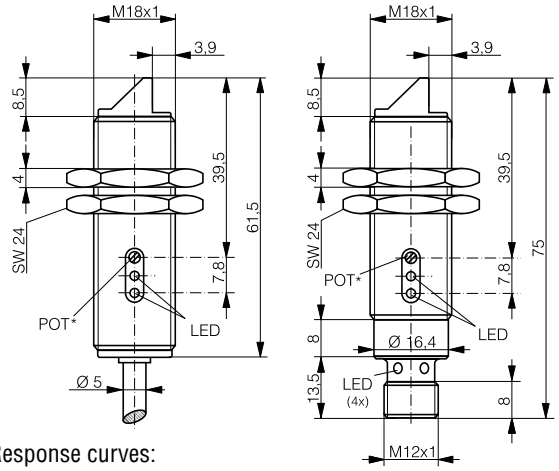
PART REFERENCES

(**bold:** preferred types)		**(R)** receiver / **(E)** emitter
NPN changeover outputs / cable	**LTK-1180-101**	**LLK-1180-001 (R) / LLK-1180-000 (E)**
NPN light-ON + excess gain / cable	LTK-1180-102	LLK-1180-002 (R) / **LLK-1180-000 (E)**
NPN changeover outputs / S12	**LTS-1180-101**	**LLS-1180-001 (R) / LLS-1180-000 (E)**
NPN light-ON + excess gain / S12	LTS-1180-102	LLS-1180-002 (R) / **LLS-1180-000 (E)**
PNP changeover outputs / cable	**LTK-1180-103**	**LLK-1180-003 (R) / LLK-1180-000 (E)**
PNP light-ON + excess gain / cable	LTK-1180-104	LLK-1180-004 (R) / **LLK-1180-000 (E)**
PNP changeover outputs / S12	**LTS-1180-103**	**LLS-1180-003 (R) / LLS-1180-000 (E)**
PNP light-ON + excess gain / S12	LTS-1180-104	LLS-1180-004 (R) / **LLS-1180-000 (E)**
Compatible connectors (page 268)	M, N	M, N
Wiring (pages 198-199)	Diagram 2	Diagram 2 (R) / 4 (E)

Detailed data sheets for these products can be found on the Contrinex website:

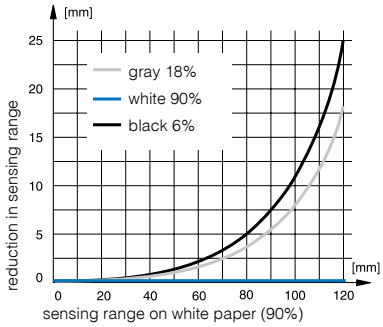
HOUSING SIZE	M18W	
SENSING RANGE	DIFFUSE SENSOR WITH BACKGROUND SUPPRESSION 120 mm	REFLEX SENSOR (POLARIZED) 2,000 mm

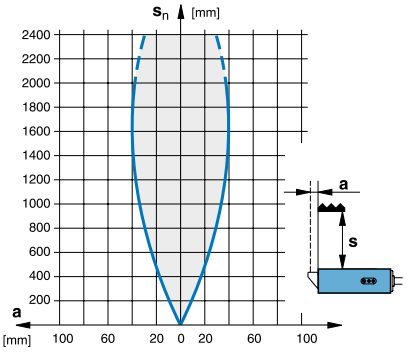
Dimensions:



*diffuse sensor with background suppression only

Response curves:





TECHNISCHE DATEN

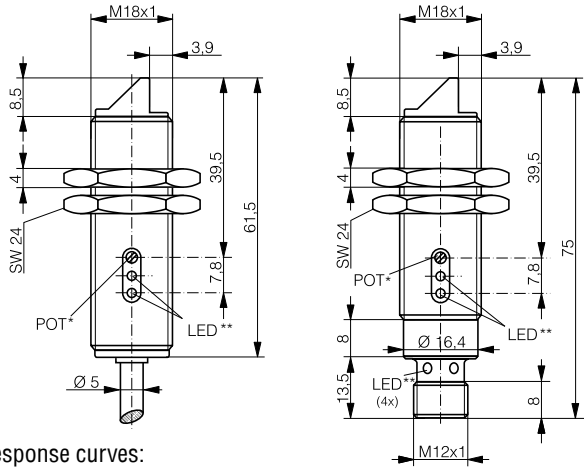
Sensing range (setting range)	120 mm (10 ... 120 mm)	2,000 mm
Standard target / reflector (page 197)	100 x 100 mm white	Reflector type 3
No-load supply current	≤ 25 mA	≤ 15 mA
Emitter	LED red 660 nm	LED red polarized 660 nm
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight (cable / connector model)	124 / 57 g	125 / 56 g

PART REFERENCES

(**bold:** preferred types)		
NPN light-ON / cable	**LHK-1180W-301**	---
NPN dark-ON / cable	---	**LRK-1180W-302**
NPN light-ON / connector S12	**LHS-1180W-301**	---
NPN dark-ON / connector S12	---	**LRS-1180W-302**
PNP light-ON / cable	**LHK-1180W-303**	---
PNP dark-ON / cable	---	**LRK-1180W-304**
PNP light-ON / connector S12	**LHS-1180W-303**	---
PNP dark-ON / connector S12	---	**LRS-1180W-304**
Compatible connectors (page 268)	G, H	G, H
Wiring (pages 198-199)	Diagram 1	Diagram 1

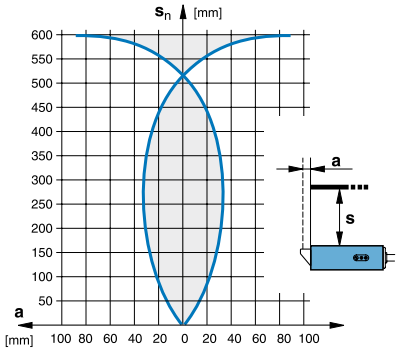
HOUSING SIZE	M18W	
SENSING RANGE	**DIFFUSE SENSOR 600 mm**	**THROUGH-BEAM SENSOR 20,000 mm**

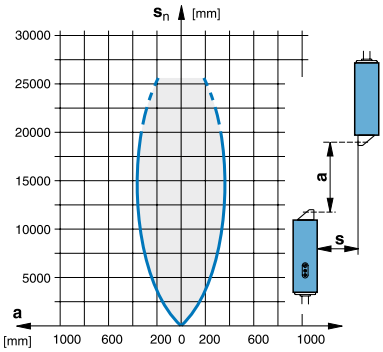
Dimensions:



* diffuse sensor only
** receiver only

Response curves:





TECHNICAL DATA

Sensing range (setting range)	600 mm (40 ... 600 mm)	20,000 mm
Standard target	200 x 200 mm white	---
No-load supply current	≤ 20 mA	≤ 10 mA (R) / ≤ 15 mA (E)
Emitter	LED red 660 nm	LED red 660 nm
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight (cable / connector model)	123 / 56 g	248 / 114 g (R and E)

PART REFERENCES

(**bold:** preferred types)		**(R)** receiver / **(E)** emitter
NPN changeover outputs / cable	**LTK-1180W-101**	**LLK-1180W-001 (R) / LLK-1180W-000 (E)**
NPN light-ON + excess gain / cable	LTK-1180W-102	LLK-1180W-002 (R) / **LLK-1180W-000 (E)**
NPN changeover outputs / S12	**LTS-1180W-101**	**LLS-1180W-001 (R) / LLS-1180W-000 (E)**
NPN light-ON + excess gain / S12	LTS-1180W-102	LLS-1180W-002 (R) / **LLS-1180W-000 (E)**
PNP changeover outputs / cable	**LTK-1180W-103**	**LLK-1180W-003 (R) / LLK-1180W-000 (E)**
PNP light-ON + excess gain / cable	LTK-1180W-104	LLK-1180W-004 (R) / **LLK-1180W-000 (E)**
PNP changeover outputs / S12	**LTS-1180W-103**	**LLS-1180W-003 (R) / LLS-1180W-000 (E)**
PNP light-ON + excess gain / S12	LTS-1180W-104	LLS-1180W-004 (R) / **LLS-1180W-000 (E)**
Compatible connectors (page 268)	M, N	M, N
Wiring (pages 198-199)	Diagram 2	Diagram 2 (R) / 4 (E)

PHOTOELECTRIC SENSORS: LASER SERIES 1180 / 1181L

- ✓ **Compact laser sensors** M18
- ✓ **Accurate detection** of smallest targets (≥ 0.1 mm)
- ✓ **Accurate & speed-independent target detection**
- ✓ Rugged **metal housing**
- ✓ **Sensing range up to 50 m**
- ✓ **Easy adjustment** (due to visible red laser light)
- ✓ **Shock & vibration resistant** due to fully vacuum-potted electronics
- ✓ **Laser protection class 2**

TECHNICAL DATA

(according to IEC 60947-5-2)	
Housing material	Stainless steel V2A
Supply voltage range U_B	10 ... 36 VDC
Max. ripple content	20 %
Output current (total of both outputs)	≤ 200 mA
Output voltage drop	≤ 2.0 V at 200 mA
Max. switching frequency	5,000 Hz* / 1,000 Hz
Switching time (↑ and ↓)	0.1 msec* / 0.5 msec
Max. ambient light:	
halogen	5,000 Lux
sun	10,000 Lux
Ambient temperature range	-10 ... +50 °C
Degree of protection	IP 67
Laser protection class	2
EMC protection:	
IEC 60947-5-2 (7.2.3.1)	1 kV
IEC 61000-4-2	Level 2
IEC 61000-4-3	Level 3
IEC 61000-4-4	Level 3
IEC 61000-4-6	Level 2
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

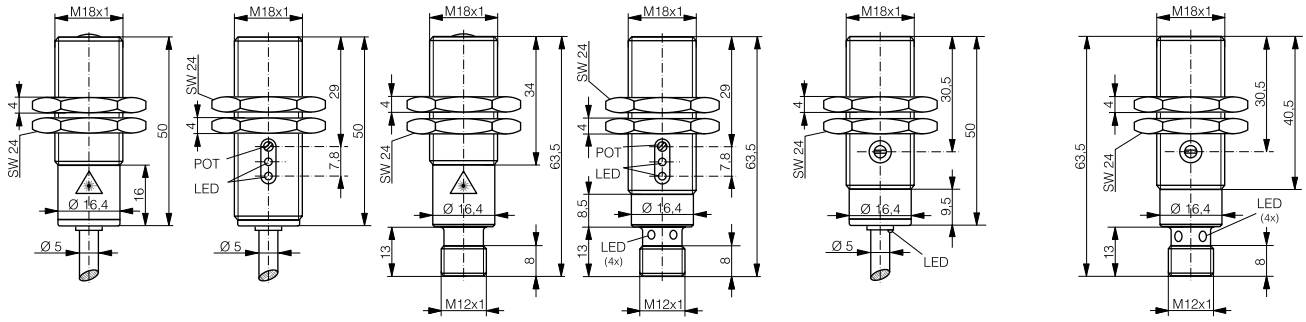
* Version -516 + through-beam sensors

Rugged compact laser sensors M18 (laser protection class 2) in metal housings with long sensing range of 50 m for accurate and speed-independent detection of smallest targets. Shock and vibration, scratch and chemically resistant with high system reserves (excess gain). Pollution monitoring (green LED) in case of reduces system reserves prevents downtime caused by pollution. Easy adjustment due to visible red laser light. Particularly suited for rough industrial environments and where space is limited:

- ✓ **automation equipment**
- ✓ **special machinery**
- ✓ fine positioning of **storage and retrieval systems**
- ✓ **waver detection** in semiconductor industry
- ✓ **edge detection**
- ✓ **cap monitoring** in packaging industry
- ✓ **printed circuit board adjustment**
- ✓ **component positioning**
- ✓ **automotive industry**

HOUSING SIZE	M18 LASER		
SENSING RANGE	**THROUGH-BEAM SENSOR 50,000 mm**	**DIFFUSE SENSOR 250 mm**	**DIFFUSE SENSOR 600 mm**

Dimensions:



Emitter | Receiver | Emitter | Receiver

TECHNICAL DATA

Sensing range (setting range)	50,000 mm	250 mm (40 ... 250 mm)	600 mm (60 ... 600 mm)
Standard target	---	100 x 100 mm white	100 x 100 mm white
No-load supply current	≤ 10 mA	≤ 20 mA	≤ 20 mA
Emitter	Laser red pulsed 660 nm	Laser red pulsed 660 nm	Laser red pulsed 660 nm
Approvals	CE, UL, RoHS	CE, UL, RoHS	CE, UL, RoHS
Weight (cable / connector model)	215 / 85 g (R and E)	96 / 63 g	96 / 63 g

PART REFERENCES

(**bold:** preferred types)	**(R)** receiver / **(E)** emitter		
NPN changeover outputs / cable	**LLK-1181L-001 (R) / LLK-1181L-000 (E)**	**LTK-1180L-101-516**	**LTK-1180L-101**
NPN light-ON + excess gain / cable	LLK-1181L-002 (R) / **LLK-1181L-000 (E)**	LTK-1180L-102-516	LTK-1180L-102
NPN changeover outputs / S12	**LLS-1181L-001 (R) / LLS-1181L-000 (E)**	**LTS-1180L-101-516**	**LTS-1180L-101**
NPN light-ON + excess gain / S12	LLS-1181L-002 (R) / **LLS-1181L-000 (E)**	LTS-1180L-102-516	LTS-1180L-102
PNP changeover outputs / cable	**LLK-1181L-003 (R) / LLK-1181L-000 (E)**	**LTK-1180L-103-516**	**LTK-1180L-103**
PNP light-ON + excess gain / cable	LLK-1181L-004 (R) / **LLK-1181L-000 (E)**	LTK-1180L-104-516	LTK-1180L-104
PNP changeover outputs / S12	**LLS-1181L-003 (R) / LLS-1181L-000 (E)**	**LTS-1180L-103-516**	**LTS-1180L-103**
PNP light-ON + excess gain / S12	LLS-1181L-004 (R) / **LLS-1181L-000 (E)**	LTS-1180L-104-516	LTS-1180L-104
Compatible connectors (page 268)	M, N	M, N	M, N
Wiring (pages 198-199)	Diagram 2 (R) / 4 (E)	Diagram 2	Diagram 2

PHOTOELECTRIC SENSORS: SERIES 3#30 & 3#31

- ✓ Complete **miniature sensor series** ⍁ 30 x 30 x 15 mm in rugged Crastin housings
- ✓ **Shock & vibration resistant** due to fully vacuum-potted electronics
- ✓ Diffuse sensors with **precise background suppression**
- ✓ **Polarizing filter** (reflex sensors)
- ✓ **High system reserves** (excess gain)
- ✓ **Pre-failure warning** (pollution monitoring)
- ✓ **Changeover outputs**
- ✓ **Analog outputs**

TECHNICAL DATA

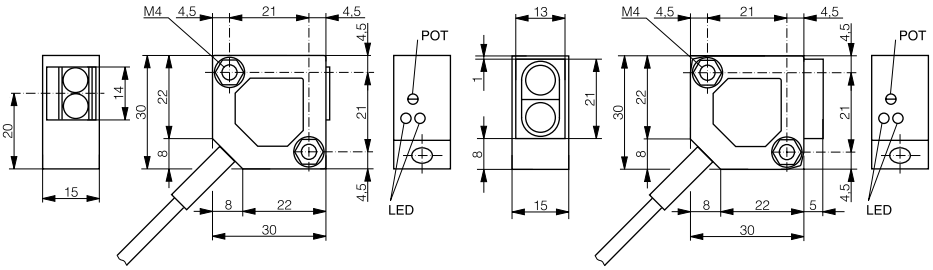
(according to IEC 60947-5-2)	
Housing material	Glass-fiber reinforced PBTP (Crastin)
Hysteresis	10 % typ. / 15% typ. (LA#-3130-119)
Supply voltage range U_B	10...36 VDC/15...36 VDC (LA#-3130-119)
Max. ripple content	≤ 20 %
Output current (total of both outputs)	≤ 200 mA / --- (LA)
Output voltage drop	≤ 2.0 V at 200 mA / --- (LA)
Max. switching frequency // Bandwidth (-3 dB)	1,000 Hz/500 Hz (LH)//500 Hz @ s=50mm (LA)
Switching time (↑ and ↓)	0.5 msec / 1 msec (LH) / --- (LA)
Max. ambient light:	
halogen	5,000 Lux
sun	10,000 Lux
Ambient temperature range	-25 ... +55 °C
Degree of protection	IP 67 / IP 65 (3031)
EMC protection:	
IEC 60947-5-2 (7.2.3.1)	5 kV
IEC 61000-4-2	Level 2 / Level 3 (3#31 + LA)
IEC 61000-4-3	Level 3
IEC 61000-4-4	Level 3
IEC 61000-4-6	Level 2 (3131 + LA)
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in / --- (LA)

Complete miniature sensor series in rugged Crastin housings ⍁ 30 x 30 x 15 mm. Shock and vibration resistant with high system reserves (excess gain) and changeover outputs. Diffuse sensors with precise background suppression or analog output as well as polarized reflex sensors. Pollution monitoring (green LED) in case of reduced system reserves (excess gain) prevents downtime caused by pollution. Particularly suited for:

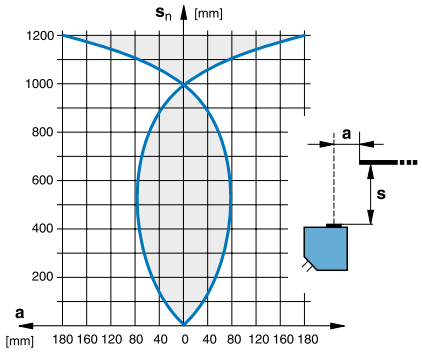
- ✓ **handling systems**
- ✓ **printing industry**
- ✓ **wrapping machines**
- ✓ **vending machines**
- ✓ **semiconductor industry**
- ✓ **electronics industry**
- ✓ **conveyor systems**
- ✓ **assembly machines**
- ✓ **inserters & sorting machines**

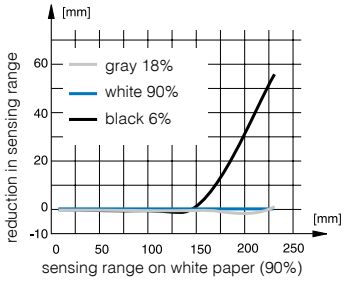
HOUSING SIZE	⌀ 30 X 30 X 15	
SENSING RANGE	DIFFUSE SENSOR 1,200 mm	DIFFUSE SENSOR WITH BACKGROUND SUPPRESSION 200 mm

Dimensions:



Response curves:





TECHNICAL DATA

Sensing range (setting range)	1,200 mm	200 mm (15 ... 200 mm)
Standard target	200 x 200 mm white	100 x 100 mm white
No-load supply current	≤ 20 mA	≤ 25 mA
Emitter	IR LED 880 nm	LED red 660 nm
Approvals	CE, UL, RoHS	CE, RoHS
Weight (cable / connector model)	75 / 17 g	75 / 17 g

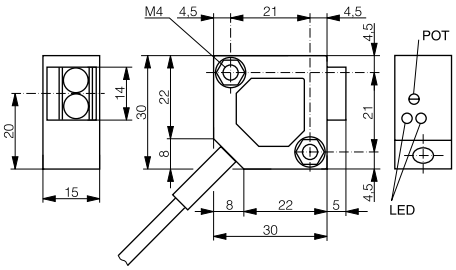
PART REFERENCES

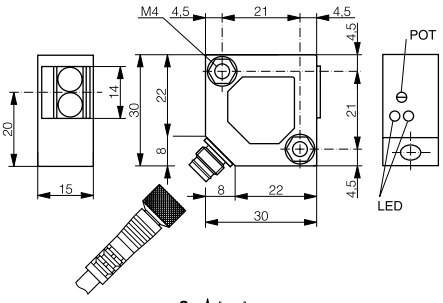
(**bold:** preferred types)		
NPN changeover outputs / cable	**LTK-3030-101**	**LHK-3130-101**
NPN light-ON + excess gain* / cable	LTK-3030-102	LHK-3130-102
NPN changeover outputs / S8	**LTS-3030-101**	**LHS-3130-101**
NPN light-ON + excess gain* / S8	LTS-3030-102	LHS-3130-102
PNP changeover outputs / cable	**LTK-3030-103**	**LHK-3130-103**
PNP light-ON + excess gain* / cable	LTK-3030-104	LHK-3130-104
PNP changeover outputs / S8	**LTS-3030-103**	**LHS-3130-103**
PNP light-ON + excess gain* / S8	LTS-3030-104	LHS-3130-104
Compatible connectors (page 268)	E, F	E, F
Wiring (pages 198-199)	Diagram 2	Diagram 2

* reception indication (for LH)

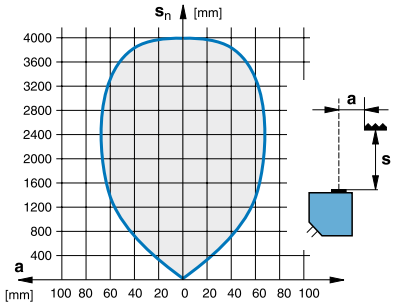
HOUSING SIZE	⌀ 30 X 30 X 15	
SENSING RANGE	**REFLEX SENSOR (POLARIZED) 4,000 mm**	**THROUGH-BEAM SENSOR 12,000 mm**

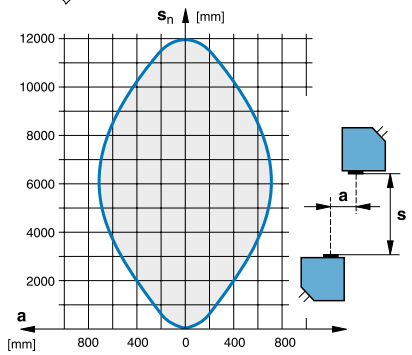
Dimensions:





Response curves:





TECHNICAL DATA

Sensing range	4,000 mm	12,000 mm
Reflector (page 197)	Reflector type 3	---
No-load supply current	≤ 20 mA	≤ 10 mA (R) / ≤ 15 mA (E)
Emitter	LED red polarized 660 nm	IR LED 880 nm
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight (cable / connector model)	80 / 18 g	150 / 34 g (R and E)

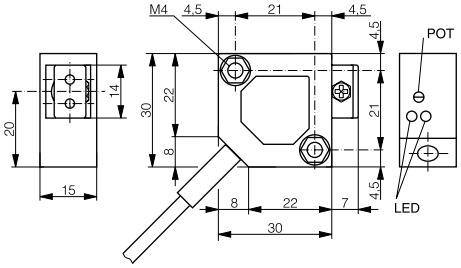
PART REFERENCES

(**bold:** preferred types)		**(R)** receiver / **(E)** emitter
NPN changeover outputs / cable	**LRK-3030-101**	**LLK-3030-001 (R) / LLK-3030-000 (E)**
NPN light-ON + excess gain / cable	LRK-3030-102	LLK-3030-002 (R) / **LLK-3030-000 (E)**
NPN changeover outputs / S8	**LRS-3030-101**	**LLS-3030-001 (R) / LLS-3030-000 (E)**
NPN light-ON + excess gain / S8	LRS-3030-102	LLS-3030-002 (R) / **LLS-3030-000 (E)**
PNP changeover outputs / cable	**LRK-3030-103**	**LLK-3030-003 (R) / LLK-3030-000 (E)**
PNP light-ON + excess gain / cable	LRK-3030-104	LLK-3030-004 (R) / **LLK-3030-000 (E)**
PNP changeover outputs / S8	**LRS-3030-103**	**LLS-3030-003 (R) / LLS-3030-000 (E)**
PNP light-ON + excess gain / S8	LRS-3030-104	LLS-3030-004 (R) / **LLS-3030-000 (E)**
Compatible connectors (page 268)	E, F	E, F
Wiring (pages 198-199)	Diagram 2	Diagram 2 (R) / 4 (E)

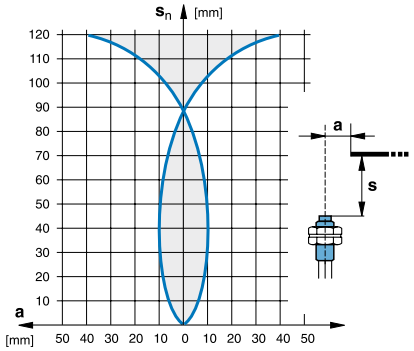
Detailed data sheets for these products can be found on the Contrinex website:

HOUSING SIZE	⧄ 30 X 30 X 15	
SENSING RANGE	FIBER-OPTIC AMPLIFIER * 120 mm	

Dimensions:



Response curve:



TECHNICAL DATA

Sensing range	120 mm (with LFP-1002-020)	
Standard target	100 x 100 mm white	
No-load supply current	≤ 20 mA	
Emitter	LED red 660 nm	
Approvals	CE, UL, RoHS	
Weight (cable / connector model)	78 / 18 g	

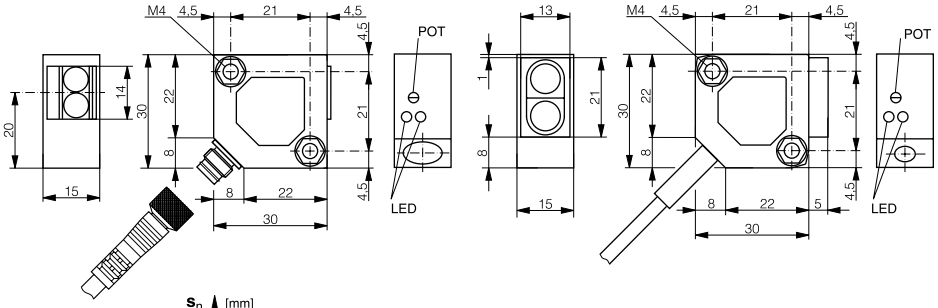
PART REFERENCES

(**bold:** preferred types)		
NPN changeover outputs / cable	**LFK-3030-101**	
NPN light-ON + excess gain / cable	LFK-3030-102	
NPN changeover outputs / S8	**LFS-3030-101**	
NPN light-ON + excess gain / S8	LFS-3030-102	
PNP changeover outputs / cable	**LFK-3030-103**	
PNP light-ON + excess gain / cable	LFK-3030-104	
PNP changeover outputs / S8	**LFS-3030-103**	
PNP light-ON + excess gain / S8	LFS-3030-104	
Compatible connectors (page 268)	E, F	
Wiring (pages 198-199)	Diagram 2	

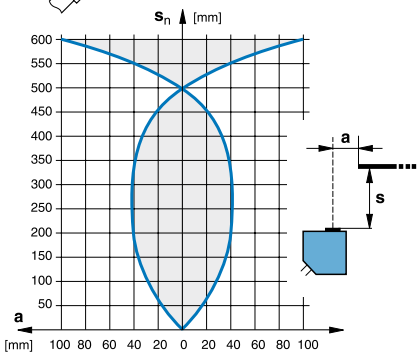
* Optical fibers (pages 200 - 219)

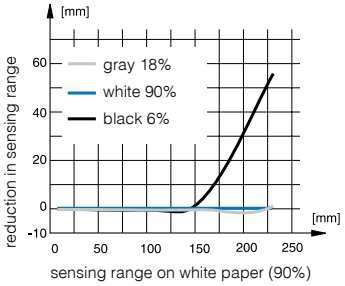
HOUSING SIZE	30 X 30 X 15	
SENSING RANGE	DIFFUSE SENSOR 600 mm	DIFFUSE SENSOR WITH BACKGROUND SUPPRESSION 200 mm

Dimensions:



Response curves:





TECHNICAL DATA

Sensing range (setting range)	600 mm	200 mm (15 ... 200 mm)
Standard target	200 x 200 mm white	100 x 100 mm white
No-load supply current	≤ 15 mA	≤ 25 mA
Emitter	IR LED 880 nm	LED red 660 nm
Approvals	CE, UL, RoHS	CE, RoHS
Weight (cable / connector model)	75 / 17 g	75 / 17 g

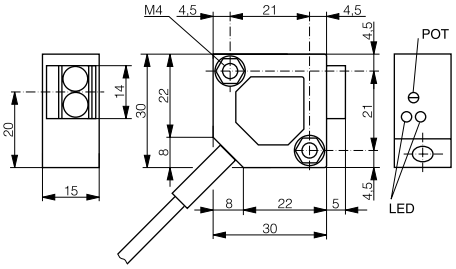
PART REFERENCES

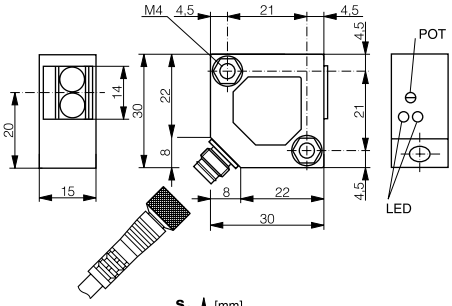
(**bold:** preferred types)		
NPN light-ON / cable	**LTK-3031-301**	**LHK-3131-301**
NPN dark-ON / cable	---	---
NPN light-ON / connector S8	**LTS-3031-301**	**LHS-3131-301**
NPN dark-ON / connector S8	---	---
PNP light-ON / cable	**LTK-3031-303**	**LHK-3131-303**
PNP dark-ON / cable	---	---
PNP light-ON / connector S8	**LTS-3031-303**	**LHS-3131-303**
PNP dark-ON / connector S8	---	---
Compatible connectors (page 268)	A, B	A, B
Wiring (pages 198-199)	Diagram 1	Diagram 1

Detailed data sheets for these products can be found on the Contrinex website:

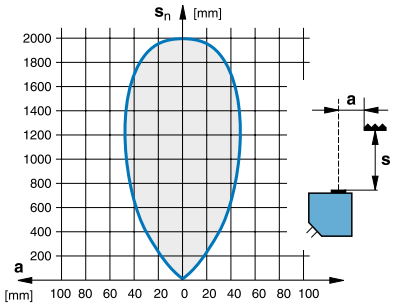
HOUSING SIZE	⌀ 30 X 30 X 15	
SENSING RANGE	**REFLEX SENSOR (POLARIZED) 2,000 mm**	**THROUGH-BEAM SENSOR 6,000 mm**

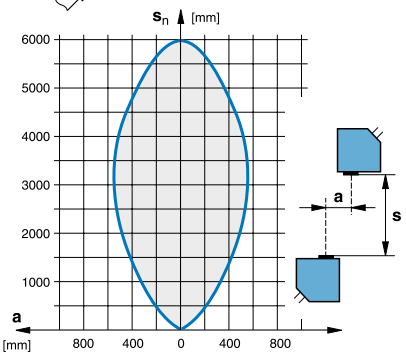
Dimensions:





Response curves:





TECHNICAL DATA

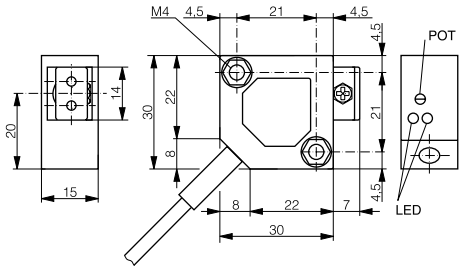
Sensing range	2,000 mm	6,000 mm
Reflector (page 197)	Reflector type 3	---
No-load supply current	≤ 15 mA	≤ 10 mA (R) / ≤ 15 mA (E)
Emitter	LED red polarized 660 nm	IR LED 880 nm
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight (cable / connector model)	80 / 18 g	150 / 34 g (R and E)

PART REFERENCES

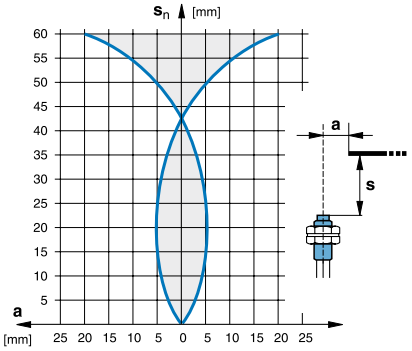
(**bold:** preferred types)		**(R)** receiver / **(E)** emitter
NPN light-ON / cable	---	---
NPN dark-ON / cable	**LRK-3031-302**	**LLK-3031-202 (R) / LLK-3031-200 (E)**
NPN light-ON / connector S8	---	---
NPN dark-ON / connector S8	**LRS-3031-302**	**LLS-3031-202 (R) / LLS-3031-200 (E)**
PNP light-ON / cable	---	---
PNP dark-ON / cable	**LRK-3031-304**	**LLK-3031-204 (R) / LLK-3031-200 (E)**
PNP light-ON / connector S8	---	---
PNP dark-ON / connector S8	**LRS-3031-304**	**LLS-3031-204 (R) / LLS-3031-200 (E)**
Compatible connectors (page 268)	A, B	A, B
Wiring (pages 198-199)	Diagram 1	Diagram 1 (R) / 4 (E)

HOUSING SIZE	⌀ 30 X 30 X 15	
SENSING RANGE	**FIBER-OPTIC AMPLIFIER * 60 mm**	

Dimensions:



Response curve:



TECHNICAL DATA

Sensing range	60 mm (with LFP-1002-020)	
Standard target	100 x 100 mm white	
No-load supply current	≤ 15 mA	
Emitter	LED red 660 nm	
Approvals	CE, UL, RoHS	
Weight (cable / connector model)	78 / 17 g	

PART REFERENCES

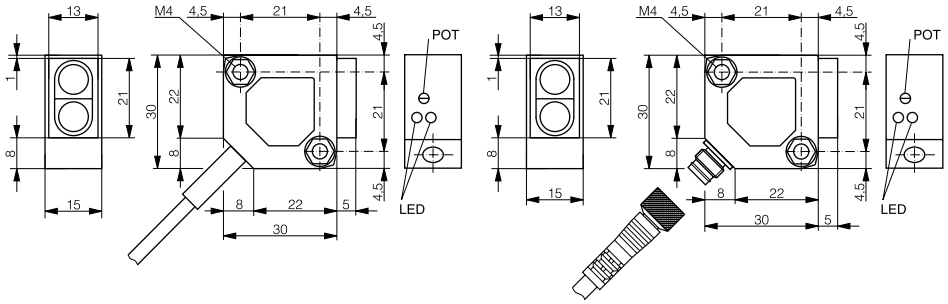
(**bold:** preferred types)		
NPN light-ON / cable	**LFK-3031-301**	
NPN dark-ON / cable	**LFK-3031-302**	
NPN light-ON / connector S8	**LFS-3031-301**	
NPN dark-ON / connector S8	**LFS-3031-302**	
PNP light-ON / cable	**LFK-3031-303**	
PNP dark-ON / cable	**LFK-3031-304**	
PNP light-ON / connector S8	**LFS-3031-303**	
PNP dark-ON / connector S8	**LFS-3031-304**	
Compatible connectors (page 268)	A, B	
Wiring (pages 198-199)	Diagram 1	

* Optical fibers (pages 200 - 219)

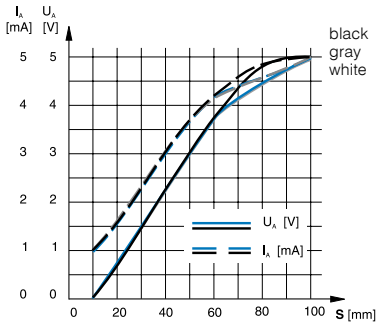
Detailed data sheets for these products can be found on the Contrinex website:

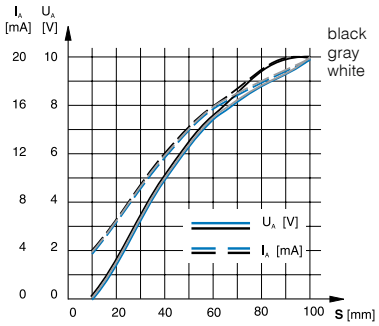
HOUSING SIZE	⌀ 30 X 30 X 15 WITH ANALOG OUTPUT	
SENSING RANGE	DIFFUSE SENSOR 10 ... 100 mm	DIFFUSE SENSOR 10 ... 100 mm

Dimensions:



Response curves:





TECHNICAL DATA

Sensing range	10 ... 100 mm	10 ... 100 mm
Standard target	100 x 100 mm white	100 x 100 mm white
No-load supply current	≤ 25 mA	≤ 25 mA
Emitter	LED red 660 nm	LED red 660 nm
Voltage output	0 ... 5 V	0 ... 10 V
Current output	1 ... 5 mA	4 ... 20 mA
Approvals	CE, RoHS	CE, RoHS
Weight (cable / connector model)	75 / 17 g	75 / 17 g

PART REFERENCES

(**bold:** preferred types)		
Voltage and current outputs / cable	**LAK-3130-109**	**LAK-3130-119**
Voltage and current outputs / S8	**LAS-3130-109**	**LAS-3130-119**
Compatible connectors (page 268)	E, F	E, F
Wiring (pages 198-199)	Diagram 9	Diagram 9

PHOTOELECTRIC SENSORS: SERIES 4040

- ✓ **Compact sensor series** ⍁ 40 x 40 x 19 mm in rugged Crastin housings
- ✓ **Shock & vibration resistant** due to fully vacuum-potted electronics
- ✓ **Polarizing filter** (reflex sensors)
- ✓ **High system reserves** (excess gain)
- ✓ **Pre-failure warning** (pollution monitoring)
- ✓ **Changeover outputs**
- ✓ **Glass-fiber optic amplifier** (temperatures up to +250 °C)

TECHNICAL DATA

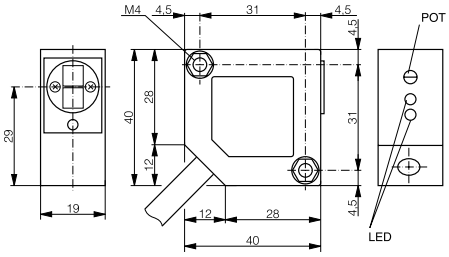
(according to IEC 60947-5-2)	
Housing material	Glass-fiber reinforced PBTP (Crastin)
Hysteresis	10 % typ.
Supply voltage range U_B	10 ... 36 VDC
Max. ripple content	≤ 20 %
Output current (total of both outputs)	≤ 200 mA
Output voltage drop	≤ 2.0 V at 200 mA
Max. switching frequency	1,000 Hz
Switching time (↑ and ↓)	0.5 msec
Max. ambient light:	
halogen	5,000 Lux
sun	10,000 Lux
Ambient temperature range	-25 ... +55 °C
Degree of protection	IP 67
EMC protection:	
IEC 60947-5-2 (7.2.3.1)	5 kV
IEC 61000-4-2	Level 2
IEC 61000-4-3	Level 3
IEC 61000-4-4	Level 3
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

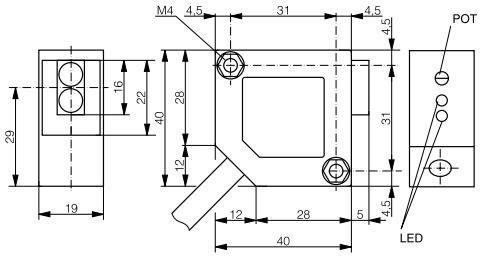
Compact sensor series in rugged Crastin housings ⍁ 40 x 40 x 19 mm. Shock and vibration resistant with high system reserves (excess gain) and changeover outputs. Glass-fiber optic amplifier for ambient temperatures up to +250 °C as well as polarized reflex sensors. Pollution monitoring (green LED) in case of reduced system reserves (excess gain) prevents downtime caused by pollution. Particularly suited for

- ✓ **wrapping machines**
- ✓ **machine tool industry**
- ✓ **filling systems**
- ✓ **elevator industry**
- ✓ **stock & conveyor systems**

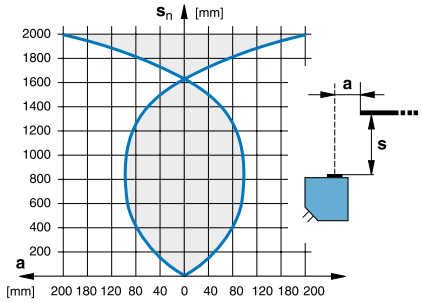
HOUSING SIZE	⌀ 40 X 40 X 19	
SENSING RANGE	**DIFFUSE SENSOR 2,000 mm**	**REFLEX SENSOR (POLARIZED) 6,000 mm**

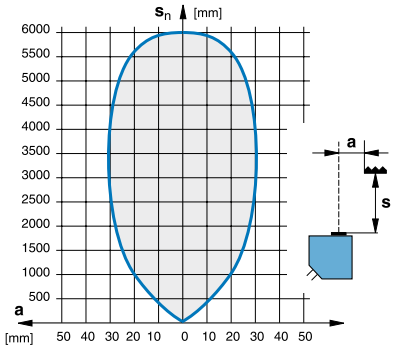
Dimensions:





Response curves:





TECHNICAL DATA

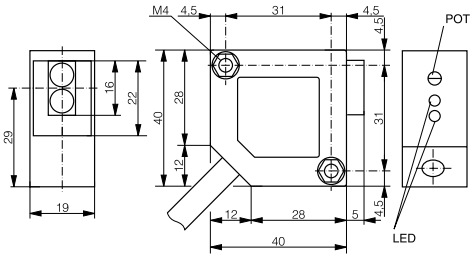
Sensing range	2,000 mm	6,000 mm
Standard target / reflector (page 197)	400 x 400 mm white	Reflector type 3
No-load supply current	≤ 25 mA	≤ 20 mA
Emitter	IR LED 880 nm	LED red polarized 660 nm
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight (cable / connector model)	90 / 35 g	90 / 35 g

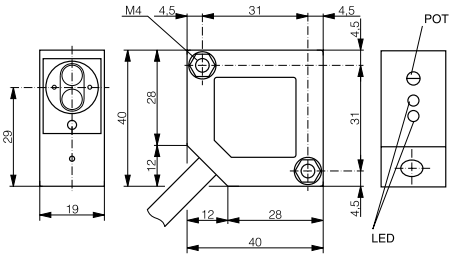
PART REFERENCES

(**bold:** preferred types)		
NPN changeover outputs / cable	**LTK-4040-101**	**LRK-4040-101**
NPN light-ON + excess gain / cable	LTK-4040-102	LRK-4040-102
NPN changeover outputs / S8	**LTS-4040-101**	**LRS-4040-101**
NPN light-ON + excess gain / S8	LTS-4040-102	LRS-4040-102
PNP changeover outputs / cable	**LTK-4040-103**	**LRK-4040-103**
PNP light-ON + excess gain / cable	LTK-4040-104	LRK-4040-104
PNP changeover outputs / S8	**LTS-4040-103**	**LRS-4040-103**
PNP light-ON + excess gain / S8	LTS-4040-104	LRS-4040-104
Compatible connectors (page 268)	E, F	E, F
Wiring (pages 198-199)	Diagram 2	Diagram 2

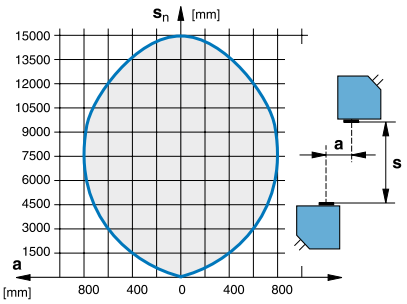
HOUSING SIZE	⧄ 40 X 40 X 19	
SENSING RANGE	**THROUGH-BEAM SENSOR 15,000 mm**	**FIBER-OPTIC AMPLIFIER * 150 mm**

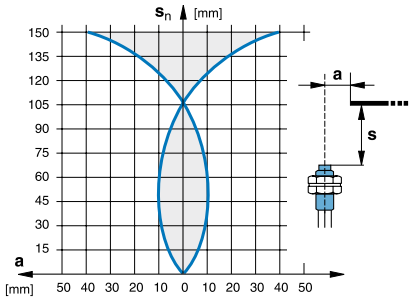
Dimensions:





Response curves:





TECHNICAL DATA

Sensing range	15,000 mm	150 mm (with LFG-1030-050)
Standard target	---	100 x 100 mm white
No-load supply current	≤ 10 mA (R) / ≤ 15 mA (E)	≤ 20 mA
Emitter	IR LED 880 nm	IR LED 880 nm
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight (cable / connector model)	190 / 70 g (R and E)	95 / 35 g

PART REFERENCES

(**bold:** preferred types)	**(R)** receiver / **(E)** emitter	
NPN changeover outputs / cable	**LLK-4040-001 (R) / LLK-4040-000 (E)**	**LFK-4040-101**
NPN light-ON + excess gain / cable	LLK-4040-002 (R) / LLK-4040-000 (E)	LFK-4040-102
NPN changeover outputs / S8	**LLS-4040-001 (R) / LLS-4040-000 (E)**	**LFS-4040-101**
NPN light-ON + excess gain / S8	LLS-4040-002 (R) / LLS-4040-000 (E)	LFS-4040-102
PNP changeover outputs / cable	**LLK-4040-003 (R) / LLK-4040-000 (E)**	**LFK-4040-103**
PNP light-ON + excess gain / cable	LLK-4040-004 (R) / LLK-4040-000 (E)	LFK-4040-104
PNP changeover outputs / S8	**LLS-4040-003 (R) / LLS-4040-000 (E)**	**LFS-4040-103**
PNP light-ON + excess gain / S8	LLS-4040-004 (R) / LLS-4040-000 (E)	LFS-4040-104
Compatible connectors (page 268)	E, F	E, F
Wiring (pages 198-199)	Diagram 2 (R) / 4 (E)	Diagram 2

* Optical fibers (pages 200 - 219)

Detailed data sheets for these products can be found on the Contrinex website:

PHOTOELECTRIC SENSORS: SERIES 4050

- ✓ Complete **compact sensor series** ⍁ 40 x 50 x 15 mm for peak performance
- ✓ Diffuse sensors with **precise background suppression**
- ✓ **High system reserves** (excess gain)
- ✓ **Pre-failure warning** (pollution monitoring)
- ✓ **Easy adjustment** (due to visible red light)
- ✓ **Adjustable connector**
- ✓ **Sensing face of glass or coated plastic**
- ✓ **Insensitive to ambient light**

TECHNICAL DATA

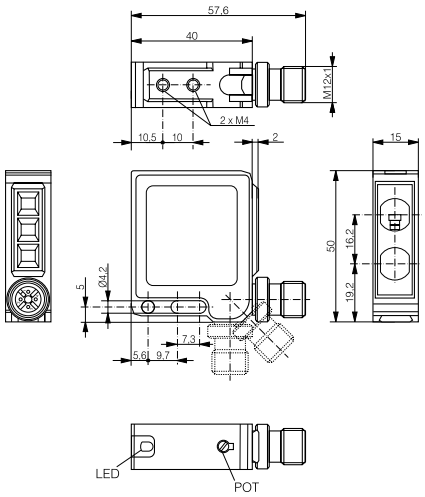
(according to IEC 60947-5-2)	
Housing material	Glass-fiber reinforced PBTP
Hysteresis	≤ 10 % s_n
Supply voltage range U_B	10 ... 36 VDC
Max. ripple content	≤ 20 %
Output current	≤ 200 mA
Output voltage drop	≤ 2.0 V at 200 mA
Max. switching frequency	1,500 Hz / 500 Hz (LH)
Switching time (↑ and ↓)	0.5 msec / 1 msec (LH)
Max. ambient light:	
halogen	5,000 Lux
sun	10,000 Lux
Ambient temperature range	-5 ... +55 °C
Degree of protection	IP 67
EMC protection:	
IEC 60947-5-2 (7.2.3.1)	5 kV
IEC 61000-4-2	Level 2
IEC 61000-4-3	Level 3
IEC 61000-4-4	Level 3
IEC 61000-4-6	Level 2
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

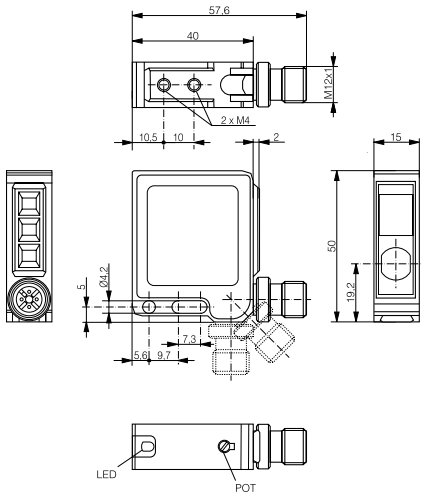
Complete compact sensor series for peak performace in standard housings ⍁ 40 x 50 x 15 mm with adjustable connector and sensing face made of glass or coated plastic. Diffuse sensors with precise background suppression as well as polarized and non-polarized reflex sensors. High system reserves (excess gain) and insensitive to ambient light. Pollution monitoring (green LED) in case of reduced system reserves (excess gain) prevents downtime caused by pollution. Particularly suited for

- ✓ **wrapping machines**
- ✓ **food & tobacco industry**
- ✓ **filling systems**
- ✓ **special machinery**
- ✓ **automation equipment**
- ✓ **machine tool industry**
- ✓ **woodworking & processing industry**

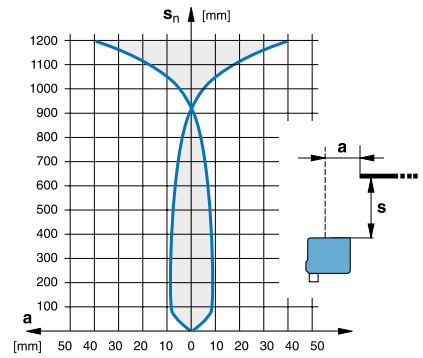
HOUSING SIZE	Ø 40 X 50 X 15	
SENSING RANGE	DIFFUSE SENSOR 1,200 mm	DIFFUSE SENSOR WITH BACKGROUND SUPPRESSION 500 mm

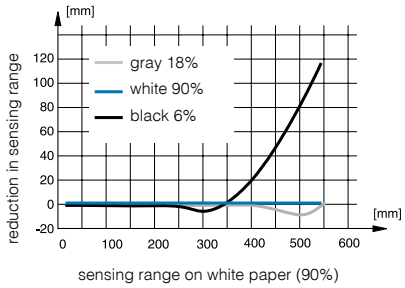
Dimensions:





Response curves:





TECHNICAL DATA

Sensing range (setting range)	1,200 mm (30 ... 1,200 mm)	500 mm (30 ... 500 mm)
Standard target	200 x 200 mm white	100 x 100 mm white
No-load supply current	≤ 25 mA	≤ 30 mA
Emitter	LED red 640 nm	LED red 660 nm
Approvals	CE, RoHS	CE, RoHS
Weight	17 g	17 g

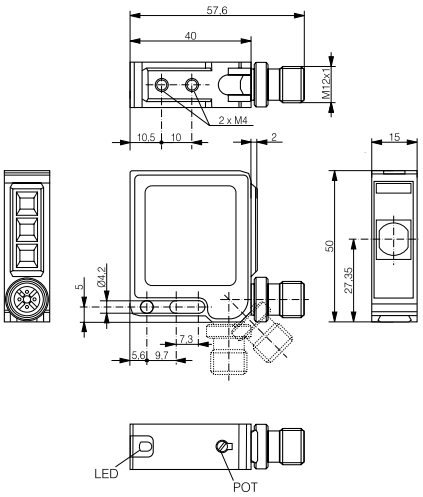
PART REFERENCES

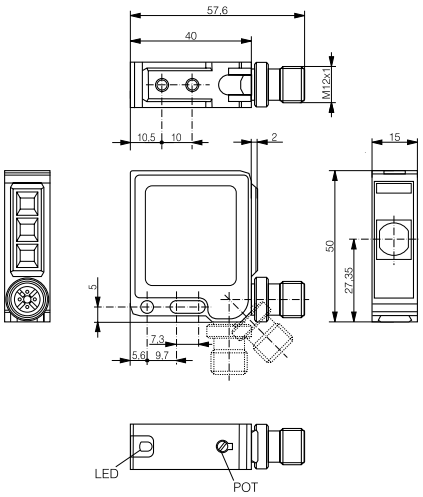
Sensing face	Glass	Coated plastic	Glass	Coated plastic
NPN changeover outputs / cable				
NPN light-ON + excess gain* / cable				
NPN changeover outputs / S12	**LTS-4050-101**	**LTS-4150-101**	**LHS-4050-101**	**LHS-4150-101**
NPN light-ON + excess gain* / S12	LTS-4050-102	LTS-4150-102	LHS-4050-102	LHS-4150-102
PNP changeover outputs / cable				
PNP light-ON + excess gain* / cable				
PNP changeover outputs / S12	**LTS-4050-103**	**LTS-4150-103**	**LHS-4050-103**	**LHS-4150-103**
PNP light-ON + excess gain* / S12	LTS-4050-104	LTS-4150-104	LHS-4050-104	LHS-4150-104
Compatible connectors (page 268)	M, N	M, N	M, N	M, N
Wiring (pages 198-199)	Diagram 2	Diagram 2	Diagram 2	Diagram 2

(**bold:** preferred types) * Reception indication (for LH)

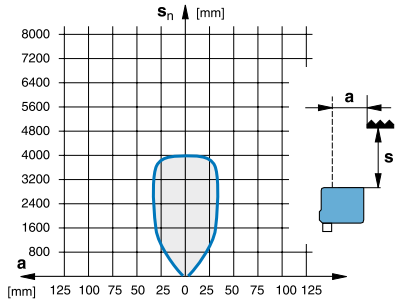
HOUSING SIZE	⌀ 40 X 50 X 15	
SENSING RANGE	**REFLEX SENSOR (POLARIZED) 4,000 mm**	**REFLEX SENSOR (NON-POLARIZED) 8,000 mm**

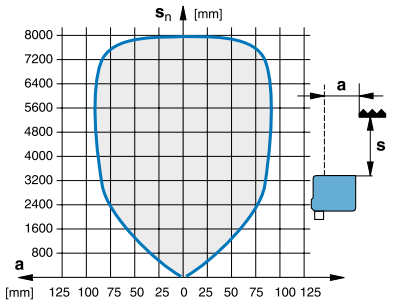
Dimensions:





Response curves::





TECHNICAL DATA

Sensing range	4,000 mm	8,000 mm
Reflector (page 197)	Reflector type 3	Reflector type 3
No-load supply current	≤ 20 mA	≤ 25 mA
Emitter	LED red polarized 680 nm	LED red 680 nm
Approvals	CE, RoHS	CE, RoHS
Weight	17 g	17 g

PART REFERENCES

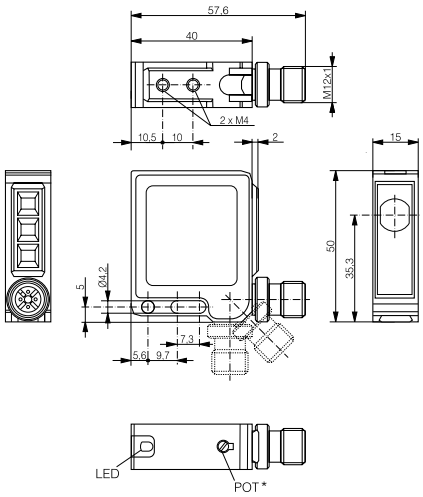
Sensing face	Glass	Coated plastic	Glass	Coated plastic
NPN changeover outputs / cable				
NPN light-ON + excess gain / cable				
NPN changeover outputs / S12	**LRS-4050-101**	**LRS-4150-101**	**LRS-4050-101-501**	**LRS-4150-101-501**
NPN light-ON + excess gain / S12	LRS-4050-102	LRS-4150-102	LRS-4050-102-501	LRS-4150-102-501
PNP changeover outputs / cable				
PNP light-ON + excess gain / cable				
PNP changeover outputs / S12	**LRS-4050-103**	**LRS-4150-103**	**LRS-4050-103-501**	**LRS-4150-103-501**
PNP light-ON + excess gain / S12	LRS-4050-104	LRS-4150-104	LRS-4050-104-501	LRS-4150-104-501
Compatible connectors (page 268)	M, N	M, N	M, N	M, N
Wiring (pages 198-199)	Diagram 2	Diagram 2	Diagram 2	Diagram 2

(**bold:** preferred types)

Detailed data sheets for these products can be found on the Contrinex website:

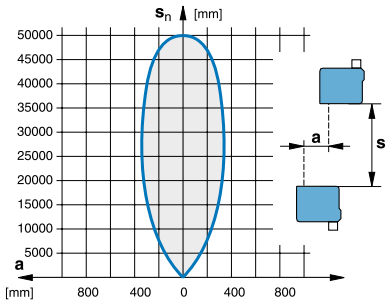
HOUSING SIZE	Ø 40 X 50 X 15	
SENSING RANGE	**THROUGH-BEAM SENSOR 50,000 mm**	**THROUGH-BEAM SENSOR 50,000 mm**

Dimensions:



* receiver only

Response curves::



TECHNICAL DATA

Sensing range	50,000 mm	50,000 mm
Standard target	---	---
No-load supply current	≤ 15 mA (R) / ≤ 15 mA (E)	≤ 15 mA (R) / ≤ 15 mA (E)
Emitter	LED red 640 nm	LED red 640 nm
Approvals	CE, RoHS	CE, RoHS
Weight	34 g (R and E)	34 g (R and E)

PART REFERENCES

Sensing face	Glass	Coated plastic
NPN changeover outputs / cable		
NPN light-ON + excess gain / cable		
NPN changeover outputs / S12	**LLS-4050-001 (R) / LLS-4050-000 (E)**	**LLS-4150-001 (R) / LLS-4150-000 (E)**
NPN light-ON + excess gain / S12	LLS-4050-002 (R) / LLS-4050-000 (E)	LLS-4150-002 (R) / LLS-4150-000 (E)
PNP changeover outputs / cable		
PNP light-ON + excess gain / cable		
PNP changeover outputs / S12	**LLS-4050-003 (R) / LLS-4050-000 (E)**	**LLS-4150-003 (R) / LLS-4150-000 (E)**
PNP light-ON + excess gain / S12	LLS-4050-004 (R) / LLS-4050-000 (E)	LLS-4150-004 (R) / LLS-4150-000 (E)
Compatible connectors (page 268)	M, N	M, N
Wiring (pages 198-199)	Diagram 2 (R) / 4 (E)	Diagram 2 (R) / 4 (E)

(**bold:** preferred types) **(R)** Receiver / **(E)** Emitter

PHOTOELECTRIC SENSORS: COLOR SENSOR SERIES 4050

- ✓ **Compact color sensor** ⍁ 40 x 50 x 15 mm
- ✓ Recognition of **3 different teachable shades of color**
- ✓ **Tolerance selection** for recognition of desired **color variation**
- ✓ **Distance-independent color recognition**
- ✓ **Speed-independent color recognition**
- ✓ **Adjustable connector**
- ✓ **Sensing face of glass or coated plastic**
- ✓ **Insensitive to ambient light**

TECHNICAL DATA

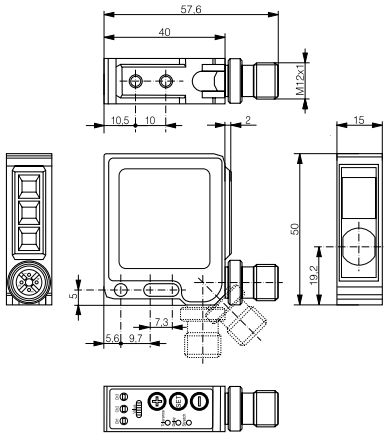
(according to IEC 60947-5-2)	
Housing material	Glass-fiber reinforced PBTP
Average positioning tolerance (tol. 3)	± 5 mm
Beam diameter at 35 mm	4 mm
Supply voltage range U_B	10 ... 30 VDC
Max. ripple content	≤ 20 %
Output current	≤ 200 mA
Output voltage drop	≤ 2.0 V at 200 mA
Max. switching frequency	4 kHz (tol. 3, 4, 5) / 1.25 kHz (tol. 1, 2)
Switching time (↑ and ↓)	200 µsec (tol. 3, 4 ,5) / 400 µsec (tol. 1, 2)
Max. ambient light:	
halogen	5,000 Lux
sun	10,000 Lux
Ambient temperature range	-5 ... +55 °C
Degree of protection	IP 67
EMC protection:	
IEC 60947-5-2 (7.2.3.1)	5 kV
IEC 61000-4-2	Level 2
IEC 61000-4-3	Level 3
IEC 61000-4-4	Level 3
IEC 61000-4-6	Level 2
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

Compact color sensor for the recognition and selection of 3 different teachable shades of color in standard housing ⍁ 40 x 50 x 15 mm with adjustable connector and sensing face made of glass or coated plastic. Recognizes or ignores smallest color differences depending on requirements, due to 5 tolerance levels for each shade of color. Color recognition independent of distance and speed. Particularly suited for

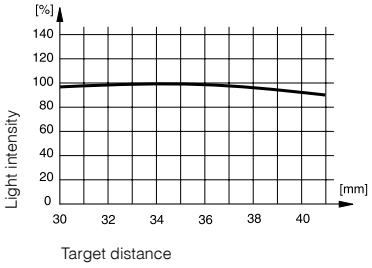
- ✓ **packaging industry**
- ✓ **printing industry**
- ✓ **quality control** of manufacturing processes
- ✓ **sorting processes** in manufacturing industry
- ✓ **food & tobacco industry**
- ✓ **wood processing machines** (furniture industry)

HOUSING SIZE	⌀ 40 X 50 X 15	
OPERATING RANGE	COLOR SENSOR (DIFFUSE) 30 ... 40 mm	COLOR SENSOR (DIFFUSE) 30 ... 40 mm

Dimensions:



Response curve:



TECHNICAL DATA

Operating range	30 ... 40 mm	30 ... 40 mm
No-load supply current (at 24 V)	≤ 35 mA	≤ 35 mA
Emitter	LED white	LED white
Approvals	CE, RoHS	CE, RoHS
Weight	35 g	35 g

PART REFERENCES

Sensing face	Glass	Coated plastic
3 x NPN light-ON / teach-in / S12	**FTS-4055-301**	**FTS-4155-301**
3 x PNP light-ON / teach-in / S12	**FTS-4055-303**	**FTS-4155-303**
Compatible connectors (page 268)	O, P	O, P
Wiring (pages 198-199)	Diagram 10	Diagram 10

(**bold:** preferred types)

PHOTOELECTRIC SENSORS: SERIES 5050

- ✓ Sensor series in **standard housings** ⍁ 50 x 50 x 18 mm
- ✓ **Designed to cost**
- ✓ **Sensing face of PMMA**
- ✓ **Polarizing filter** (reflex sensors)
- ✓ **High system reserves** (excess gain)
- ✓ **Pre-failure warning** (pollution monitoring)
- ✓ **Changeover outputs**
- ✓ **AC/DC models**

TECHNICAL DATA

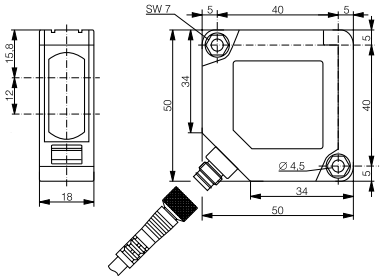
(according to IEC 60947-5-2)	
Housing material	ABS
Hysteresis	10 % typ.
Supply voltage range U_B (DC)	10 ... 36 VDC
Supply voltage range U_B (AC/DC)	20 ... 250 VAC / 20 ... 300 VDC
Max. ripple content (DC)	≤ 20 %
Output current (total of both outputs/DC)	≤ 200 mA
Output voltage drop (DC)	≤ 2.0 V at 200 mA
Max. switching frequency	1,000 Hz (DC) / 50 Hz (AC/DC)
Switching time (↑ and ↓)	0.5 msec (DC) / 10 msec (AC/DC)
Max. ambient light:	
halogen	5,000 Lux
sun	10,000 Lux
Ambient temperature range	-5 ... +55 °C
Degree of protection	IP 65
EMC protection:	
IEC 60947-5-2 (7.2.3.1)	5 kV
IEC 61000-4-2	Level 2
IEC 61000-4-3	Level 3
IEC 61000-4-4	Level 3
IEC 61000-4-6	Level 2
Short-circuit protection	Built-in (DC)
Polarity reversal protection	Built-in (DC)
Power-on reset	Built-in (DC)

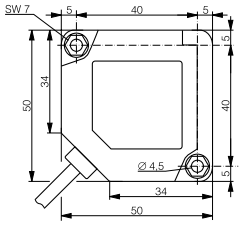
Sensor series in standard housings ⍁ 50 x 50 x 18 mm. High system reserves (excess gain), changeover outputs, AC/DC models and polarized reflex sensors. Pollution monitoring (green LED) in case of reduced system reserves prevents downtime caused by pollution. Particularly suited for

- ✓ **packaging machines**
- ✓ **machine tool industry**
- ✓ **filling systems**
- ✓ **elevator industry**
- ✓ **stock & conveyor systems**

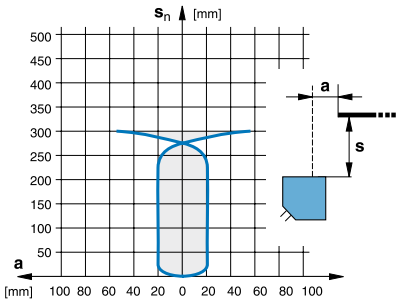
HOUSING SIZE	⌀ 50 X 50 X 18	
SENSING RANGE	DIFFUSE SENSOR 300 mm	DIFFUSE SENSOR 800 mm

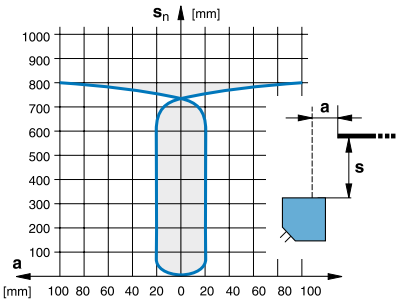
Dimensions:





Response curves:





TECHNICAL DATA

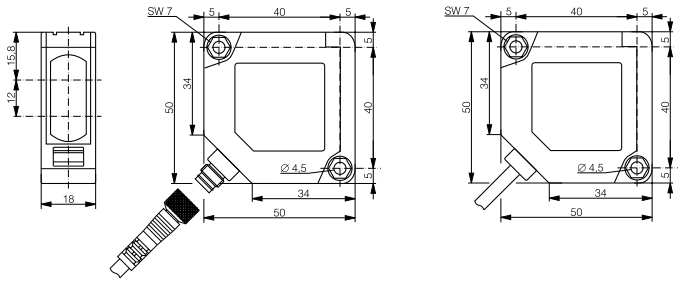
Sensing range	300 mm	800 mm
Standard target	100 x 100 mm white	200 x 200 mm white
No-load supply current (DC)	≤ 15 mA	≤ 15 mA
Emitter	LED red 648 nm	LED red 648 nm
Approvals	CE, RoHS	CE, RoHS
Weight (cable / connector model)	95 / 30 g	95 / 30 g

PART REFERENCES

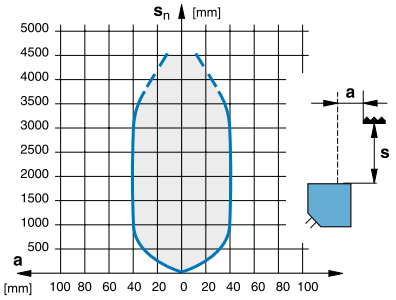
(**bold:** preferred types)		
DC NPN changeover outputs / cable	**LTK-5050-101-501**	**LTK-5050-101**
DC NPN light-ON + excess gain/cable	LTK-5050-102-501	LTK-5050-102
DC NPN changeover outputs / S8	**LTS-5050-101-501**	**LTS-5050-101**
DC NPN light-ON + excess gain / S8	LTS-5050-102-501	LTS-5050-102
DC PNP changeover outputs / cable	**LTK-5050-103-501**	**LTK-5050-103**
DC PNP light-ON + excess gain/cable	LTK-5050-104-501	LTK-5050-104
DC PNP changeover outputs / S8	**LTS-5050-103-501**	**LTS-5050-103**
DC PNP light-ON + excess gain / S8	LTS-5050-104-501	LTS-5050-104
AC/DC relay light-ON / cable	**LTK-5050-115-501**	**LTK-5050-115**
Compatible connectors (page 268)	E, F	E, F
Wiring (pages 198-199)	Diagram 2 (DC) / Diagram 5 (AC/DC)	Diagram 2 (DC) / Diagram 5 (AC/DC)

HOUSING SIZE	50 X 50 X 18	
SENSING RANGE	REFLEX SENSOR (POLARIZED) 4,000 mm	

Dimensions:



Response curve:



TECHNICAL DATA

Sensing range	4,000 mm	
Reflector (page 197)	Reflector type 3*	
No-load supply current (DC)	≤ 15 mA	
Emitter	LED red polarized 660 nm	
Approvals	CE, RoHS	
Weight (cable / connector model)	90 / 35 g	

PART REFERENCES

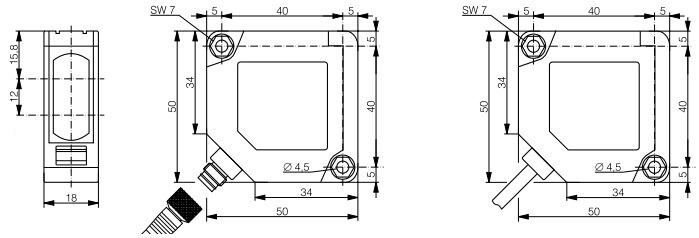
(**bold:** preferred types)		
DC NPN changeover outputs / cable	**LRK-5050-101**	
DC NPN light-ON + excess gain/cable	LRK-5050-102	
DC NPN changeover outputs / S8	**LRS-5050-101**	
DC NPN light-ON + excess gain / S8	LRS-5050-102	
DC PNP changeover outputs / cable	**LRK-5050-103**	
DC PNP light-ON + excess gain/cable	LRK-5050-104	
DC PNP changeover outputs / S8	**LRS-5050-103**	
DC PNP light-ON + excess gain / S8	LRS-5050-104	
AC/DC relay light-ON / cable	**LRK-5050-115**	
Compatible connectors (page 268)	E, F	
Wiring (pages 198-199)	Diagram 2 (DC) / Diagram 5 (AC/DC)	

* 3,000 mm sensing range with reflector type 15

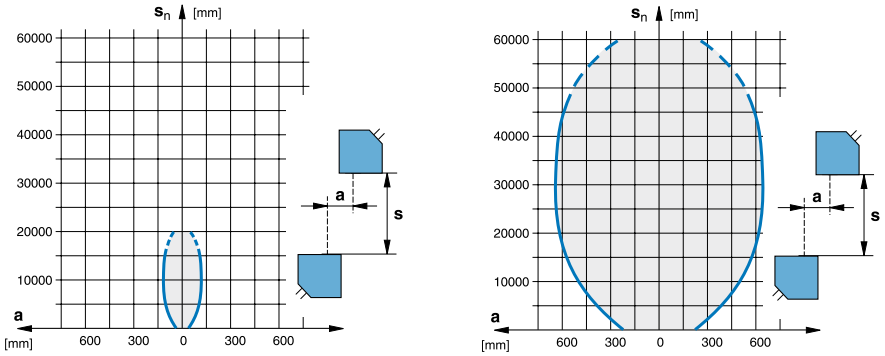
Detailed data sheets for these products can be found on the Contrinex website:

HOUSING SIZE	⌀ 50 X 50 X 18	
SENSING RANGE	**THROUGH-BEAM SENSOR 15,000 mm**	**THROUGH-BEAM SENSOR 50,000 mm**

Dimensions:



Response curves:



TECHNICAL DATA

Sensing range	15,000 mm	50,000 mm
Standard target	---	---
No-load supply current (DC)	≤ 10 mA (R) / ≤ 10 mA (E)	≤ 10 mA (R) / ≤ 10 mA (E)
Emitter	LED red 660 nm	IR LED 880 nm
Approvals	CE, RoHS	CE, RoHS
Weight (cable / connector model)	190 / 60 g (R and E)	190 / 60 g (R and E)

PART REFERENCES

(**bold:** preferred types)	**(R)** receiver / **(E)** emitter	**(R)** receiver / **(E)** emitter
DC NPN changeover outputs / cable	**LLK-5050-001 (R) / LLK-5050-000 (E)**	**LLK-5050-001-502 (R) / LLK-5050-000-502 (E)**
DC NPN light-ON + excess gain/cable	LLK-5050-002 (R) / **LLK-5050-000 (E)**	LLK-5050-002-502 (R) / **LLK-5050-000-502 (E)**
DC NPN changeover outputs / S8	**LLS-5050-001 (R) / LLS-5050-000 (E)**	**LLS-5050-001-502 (R) / LLS-5050-000-502 (E)**
DC NPN light-ON + excess gain / S8	LLS-5050-002 (R) / **LLS-5050-000 (E)**	LLS-5050-002-502 (R) / **LLS-5050-000-502 (E)**
DC PNP changeover outputs / cable	**LLK-5050-003 (R) / LLK-5050-000 (E)**	**LLK-5050-003-502 (R) / LLK-5050-000-502 (E)**
DC PNP light-ON + excess gain/cable	LLK-5050-004 (R) / **LLK-5050-000 (E)**	LLK-5050-004-502 (R) / **LLK-5050-000-502 (E)**
DC PNP changeover outputs / S8	**LLS-5050-003 (R) / LLS-5050-000 (E)**	**LLS-5050-003-502 (R) / LLS-5050-000-502 (E)**
DC PNP light-ON + excess gain / S8	LLS-5050-004 (R) / **LLS-5050-000 (E)**	LLS-5050-004-502 (R) / **LLS-5050-000-502 (E)**
AC/DC relay light-ON / cable	**LLK-5050-015 (R) / LLK-5050-010 (E)**	**LLK-5050-015-502 (R) / LLK-5050-010-502 (E)**
Compatible connectors (page 268)	E, F	E, F
Wiring (pages 198-199)	Diagram 2 (R; DC) / 4 (E; DC) / Diagram 5 (AC/DC)	Diagram 2 (R; DC) / 4 (E; DC) / Diagram 5 (AC/DC)

PHOTOELECTRIC SENSORS: FIBER-OPTIC AMPLIFIERS SERIES 3#6#

- ✓ Complete series of fiber-optic amplifiers for **DIN-rail mounting** (TS35)
- ✓ **Small housings** ⍁ 31 x 60 x 10 mm
- ✓ Sensing range: **0 ... 200 mm**
- ✓ **Operator-guided setting**
- ✓ **IO-Link**
- ✓ For application environments from **-55 °C to +105 °C**
- ✓ **Blue light** for glass detection

TECHNICAL DATA

(according to IEC 60947-5-2)	
Housing material	Glass-fiber reinforced PBTP (Crastin)
Hysteresis	10 % typ. / ≤ 5 % (3066)
Supply voltage range U_B	10 ... 30 VDC
Max. ripple content	≤ 20 %
Output current	≤ 200 mA
Output voltage drop	≤ 2.0 V at 200 mA
Max. switching frequency	1,500 Hz / 5,000 Hz (high frequency)
	4,000 Hz (3066)
Switching time (↑ and ↓)	330 µsec / 100 µsec (high frequency)
	≥ 80 µsec (3066)
Max. ambient light:	
halogen	5,000 Lux
sun	10,000 Lux
Ambient temperature range	-25 ... +55 °C / -5 ... +55 °C (3066)
Degree of protection	IP 64
EMC protection:	
IEC 60947-5-2 (7.2.3.1)	5 kV
IEC 61000-4-2	Level 2
IEC 61000-4-3	Level 3
IEC 61000-4-4	Level 2
IEC 61000-4-6	Level 2 (3066)
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

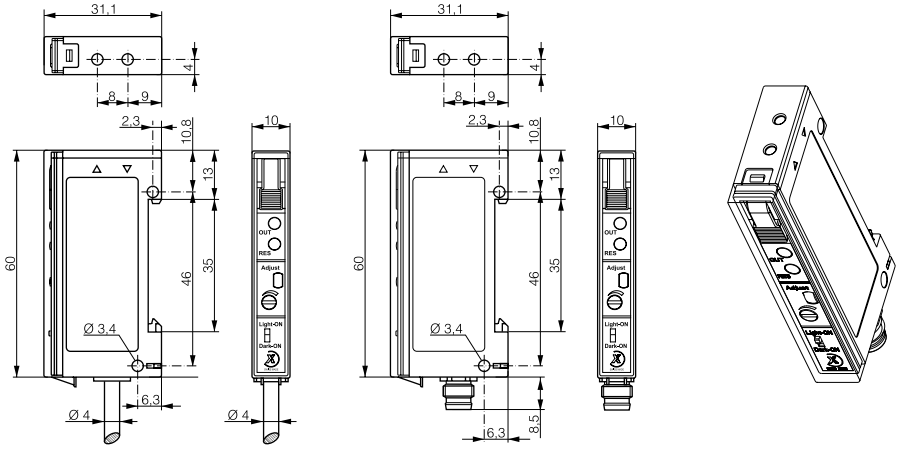
Complete series of fiber-optic amplifiers in small housings ⍁ 31 x 60 x 10 mm for DIN-rail mounting (TS35) with large sensing range of 0 ... 200 mm. For application environments from -55 °C to +105 °C. IO-Link as well as blue-light models for glass detection. For a large selection of optical fibers, please refer to pages 200 - 219 of this catalog.

Fiber-optic solutions are particularly suited for

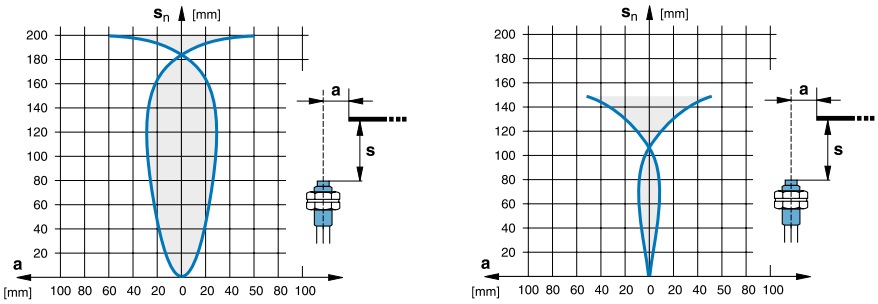
- ✓ **precision engineering**
- ✓ **robot gripping arms**
- ✓ **handling systems**
- ✓ **automation equipment**
- ✓ **special machinery**
- ✓ **electronics industry**
- ✓ **printed circuit board production**

HOUSING SIZE	31 X 60 X 10 WITH POTENTIOMETER	
SENSING RANGE	FIBER-OPTIC AMPLIFIER * 200 mm	FIBER-OPTIC AMPLIFIER * HIGH SWITCHING FREQUENCY 140 mm

Dimensions:



Response curves:



TECHNICAL DATA

Sensing range	200 mm (with LFP-1002-020)	140 mm (with LFP-1002-020)
Standard target	100 x 100 mm white	100 x 100 mm white
No-load supply current (at U_B = 24V)	15 mA (typ.)	15 mA (typ.)
Emitter	LED red 680 nm	LED red 680 nm
Approvals	CE, UL, RoHS	CE, RoHS
Weight (cable / connector model)	69 / 18 g	69 / 18 g

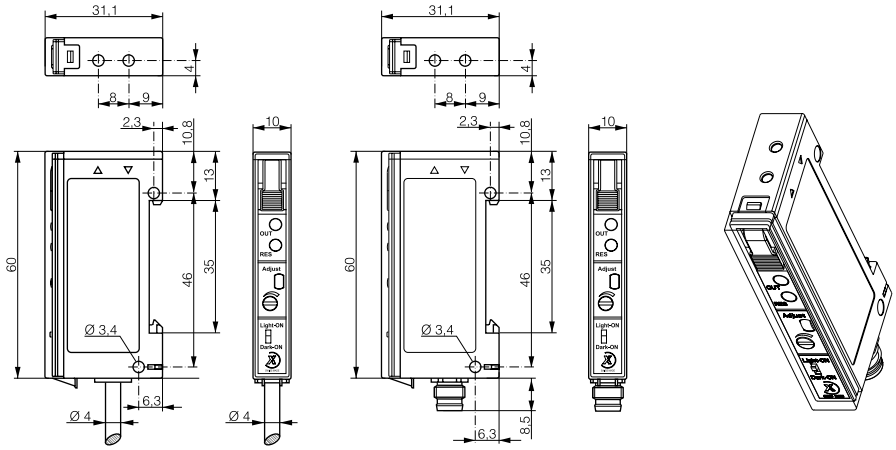
PART REFERENCES

(**bold:** preferred types)		
NPN light-ON / dark-ON switchable	**LFK-3060-101**	**LFK-3260-101**
+ excess gain / cable		
NPN light-ON / dark-ON switchable	**LFS-3060-101**	**LFS-3260-101**
+ excess gain / connector S8		
PNP light-ON / dark-ON switchable	**LFK-3060-103**	**LFK-3260-103**
+ excess gain / cable		
PNP light-ON / dark-ON switchable	**LFS-3060-103**	**LFS-3260-103**
+ excess gain / connector S8		
Compatible connectors (page 268)	E, F	E, F
Wiring (pages 198-199)	Diagram 2	Diagram 2

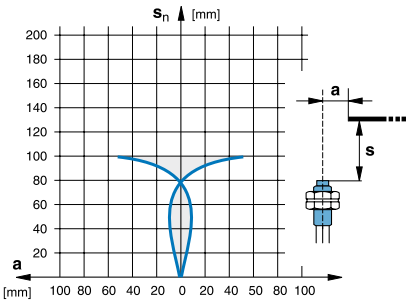
* Optical fibers (pages 200 - 219)

HOUSING SIZE	⌀ 31 X 60 X 10 WITH POTENTIOMETER	
SENSING RANGE	FIBER-OPTIC AMPLIFIER * BLUE-LIGHT 100 mm	

Dimensions:



Response curve:



TECHNICAL DATA

Sensing range	100 mm (with LFP-1002-020)	
Standard target	100 x 100 mm white	
No-load supply current (at U_B = 24V)	15 mA (typ.)	
Emitter	LED blue 465 nm	
Approvals	CE, RoHS	
Weight (cable / connector model)	69 / 18 g	

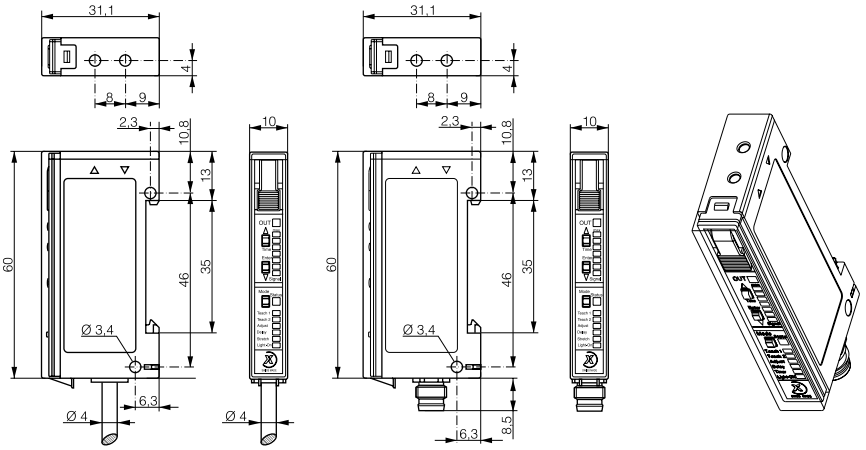
PART REFERENCES

(**bold:** preferred types)		
NPN light-ON / dark-ON switchable	**LFK-3360-101**	
+ excess gain / cable		
NPN light-ON / dark-ON switchable	**LFS-3360-101**	
+ excess gain / connector S8		
PNP light-ON / dark-ON switchable	**LFK-3360-103**	
+ excess gain / cable		
PNP light-ON / dark-ON switchable	**LFS-3360-103**	
+ excess gain / connector S8		
Compatible connectors (page 268)	E, F	
Wiring (pages 198-199)	Diagram 2	

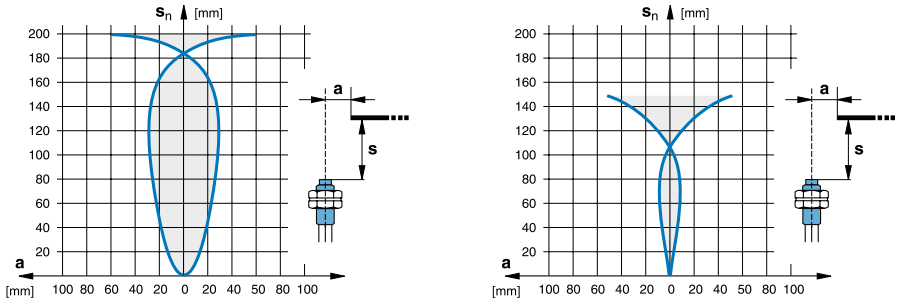
* Optical fibers (pages 200 - 219)

HOUSING SIZE	⌀ 31 X 60 X 10 WITH TEACH-IN	
SENSING RANGE	FIBER-OPTIC AMPLIFIER * 200 mm	FIBER-OPTIC AMPLIFIER * HIGH SWITCHING FREQUENCY 140 mm

Dimensions:



Response curves:



TECHNICAL DATA

Sensing range	200 mm (with LFP-1002-020)	140 mm (with LFP-1002-020)
Standard target	100 x 100 mm white	100 x 100 mm white
No-load supply current (at U_B = 24V)	25 mA (typ.)	25 mA (typ.)
Emitter	LED red 680 nm	LED red 680 nm
Approvals	CE, UL, RoHS	CE, RoHS
Weight (cable / connector model)	68 / 17 g	68 / 17 g

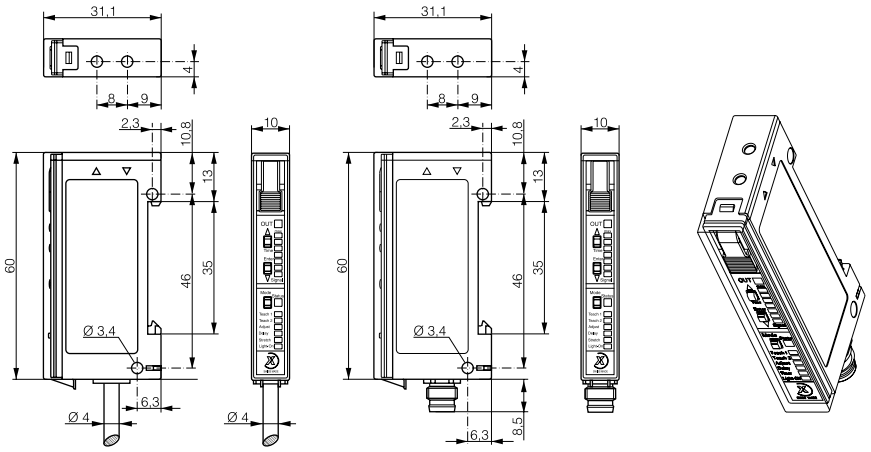
PART REFERENCES

(**bold:** preferred types)		
NPN light-ON / dark-ON switchable	**LFK-3065-101**	**LFK-3265-101**
+ excess gain / cable		
NPN light-ON / dark-ON switchable	**LFS-3065-101**	**LFS-3265-101**
+ excess gain / connector S8		
PNP light-ON / dark-ON switchable	**LFK-3065-103**	**LFK-3265-103**
+ excess gain / cable		
PNP light-ON / dark-ON switchable	**LFS-3065-103**	**LFS-3265-103**
+ excess gain / connector S8		
Compatible connectors (page 268)	E, F	E, F
Wiring (pages 198-199)	Diagram 6	Diagram 7

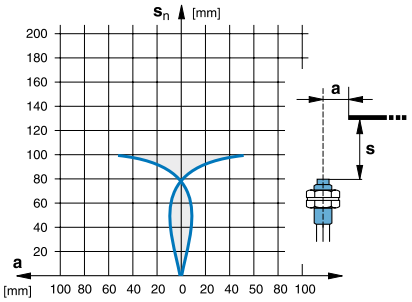
* Optical fibers (pages 200 - 219)

HOUSING SIZE	⌀ 31 X 60 X 10 WITH TEACH-IN	
SENSING RANGE	FIBER-OPTIC AMPLIFIER * BLUE-LIGHT 100 mm	

Dimensions:



Response curve:



TECHNICAL DATA

Sensing range	100 mm (with LFP-1002-020)	
Standard target	100 x 100 mm white	
No-load supply current (at U_B = 24V)	25 mA (typ.)	
Emitter	LED blue 465 nm	
Approvals	CE, RoHS	
Weight (cable / connector model)	68 / 17 g	

PART REFERENCES

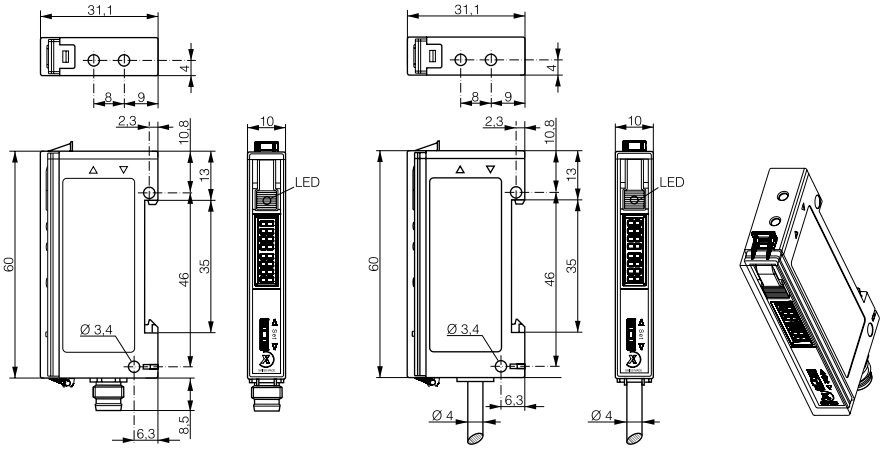
(**bold:** preferred types)		
NPN light-ON / dark-ON switchable	**LFK-3365-101**	
+ excess gain / cable		
NPN light-ON / dark-ON switchable	**LFS-3365-101**	
+ excess gain / connector S8		
PNP light-ON / dark-ON switchable	**LFK-3365-103**	
+ excess gain / cable		
PNP light-ON / dark-ON switchable	**LFS-3365-103**	
+ excess gain / connector S8		
Compatible connectors (page 268)	E, F	
Wiring (pages 198-199)	Diagram 6	

* Optical fibers (pages 200 - 219)

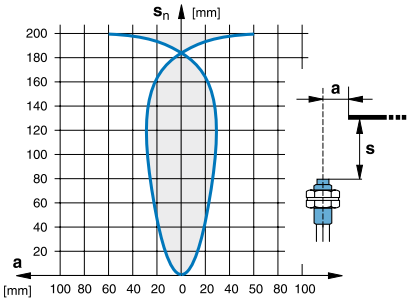
HOUSING SIZE	⌀ 31 X 60 X 10 WITH TEACH-IN & DIGITAL DISPLAY	
SENSING RANGE	FIBER-OPTIC AMPLIFIER * 200 mm	

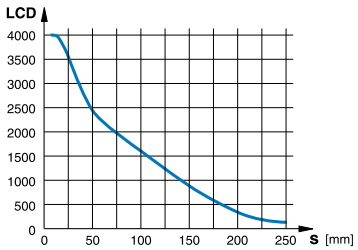
IO-Link

Dimensions:



Response curves:





Display value as a function of the distance

TECHNICAL DATA

Sensing range	200 mm (with LFP-1002-020)	
Standard target	100 x 100 mm white	
No-load supply current (at U_B = 24V)	30 mA (typ.)	
Emitter	LED red 680 nm	
Approvals	CE, RoHS	
Weight (cable / connector model)	68 / 17 g	

PART REFERENCES

(**bold:** preferred types)		
NPN light/dark-ON switchable / cable	**LFK-3066-101**	
NPN light/dark-ON switchable / S8	**LFS-3066-101**	
PNP light/dark-ON switchable / cable	**LFK-3066-103**	
PNP light/dark-ON switchable / S8	**LFS-3066-103**	
PNP light/dark-ON switchable	**LFK-3066-403**	
+ IO-Link / cable		
PNP light/dark-ON switchable	**LFS-3066-403**	
+ IO-Link / connector S8		
Compatible connectors (page 268)	E, F	
Wiring (pages 198-199)	Diagram 6	

* Optical fibers (pages 200 - 219)

PHOTOELECTRIC SENSORS: SERIES 6080

- ✓ **Universal sensor series** ⍁ 65 x 83 x 25 mm for **rough industrial applications**
- ✓ **Autocollimation principle** (reflex sensors)
- ✓ **Pre-failure warning** (pollution monitoring)
- ✓ **AC/DC models**

TECHNICAL DATA

(according to IEC 60947-5-2)	
Housing material	Glass-fiber reinforced PBTP (Crastin)
Hysteresis	10 % typ.
Supply voltage range U_B (DC)	10 ... 36 VDC
Supply voltage range U_B (AC/DC)	20 ... 265 VAC / 20 ... 320 VDC
Max. ripple content*	≤ 20 %
Output current*	≤ 200 mA
Output voltage drop*	≤ 2.0 V at 200 mA
Max. switching frequency*	1,000 Hz / 250 Hz (LH)
Switching time (↑ and ↓)*	0.5 msec / 2 msec (LH)
Max. ambient light:	
halogen	5,000 Lux
sun	10,000 Lux
Ambient temperature range	-5 ... +55 °C
Degree of protection	IP 67
EMC protection:	
IEC 60947-5-2 (7.2.3.1)	1 kV
IEC 61000-4-2	Level 3
IEC 61000-4-3	Level 3
IEC 61000-4-4	Level 3
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

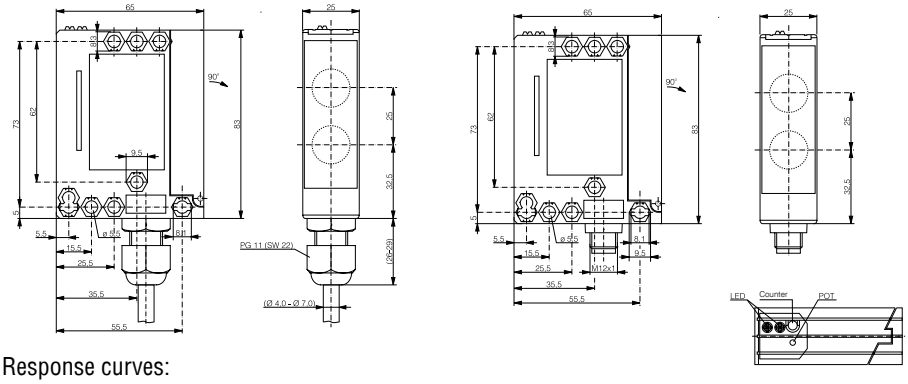
* DC models (AC/DC see data sheet)

Universal sensor series ⍁ 65 x 83 x 25 mm for rough industrial applications. Reflex sensors with autocollimation principle. Pollution monitoring (green LED) in case of reduced system reserves (excess gain) prevents downtime caused by pollution. Particularly suited for

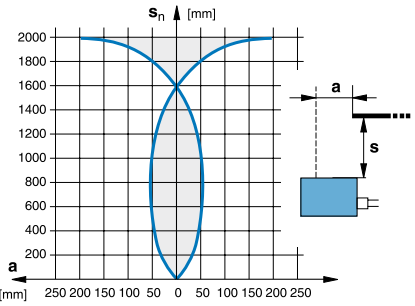
- ✓ **crane installations**
- ✓ **paper machines**
- ✓ **doors & gates**
- ✓ **woodworking machines**
- ✓ **palletizers**
- ✓ **steel industry**
- ✓ **heavy duty conveyor systems**
- ✓ **chemical industry**
- ✓ **automotive industry**

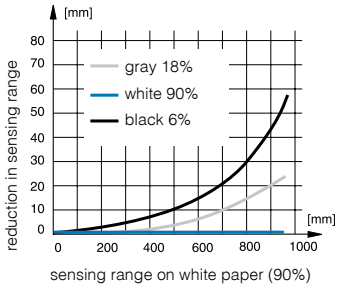
HOUSING SIZE	⌀ 65 X 83 X 25	
SENSING RANGE	DIFFUSE SENSOR 2,000 mm	DIFFUSE SENSOR WITH BACKGROUND SUPPRESSION 50 ... 1,000 mm

Dimensions:



Response curves:





TECHNICAL DATA

Sensing range (setting range)	2,000 mm	1,000 mm (50 ... 1,000 mm)
Standard target	400 x 400 mm white	200 x 200 mm white
No-load supply current (DC)/voltage (AC/DC)	≤ 20 mA / < 2 VA	≤ 50 mA / < 2 VA
Emitter	IR LED 880 nm	IR LED 880 nm
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight	100 g	100 g

PART REFERENCES

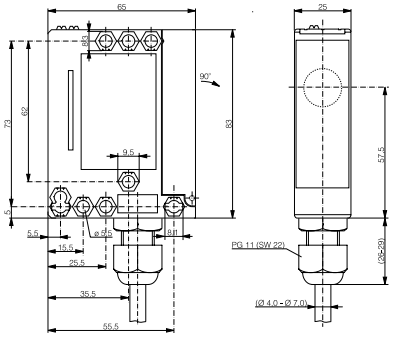
(**bold:** preferred types)		
DC NPN / connector S12	**LTS-6080-101***	**LHS-6080-101***
DC NPN / screw terminal	**LTT-6080-101**	**LHT-6080-101**
DC NPN timer***/ connector S12	**LTS-6080-151****	**LHS-6080-151****
DC NPN timer***/ screw terminal	**LTT-6080-151**	**LHT-6080-151**
DC PNP / connector S12	**LTS-6080-103***	**LHS-6080-103***
DC PNP / screw terminal	**LTT-6080-103**	**LHT-6080-103**
DC PNP timer***/ connector S12	**LTS-6080-153****	**LHS-6080-153****
DC PNP timer***/ screw terminal	**LTT-6080-153**	**LHT-6080-153**
AC/DC relay / connector S12	**LTS-6080-115****	**LHS-6080-115****
AC/DC relay / screw terminal	**LTT-6080-115**	**LHT-6080-115**
AC/DC relay/timer***/connector S12	LTS-6080-165**	LHS-6080-165**
AC/DC relay/timer***/screw terminal	LTT-6080-165	LHT-6080-165
Compatible connectors (page 268)	M, N (**O, P)	M, N (**O, P)
Wiring (pages 198-199)	2 (DC*) / 3 (DC) / 5 (AC/DC)	2 (DC*) / 3 (DC) / 5 (AC/DC)

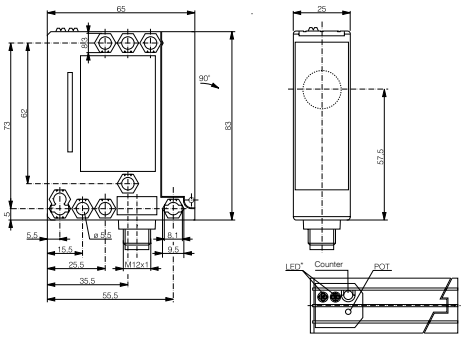
*** light-ON / dark-ON switchable

HOUSING SIZE	⌀ 65 X 83 X 25	
SENSING RANGE	**REFLEX SENSOR (POLARIZED) 6,000 mm**	**THROUGH-BEAM SENSOR 50,000 mm**

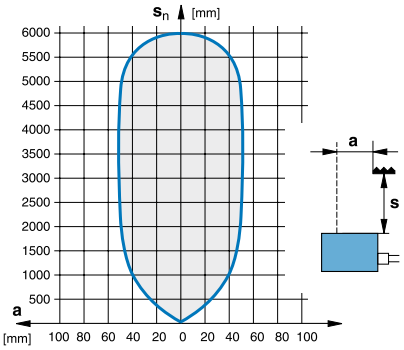
Dimensions:

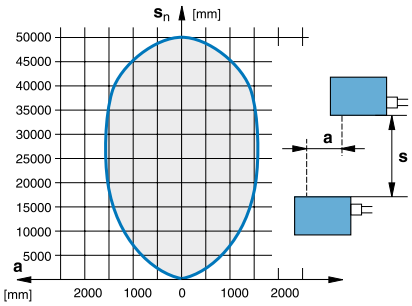
* receiver only





Response curves:





TECHNICAL DATA

Sensing range	6,000 mm	50,000 mm
Reflector (page 197)	Reflector type 3	---
No-load supply current (DC)/voltage (AC/DC)	≤ 30 mA / < 2 VA	≤ 15 mA (R) / ≤ 15 mA (E) // < 2 VA
Emitter	LED red polarized 660 nm	IR LED 880 nm
Approvals	CE, UL, RoHS	CE, UL, RoHS
Weight	100 g	200 g (R and E)

PART REFERENCES

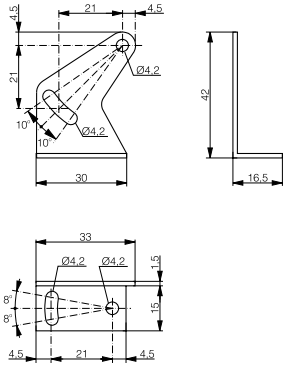
(**bold:** preferred types)		**(R)** receiver / **(E)** emitter
DC NPN / connector S12	**LRS-6080-102***	**LLS-6080-002 (R) / LLS-6080-000 (E)**
DC NPN / screw terminal	**LRT-6080-102**	**LLT-6080-002 (R) / LLT-6080-000 (E)**
DC NPN timer***/ connector S12	**LRS-6080-152****	**LLS-6080-052 (R) / LLS-6080-000 (E)**
DC NPN timer***/ screw terminal	**LRT-6080-152**	**LLT-6080-052 (R) / LLT-6080-000 (E)**
DC PNP / connector S12	**LRS-6080-104***	**LLS-6080-004 (R) / LLS-6080-000 (E)**
DC PNP / screw terminal	**LRT-6080-104**	**LLT-6080-004 (R) / LLT-6080-000 (E)**
DC PNP timer***/ connector S12	**LRS-6080-154****	**LLS-6080-054 (R) / LLS-6080-000 (E)**
DC PNP timer***/ screw terminal	**LRT-6080-154**	**LLT-6080-054 (R) / LLT-6080-000 (E)**
AC/DC relay / connector S12	**LRS-6080-115****	**LLS-6080-015 (R)* / LLS-6080-010 (E)**
AC/DC relay / screw terminal	**LRT-6080-115**	**LLT-6080-015 (R) / LLT-6080-010 (E)**
AC/DC relay/timer***/connector S12	LRS-6080-165**	LLS-6080-065 (R)* / **LLS-6080-010 (E)**
AC/DC relay/timer***/screw terminal	LRT-6080-165	LLT-6080-065 (R) / **LLT-6080-010 (E)**
Compatible connectors (page 268)	M, N (**O, P)	M, N (*O, P)
Wiring (pages 198-199)	2 (DC*) / 3 (DC) / 5 (AC/DC)	2 (R; DC) / 4 (E; DC) / 5 (AC/DC)

*** light-ON / dark-ON switchable

PHOTOELECTRIC ACCESSORIES

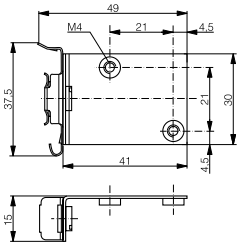
UNIVERSAL MOUNTING BRACKET

For 3#30 / 3#31 series
Material: stainless steel V2A
Part reference: ***LXW-3030-000***



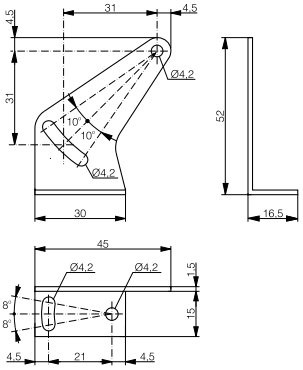
DIN-RAIL MOUNTING BRACKET

(TS35) for 3#30 / 3#31 series
Material: stainless steel V2A
Part reference: ***LXW-3030-001***



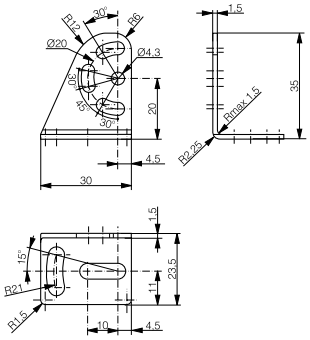
UNIVERSAL MOUNTING BRACKET

For 4040 series
Material: stainless steel V2A
Part reference: ***LXW-4040-000***



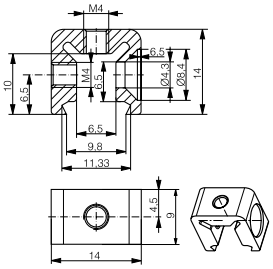
UNIVERSAL MOUNTING BRACKET

For 4050 series
Material: stainless steel V2A
Part reference: ***LXW-4050-000***



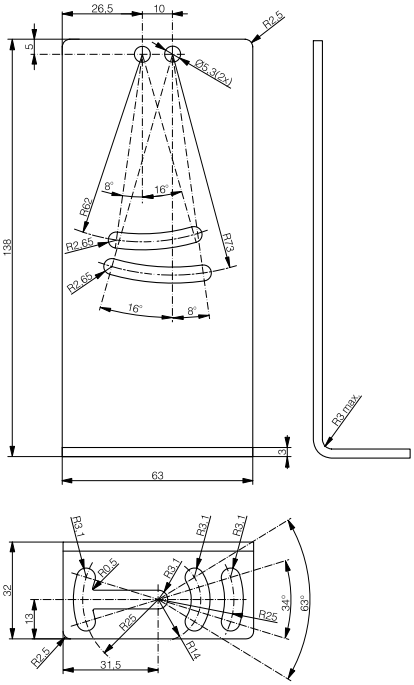
CLAMP BRACKET

For 4050 series
Material: aluminum
Part reference: ***LXW-4050-002***



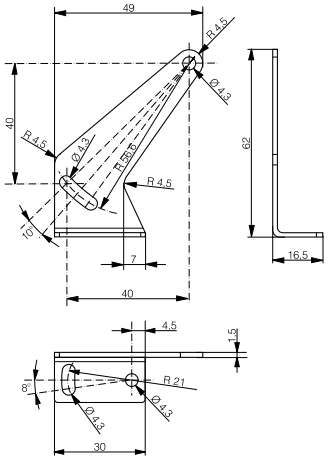
UNIVERSAL MOUNTING BRACKET

For 6080 series
Material: stainless steel V2A
Part reference: ***LXW-6080-000***



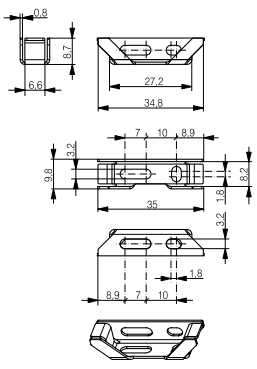
UNIVERSAL MOUNTING BRACKET

For 5050 series
Material: stainless steel V2A
Part reference: ***LXW-5050-000***



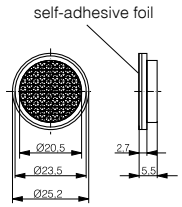
UNIVERSAL MOUNTING BRACKET

For 3#6# series
Material: stainless steel V2A
Part reference: ***LXW-3060-000***



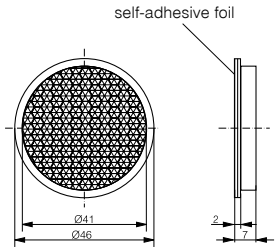
REFLECTOR TYPE 1

Range 50% of type 3
Part reference: ***LXR-0000-025***



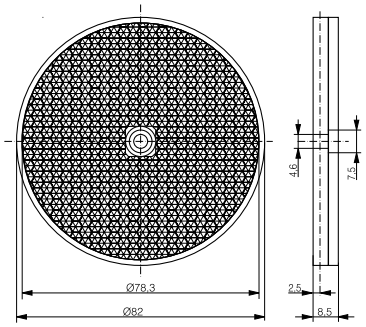
REFLECTOR TYPE 2

Range 60% of type 3
Part reference: ***LXR-0000-046***



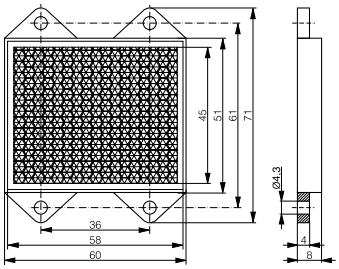
REFLECTOR TYPE 3

Reference reflector for all reflex sensors
Part reference: ***LXR-0000-084***



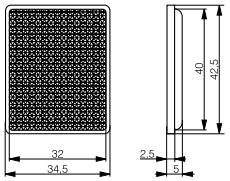
REFLECTOR TYPE 12

Range 80% of type 3
Part reference: ***LXR-0000-012***



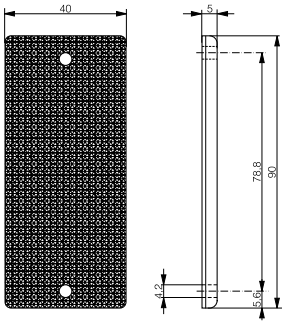
REFLECTOR TYPE 13

Range 40% of type 3
Part reference: ***LXR-0000-013***



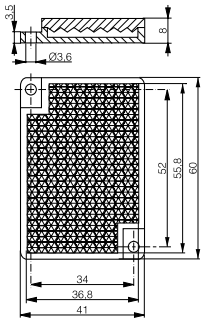
REFLECTOR TYPE 14

Range 50% of type 3
Part reference: ***LXR-0000-014***



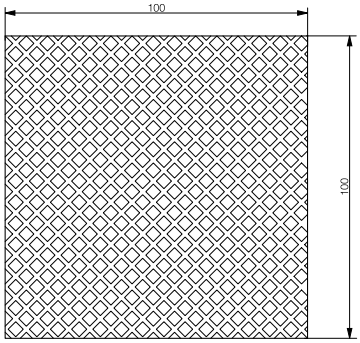
REFLECTOR TYPE 15

Range 100% of type 3
Part reference: ***LXR-0000-015***



REFLECTIVE FOIL (SELF-ADHESIVE)

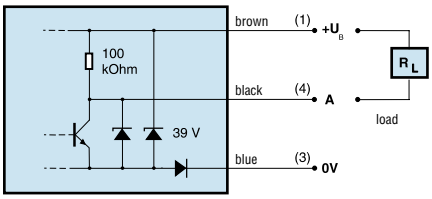
For all reflex sensors (IMOS IRF 6000)
Part reference: ***LXR-0000-000***



WIRING DIAGRAMS

Diagram 1

NPN light-ON / dark-ON output



PNP light-ON / dark-ON output

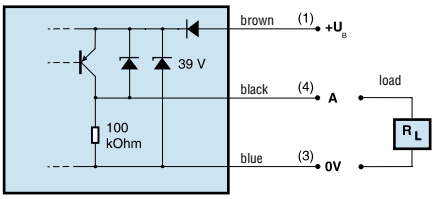
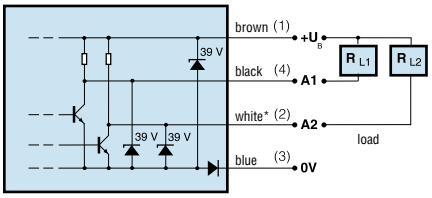


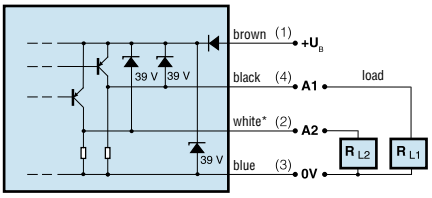
Diagram 2

NPN changeover outputs
NPN light-ON (/dark-ON) + excess-gain outputs



* pink for LFK-3#60-10#

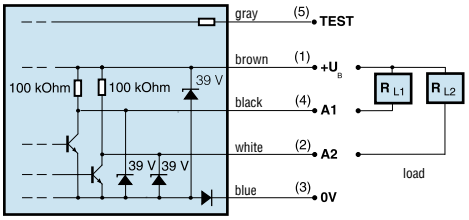
PNP changeover outputs
PNP light-ON (/dark-ON) + excess-gain outputs



* pink for LFK-3#60-10#

Diagram 3

NPN with test input



PNP with test input

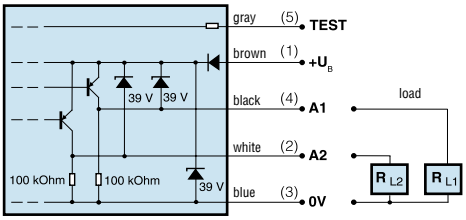


Diagram 4

Emitter of through-beam sensor

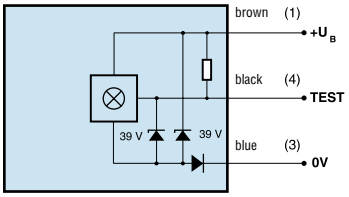
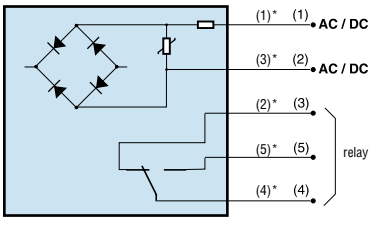


Diagram 5

AC/DC with relay output



* for connector models

AC/DC with relay output/emitter of through-beam sensor

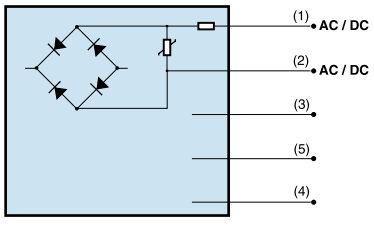
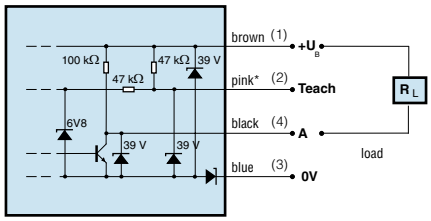


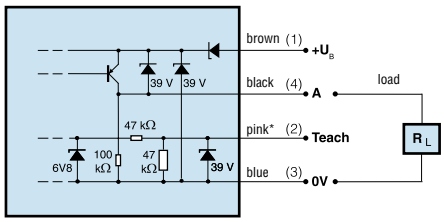
Diagram 6

NPN light-ON / dark-ON output with teach-in (3#65)



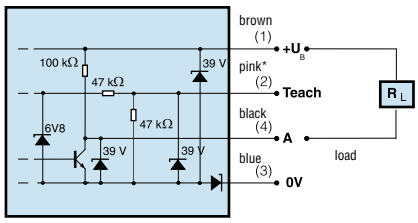
* white for LFS-3#65-10#

PNP light-ON / dark-ON output with teach-in



* white for LFS-3#65-10# / LFS-3066-#0#

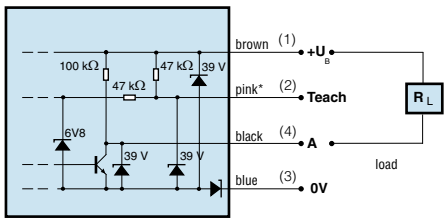
NPN light-ON / dark-ON output with teach-in (3066)



* white for LFS-3066-10#

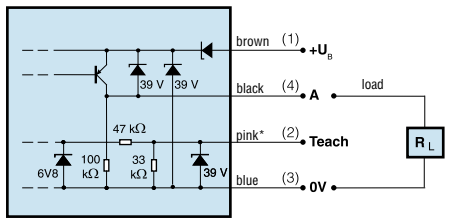
Diagram 7

NPN light-ON / dark-ON output with teach-in



* white for LFS-3265-10#

PNP light-ON / dark-ON output with teach-in



* white for LFS-3265-10#

Diagram 8

Analog output

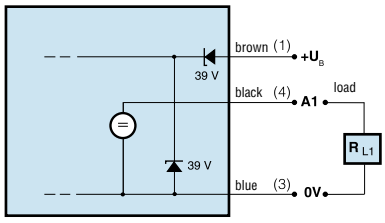


Diagram 9

Analog output

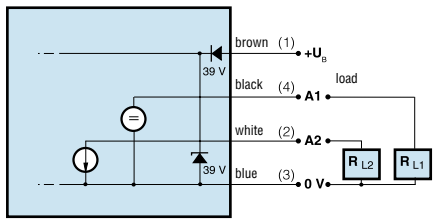
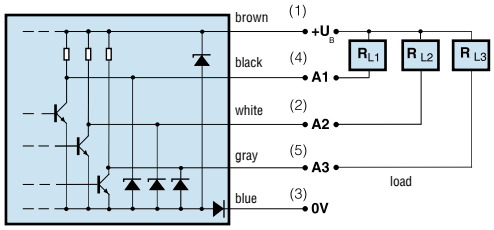
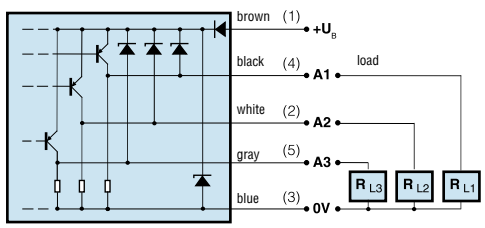


Diagram 10

3 x NPN light-ON with teach-in



3 x PNP light-ON with teach-in



SYNTHETIC OPTICAL FIBERS

- ✓ Very small dimensions
- ✓ Long sensing ranges
- ✓ Small bending radii
- ✓ Can be cut on site
- ✓ Large selection of types
- ✓ Mechanically rugged sensing head

TECHNICAL DATA

Ambient temperature range	-25 ... +70 °C / -55 ... +105 °C*
Standard length	2 m ± 0.1 m (other lengths on request)
Fiber bending radii:	
miniature / multi-beam	15 mm
standard / coaxial	25 mm
low & high temperature	25 mm
liquid level monitoring	25 mm
flexible / background suppression	2 mm
luminous (enhanced brightness)	40 mm
Bending radius of light-outlet tube	25 mm
Tensile load	30 N max.
Fiber material	PMMA
Sleeve material	Polyethylene
Sensing head material	Stainless steel V2A / PBTP**
Sensing head light-outlet tube material	Stainless steel V2A
Optical attenuation:	
standard / luminous (enhanced brightness)	0.2 dB / m max. at 660 nm
miniature	0.22 dB / m max. at 660 nm
flexible	0.4 dB / m max. at 660 nm
coaxial	0.42 dB / m max. at 660 nm
multi-beam	0.65 dB / m max. at 660 nm
Angle of incidence	See data sheets
Tightening torque:	
M3	1 Nm
M4	2 Nm
M5	3 Nm
M6	4 Nm
M8	10 Nm

* LFP-1002-020-002 / LFP-2002-020-002

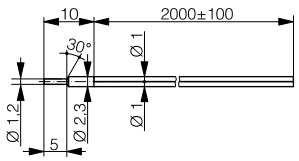
** LFP-1108 / 1109 / 1011-020

SYNTHETIC OPTICAL FIBERS DIFFUSE SENSING

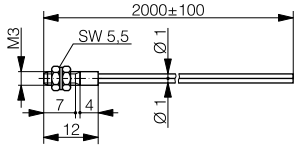
Part reference (**bold:** preferred types)

Dimensions: light emission on the left

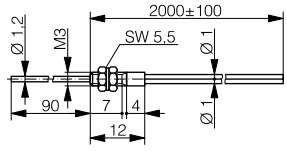
Double fiber (10 m)	**No sensing head**	
Part reference	LFP-0005-100	
Sensing range	with series 3030	120 mm (2 m fiber, diffuse sensing)
	with series 3031	60 mm (2 m fiber, diffuse sensing)
	with series 3060/65/66	200 mm (2 m fiber, diffuse sensing)
Outside fiber	separable double fiber, ∅ 2.2 mm	
Inner fiber	∅ 1.0 mm	
Special characteristics	Long sensing range	



Housing size: ∅ 2.3 mm	**Miniature**	
Part reference	**LFP-1012-020**	
Sensing range	with series 3030	40 mm (with 2 m fiber length)
	with series 3031	20 mm (with 2 m fiber length)
	with series 3060/65/66	70 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, ∅ 1 mm*	
Inner fiber	∅ 0.5 mm	
Special characteristics	Highest resolution	
* Adaptor included in delivery package		



Housing size: M3	**Miniature**	
Part reference	**LFP-1001-020**	
Sensing range	with series 3030	40 mm (with 2 m fiber length)
	with series 3031	20 mm (with 2 m fiber length)
	with series 3060/65/66	70 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, ∅ 1 mm*	
Inner fiber	∅ 0.5 mm	
Special characteristics	Highest resolution	
* Adaptor included in delivery package		

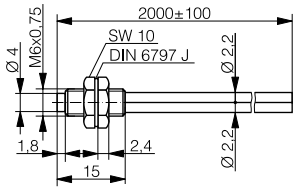


Housing size: M3	**Miniature**	
Part reference	**LFP-1004-020**	
Sensing range	with series 3030	40 mm (with 2 m fiber length)
	with series 3031	20 mm (with 2 m fiber length)
	with series 3060/65/66	70 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, ∅ 1 mm*	
Inner fiber	∅ 0.5 mm	
Special characteristics	Sensing head with bendable light-outlet tube for ease of positioning; highest resolution	
* Adaptor included in delivery package		

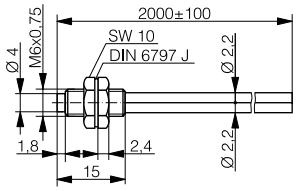
SYNTHETIC OPTICAL FIBERS
DIFFUSE SENSING

Part reference (**bold:** preferred types)

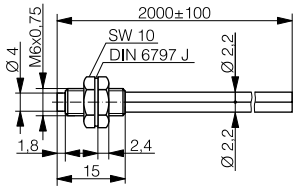
Dimensions: light emission on the left



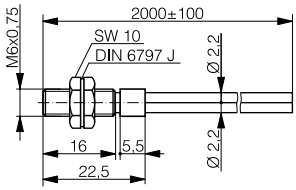
Housing size: M6	Standard	
Part reference	**LFP-1002-020**	
Sensing range	with series 3030	120 mm (with 2 m fiber length)
	with series 3031	60 mm (with 2 m fiber length)
	with series 3060/65/66	200 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, ∅ 2.2 mm	
Inner fiber	∅ 1.0 mm	
Special characteristics	Long sensing range	



Housing size: M6	Flexible	
Part reference	LFP-1102-020	
Sensing range	with series 3030	90 mm (with 2 m fiber length)
	with series 3031	45 mm (with 2 m fiber length)
	with series 3060/65/66	150 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, ∅ 2.2 mm	
Inner fiber	151 x ∅ 75 µm	
Special characteristics	Very small bending radius	



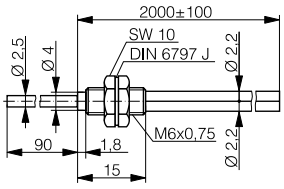
Housing size: M6	Luminous (enhanced brightness)	
Part reference	LFP-1202-020	
Sensing range	with series 3030	160 mm (with 2 m fiber length)
	with series 3031	80 mm (with 2 m fiber length)
	with series 3060/65/66	260 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, ∅ 2.2 mm	
Inner fiber	∅ 1.5 mm	
Special characteristics	Longest sensing range	



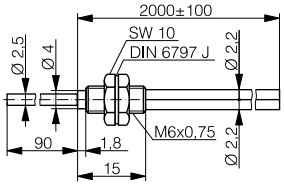
Housing size: M6	Coaxial	
Part reference	LFP-1003-020	
Sensing range	with series 3030	120 mm (with 2 m fiber length)
	with series 3031	60 mm (with 2 m fiber length)
	with series 3060/65/66	200 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, ∅ 2.2 mm	
Inner fiber	∅ 1.0 mm	
Special characteristics	Coaxial arrangement of fibers, thus axially symmetric beam	

Part reference (**bold:** preferred types)

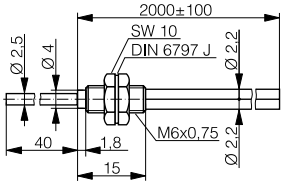
Dimensions: light emission on the left



Housing size: M6	Standard	
Part reference	**LFP-1005-020**	
Sensing range	with series 3030	120 mm (with 2 m fiber length)
	with series 3031	60 mm (with 2 m fiber length)
	with series 3060/65/66	200 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, ∅ 2.2 mm	
Inner fiber	∅ 1.0 mm	
Special characteristics	Sensing head with bendable light-outlet tube for ease of positioning	
	Long sensing range	



Housing size: M6	Flexible	
Part reference	LFP-1105-020	
Sensing range	with series 3030	90 mm (with 2 m fiber length)
	with series 3031	45 mm (with 2 m fiber length)
	with series 3060/65/66	150 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, ∅ 2.2 mm	
Inner fiber	151 x ∅ 75 µm	
Special characteristics	Sensing head with bendable light-outlet tube for ease of positioning	
	Very small bending radius	



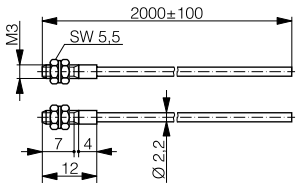
Housing size: M6	Standard	
Part reference	**LFP-1013-020**	
Sensing range	with series 3030	120 mm (with 2 m fiber length)
	with series 3031	60 mm (with 2 m fiber length)
	with series 3060/65/66	200 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, ∅ 2.2 mm	
Inner fiber	∅ 1.0 mm	
Special characteristics	Sensing head with bendable light-outlet tube for ease of positioning	
	Long sensing range	

SYNTHETIC OPTICAL FIBERS THROUGH-BEAM SENSING

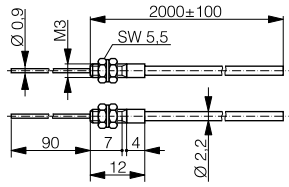
Part reference (**bold:** preferred types)

Dimensions: light emission on the left

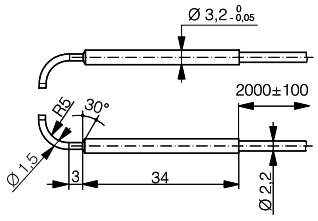
Individual fiber (10 m)	No sensing head	
Part reference	LFP-0004-100	
Sensing range	with series 3030	400 mm (2 m fiber, through-beam sensing)
	with series 3031	200 mm (2 m fiber, through-beam sensing)
	with series 3060/65/66	700 mm (2 m fiber, through-beam sensing)
Outside fiber	individual fiber, ∅ 2.2 mm	
Inner fiber	∅ 1.0 mm	
Special characteristics	Long sensing range	



Housing size: M3	Miniature	
Part reference	**LFP-2001-020**	
Sensing range	with series 3030	120 mm (with 2 m fiber length)
	with series 3031	60 mm (with 2 m fiber length)
	with series 3060/65/66	200 mm (with 2 m fiber length)
Outside fiber	2 individual fibers, ∅ 2.2 mm	
Inner fiber	∅ 0.5 mm	
Special characteristics	Highest resolution	



Housing size: M3	Miniature	
Part reference	**LFP-2003-020**	
Sensing range	with series 3030	120 mm (with 2 m fiber length)
	with series 3031	60 mm (with 2 m fiber length)
	with series 3060/65/66	200 mm (with 2 m fiber length)
Outside fiber	2 individual fibers, ∅ 2.2 mm	
Inner fiber	∅ 0.5 mm	
Special characteristics	Sensing head with bendable light-outlet tube for ease	
	of positioning	
	Highest resolution	

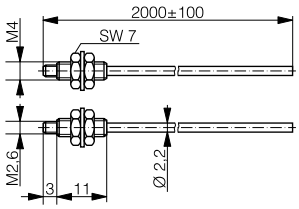


Housing size: ∅ 3.2 mm	Standard 90°	
Part reference	**LFP-2006-020**	
Sensing range	with series 3030	120 mm (with 2 m fiber length)
	with series 3031	60 mm (with 2 m fiber length)
	with series 3060/65/66	200 mm (with 2 m fiber length)
Outside fiber	2 individual fibers, ∅ 2.2 mm	
Inner fiber	∅ 1.0 mm	
Special characteristics	Lateral sensing	

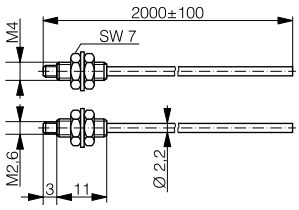
SYNTHETIC OPTICAL FIBERS THROUGH-BEAM SENSING

Part reference (**bold:** preferred types)

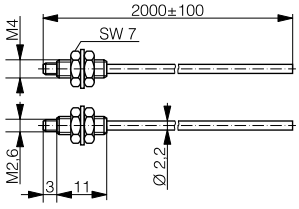
Dimensions: light emission on the left



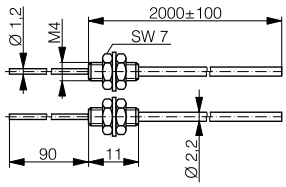
Housing size: M4	Standard	
Part reference	**LFP-2002-020**	
Sensing range	with series 3030	400 mm (with 2 m fiber length)
	with series 3031	200 mm (with 2 m fiber length)
	with series 3060/65/66	700 mm (with 2 m fiber length)
Outside fiber	2 individual fibers, ∅ 2.2 mm	
Inner fiber	∅ 1.0 mm	
Special characteristics	Long sensing range	



Housing size: M4	Flexible	
Part reference	LFP-2102-020	
Sensing range	with series 3030	300 mm (with 2 m fiber length)
	with series 3031	150 mm (with 2 m fiber length)
	with series 3060/65/66	550 mm (with 2 m fiber length)
Outside fiber	2 individual fibers, ∅ 2.2 mm	
Inner fiber	151 x ∅ 75 µm	
Special characteristics	Very small bending radius	



Housing size: M4	Luminous (enhanced brightness)	
Part reference	LFP-2202-020	
Sensing range	with series 3030	500 mm (with 2 m fiber length)
	with series 3031	250 mm (with 2 m fiber length)
	with series 3060/65/66	900 mm (with 2 m fiber length)
Outside fiber	2 individual fibers, ∅ 2.2 mm	
Inner fiber	∅ 1.5 mm	
Special characteristics	Longest sensing range	

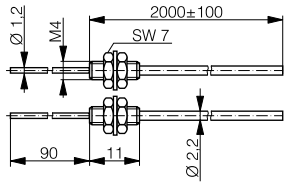


Housing size: M4	Standard	
Part reference	**LFP-2004-020**	
Sensing range	with series 3030	400 mm (with 2 m fiber length)
	with series 3031	200 mm (with 2 m fiber length)
	with series 3060/65/66	700 mm (with 2 m fiber length)
Outside fiber	2 individual fibers, ∅ 2.2 mm	
Inner fiber	∅ 1.0 mm	
Special characteristics	Sensing head with bendable light-outlet tube for ease of positioning	
	Long sensing range	

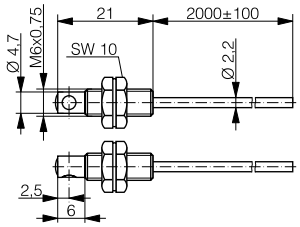
SYNTHETIC OPTICAL FIBERS THROUGH-BEAM SENSING

Part reference (**bold:** preferred types)

Dimensions: light emission on the left



Housing size: M4	Flexible	
Part reference	LFP-2104-020	
Sensing range	with series 3030	300 mm (with 2 m fiber length)
	with series 3031	150 mm (with 2 m fiber length)
	with series 3060/65/66	500 mm (with 2 m fiber length)
Outside fiber	2 individual fibers, ∅ 2.2 mm	
Inner fiber	151 x ∅ 75 µm	
Special characteristics	Sensing head with bendable light-outlet tube for ease	
	of positioning	
	Very small bending radius	



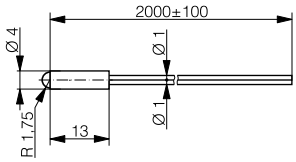
Housing size: M6	Standard 90°	
Part reference	**LFP-2005-020**	
Sensing range	with series 3030	1100 mm (with 2 m fiber length)
	with series 3031	550 mm (with 2 m fiber length)
	with series 3060/65/66	1800 mm (with 2 m fiber length)
Outside fiber	2 individual fibers, ∅ 2.2 mm	
Inner fiber	∅ 1.0 mm	
Special characteristics	Lateral sensing	
	Long sensing range	

SYNTHETIC OPTICAL FIBERS APPLICATION-SPECIFIC CYLINDRICAL LIGHT BEAM

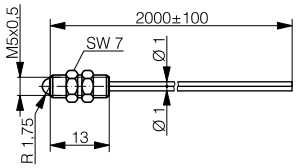
- ✓ Diffuse fibers particularly suitable for the detection of objects in recesses and behind covers (through holes and gaps)
- ✓ Extremely small sensing heads
- ✓ Quasi-cylindrical light beam
- ✓ Recessed mounting possible
- ✓ Sapphire glass optical parts, thus easy to clean

Part reference (**bold:** preferred types)

Dimensions: light emission on the left

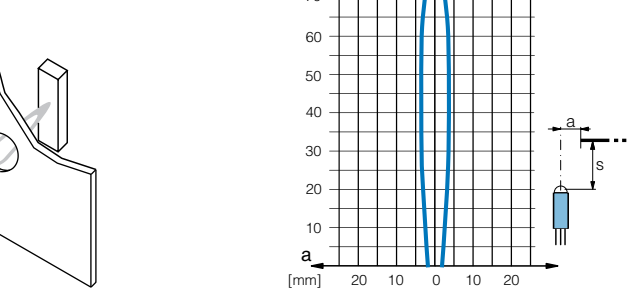


Housing size: ∅ 4 mm	**Miniature / spherical optics**	
Part reference	**LFP-1006-020**	
Sensing range	with series 3030	100 mm (with 2 m fiber length)
	with series 3031	60 mm (with 2 m fiber length)
	with series 3060/65/66	140 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, ∅ 1 mm*	
Inner fiber	∅ 0.5 mm	
Special characteristics	Spherical optics for cylindrical light beam	
* Adaptor included in delivery package		

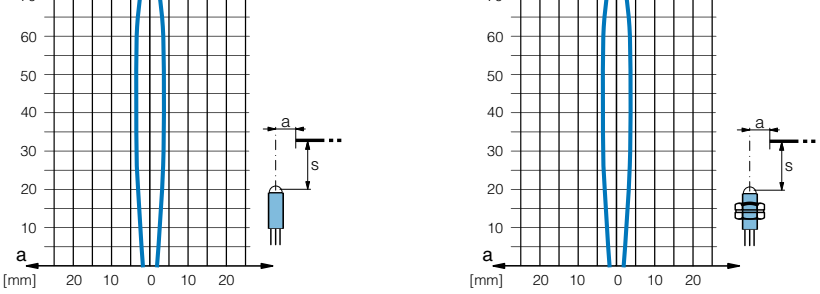


Housing size: M5	**Miniature / spherical optics**	
Part reference	**LFP-1007-020**	
Sensing range	with series 3030	100 mm (with 2 m fiber length)
	with series 3031	60 mm (with 2 m fiber length)
	with series 3060/65/66	140 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, ∅ 1 mm*	
Inner fiber	∅ 0.5 mm	
Special characteristics	Spherical optics for cylindrical light beam	
* Adaptor included in delivery package		

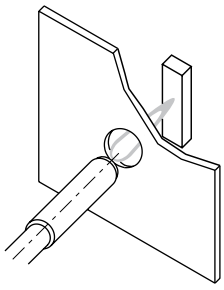
Response curves (with series 3030):



LFP-1006-020



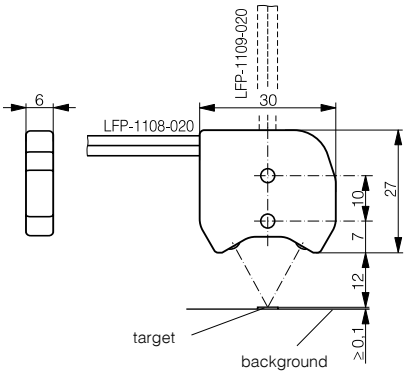
LFP-1007-020



Detection through holes and gaps

SYNTHETIC OPTICAL FIBERS APPLICATION-SPECIFIC BACKGROUND SUPPRESSION

Part reference (**bold:** preferred types)



- ✓ Diffuse fiber with background suppression
- ✓ Factory adjusted operating distance of 12 mm
- ✓ Fully potted optical parts
- ✓ Recognition of position and thickness differences of only 0.1 mm
- ✓ Suitable for rough environments, thanks to glass-fiber reinforced PBTP housing
- ✓ Scratch resistant, easy-to-clean glass lenses

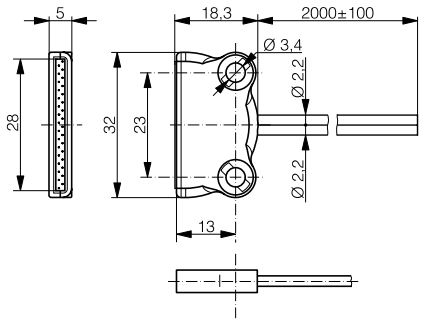
Housing size: ☐ 27 x 30	Background suppression / flexible / 90°
Part reference	LFP-1108-020
Operating distance	12 mm
Outside fiber	2 separate fibers, ∅ 2.2 mm
Inner fiber	151 x ∅ 75 µm
Special characteristics	Lateral sensing
	Detectable height difference: 0.1 mm
	Minimum detectable target size: 0.15 mm²
	Minimum detectable wire diameter: 0.1 mm

Housing size: ☐ 27 x 30	Background suppression / flexible
Part reference	LFP-1109-020
Operating distance	12 mm
Outside fiber	2 separate fibers, ∅ 2.2 mm
Inner fiber	151 x ∅ 75 µm
Special characteristics	Axial sensing
	Detectable height difference: 0.1 mm
	Minimum detectable target size: 0.15 mm²
	Minimum detectable wire diameter: 0.1 mm

SYNTHETIC OPTICAL FIBERS APPLICATION-SPECIFIC MULTI-BEAM

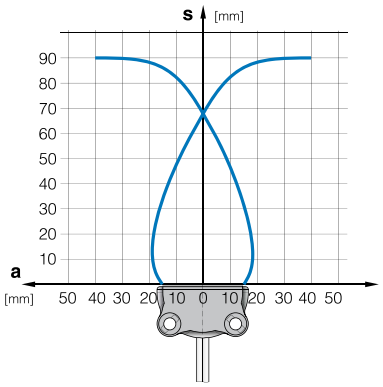
- ✓ Multi-beam diffuse fiber
- ✓ Detection of objets across the whole width of the sensing head (28 mm)
- ✓ Suitable for rough environments, thanks to PBTP housing
- ✓ Lateral mounting

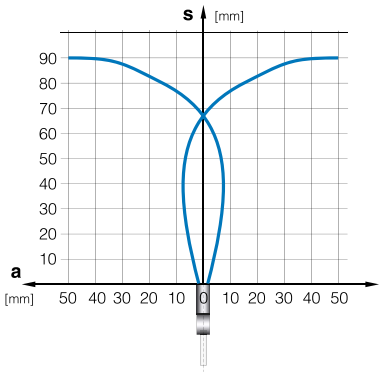
Part reference (**bold:** preferred types)



Housing size: ☐ 18 x 32	Multi-beam	
Part reference	**LFP-1011-020**	
Sensing range	with series 3030	90 mm (with 2 m fiber length)
	with series 3031	45 mm (with 2 m fiber length)
	with series 3060/65/66	150 mm (with 2 m fiber length)
Outside fiber	2 separate fibers, ∅ 2.2 mm	
Inner fiber	16 x ∅ 0.265 mm	
Special characteristics	Wide detection range (28 mm)	

Response curves (with series 3030):

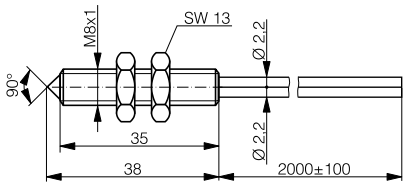




SYNTHETIC OPTICAL FIBERS APPLICATION-SPECIFIC LIQUID LEVEL MONITORING

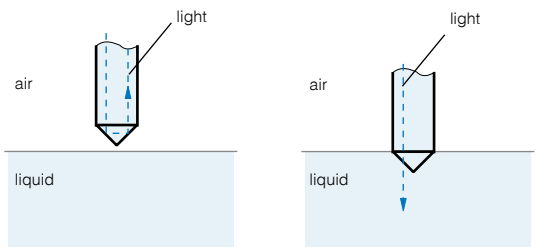
- ✓ Contact liquid detection (with the exception of white milky liquids)
- ✓ Fully potted optical parts
- ✓ Scratch-resistant, easy-to-clean glass prism
- ✓ Impervious (degree of protection: IP 68)

Part reference (**bold:** preferred types)



Housing size: M8	Liquid level monitoring
Part reference	**LFP-1010-020**
Outside fiber	2 separate fibers, ∅ 2.2 mm
Inner fiber	∅ 0.5 mm
Special characteristics	Contact liquid detection

Operating principle:

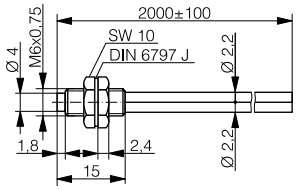


SYNTHETIC OPTICAL FIBERS APPLICATION-SPECIFIC LOW & HIGH TEMPERATURES

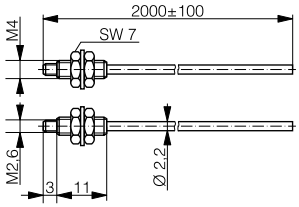
Part reference (**bold:** preferred types)

Dimensions: light emission on the left

- ✓ Diffuse (LFP-1002-020-002) and through-beam (LFP-2002-020-002) fibers
- ✓ Extended temperature range : -55 ... +105°C
- ✓ Very small dimensions
- ✓ Long sensing ranges
- ✓ Small bending radii
- ✓ Can be cut on site



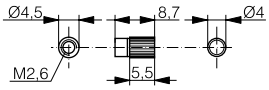
Housing size: M6	Low & high temperature resistant	
Part reference	LFP-1002-020-002	
Sensing range	with series 3030	90 mm (with 2 m fiber length)
	with series 3031	45 mm (with 2 m fiber length)
	with series 3060/65/66	150 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, ∅ 2.2 mm	
Inner fiber	∅ 1.0 mm	
Special characteristics	Extended temperature range of -55 ... +105°C	



Housing size: M4	Low & high temperature resistant	
Part reference	LFP-2002-020-002	
Sensing range	with series 3030	300 mm (with 2 m fiber length)
	with series 3031	150 mm (with 2 m fiber length)
	with series 3060/65/66	550 mm (with 2 m fiber length)
Outside fiber	2 individual fibers, ∅ 2.2 mm	
Inner fiber	∅ 1.0 mm	
Special characteristics	Extended temperature range of -55 ... +105°C	

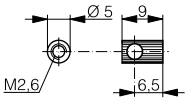
ACCESSORIES FOR SYNTHETIC OPTICAL FIBERS

Part reference (**bold:** preferred types)



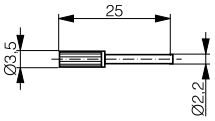
Axial front lens for increased sensing ranges

Part reference	**LFP-0001-000**	
Sensing range	with series 3030	3000 mm (2 m fibers)
	with series 3031	1500 mm (2 m fibers)
	with series 3060/65/66	5000 mm (5 m fibers)
Can be used with	LFP-2#02-020	
Delivery package	1 pair	



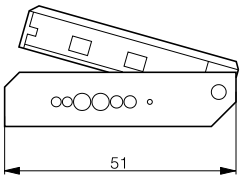
90° front lens for increased sensing ranges

Part reference	**LFP-0002-000**	
Sensing range	with series 3030	1000 mm (2 m fibers)
	with series 3031	500 mm (2 m fibers)
	with series 3060/65/66	1700 mm (2 m fibers)
Can be used with	LFP-2#02-020	
Delivery package	1 pair	



Adaptor

Part reference	**LFP-0003-000**
Suitable for	fine synthetic optical fibers



Cutting tool

Part reference	**LXF-0000-000**
Suitable for	all synthetic optical fibers

GLASS OPTICAL FIBERS

- ✓ For high ambient temperatures (models with chrome-plated brass and silicone sleeves)
- ✓ Executions for extreme environmental conditions
- ✓ Small dimensions
- ✓ Long sensing ranges
- ✓ Suitable for the detection of smallest objects
- ✓ Large selection of types

TECHNICAL DATA

Ambient temperature range	PVC sleeve	0 ... +70 °C
	Wound brass sleeve	-25 ... +250 °C
	Silicone sleeve	-25 ... +150 °C
Protection degree of sensing head	IP 65 (optional up to IP 68)	
Protection degree of optical fiber	PVC sleeve	IP 67
	Wound brass sleeve	IP 54
	Silicone sleeve	IP 67
Standard lengths	250 mm, 500 mm, 1000 mm	
Sensing head material	Aluminum	
Sensing head light-outlet tube material	Stainless steel	
Optical attenuation	10 dB / km max. at 880 nm	
Angle of incidence	See data sheets	

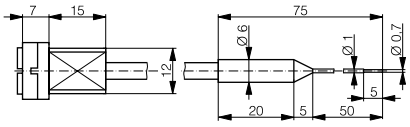
Depending on the type involved, glass optical fibers consist of 200 to 5,000 individual fibers with diameters of 30 to 50 µm. The fiber bundle is surrounded by a sleeve, which can be selected according to the application:

– PVC sleeve: the economical solution if no special stresses are to be expected.
– Wound sleeve of chrome-plated brass: for permanent operating temperatures of up to +250 °C, and maximum protection against crushing.
– Silicone sleeve with stainless-steel braiding for strain relief: for use in corrosive media, at temperatures of up to +150 °C, and where mechanical strain relief is required.

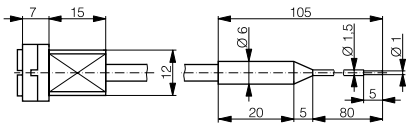
The sensing heads are available with straight or right-angle light outlets. The range comprises models for use as diffuse sensors (emitting and receiving fiber bundles in the same sleeve) and as through-beam sensors (the fiber bundles are in separate sleeves). In order to cover various application needs, a number of different bundle cross-sections are available: large cross-sections for long sensing ranges, small cross-sections for short ranges, high resolutions, and detection of small objects.

length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)
***bold** = preferred types (-### **only 500 mm length**)*

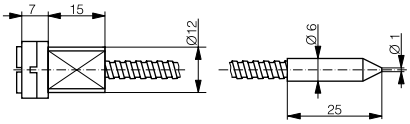
***Dimensions:** light emission on the right*



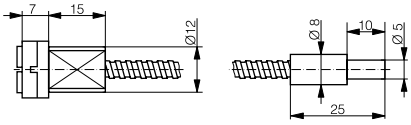
Housing size: ∅ 6 mm	
Part reference	**LFG-1005-###**
Sensing range	with series 4040 5 mm
Special characteristics	With bendable light-outlet tube
	For the detection of smallest objects
Sleeve	Silicone, ∅ 4.7 mm
Min. bending radius	20 mm / light-outlet tube: 5 mm (do not bend the inner
	and outer 10 mm)
Max. tensile load	10 N



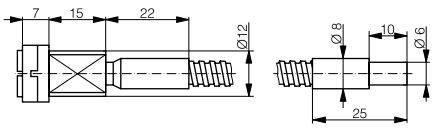
Housing size: ∅ 6 mm	
Part reference	**LFG-1015-###**
Sensing range	with series 4040 15 mm
Special characteristics	With bendable light-outlet tube
	For places difficult to access
Sleeve	Silicone, ∅ 4.7 mm
Min. bending radius	20 mm / light-outlet tube: 5 mm (do not bend the inner
	and outer 10 mm)
Max. tensile load	10 N



Housing size: ∅ 6 mm	
Part reference	**LFG-1010-###**
Sensing range	with series 4040 15 mm
Special characteristics	For the detection of smallest objects
	in places difficult to access
Sleeve	Wound sleeve of chrome-plated brass, ∅ 4.7 mm
Min. bending radius	23 mm
Max. tensile load	20 N



Housing size: ∅ 8 mm	
Part reference	**LFG-1020-###**
Sensing range	with series 4040 50 mm
Special characteristics	Multi-purpose medium sensing range model
Sleeve	Wound sleeve of chrome-plated brass, ∅ 4.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N

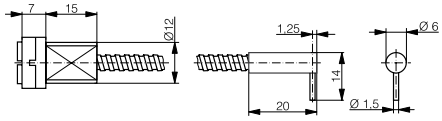


Housing size: ∅ 8 mm	
Part reference	**LFG-1030-###**
Sensing range	with series 4040 150 mm
Special characteristics	For long sensing range
Sleeve	Wound sleeve of chrome-plated brass, ∅ 6.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N

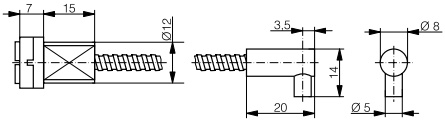
GLASS OPTICAL FIBERS
RADIAL DIFFUSE SENSING

length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)
***bold** = preferred types (-### **only 500 mm length**)*

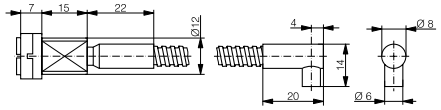
***Dimensions:** light emission on the right*



Housing size: ∅ 6 mm	
Part reference	**LFG-2010-###**
Sensing range	with series 4040 15 mm
Special characteristics	For the detection of smallest objects
	in places difficult to access
Leg length	14 mm
Sleeve	Wound sleeve of chrome-plated brass, ∅ 4.7 mm
Min. bending radius	23 mm
Max. tensile load	20 N



Housing size: ∅ 8 mm	
Part reference	**LFG-2020-###**
Sensing range	with series 4040 30 mm
Special characteristics	Multi-purpose medium sensing range model
Leg length	14 mm
Sleeve	Wound sleeve of chrome-plated brass, ∅ 4.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N

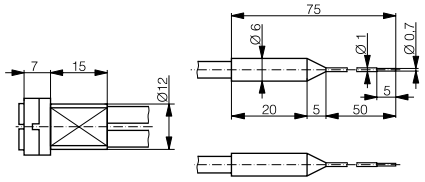


Housing size: ∅ 8 mm	
Part reference	**LFG-2030-###**
Sensing range	with series 4040 150 mm
Special characteristics	For long sensing range
Leg length	14 mm
Sleeve	Wound sleeve of chrome-plated brass, ∅ 6.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N

GLASS OPTICAL FIBERS
AXIAL THROUGH-BEAM SENSING

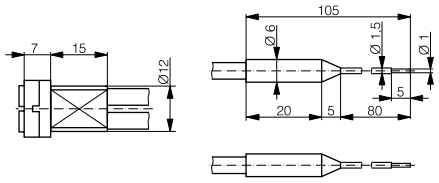
length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)
***bold** = preferred types (-### **only 500 mm length**)*

***Dimensions:** light emission on the right*



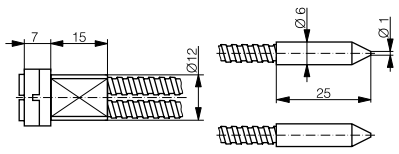
Housing size: ∅ 6 mm

Part reference	LFG-3005-###	
Sensing range	with series 4040	50 mm
Special characteristics	With bendable light-outlet tube	
	For the detection of smallest objects	
Sleeve	Silicone, ∅ 4.7 mm	
Min. bending radius	20 mm / light-outlet tube: 5 mm	
	(do not bend the inner and outer 10 mm)	
Max. tensile load	10 N	



Housing size: ∅ 6 mm

Part reference	LFG-3015-###	
Sensing range	with series 4040	200 mm
Special characteristics	With bendable light-outlet tube	
	For places difficult to access	
Sleeve	Silicone, ∅ 4.7 mm	
Min. bending radius	20 mm / light-outlet tube: 5 mm	
	(do not bend the inner and outer 10 mm)	
Max. tensile load	10 N	



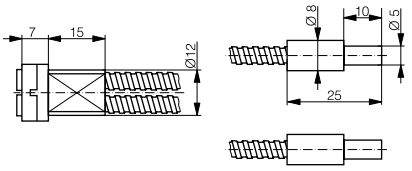
Housing size: ∅ 6 mm

Part reference	LFG-3010-###	
Sensing range	with series 4040	200 mm
Special characteristics	For the detection of smallest objects	
	in places difficult to access	
Sleeve	Wound sleeve of chrome-plated brass, ∅ 4.7 mm	
Min. bending radius	23 mm	
Max. tensile load	20 N	

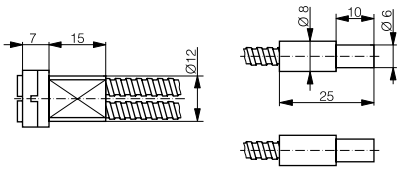
GLASS OPTICAL FIBERS
AXIAL THROUGH-BEAM SENSING

length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)
***bold** = preferred types (-### **only 500 mm length**)*

***Dimensions:** light emission on the right*



Housing size: ∅ 8 mm	
Part reference	**LFG-3020-###**
Sensing range	with series 4040 800 mm
Special characteristics	Multi-purpose medium sensing range model
Sleeve	Wound sleeve of chrome-plated brass, ∅ 4.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N

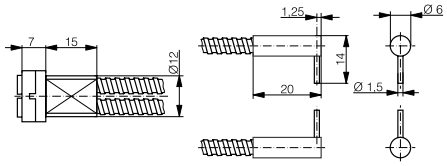


Housing size: ∅ 8 mm	
Part reference	**LFG-3030-###**
Sensing range	with series 4040 1500 mm
Special characteristics	For long sensing range
Sleeve	Wound sleeve of chrome-plated brass, ∅ 4.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N

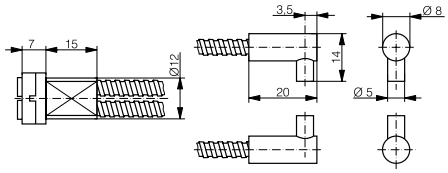
GLASS OPTICAL FIBERS
RADIAL THROUGH-BEAM SENSING

length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)
***bold** = preferred types (-### **only 500 mm length**)*

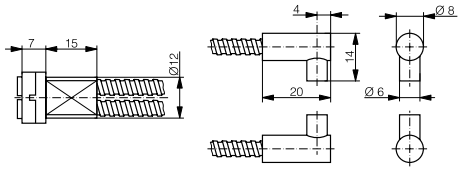
***Dimensions:** light emission on the right*



Housing size: ∅ 6 mm	
Part reference	**LFG-4010-###**
Sensing range	with series 4040 200 mm
Special characteristics	For the detection of smallest objects
	in places difficult to access
Leg length	14 mm
Sleeve	Wound sleeve of chrome-plated brass, ∅ 4.7 mm
Min. bending radius	23 mm
Max. tensile load	20 N



Housing size: ∅ 8 mm	
Part reference	**LFG-4020-###**
Sensing range	with series 4040 800 mm
Special characteristics	Multi-purpose medium sensing range model
Leg length	14 mm
Sleeve	Wound sleeve of chrome-plated brass, ∅ 4.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N



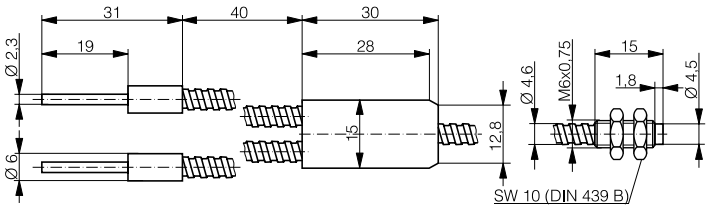
Housing size: ∅ 8 mm	
Part reference	**LFG-4030-###**
Sensing range	with series 4040 1500 mm
Special characteristics	For long sensing range
Leg length	14 mm
Sleeve	Wound sleeve of chrome-plated brass, ∅ 4.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N

FOR SERIES 3030 / 3031 SENSORS (CONNECTION AS WITH SYNTHETIC FIBERS)

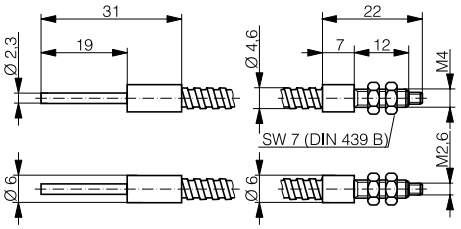
Part reference (**bold:** preferred types)

Dimensions: light emission on the right

Housing size: M6	**Diffuse sensing**	
Part reference	**LFG-1022-050**	
Sensing range	with series 3030	120 mm
	with series 3031	60 mm
Special characteristics	For difficult environmental conditions	
Sleeve	Wound sleeve of chrome-plated brass, ∅ 4.6 mm	
Min. bending radius	25 mm	
Max. tensile load	20 N	

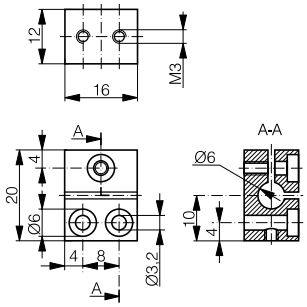


Housing size: M4	**Through-beam sensing**	
Part reference	**LFG-3022-050**	
Sensing range	with series 3030	500 mm
	with series 3031	250 mm
Special characteristics	For difficult environmental conditions	
Sleeve	Wound sleeve of chrome-plated brass, ∅ 4.6 mm	
Min. bending radius	25 mm	
Max. tensile load	20 N	

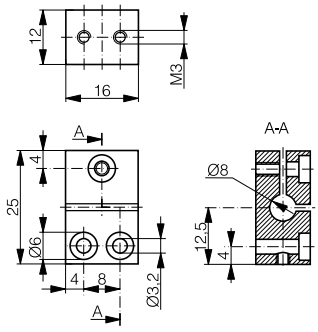


ACCESSORIES FOR GLASS OPTICAL FIBERS

Part reference (**bold:** preferred types)



For ∅ 6 mm heads	Fiber mounting clamp
Part reference	LXG-0000-060
Characteristics	Mounting clamp for axial and radial light-outlet tubes
Material	Nickel-plated brass
Suitable for the following fibers	LFG-1005-### / LFG-1015-###
	LFG-1010-### / LFG-2010-###
	LFG-3005-### / LFG-3015-###
	LFG-3010-### / LFG-4010-###



For ∅ 8 mm heads	Fiber mounting clamp
Part reference	LXG-0000-080
Characteristics	Mounting clamp for axial and radial light-outlet tubes
Material	Nickel-plated brass
Suitable for the following fibers	LFG-1020-### / LFG-1030-###
	LFG-2020-### / LFG-2030-###
	LFG-3020-### / LFG-3030-###
	LFG-4020-### / LFG-4030-###

FOR FURTHER INFORMATION: **WWW.CONTRINEX.COM**

ULTRASONIC SENSORS

HIGHLIGHTS:

- ✓ Ready-to-connect compact devices
- ✓ Short housings
- ✓ Adjustment by means of teach-in, potentiometer and/or interface
- ✓ Devices with digital and/or analog outputs

ULTRASONIC SENSORS

PROGRAM OVERVIEW

HOUSING SIZE	FUNCTION			OPERATING DISTANCE
	Diffuse	Reflex	Through-beam	30 mm / 50 / 60 mm / 100 mm / 150 mm / 200 mm / 300 mm / 400 mm / 600 mm / 700 mm / 1000 mm / 1300 mm / 1500 mm / 3000 mm / 6000 mm
M18 / M18W		✓		0 ... 200 mm
	✓			30 ... 200 mm
		✓		0 ... 700 mm
	✓			100 ... 700 mm
	✓	✓		50 ... 300 mm
	✓	✓		150 ... 1000 mm
M30	✓	✓		60 ... 300 mm
	✓	✓		200 ... 1300 mm
	✓	✓		400 ... 3000 mm
	✓	✓		600...6000 mm
40 x 40 mm			✓	50 ... 1500 mm

OUTPUT					SENSITIVITY SETTING				SUPPLY VOLTAGE U_B	CONNECTION			HOUSING		PAGE
1 x PNP	2 x PNP	NPN	Analog	Analog + PNP	Teach-in	Potentiometer	Interface	Pin 2		Connector S8	Connector S12	Cable	Metal	PBTP	
✓					✓				20 ... 30 VDC		✓		✓		227, 229
✓					✓				20 ... 30 VDC		✓		✓		227, 229
✓					✓				20 ... 30 VDC		✓		✓		227, 229
✓					✓				20 ... 30 VDC		✓		✓		227, 229
✓			✓			✓	✓		12 ... 30 VDC*		✓		✓		231
✓			✓			✓	✓		12 ... 30 VDC*		✓		✓		231
✓	✓			✓		✓	✓		12 ... 30 VDC*		✓		✓		233, 235
✓	✓			✓		✓	✓		12 ... 30 VDC*		✓		✓		233, 235
✓	✓			✓		✓	✓		12 ... 30 VDC*		✓		✓		233, 235
✓	✓			✓		✓	✓		12 ... 30 VDC*		✓		✓		233, 235
✓								✓	12 ... 30 VDC*	✓	✓	✓		✓	237

* At 12 ... 20 V, approx. 20% reduced sensing range

OPERATING PRINCIPLE

Ultrasonic sensors can be used as contact-free devices in many areas of automation. They are employed wherever distances have to be measured in air, since they not only detect objects, but they can also indicate and evaluate the absolute distance between themselves and the target. Changing atmospheric conditions, (e.g. temperature variations) are compensated during evaluation of the measurement.

Ultrasonic devices working as diffuse or reflex sensors send out ultrasonic impulses in cyclical intervals. If these are reflected by an object, the resulting echo is received and converted into an electrical signal. Detection of the received echo is dependent on its intensity, itself dependent on the distance of the object from the sensor. The devices function according to the echo-delay principle, i.e. the time delay between the emitter and echo impulses is evaluated.

With ultrasonic devices working as through-beam sensors, on the other hand, the emitter sends out a narrowly focused permanent sound towards the receiver. The latter evaluates the ultrasonic signal and switches the output as soon as the sound is interrupted by an object.

SENSING RANGE

Due to the sensor's construction, the ultrasound is radiated in a lobar shape. Only reflecting objects within this sound beam are detected. Echoes in the blind zone between the sensing face and the sensing range cannot be evaluated.

TARGETS

The targets to be detected can be in the solid, liquid, granular or powder state. The material may be transparent or colored, of any shape, and with a polished or matt surface. All even or flat surfaces up to an angular deviation of approximately 3° from perpendicular to the sound beam can be detected with certainty, even at the maximum operating distance. Depending on surface roughness, the angular deviation may even be greater. In principle, targets can enter the sound beam from any direction.

TEMPERATURE COMPENSATION

The ultrasonic sensors are equipped with temperature sensors and a compensation circuit, in order to be able to compensate for changes in operating distance caused by temperature fluctuations.

ENVIRONMENTAL CONDITIONS

Normal atmospheric variations at any given location have a negligible influence on the speed of sound. The propagation of ultrasonic waves in a vacuum is not possible.

Hot objects (e.g. red-hot metals) cause air turbulence, dispersing or diverting the ultrasound. In such surroundings, no analyzable echo is produced.

Ultrasonic sensors are designed for use under normal atmospheric conditions, i.e. in air. Operation in other gases (e.g. carbon dioxide) can give rise to serious error measurements or even functional failure, due to differing sound speed and damping values.

Normal rain or snowfall does not impair the functioning of ultrasonic sensors. The transducer surface should, however, not become moistened, although dew is permissible.

Ambient noise is distinguished from the system's own sound echoes and, as a rule, does not lead to functional errors.

SAFETY

The use of ultrasonic sensors in applications where the safety of people is dependent on their functioning is not permitted.

AVAILABLE MODELS

Ultrasonic sensors from Contrinex are available as diffuse, reflex and through-beam types.

DIFFUSE SENSORS

With diffuse sensors, the target functions as a reflector. As soon as an object enters the preset sensing area, its echo causes the device to switch.

REFLEX SENSORS

In the case of reflex sensors, a fixed reflector (e.g. a small metal plate) is mounted facing the device. The switching range is set to this reflector. If an object comes between the ultrasonic sensor and the reflector, the sensor no longer recognizes the latter, which causes the output to switch.

THROUGH-BEAM SENSORS

Through-beam sensors consist of an emitter and a receiver placed opposite each other. If an object comes between them, the sound is interrupted, causing the output to switch.

SYNCHRONIZATION

Devices of series 1180/1181 and 1300...1303 can be synchronized with each other by simply connecting their synchronization outputs (pin 2 for N.O., pin 4 for N.C.). In this way, up to 10 sensors can be synchronized. In many cases, it is thus possible to mount the sensors very close to one another without mutual interference.

The fourth connection can be used as an external release input. Thus, ultrasonic sensors can be activated or deactivated with an external control, without switching the supply voltage on and off. An external multiplex operation can be achieved by switching the ultrasonic sensors on and off one after the other via the release input. In this case, assurance is always given that the ultrasonic sensors do not influence one another. As opposed to internal synchronization, where more than 10 switches can be operated.

PROGRAMMING

For optimum adaptation to the application conditions, devices of series 1180/1181 and 1300 ... 1303 can be programmed with the PC interface device APE-0000-001 (see Ultrasonic accessories, page 238).

The series 1180/1181C and 1180/1181W devices are adjustable by teach-in via the device connection.

The sensitivity of series 4040 devices can be adjusted via pin 2 or the white cable wire of the receiver.

MOUNTING

Ultrasonic sensors can be operated in any installation position. However, positions in which materials can be deposited on the transducer surface should be avoided.

In order to obtain the best reflection results, the ultrasonic sensor should be oriented in such a way that the sound waves strike the target at as close to 90° as possible. If this is not possible (e.g. with bulk materials), the maximum possible range has to be determined experimentally, and is dependent on the material, surface and orientation of the objects.

MAIN FEATURES

- Ready-to-connect compact devices
- Short cylindrical housings of 63.5 mm
- High excess gain, therefore insensitive to dirt and ambient noise
- Detection independent of target's color, shape, material and surface structure
- Reduced blind zone
- Low current drain
- Adjustment by means of external teach-in
- Diffuse sensors feature background suppression

TECHNICAL DATA

(according to IEC 60947-5-2)	
Housing material	Nickel-plated brass
Supply voltage range U_B	20 ... 30 VDC
Max. ripple content	≤ 10 %
Output current	≤ 150 mA
Output voltage drop	≤ 2.0 V at 150 mA
Ambient temperature range	-25 ... +70 °C
Degree of protection	IP 67
EMC protection:	
IEC 61000-4-2	4 kV
IEC 61000-4-3	10 V/m
IEC 61000-4-4	2 kV
IEC 61000-4-6	10 V
EN 55011	Class B
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

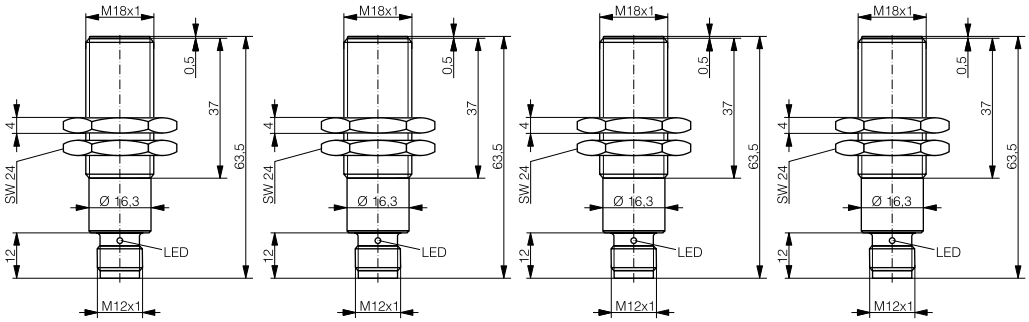
LED

The yellow LED lights up when the output is switched. In teach mode, the LED flashes.

CONNECTION

Devices with 4-pole S12 connector are standard.

HOUSING SIZE	M18 WITH TEACH-IN			
SENSING RANGE	DIFFUSE SENSOR WITH BACKGROUND SUPP. 30 ... 200 mm	REFLEX SENSOR 0 ... 200 mm	DIFFUSE SENSOR WITH BACKGROUND SUPP. 100 ... 700 mm	REFLEX SENSOR 0 ... 700 mm



TECHNICAL DATA

Sensing range	30 ... 200 mm	0 ... 200 mm	100 ... 700 mm	0 ... 700 mm
Setting range	50 ... 200 mm	120 ... 220 mm	150 ... 700 mm	350 ... 750 mm
Tolerance width	---	20 mm	---	50 mm
Standard target	20 x 20 mm	20 x 20 mm	20 x 20 mm	20 x 20 mm
Hysteresis	10 mm	2 mm	10 mm	3 mm
No-load supply current	≤ 20 mA	≤ 20 mA	≤ 20 mA	≤ 20 mA
Rated ultrasonic frequency	400 kHz	400 kHz	200 kHz	200 kHz
Switching frequency	10 Hz	10 Hz	5 Hz	5 Hz
Time delay before availability	20 msec	20 msec	20 msec	20 msec
Response time	50 msec	50 msec	100 msec	100 msec
Approvals	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS
Weight	30 g	30 g	30 g	30 g

PART REFERENCES

(**bold:** preferred types)				
PNP N.O. / connector S12	**UTS-1180C-303**	**URS-1180C-303**	**UTS-1181C-303**	**URS-1181C-303**
Compatible connectors (page 268)	M, N	M, N	M, N	M, N
Wiring (page 239)	Diagram 1	Diagram 1	Diagram 1	Diagram 1

ULTRASONIC SENSORS

MAIN FEATURES

- Ready-to-connect compact devices
- Lateral sensing
- Robust and fully integrated sensing head
- High excess gain, therefore insensitive to dirt and ambient noise
- Detection independent of target's color, shape, material and surface structure
- Reduced blind zone
- Low current drain
- Adjustment by means of external teach-in
- Diffuse sensors feature background suppression

TECHNICAL DATA

(according to IEC 60947-5-2)	
Housing material	Nickel-plated brass
Supply voltage range U_B	20 ... 30 VDC
Max. ripple content	≤ 10 %
Output current	≤ 150 mA
Output voltage drop	≤ 2.0 V at 150 mA
Ambient temperature range	-25 ... +70 °C
Degree of protection	IP 67
EMC protection:	
IEC 61000-4-2	4 kV
IEC 61000-4-3	10 V/m
IEC 61000-4-4	2 kV
IEC 61000-4-6	10 V
EN 55011	Class B
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

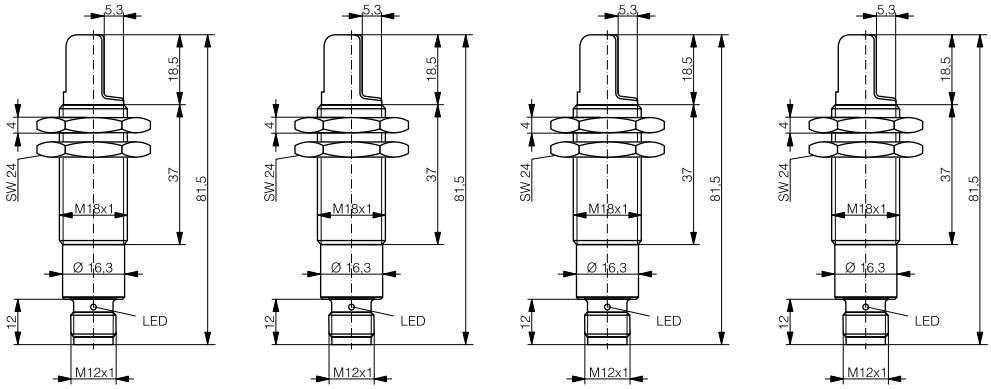
LED

The yellow LED lights up when the output is switched. In teach mode, the LED flashes.

CONNECTION

Devices with 4-pole S12 connector are standard.

HOUSING SIZE	M18 WITH TEACH-IN			
SENSING RANGE	DIFFUSE SENSOR WITH BACKGROUND SUPP. 30 ... 200 mm	REFLEX SENSOR 0 ... 200 mm	DIFFUSE SENSOR WITH BACKGROUND SUPP. 100 ... 700 mm	REFLEX SENSOR 0 ... 700 mm



TECHNICAL DATA

Sensing range	30 ... 200 mm	0 ... 200 mm	100 ... 700 mm	0 ... 700 mm
Setting range	50 ... 200 mm	120 ... 220 mm	150 ... 700 mm	350 ... 750 mm
Tolerance width	---	20 mm	---	50 mm
Standard target	20 x 20 mm	20 x 20 mm	20 x 20 mm	20 x 20 mm
Hysteresis	10 mm	2 mm	10 mm	3 mm
No-load supply current	≤ 20 mA	≤ 20 mA	≤ 20 mA	≤ 20 mA
Rated ultrasonic frequency	400 kHz	400 kHz	200 kHz	200 kHz
Switching frequency	10 Hz	10 Hz	5 Hz	5 Hz
Time delay before availability	20 msec	20 msec	20 msec	20 msec
Response time	50 msec	50 msec	100 msec	100 msec
Approvals	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS
Weight	30 g	30 g	30 g	30 g

PART REFERENCES

(**bold:** preferred types)				
PNP N.O. / connector S12	**UTS-1180W-303**	**URS-1180W-303**	**UTS-1181W-303**	**URS-1181W-303**
Compatible connectors (page 268)	M, N	M, N	M, N	M, N
Wiring (page 239)	Diagram 1	Diagram 1	Diagram 1	Diagram 1

ULTRASONIC SENSORS

MAIN FEATURES

- Ready-to-connect compact devices
- Can be operated as diffuse or reflex sensors (with interface)
- High excess gain, therefore insensitive to dirt and ambient noise
- Detection independent of target's color, shape, material and surface structure
- Reduced blind zone
- Low current drain
- Adjustment by means of potentiometer (only devices with switching output) and interface device APE-0000-001
- Switching or analog output
- Fore- and background suppression
- Diffuse sensors with window function

TECHNICAL DATA

(according to IEC 60947-5-2)	
Housing material	Nickel-plated brass
Supply voltage range U_B	12 ... 30 VDC*
Max. ripple content	≤ 10 %
Output current	≤ 150 mA (devices with switchig output)
Output voltage drop	≤ 3.0 V at 150 mA
Ambient temperature range	-25 ... +70 °C
Degree of protection	IP 67
EMC protection:	
IEC 61000-4-2	4 kV
IEC 61000-4-3	10 V/m
IEC 61000-4-4	2 kV
IEC 61000-4-6	10 V
EN 55011	Class B
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

* At 12 ... 20 V, approx. 20% reduced sensing range.

LED

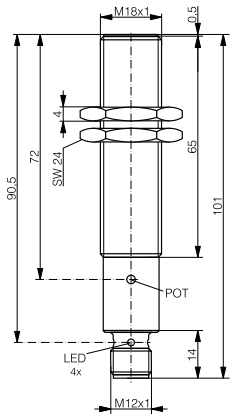
The yellow LED lights up when the output is switched. Flashing LED indicates misadjustment.

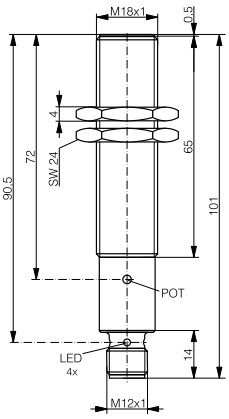
CONNECTION

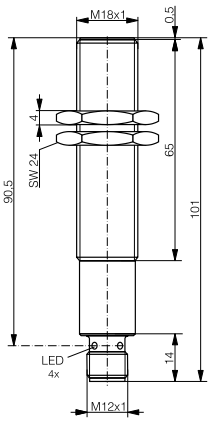
Devices with 4-pole S12 connector are standard.

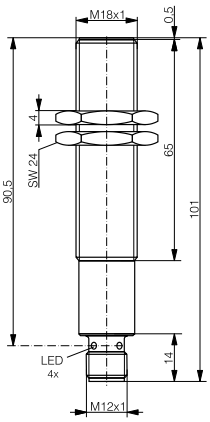
HOUSING SIZE	M18			
SENSING RANGE	DIFFUSE & REFLEX SENSOR 50 ... 300 mm	DIFFUSE & REFLEX SENSOR 150 ... 1,000 mm	DIFFUSE & REFLEX SENSOR 50 ... 300 mm	DIFFUSE & REFLEX SENSOR 150 ... 1,000 mm









TECHNICAL DATA

Sensing range	50 ... 300 mm	150 ... 1,000 mm	50 ... 300 mm	150 ... 1,000 mm
Setting range	70 ... 300 mm	170 ... 1,000 mm	70 ... 300 mm	170 ... 1,000 mm
Standard target	10 x 10 mm	20 x 20 mm	10 x 10 mm	20 x 20 mm
Hysteresis	10 mm	10 mm	10 mm	10 mm
No-load supply current	≤ 50 mA	≤ 50 mA	≤ 50 mA	≤ 50 mA
Rated ultrasonic frequency	400 kHz	200 kHz	400 kHz	200 kHz
Switching frequency	5 Hz	4 Hz	---	---
Time delay before availability	280 msec	280 msec	280 msec	280 msec
Response time	100 msec	120 msec	100 msec	120 msec
Approvals	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS
Weight	50 g	50 g	50 g	50 g

PART REFERENCES

(**bold:** preferred types)				
PNP N.O. / connector S12	**UTS-1180-303**	**UTS-1181-303**		
Analog 4 ... 20 mA / S12			**UTS-1180-329**	**UTS-1181-329**
Compatible connectors (page 268)	M, N	M, N	M, N	M, N
Wiring (page 239)	Diagram 2	Diagram 2	Diagram 2	Diagram 2

ULTRASONIC SENSORS

MAIN FEATURES

- Ready-to-connect compact devices
- Can be operated as diffuse or reflex sensors
- High excess gain, therefore insensitive to dirt and ambient noise
- Detection independent of target's color, shape, material and surface structure
- Reduced blind zone
- Low current drain
- Adjustment by means of potentiometer and interface device APE-0000-001
- 1 or 2 switching outputs
- Fore- and background suppression
- Diffuse sensors with window function

TECHNICAL DATA

(according to IEC 60947-5-2)	
Housing material	Nickel-plated brass
Supply voltage range U_B	12 ... 30 VDC*
Max. ripple content	≤ 10 %
Output current	≤ 300 mA
Output voltage drop	≤ 3.0 V at 300 mA
Ambient temperature range	-25 ... +70 °C
Degree of protection	IP 65
EMC protection:	
IEC 61000-4-2	4 kV
IEC 61000-4-3	10 V/m
IEC 61000-4-4	2 kV
IEC 61000-4-6	10 V
EN 55011	Class B
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

* At 12 ... 20 V, approx. 20% reduced sensing range.

LED

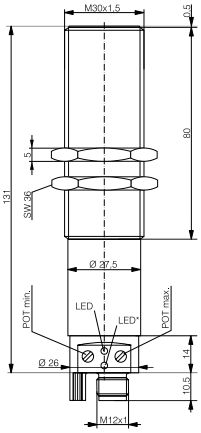
The yellow LED lights up when the output is switched. Flashing LED indicates misadjustment.

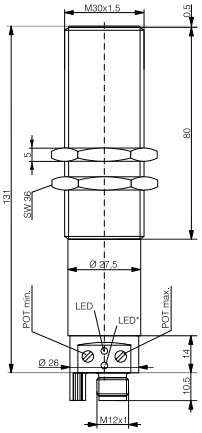
CONNECTION

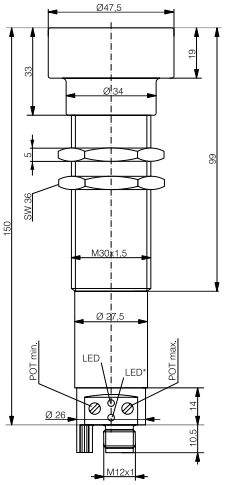
Devices with 4-pole (UTS-130#-303) or 5-pole (UTS-130#-107) S12 connector are standard.

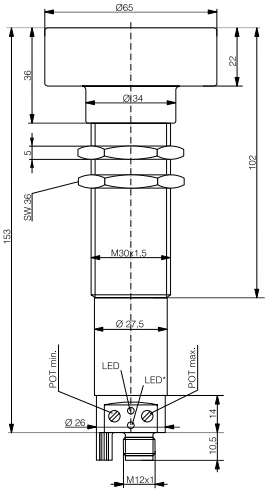
HOUSING SIZE	M30			
SENSING RANGE	DIFFUSE & REFLEX SENSOR 60 ... 300 mm	DIFFUSE & REFLEX SENSOR 200 ... 1,300 mm	DIFFUSE & REFLEX SENSOR 400 ... 3,000 mm	DIFFUSE & REFLEX SENSOR 600 ... 6,000 mm









*UTS-130#-107 only

TECHNICAL DATA

Sensing range	60 ... 300 mm	200 ... 1,300 mm	400 ... 3,000 mm	600 ... 6,000 mm
Setting range	80 ... 300 mm	220 ... 1,300 mm	420 ... 3,000 mm	640 ... 6,000 mm
Standard target	10 x 10 mm	20 x 20 mm	50 x 50 mm	100 x 100 mm
Hysteresis	10 mm	10 mm	20 mm	60 mm
No-load supply current	≤ 50 mA	≤ 50 mA	≤ 50 mA	≤ 50 mA
Rated ultrasonic frequency	400 kHz	200 kHz	120 kHz	80 kHz
Switching frequency	8 Hz	4 Hz	2 Hz	1 Hz
Time delay before availability	280 msec	280 msec	280 msec	280 msec
Response time	80 msec	110 msec	200 msec	400 msec
Approvals	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS
Weight	210 g	210 g	340 g	380 g

PART REFERENCES

(**bold:** preferred types)				
1 x PNP N.O. / S12	**UTS-1300-303**	**UTS-1301-303**	**UTS-1302-303**	**UTS-1303-303**
2 x PNP N.O. / S12	**UTS-1300-107**	**UTS-1301-107**	**UTS-1302-107**	**UTS-1303-107**
Compatible connectors (page 268)	M, N (...-303)/O, P (...-107)	M, N (...-303)/O, P (...-107)	M, N (...-303)/O, P (...-107)	M, N (...-303)/O, P (...-107)
Wiring (page 239)	Diagram 2 (...-303)/3 (...-107)	Diagram 2 (...-303)/3 (...-107)	Diagram 2 (...-303)/3 (...-107)	Diagram 2 (...-303)/3 (...-107)

ULTRASONIC SENSORS

MAIN FEATURES

- Ready-to-connect compact devices
- Can be operated as diffuse or reflex sensors
- High excess gain, therefore insensitive to dirt and ambient noise
- Detection independent of target's color, shape, material and surface structure
- Reduced blind zone
- Low current drain
- Adjustment by means of potentiometer and interface device APE-0000-001
- Switching and analog outputs
- Fore- and background suppression
- Diffuse sensors with window function

TECHNICAL DATA

(according to IEC 60947-5-2)	
Housing material	Nickel-plated brass
Supply voltage range U_B	12 ... 30 VDC*
Max. ripple content	≤ 10 %
Output current	≤ 300 mA
Output voltage drop	≤ 3.0 V at 300 mA
Ambient temperature range	-25 ... +70 °C
Degree of protection	IP 65
EMC protection:	
IEC 61000-4-2	4 kV
IEC 61000-4-3	10 V/m
IEC 61000-4-4	2 kV
IEC 61000-4-6	10 V
EN 55011	Class B
Short-circuit protection	Built-in
Polarity reversal protection	Built-in
Power-on reset	Built-in

* At 12 ... 20 V, approx. 20% reduced sensing range.

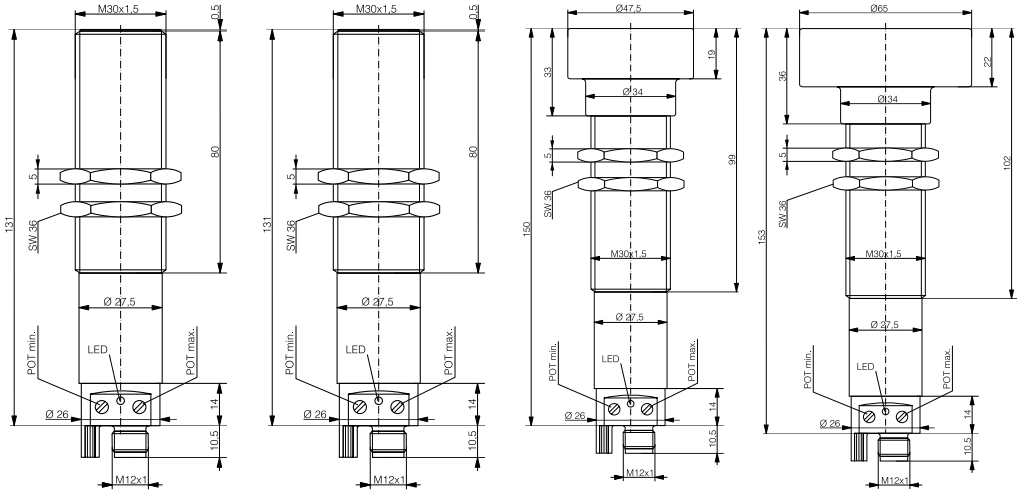
LED

The yellow LED lights up when the output is switched. Flashing LED indicates misadjustment.

CONNECTION

Devices with 5-pole S12 connector are standard.

HOUSING SIZE	M30 WITH ANALOG OUTPUT			
SENSING RANGE	DIFFUSE & REFLEX SENSOR 60 ... 300 mm	DIFFUSE & REFLEX SENSOR 200 ... 1,300 mm	DIFFUSE & REFLEX SENSOR 400 ... 3,000 mm	DIFFUSE & REFLEX SENSOR 600 ... 6,000 mm



TECHNICAL DATA

Sensing range	60 ... 300 mm	200 ... 1,300 mm	400 ... 3,000 mm	600 ... 6,000 mm
Setting range	80 ... 300 mm	220 ... 1,300 mm	420 ... 3,000 mm	640 ... 6,000 mm
Standard target	10 x 10 mm	20 x 20 mm	50 x 50 mm	100 x 100 mm
Hysteresis	10 mm	10 mm	20 mm	60 mm
No-load supply current	≤ 60 mA	≤ 60 mA	≤ 60 mA	≤ 60 mA
Rated ultrasonic frequency	400 kHz	200 kHz	120 kHz	80 kHz
Switching frequency	5 Hz	4 Hz	2 Hz	1 Hz
Time delay before availability	280 msec	280 msec	280 msec	280 msec
Response time	100 msec	120 msec	200 msec	400 msec
Approvals	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS
Weight	210 g	210 g	340 g	380 g

PART REFERENCES

(**bold:** preferred types)				
Analog 4...20 mA+PNP N.O./S12	**UTS-1300-123**	**UTS-1301-123**	**UTS-1302-123**	**UTS-1303-123**
Analog 0...10 V+PNP N.O./S12	**UTS-1300-113**	**UTS-1301-113**	**UTS-1302-113**	**UTS-1303-113**
Compatible connectors (page 268)	O, P	O, P	O, P	O, P
Wiring (page 239)	Diagram 4 (...-123)/5 (...-113)	Diagram 4 (...-123)/5 (...-113)	Diagram 4 (...-123)/5 (...-113)	Diagram 4 (...-123)/5 (...-113)

MAIN FEATURES

- Ready-to-connect compact devices
- High excess gain, therefore insensitive to dirt and ambient noise
- Detection independent of target's color, shape, material and surface structure
- High switching frequency
- Narrowly focused permanent sound emission
- No blind zone
- Low current drain
- Sensitivity adjustment via pin 2 or white cable wire of receiver

TECHNICAL DATA

(according to IEC 60947-5-2)	
Housing material	Glass-fiber reinforced PBTP (Crastin)
Supply voltage range U_B	12 ... 30 VDC*
Max. ripple content	≤ 10 %
Output current	≤ 100 mA
Output voltage drop	≤ 2.0 V at 100 mA
Ambient temperature range	0 ... +70 °C
Degree of protection	IP 67
EMC protection:	
IEC 60947-5-2 (7.2.3.1)	1 kV
IEC 61000-4-2	4 kV / 8 kV
IEC 61000-4-3	10 V/m
IEC 61000-4-4	2 kV
IEC 61000-4-6	7 V
Short-circuit protection	Built-in
Polarity reversal protection	Built-in

* At 12 ... 20 V, approx. 20% reduced sensitivity.

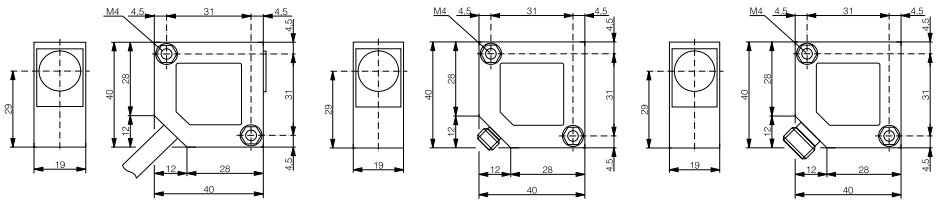
LED

The yellow LED lights up when the output is switched, the green LED lights up as soon as the sensor is connected.

CONNECTION

Devices with 4-pole S12 or S8 connector, or 3 m PUR cable are standard.

HOUSING SIZE	⌀ 40 X 40		
SENSING RANGE	THROUGH-BEAM SENSOR 50 ... 1,500 mm	THROUGH-BEAM SENSOR 50 ... 1,500 mm	THROUGH-BEAM SENSOR 50 ... 1,500 mm



TECHNICAL DATA

Sensing range (E)	50 ... 1,500 mm	50 ... 1,500 mm	50 ... 1,500 mm
Standard target	20x20 mm <400 mm> 10x10 mm	20x20 mm <400 mm> 10x10 mm	20x20 mm <400 mm> 10x10 mm
No-load supply current	≤ 30 mA (E) / ≤ 20 mA (R)	≤ 30 mA (E) / ≤ 20 mA (R)	≤ 30 mA (E) / ≤ 20 mA (R)
Rated ultrasonic frequency (E)	200 kHz	200 kHz	200 kHz
Switching frequency	200 Hz (< 400 mm) / 150 Hz	200 Hz (< 400 mm) / 150 Hz	200 Hz (< 400 mm) / 150 Hz
	(< 800 mm)/100 Hz (< 1500 mm)	(< 800 mm)/100 Hz (< 1500 mm)	(< 800 mm)/100 Hz (< 1500 mm)
Time delay before availability (R)	40 msec	40 msec	40 msec
Response time (R)	2 msec (<400 mm)/1.5 msec	2 msec (<400 mm)/1.5 msec	2 msec (<400 mm)/1.5 msec
	(< 800 mm)/1 msec (< 1500 mm)	(< 800 mm)/1 msec (< 1500 mm)	(< 800 mm)/1 msec (< 1500 mm)
Connection	PUR cable 3 m	Connector S8	Connector S12
Approvals	CE, RoHS	CE, RoHS	CE, RoHS
Weight (R + E)	220 g	70 g	80 g

PART REFERENCES

(**bold:** preferred types)	**(R)** receiver / **(E)** emitter	**(R)** receiver / **(E)** emitter	**(R)** receiver / **(E)** emitter
PNP N.O. (Receiver)	**ULK-4040-003**	**ULS-4040-003**	**ULS-4040-003-305**
Emitter	**ULK-4040-000**	**ULS-4040-000**	**ULS-4040-000-305**
Compatible connectors (page 268)	---	E, F	M, N
Wiring (page 239)	Diagram 2 (R) / 6 (E)	Diagram 2 (R) / 6 (E)	Diagram 2 (R) / 6 (E)

ULTRASONIC ACCESSORIES

CONPROG PC INTERFACE

For optimum adaptation to the application conditions, the parameters of all the devices in this catalog (excepting series 1180/1181C, 1180/1181W and 4040) can be programmed, visualized, checked and changed with the PC interface device APE-0000-001 and its software CONPROG. Amongst others, the following parameters can be set:

- Beginning and end of operating range
- Hysteresis
- End of sensing range
- Switching function (N.O. or N.C.)
- Beginning and end of analog characteristic curve (devices with analog output)
- Direction of analog characteristic curve (rising or falling)
- End of blind zone
- Mean value generation
- Temperature compensation
- Multiplex function
- Function as diffuse or reflex sensor
- Switching frequency
- Damping (sensitivity)

The programmed values can be stored and printed, thus simplifying the maintenance and documentation of the installation. In case several sensors need to be parametrized identically, the stored setting values can be transferred rapidly to the other sensors by means of the interface device (e.g. when connecting switches in series, or when exchanging them).

The interface device is delivered with a RS232 cable (for serial interface), a mains transformer plug, a sensor connecting cable and CONPROG PC software for Windows. Updates to the latest software version can be downloaded from the Contrinex website (www.contrinex.com).

INTERFACE DEVICE

suitable for all the devices in this catalog, excepting series 1180/1181C, 1180/1181W and 4040.

Part reference: **APE-0000-001**

S12 INTERFACE CABLE WITH TEACH-IN BUTTON

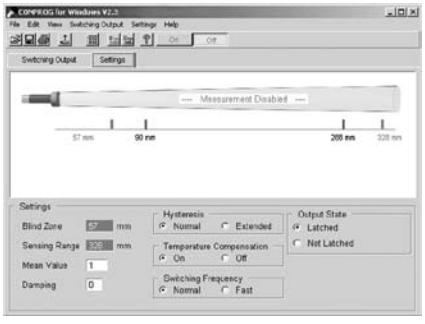
suitable for teach-in of 1180/1181C and 1180/1181W devices.

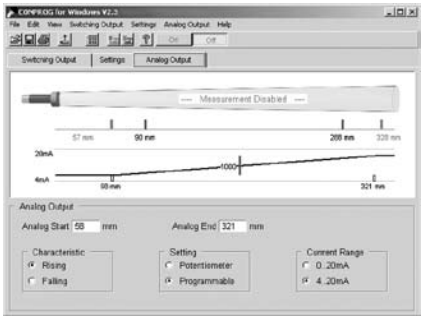
Part reference: **APE-0000-003**

CONPROG PC SOFTWARE

for Windows.

Included with APE-0000-001 interface device

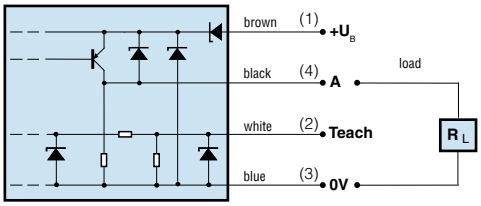




WIRING DIAGRAMS

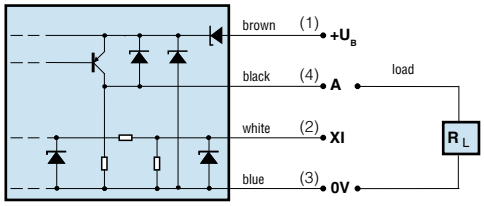
PNP N.O. with teach-in

Diagram 1



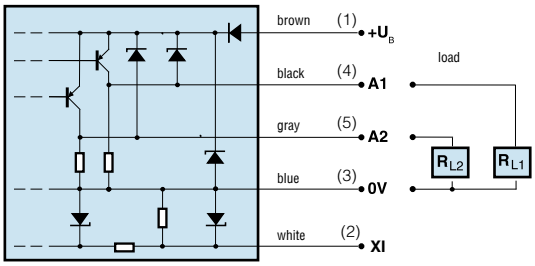
PNP N.O. output / Analog output (current)

Diagram 2



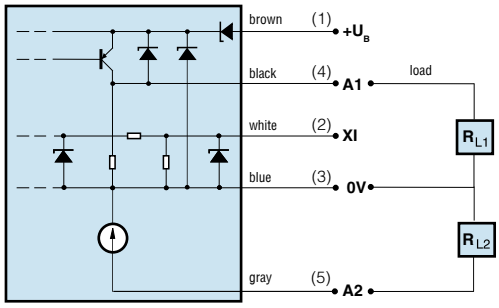
2 x PNP N.O.

Diagram 3



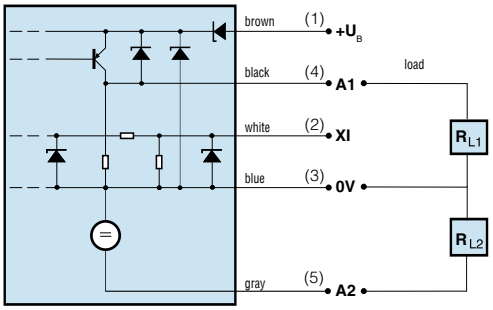
PNP N.O. + analog outputs (current)

Diagram 4



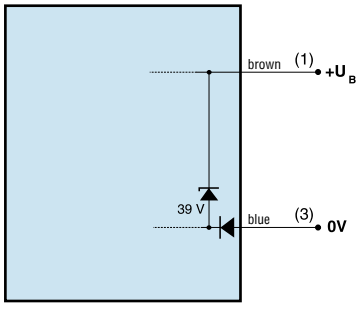
PNP N.O. + analog outputs (voltage)

Diagram 5



Emitter of through-beam sensor

Diagram 6



FOR FURTHER INFORMATION: **WWW.CONTRINEX.COM**

CAPACITIVE SENSORS

HIGHLIGHTS:

- ✓ Synthetic or metal housings
- ✓ 4- or 2-wire devices
- ✓ Adjustable operating distances
- ✓ For the detection of all kinds of materials

PROGRAM OVERVIEW

HOUSING SIZE	OPERATING DISTANCE						OUTPUT		
	2.0 mm	4.0 mm	5.0 mm	8.0 mm	10 mm	15 mm	PNP changeover	NPN changeover	AC/DC 2-wire N.O.
M12	2.0 mm						✓	✓	
		4.0 mm					✓	✓	
M18			5.0 mm				✓	✓	✓
				8.0 mm			✓	✓	✓
M30					10 mm		✓	✓	✓
						15 mm	✓	✓	✓

MOUNTING		SUPPLY VOLTAGE RANGE U_B		CONNECTION		HOUSING			PAGE
Embeddable	Non-embeddable	PNP / NPN	AC/DC 2-wire N.O.	Connector S12	Cable	Metal	PPO	PTFE	
✓		10 ... 35 VDC		✓	✓	✓	✓	✓	246-247
	✓	10 ... 35 VDC		✓	✓	✓	✓	✓	247-248
✓		10 ... 35 VDC	20 ... 250 VAC / DC	✓	✓	✓	✓	✓	249-250, 256
	✓	10 ... 30 / 35 VDC	20 ... 250 VAC / DC	✓	✓	✓	✓	✓	250-251, 256
✓		10 ... 35 VDC	20 ... 250 VAC / DC	✓	✓	✓	✓	✓	252-253, 257
	✓	10 ... 30 / 35 VDC	20 ... 250 VAC / DC	✓	✓	✓	✓	✓	253-255, 257

CAPACITIVE SENSORS

INTRODUCTION

Capacitive sensors are used in machines, installations and vehicles for monitoring the levels of liquids, pastes and bulk material. These materials can even be detected through non-metallic dividing walls. In addition, capacitive sensors are suitable as limit switches, contact-free position switches, for monitoring and positioning, as pulse generators for counting purposes, distance and speed measurement, and much more.

OPERATING PRINCIPALE

The electrodes at the device's sensing face permit the sensor to detect the dielectric conditions in its close surroundings. Depending on the distance between the target (or material) to be detected and the capacitive sensor, the capacitance in the measuring zone changes. The capacitance is dependent not only on the above-mentioned distance, but also on the dielectric constant (ε_r) of the target, as well as its shape. As the sensor approaches the target, the capacitance increases. When the set threshold value is reached, the transistor-oscillator is activated. By means of the built-in electronics, a changeable, electrical current is generated which, depending on the execution of the device, is available as a linear current signal or as a binary voltage at the output.

Using capacitive sensors, electronic circuits and PLCs, as well as relays or contactors can be controlled directly.

Capacitive sensors are enclosed in synthetic or metal housings and potted in epoxy resin. They are, moreover, insensitive to dirt and shock.

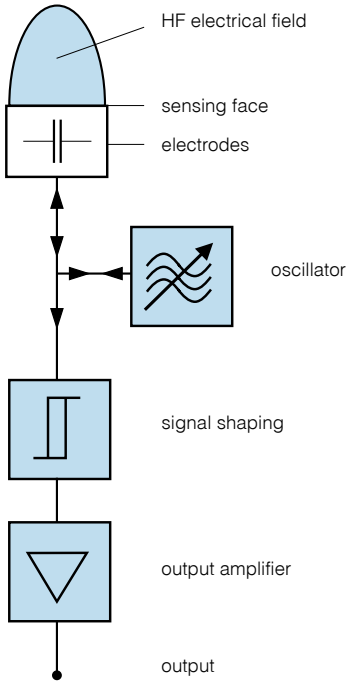


Fig. 16: operating principle

DELIVERY PROGRAM

The Contrinex delivery program consists of 4-wire devices in sizes M12, M18 and M30 (PNP or NPN, with changeover outputs) as well as 2-wire switches (AC/DC, NO) in sizes M18 and M30.

SERIES AND PARALLEL CONNECTION

Capacitive 2-wire sensors with binary output can be used in series or parallel connection, similar to mechanical contacts. Attention has to be paid to the device-specific voltage drop, i.e. the residual voltage U_d, which multiplies in the case of series connection according to the number of devices. In the case of parallel connection of sensors with thyristor output, the first switching output takes the whole load current.

ADJUSTMENT OF THE OPERATING DISTANCE

Equipped with a 20-turn potentiometer, these Contrinex sensors allow for adjustment of the operating distance, which can be either longer than or shorter than the rated operating distance. Under favorable conditions, an operating distance of up to the maximum given value can be set.

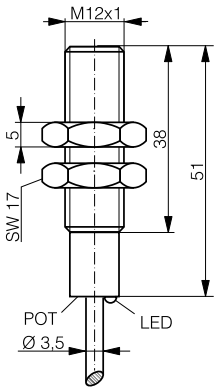
MOUNTING

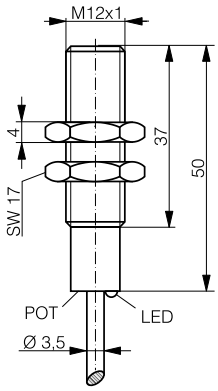
As with inductive sensors, two kinds of mounting are distinguished for capacitive sensors: embeddable or non-embeddable.

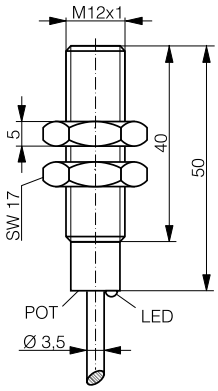
Sensors for embeddable installation in metal or other materials can be arranged side by side, and are particularly suitable for the contact-free detection of solid bodies or liquid levels through non-metallic dividing walls (max. wall thickness 4 mm).

When mounting two or more sensors for non-embeddable installation side by side in metal or other materials, some free space must be provided. Non-embeddable sensors are particularly suitable for applications where the medium to be detected comes into contact with the sensing head (e.g. level monitoring of bulk material, pastes or liquids).

HOUSING SIZE	M12		
OPERATING DISTANCE MM	2	2	2







[1] Standard cable length 2 m.
Non-standard cable lengths and types on request.
[2] see page 258
[3] see page 259
[4] see page 268

TECHNICAL DATA

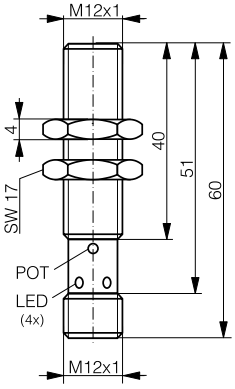
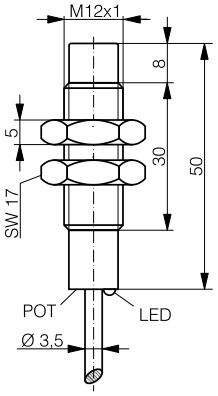
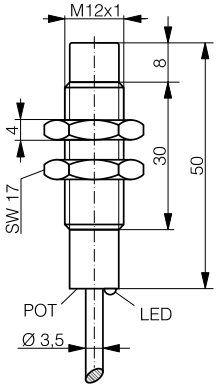
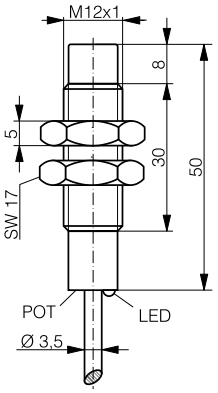
Op. distance min./max. adjustable	0.5 ... 5 mm	0 ... 6 mm	0 ... 6 mm
Housing material	PPO	Stainless steel V2A	PTFE
Sensing face	PPO	PTFE	PTFE
Connection [1]	PUR 4 x 0.14 mm²	PUR 4 x 0.14 mm²	PUR 4 x 0.14 mm²
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	500 Hz	500 Hz	500 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 1
LED	Green / yellow	Green / yellow	Green / yellow
Supply voltage range	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA
Approvals	CE, RoHS	CE, RoHS	CE, RoHS

PART REFERENCES

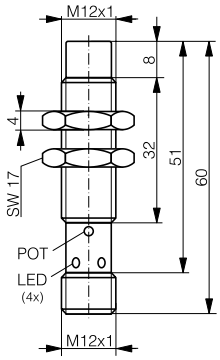
(**bold:** preferred types)			
NPN changeover outputs	**CSK-1120-201**	**CSK-1120-101**	**CSK-1120-301**
PNP changeover outputs	**CSK-1120-203**	**CSK-1120-103**	**CSK-1120-303**
Compatible connectors [4]			

Detailed data sheets for these products can be found on the Contrinex website:

M12

2	4	4	4
			
			
0 ... 6 mm	1 ... 6 mm	0.5 ... 10 mm	0.5 ... 10 mm
Stainless steel V2A	PPO	Stainless steel V2A	PTFE
PTFE	PPO	PTFE	PTFE
Connector S12	PUR 4 x 0.14 mm^2	PUR 4 x 0.14 mm^2	PUR 4 x 0.14 mm^2
IP 67	IP 67	IP 67	IP 67
Embeddable	Non-embeddable	Non-embeddable	Non-embeddable
500 Hz	50 Hz	50 Hz	50 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1
Yellow	Green / yellow	Green / yellow	Green / yellow
10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA
CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS
CSS-1120-101	**CSK-1120-211**	**CSK-1120-111**	**CSK-1120-311**
CSS-1120-103	**CSK-1120-213**	**CSK-1120-113**	**CSK-1120-313**
M, N			

HOUSING SIZE	M12		
OPERATING DISTANCE MM	4		



[1] Standard cable length 2 m. Non-standard cable lengths and types on request.
[2] see page 258
[3] see page 259
[4] see page 268

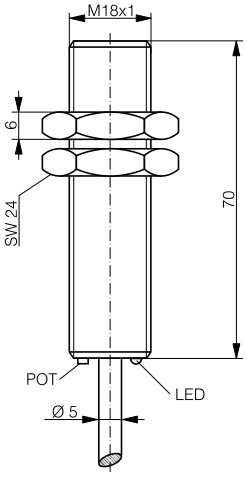
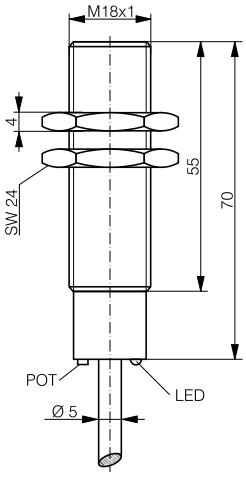
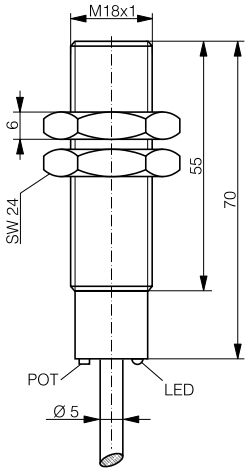
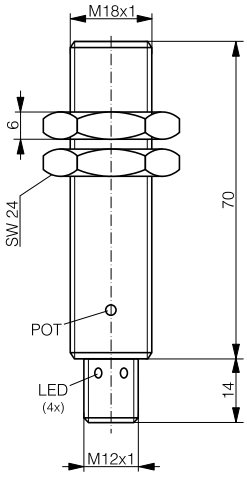
TECHNICAL DATA

Op. distance min./max. adjustable	0.5 ... 10 mm		
Housing material	Stainless steel V2A		
Sensing face	PTFE		
Connection [1]	Connector S12		
Degree of protection	IP 67		
Mounting	Non-embeddable		
Max. switching frequency	50 Hz		
Additional technical data [2]	Table 1		
Wiring [3]	Diagram 1		
LED	Yellow		
Supply voltage range	10 ... 35 VDC		
Ambient temperature range	-25 ... +70 °C		
Output current	≤ 2 x 250 mA		
Approvals	CE, RoHS		

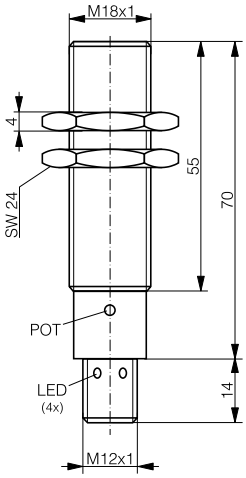
PART REFERENCES

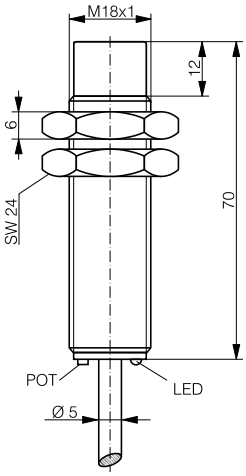
(**bold:** preferred types)			
NPN changeover outputs	**CSS-1120-111**		
PNP changeover outputs	**CSS-1120-113**		
Compatible connectors [4]	M, N		

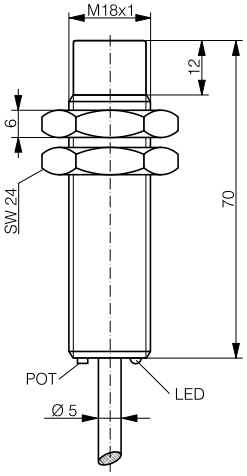
M18

5	5	5	5
			
			
0.5 ... 10 mm	0.5 ... 10 mm	0.5 ... 10 mm	0.5 ... 10 mm
PPO	Nickel-plated brass	PTFE	PPO
PPO	PTFE	PTFE	PPO
PVC 4 x 0.34 mm^2	PVC 4 x 0.34 mm^2	PVC 4 x 0.34 mm^2	Connector S12
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
300 Hz	300 Hz	300 Hz	300 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1
Green / yellow	Green / yellow	Green / yellow	Yellow
10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA
CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS
CSK-1180-201	**CSK-1180-101**	**CSK-1180-301**	**CSS-1180-201**
CSK-1180-203	**CSK-1180-103**	**CSK-1180-303**	**CSS-1180-203**
			M, N

HOUSING SIZE	M18		
OPERATING DISTANCE MM	5	8	8







[1] Standard cable length 2 m.
Non-standard cable lengths and types on request.
[2] see page 258
[3] see page 259
[4] see page 268

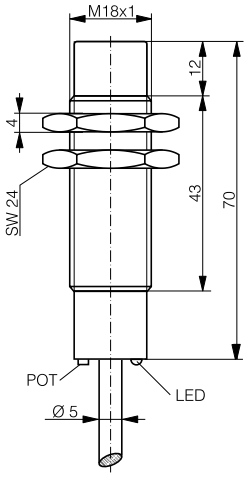
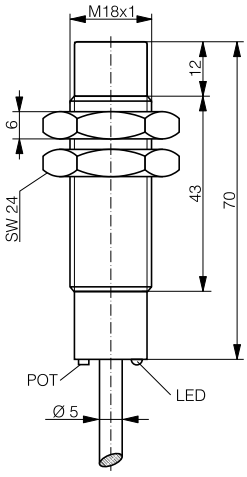
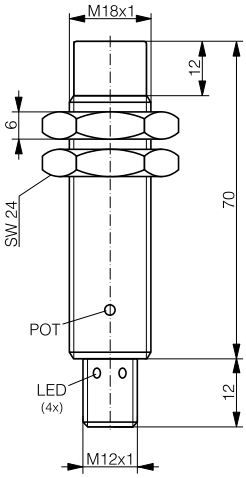
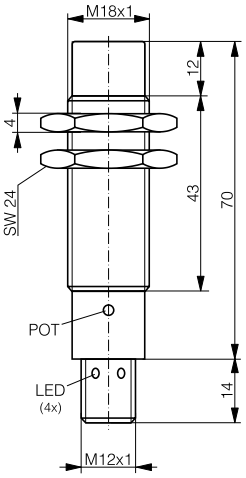
TECHNICAL DATA

Op. distance min./max. adjustable	0.5 ... 10 mm	1 ... 10 mm	0.5 ... 15 mm
Housing material	Nickel-plated brass	PPO	PPO
Sensing face	PTFE	PPO	PPO
Connection [1]	Connector S12	PVC 4 x 0.34 mm²	PVC 4 x 0.34 mm²
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	300 Hz	50 Hz	50 Hz
Additional technical data [2]	Table 1	Table 3	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 1
LED	Yellow	Yellow	Green / yellow
Supply voltage range	10 ... 35 VDC	10 ... 30 VDC	10 ... 35 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 2 x 250 mA	≤ 2 x 200 mA	≤ 2 x 250 mA
Approvals	CE, RoHS	CE, RoHS	CE, RoHS

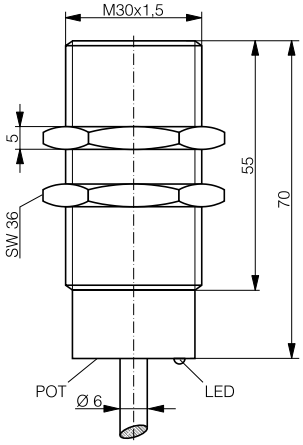
PART REFERENCES

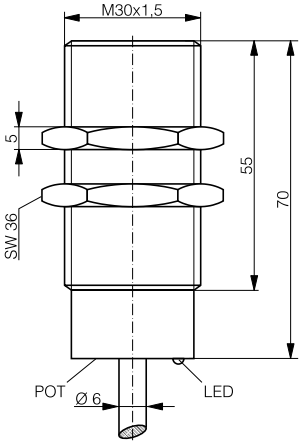
(**bold:** preferred types)			
NPN changeover outputs	**CSS-1180-101**		**CSK-1180-211**
PNP changeover outputs	**CSS-1180-103**	**CSK-1181-213**	**CSK-1180-213**
Compatible connectors [4]	M, N		

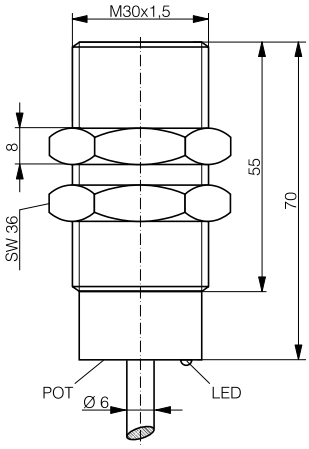
M18

8	8	8	8
			
			
0.5 ... 15 mm	0.5 ... 15 mm	0.5 ... 15 mm	0.5 ... 15 mm
Nickel-plated brass	PTFE	PPO	Nickel-plated brass
PTFE	PTFE	PPO	PTFE
PVC 4 x 0.34 mm^2	PVC 4 x 0.34 mm^2	Connector S12	Connector S12
IP 67	IP 67	IP 67	IP 67
Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
50 Hz	50 Hz	50 Hz	50 Hz
Table 1	Table 1	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1
Green / yellow	Green / yellow	Yellow	Yellow
10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA
CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS
CSK-1180-111	**CSK-1180-311**	**CSS-1180-211**	**CSS-1180-111**
CSK-1180-113	**CSK-1180-313**	**CSS-1180-213**	**CSS-1180-113**
		M, N	M, N

HOUSING SIZE	M30		
OPERATING DISTANCE MM	10	10	10







[1] Standard cable length 2 m. Non-standard cable lengths and types on request.
[2] see page 258
[3] see page 259
[4] see page 268

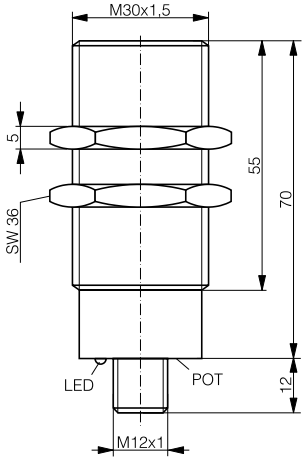
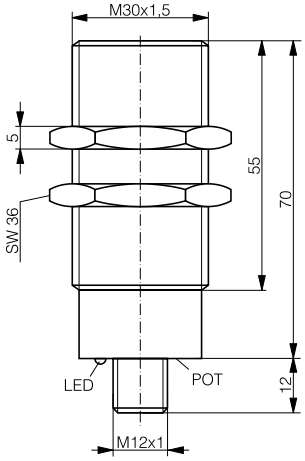
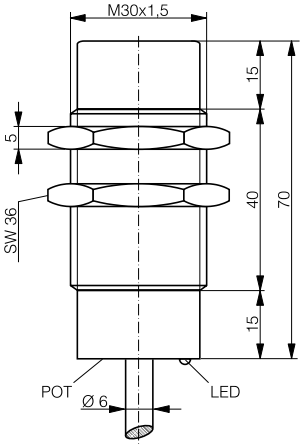
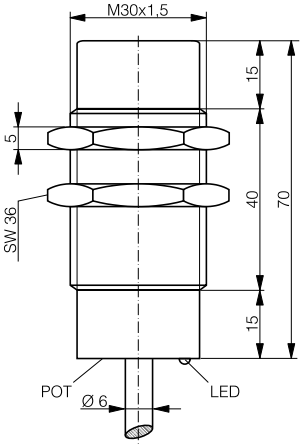
TECHNICAL DATA

Op. distance min./max. adjustable	0.5 ... 25 mm	0.5 ... 25 mm	0.5 ... 25 mm
Housing material	PPO	Nickel-plated brass	PTFE
Sensing face	PPO	PTFE	PTFE
Connection [1]	PVC 4 x 0.5 mm²	PVC 4 x 0.5 mm²	PVC 4 x 0.5 mm²
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	200 Hz	200 Hz	200 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 1
LED	Green / yellow	Green / yellow	Green / yellow
Supply voltage range	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA
Approvals	CE, RoHS	CE, RoHS	CE, RoHS

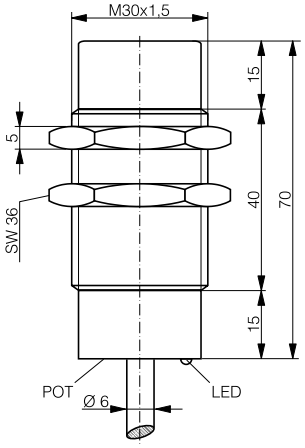
PART REFERENCES

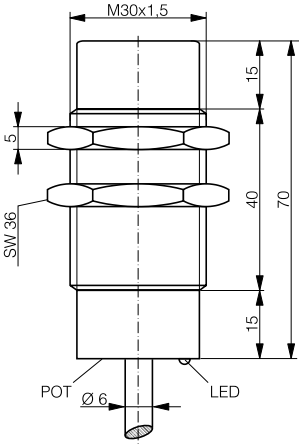
(**bold:** preferred types)			
NPN changeover outputs	**CSK-1300-201**	**CSK-1300-101**	**CSK-1300-301**
PNP changeover outputs	**CSK-1300-203**	**CSK-1300-103**	**CSK-1300-303**
Compatible connectors [4]			

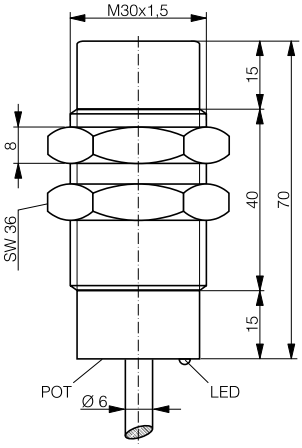
M30

10	10	15	15
			
			
0.5 ... 25 mm	0.5 ... 25 mm	2 ... 25 mm	2 ... 25 mm
PPO	Nickel-plated brass	PPO	Nickel-plated brass
PPO	PTFE	PPO	PPO
Connector S12	Connector S12	PVC 4 x 0.5 mm^2	PVC 4 x 0.5 mm^2
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Non-embeddable	Non-embeddable
200 Hz	200 Hz	50 Hz	50 Hz
Table 1	Table 1	Table 3	Table 3
Diagram 1	Diagram 1	Diagram 1	Diagram 1
Green / yellow	Green / yellow	Yellow	Yellow
10 ... 35 VDC	10 ... 35 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 200 mA	≤ 2 x 200 mA
CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS
CSS-1300-201	**CSS-1300-101**		
CSS-1300-203	**CSS-1300-103**	**CSK-1301-213**	**CSK-1301-113**
M, N	M, N		

HOUSING SIZE	M30		
OPERATING DISTANCE MM	15	15	15







[1] Standard cable length 2 m. Non-standard cable lengths and types on request.
[2] see page 258
[3] see page 259
[4] see page 268

TECHNICAL DATA

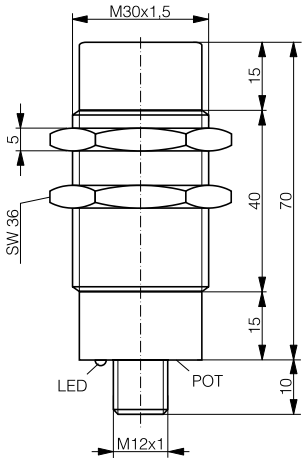
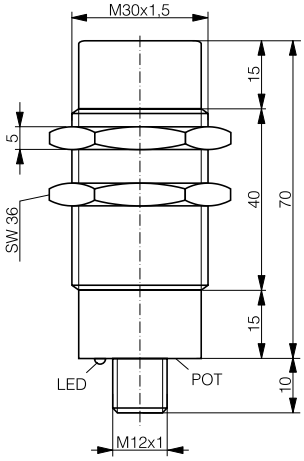
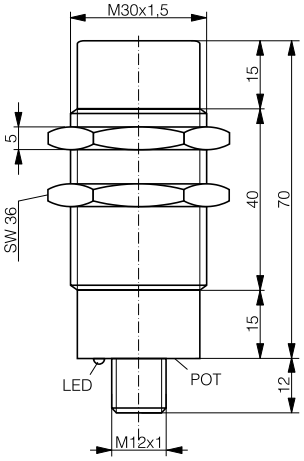
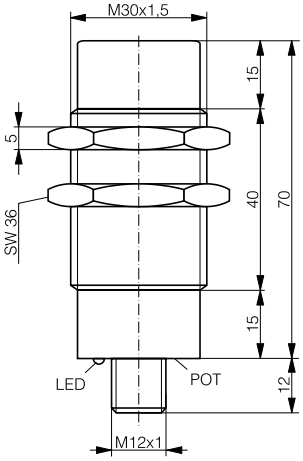
Op. distance min./max. adjustable	1 ... 30 mm	1 ... 30 mm	1 ... 30 mm
Housing material	PPO	Nickel-plated brass	PTFE
Sensing face	PPO	PTFE	PTFE
Connection [1]	PVC 4 x 0.5 mm^2	PVC 4 x 0.5 mm^2	PVC 4 x 0.5 mm^2
Degree of protection	IP 67	IP 67	IP 67
Mounting	Non-embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	50 Hz	50 Hz	50 Hz
Additional technical data [2]	Table 1	Table 1	Table 1
Wiring [3]	Diagram 1	Diagram 1	Diagram 1
LED	Green / yellow	Green / yellow	Green / yellow
Supply voltage range	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 2 x 250 mA	≤ 2 x 250 mA	≤ 2 x 250 mA
Approvals	CE, RoHS	CE, RoHS	CE, RoHS

PART REFERENCES

(**bold:** preferred types)			
NPN changeover outputs	**CSK-1300-211**	**CSK-1300-111**	**CSK-1300-311**
PNP changeover outputs	**CSK-1300-213**	**CSK-1300-113**	**CSK-1300-313**
Compatible connectors [4]			

Detailed data sheets for these products can be found on the Contrinex website:

M30

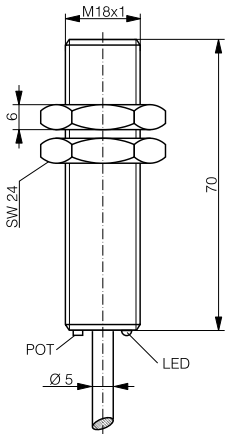
15	15	15	15
			
			

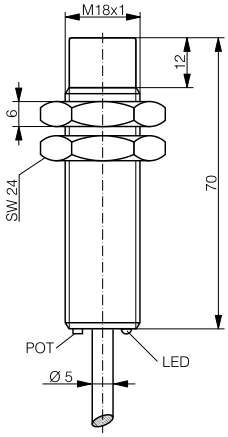
2 ... 25 mm	2 ... 25 mm	1 ... 30 mm	1 ... 30 mm
PPO	Nickel-plated brass	PPO	Nickel-plated brass
PPO	PPO	PPO	PTFE
Connector S12	Connector S12	Connector S12	Connector S12
IP 67	IP 67	IP 67	IP 67
Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
50 Hz	50 Hz	50 Hz	50 Hz
Table 3	Table 3	Table 1	Table 1
Diagram 1	Diagram 1	Diagram 1	Diagram 1
Yellow	Yellow	Green / yellow	Green / yellow
10 ... 30 VDC	10 ... 30 VDC	10 ... 35 VDC	10 ... 35 VDC
-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C	-25 ... +70 °C
≤ 2 x 200 mA	≤ 2 x 200 mA	≤ 2 x 250 mA	≤ 2 x 250 mA
CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS

		CSS-1300-211	**CSS-1300-111**
CSS-1301-213	**CSS-1301-113**	**CSS-1300-213**	**CSS-1300-113**
M, N	M, N	M, N	M, N

HOUSING SIZE	M18	
OPERATING DISTANCE MM	5	8

AC / DC 2-WIRE





[1] Standard cable length 2 m.
Non-standard cable lengths and types on request.
[2] see page 258
[3] see page 259
[4] see page 268

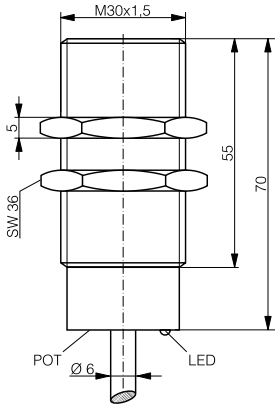
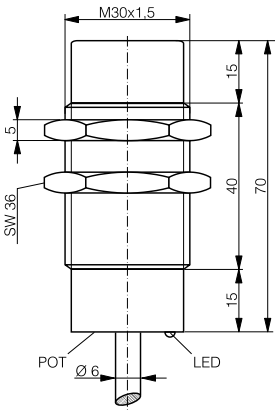
TECHNICAL DATA

Op. distance min./max. adjustable	1 ... 5 mm	2 ... 8 mm
Housing material	PPO	PPO
Sensing face	PPO	PPO
Connection [1]	PUR 2 x 0.34 mm^2	PUR 2 x 0.34 mm^2
Degree of protection	IP 67	IP 67
Mounting	Embeddable	Non-embeddable
Max. switching frequency	25 Hz	25 Hz
Additional technical data [2]	Table 2	Table 2
Wiring [3]	Diagram 2	Diagram 2
LED	Yellow	Yellow
Supply voltage range	20 ... 250 VAC / DC	20 ... 250 VAC / DC
Ambient temperature range	-25 ... +70 °C	-25 ... +70 °C
Output current	≤ 330 mA	≤ 330 mA
Approvals	CE, RoHS	CE, RoHS

PART REFERENCES

(**bold:** preferred types)		
AC / DC 2-wire N.O.	**CSK-1180-207**	**CSK-1180-217**
Compatible connectors [4]		

M30

10	15	
		
		

2 ... 15 mm	2 ... 20 mm	
PPO	PPO	
PPO	PPO	
PVC 2 x 0.75 mm^2	PVC 2 x 0.75 mm^2	
IP 67	IP 67	
Embeddable	Non-embeddable	
25 Hz	25 Hz	
Table 2	Table 2	
Diagram 2	Diagram 2	
Yellow	Yellow	
20 ... 250 VAC / DC	20 ... 250 VAC / DC	
-25 ... +70 °C	-25 ... +70 °C	
≤ 330 mA	≤ 330 mA	
CE, RoHS	CE, RoHS	

CSK-1300-207	**CSK-1300-217**	

TECHNICAL DATA

	Table 1	Table 2	Table 3
Permissible ripple content	≤ 10 %	---	≤ 5 %
No-load supply current	15 mA typ.	2.5 mA typ.	≤ 8 mA
Min. load current	---	5 mA	---
Voltage drop, switched state	≤ 2 V	≤ 6 V	≤ 2 V
Hysteresis % s_r	≤ 20 %	≤ 20 %	≤ 20 %
Repeat accuracy	≤ 0.02 mm	≤ 0.02 mm	≤ 0.02 mm
(T_A constant)			
Short-circuit protection	built-in	---	built-in
Polarity reversal protection	built-in	--- (non polarized)	built-in

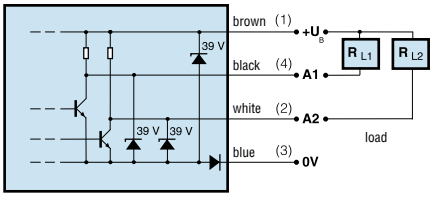
TIGHTENING TORQUE

	PPO	PTFE	Nickel-plated brass	Stainless steel
M12 x 1	1 Nm	0.2 Nm	16 Nm	25 Nm
M18 x 1	1.7 Nm	0.5 Nm	28 Nm	60 Nm
M30 x 1.5	8 Nm	2.5 Nm	82 Nm	200 Nm

WIRING DIAGRAMS

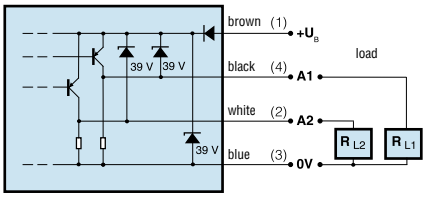
Diagram 1

NPN changeover outputs



2 N.C. / 4 N.O.

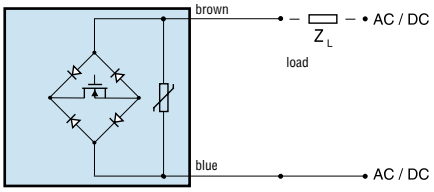
PNP changeover outputs



2 N.C. / 4 N.O.

Diagram 2

2-wire AC/DC normally open (N.O.)



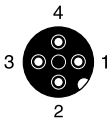
FOR FURTHER INFORMATION: **WWW.CONTRINEX.COM**

CABLES & CONNECTORS

HIGHLIGHTS:

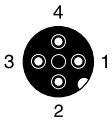
- ✓ Impervious and cleaning resistant connection cables & cable connectors (IP 67, IP 68 & IP 69K)
- ✓ Food-safe connection cables & cable connectors with V4A connectors (ECOLAB certified)
- ✓ Quick-lock connection cables & cable connectors
- ✓ Distribution boxes with 3-pole M8 & 5-pole M12 connections

QUICK-LOCK CONNECTION CABLES & CABLE CONNECTORS



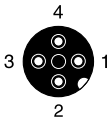
M12 4-pole

SOCKET			CABLE	LENGTH	DEGREE OF PROTECTION	PART REFERENCE	TYPE
M12	straight	4-pole	PVC	2 m	IP 67	S12-4FVG-020-NNNQ	M
M12	straight	4-pole	PVC	5 m	IP 67	S12-4FVG-050-NNNQ	M
M12	straight	4-pole	PVC	10 m	IP 67	S12-4FVG-100-NNNQ	M
M12	straight	4-pole	PUR	2 m	IP 67	S12-4FUG-020-NNNQ	M
M12	straight	4-pole	PUR	5 m	IP 67	S12-4FUG-050-NNNQ	M
M12	straight	4-pole	PUR	10 m	IP 67	S12-4FUG-100-NNNQ	M



M12 4-pole

SOCKET			CABLE	LENGTH	DEGREE OF PROTECTION	REFERENCE	TYPE
M12	right angle	4-pole	PVC	2 m	IP 67	S12-4FVW-020-NNNQ	N
M12	right angle	4-pole	PVC	5 m	IP 67	S12-4FVW-050-NNNQ	N
M12	right angle	4-pole	PVC	10 m	IP 67	S12-4FVW-100-NNNQ	N
M12	right angle	4-pole	PUR	2 m	IP 67	S12-4FUW-020-NNNQ	N
M12	right angle	4-pole	PUR	5 m	IP 67	S12-4FUW-050-NNNQ	N
M12	right angle	4-pole	PUR	10 m	IP 67	S12-4FUW-100-NNNQ	N



M12 4-pole

SOCKET				CABLE	LENGTH	DEGREE OF PROTECTION	REFERENCE	TYPE
M12	right angle	4-pole	LED*	PVC	2 m	IP 67	S12-4FVW-020-YNNQ	N
M12	right angle	4-pole	LED*	PVC	5 m	IP 67	S12-4FVW-050-YNNQ	N
M12	right angle	4-pole	LED*	PVC	10 m	IP 67	S12-4FVW-100-YNNQ	N
M12	right angle	4-pole	LED*	PUR	2 m	IP 67	S12-4FUW-020-YNNQ	N
M12	right angle	4-pole	LED*	PUR	5 m	IP 67	S12-4FUW-050-YNNQ	N
M12	right angle	4-pole	LED*	PUR	10 m	IP 67	S12-4FUW-100-YNNQ	N

* PNP only

M12 4-pole **M12 4-pole**

SOCKET			CABLE	LENGTH	PLUG			DEGREE OF PROTECTION	REFERENCE
M12	straight	4-pole	PVC	0.3 m	M12	straight	4-pole	IP 67	S12-4FVG-003-NNNQ-12MG
M12	straight	4-pole	PVC	0.6 m	M12	straight	4-pole	IP 67	S12-4FVG-006-NNNQ-12MG
M12	straight	4-pole	PVC	1 m	M12	straight	4-pole	IP 67	S12-4FVG-010-NNNQ-12MG
M12	straight	4-pole	PVC	1.5 m	M12	straight	4-pole	IP 67	S12-4FVG-015-NNNQ-12MG
M12	straight	4-pole	PVC	2 m	M12	straight	4-pole	IP 67	S12-4FVG-020-NNNQ-12MG
M12	straight	4-pole	PUR	0.3 m	M12	straight	4-pole	IP 67	S12-4FUG-003-NNNQ-12MG
M12	straight	4-pole	PUR	0.6 m	M12	straight	4-pole	IP 67	S12-4FUG-006-NNNQ-12MG
M12	straight	4-pole	PUR	1 m	M12	straight	4-pole	IP 67	S12-4FUG-010-NNNQ-12MG
M12	straight	4-pole	PUR	1.5 m	M12	straight	4-pole	IP 67	S12-4FUG-015-NNNQ-12MG
M12	straight	4-pole	PUR	2 m	M12	straight	4-pole	IP 67	S12-4FUG-020-NNNQ-12MG

M12 4-pole **M12 4-pole**

SOCKET			CABLE	LENGTH	PLUG			DEGREE OF PROTECTION	REFERENCE
M12	right angle	4-pole	PVC	0.3 m	M12	straight	4-pole	IP 67	S12-4FVW-003-NNNQ-12MG
M12	right angle	4-pole	PVC	0.6 m	M12	straight	4-pole	IP 67	S12-4FVW-006-NNNQ-12MG
M12	right angle	4-pole	PVC	1 m	M12	straight	4-pole	IP 67	S12-4FVW-010-NNNQ-12MG
M12	right angle	4-pole	PVC	1.5 m	M12	straight	4-pole	IP 67	S12-4FVW-015-NNNQ-12MG
M12	right angle	4-pole	PVC	2 m	M12	straight	4-pole	IP 67	S12-4FVW-020-NNNQ-12MG
M12	right angle	4-pole	PUR	0.3 m	M12	straight	4-pole	IP 67	S12-4FUW-003-NNNQ-12MG
M12	right angle	4-pole	PUR	0.6 m	M12	straight	4-pole	IP 67	S12-4FUW-006-NNNQ-12MG
M12	right angle	4-pole	PUR	1 m	M12	straight	4-pole	IP 67	S12-4FUW-010-NNNQ-12MG
M12	right angle	4-pole	PUR	1.5 m	M12	straight	4-pole	IP 67	S12-4FUW-015-NNNQ-12MG
M12	right angle	4-pole	PUR	2 m	M12	straight	4-pole	IP 67	S12-4FUW-020-NNNQ-12MG

M12 4-pole **M12 4-pole**

SOCKET				CABLE	LENGTH	PLUG			DEGREE OF PROTECTION	REFERENCE
M12	right angle	4-pole	LED*	PVC	0.3 m	M12	straight	4-pole	IP 67	S12-4FVW-003-YNNQ-12MG
M12	right angle	4-pole	LED*	PVC	0.6 m	M12	straight	4-pole	IP 67	S12-4FVW-006-YNNQ-12MG
M12	right angle	4-pole	LED*	PVC	1 m	M12	straight	4-pole	IP 67	S12-4FVW-010-YNNQ-12MG
M12	right angle	4-pole	LED*	PVC	1.5 m	M12	straight	4-pole	IP 67	S12-4FVW-015-YNNQ-12MG
M12	right angle	4-pole	LED*	PVC	2 m	M12	straight	4-pole	IP 67	S12-4FVW-020-YNNQ-12MG
M12	right angle	4-pole	LED*	PUR	0.3 m	M12	straight	4-pole	IP 67	S12-4FUW-003-YNNQ-12MG
M12	right angle	4-pole	LED*	PUR	0.6 m	M12	straight	4-pole	IP 67	S12-4FUW-006-YNNQ-12MG
M12	right angle	4-pole	LED*	PUR	1 m	M12	straight	4-pole	IP 67	S12-4FUW-010-YNNQ-12MG
M12	right angle	4-pole	LED*	PUR	1.5 m	M12	straight	4-pole	IP 67	S12-4FUW-015-YNNQ-12MG
M12	right angle	4-pole	LED*	PUR	2 m	M12	straight	4-pole	IP 67	S12-4FUW-020-YNNQ-12MG

* PNP only

CABLE CONNECTORS

M8 3-pole **M8 3-pole**

SOCKET			CABLE	LENGTH	PLUG			DEGREE OF PROTECTION	REFERENCE
M8	straight	3-pole	PVC	0.6 m	M8	straight	3-pole	IP 67 & IP 69K	S08-3FVG-006-08MG
M8	straight	3-pole	PVC	2 m	M8	straight	3-pole	IP 67 & IP 69K	S08-3FVG-020-08MG
M8	straight	3-pole	PVC	5 m	M8	straight	3-pole	IP 67 & IP 69K	S08-3FVG-050-08MG
M8	straight	3-pole	PUR	0.6 m	M8	straight	3-pole	IP67, IP68 & IP69K	S08-3FUG-006-08MG
M8	straight	3-pole	PUR	2 m	M8	straight	3-pole	IP67, IP68 & IP69K	S08-3FUG-020-08MG
M8	straight	3-pole	PUR	5 m	M8	straight	3-pole	IP67, IP68 & IP69K	S08-3FUG-050-08MG

M12 4-pole **M12 4-pole**

SOCKET			CABLE	LENGTH	PLUG			DEGREE OF PROTECTION	REFERENCE
M12	straight	4-pole	PVC	0.6 m	M12	straight	4-pole	IP 67 & IP 69K	S12-4FVG-006-12MG
M12	straight	4-pole	PVC	2 m	M12	straight	4-pole	IP 67 & IP 69K	S12-4FVG-020-12MG
M12	straight	4-pole	PVC	5 m	M12	straight	4-pole	IP 67 & IP 69K	S12-4FVG-050-12MG
M12	straight	4-pole	PUR	0.6 m	M12	straight	4-pole	IP67, IP68 & IP69K	S12-4FUG-006-12MG
M12	straight	4-pole	PUR	2 m	M12	straight	4-pole	IP67, IP68 & IP69K	S12-4FUG-020-12MG
M12	straight	4-pole	PUR	5 m	M12	straight	4-pole	IP67, IP68 & IP69K	S12-4FUG-050-12MG

M8 3-pole **M12 3-pole**

SOCKET			CABLE	LENGTH	PLUG			DEGREE OF PROTECTION	REFERENCE
M8	straight	3-pole	PVC	0.6 m	M12	straight	3-pole	IP 67 & IP 69K	S08-3FVG-006-12MG
M8	straight	3-pole	PVC	2 m	M12	straight	3-pole	IP 67 & IP 69K	S08-3FVG-020-12MG
M8	straight	3-pole	PVC	5 m	M12	straight	3-pole	IP 67 & IP 69K	S08-3FVG-050-12MG
M8	straight	3-pole	PUR	0.6 m	M12	straight	3-pole	IP67, IP68 & IP69K	S08-3FUG-006-12MG
M8	straight	3-pole	PUR	2 m	M12	straight	3-pole	IP67, IP68 & IP69K	S08-3FUG-020-12MG
M8	straight	3-pole	PUR	5 m	M12	straight	3-pole	IP67, IP68 & IP69K	S08-3FUG-050-12MG

Detailed data sheets for these products can be found on the Contrinex website:

M8 4-pole **M12 4-pole**

SOCKET			CABLE	LENGTH	PLUG			DEGREE OF PROTECTION	REFERENCE
M8	straight	4-pole	PVC	0.6 m	M12	straight	4-pole	IP 67 & IP 69K	S08-4FVG-006-12MG
M8	straight	4-pole	PVC	2 m	M12	straight	4-pole	IP 67 & IP 69K	S08-4FVG-020-12MG
M8	straight	4-pole	PVC	5 m	M12	straight	4-pole	IP 67 & IP 69K	S08-4FVG-050-12MG
M8	straight	4-pole	PUR	0.6 m	M12	straight	4-pole	IP67, IP68 & IP69K	S08-4FUG-006-12MG
M8	straight	4-pole	PUR	2 m	M12	straight	4-pole	IP67, IP68 & IP69K	S08-4FUG-020-12MG
M8	straight	4-pole	PUR	5 m	M12	straight	4-pole	IP67, IP68 & IP69K	S08-4FUG-050-12MG

CABLE CONNECTORS WITH V4A (AISI 316L/DIN 1.4404) CONNECTORS FOR FOOD INDUSTRY

M8 3-pole **M8 3-pole**

SOCKET			CABLE	LENGTH	PLUG			DEGREE OF PROTECTION	REFERENCE
M8	straight	3-pole	PVC	0.6 m	M8	straight	3-pole	IP67, IP68 & IP69K	S08-3FVG-006-NNLN-08MG
M8	straight	3-pole	PVC	2 m	M8	straight	3-pole	IP67, IP68 & IP69K	S08-3FVG-020-NNLN-08MG
M8	straight	3-pole	PVC	5 m	M8	straight	3-pole	IP67, IP68 & IP69K	S08-3FVG-050-NNLN-08MG

M12 4-pole **M12 4-pole**

SOCKET			CABLE	LENGTH	PLUG			DEGREE OF PROTECTION	REFERENCE
M12	straight	4-pole	PVC	0.6 m	M12	straight	4-pole	IP67, IP68 & IP69K	S12-4FVG-006-NNLN-12MG
M12	straight	4-pole	PVC	2 m	M12	straight	4-pole	IP67, IP68 & IP69K	S12-4FVG-020-NNLN-12MG
M12	straight	4-pole	PVC	5 m	M12	straight	4-pole	IP67, IP68 & IP69K	S12-4FVG-050-NNLN-12MG

M8 3-pole **M12 3-pole**

SOCKET			CABLE	LENGTH	PLUG			DEGREE OF PROTECTION	REFERENCE
M8	straight	3-pole	PVC	0.6 m	M12	straight	3-pole	IP67, IP68 & IP69K	S08-3FVG-006-NNLN-12MG
M8	straight	3-pole	PVC	2 m	M12	straight	3-pole	IP67, IP68 & IP69K	S08-3FVG-020-NNLN-12MG
M8	straight	3-pole	PVC	5 m	M12	straight	3-pole	IP67, IP68 & IP69K	S08-3FVG-050-NNLN-12MG

M8 4-pole **M12 4-pole**

SOCKET			CABLE	LENGTH	PLUG			DEGREE OF PROTECTION	REFERENCE
M8	straight	4-pole	PVC	0.6 m	M12	straight	4-pole	IP67, IP68 & IP69K	S08-4FVG-006-NNLN-12MG
M8	straight	4-pole	PVC	2 m	M12	straight	4-pole	IP67, IP68 & IP69K	S08-4FVG-020-NNLN-12MG
M8	straight	4-pole	PVC	5 m	M12	straight	4-pole	IP67, IP68 & IP69K	S08-4FVG-050-NNLN-12MG

CONNECTION CABLES

SOCKET			CABLE	LENGTH	DEGREE OF PROTECTION	REFERENCE	TYPE
M8	straight	3-pole	PVC	2 m	IP 67 & IP 69K	**S08-3FVG-020**	**A**
M8	straight	3-pole	PVC	5 m	IP 67 & IP 69K	S08-3FVG-050	A
M8	straight	3-pole	PVC	10 m	IP 67 & IP 69K	S08-3FVG-100	A
M8	straight	3-pole	PUR	2 m	IP 67, IP 68 & IP 69K	**S08-3FUG-020**	**A**
M8	straight	3-pole	PUR	5 m	IP 67, IP 68 & IP 69K	S08-3FUG-050	A
M8	straight	3-pole	PUR	10 m	IP 67, IP 68 & IP 69K	S08-3FUG-100	A
M8	right angle	3-pole	PVC	2 m	IP 67 & IP 69K	**S08-3FVW-020**	**B**
M8	right angle	3-pole	PVC	5 m	IP 67 & IP 69K	S08-3FVW-050	B
M8	right angle	3-pole	PVC	10 m	IP 67 & IP 69K	S08-3FVW-100	B
M8	right angle	3-pole	PUR	2 m	IP 67, IP 68 & IP 69K	**S08-3FUW-020**	**B**
M8	right angle	3-pole	PUR	5 m	IP 67, IP 68 & IP 69K	S08-3FUW-050	B
M8	right angle	3-pole	PUR	10 m	IP 67, IP 68 & IP 69K	S08-3FUW-100	B
M8	straight	4-pole	PVC	2 m	IP 67 & IP 69K	**S08-4FVG-020**	**E**
M8	straight	4-pole	PVC	5 m	IP 67 & IP 69K	S08-4FVG-050	E
M8	straight	4-pole	PVC	10 m	IP 67 & IP 69K	S08-4FVG-100	E
M8	straight	4-pole	PUR	2 m	IP 67, IP 68 & IP 69K	**S08-4FUG-020**	**E**
M8	straight	4-pole	PUR	5 m	IP 67, IP 68 & IP 69K	S08-4FUG-050	E
M8	straight	4-pole	PUR	10 m	IP 67, IP 68 & IP 69K	S08-4FUG-100	E
M8	right angle	4-pole	PVC	2 m	IP 67 & IP 69K	**S08-4FVW-020**	**F**
M8	right angle	4-pole	PVC	5 m	IP 67 & IP 69K	S08-4FVW-050	F
M8	right angle	4-pole	PVC	10 m	IP 67 & IP 69K	S08-4FVW-100	F
M8	right angle	4-pole	PUR	2 m	IP 67, IP 68 & IP 69K	**S08-4FUW-020**	**F**
M8	right angle	4-pole	PUR	5 m	IP 67, IP 68 & IP 69K	S08-4FUW-050	F
M8	right angle	4-pole	PUR	10 m	IP 67, IP 68 & IP 69K	S08-4FUW-100	F
M12	straight	3-pole*	PVC	2 m	IP 67 & IP 69K	**S12-3FVG-020**	G
M12	straight	3-pole*	PUR	2 m	IP 67, IP 68 & IP 69K	**S12-3FUG-020**	G
M12	right angle	3-pole*	PVC	2 m	IP 67 & IP 69K	**S12-3FVW-020**	H
M12	right angle	3-pole*	PUR	2 m	IP 67, IP 68 & IP 69K	**S12-3FUW-020**	H
M12	straight	4-pole	PVC	2 m	IP 67 & IP 69K	**S12-4FVG-020**	**M**
M12	straight	4-pole	PVC	5 m	IP 67 & IP 69K	S12-4FVG-050	M
M12	straight	4-pole	PVC	10 m	IP 67 & IP 69K	S12-4FVG-100	M
M12	straight	4-pole	PUR	2 m	IP 67, IP 68 & IP 69K	**S12-4FUG-020**	**M**
M12	straight	4-pole	PUR	5 m	IP 67, IP 68 & IP 69K	S12-4FUG-050	M
M12	straight	4-pole	PUR	10 m	IP 67, IP 68 & IP 69K	S12-4FUG-100	M
M12	right angle	4-pole	PVC	2 m	IP 67 & IP 69K	**S12-4FVW-020**	**N**
M12	right angle	4-pole	PVC	5 m	IP 67 & IP 69K	S12-4FVW-050	N
M12	right angle	4-pole	PVC	10 m	IP 67 & IP 69K	S12-4FVW-100	N
M12	right angle	4-pole	PUR	2 m	IP 67, IP 68 & IP 69K	**S12-4FUW-020**	**N**
M12	right angle	4-pole	PUR	5 m	IP 67, IP 68 & IP 69K	S12-4FUW-050	N
M12	right angle	4-pole	PUR	10 m	IP 67, IP 68 & IP 69K	S12-4FUW-100	N
M12	straight	5-pole	PVC	2 m	IP 67 & IP 69K	**S12-5FVG-020**	**O**
M12	straight	5-pole	PVC	10 m	IP 67 & IP 69K	S12-5FVG-100	O
M12	right angle	5-pole	PVC	2 m	IP 67 & IP 69K	**S12-5FVW-020**	**P**
M12	right angle	5-pole	PVC	10 m	IP 67 & IP 69K	S12-5FVW-100	P
1/2"	straight	3-pole	PUR	2 m	IP 67, IP 68 & IP 69K	**S13-3FUG-020**	**Q**
1/2"	right angle	3-pole	PUR	2 m	IP 67, IP 68 & IP 69K	**S13-3FUW-020**	**R**

Bold: preferred types * N.O.

Detailed data sheets for these products can be found on the Contrinex website:

CONNECTION CABLES WITH V4A (AISI 316L / DIN 1.4404) CONNECTORS FOR FOOD INDUSTRY

ECOLAB

SOCKET			CABLE	LENGTH	DEGREE OF PROTECTION	REFERENCE	TYPE
M8	straight	3-pole	PVC	2 m	IP 67, IP 68 & IP 69K	**S08-3FVG-020-NNLN**	**S**
M8	straight	3-pole	PVC	10 m	IP 67, IP 68 & IP 69K	S08-3FVG-100-NNLN	S
M8	right angle	3-pole	PVC	2 m	IP 67, IP 68 & IP 69K	**S08-3FVW-020-NNLN**	**S**
M8	right angle	3-pole	PVC	10 m	IP 67, IP 68 & IP 69K	S08-3FVW-100-NNLN	S
M8	straight	4-pole	PVC	2 m	IP 67, IP 68 & IP 69K	**S08-4FVG-020-NNLN**	**T**
M8	straight	4-pole	PVC	10 m	IP 67, IP 68 & IP 69K	S08-4FVG-100-NNLN	T
M8	right angle	4-pole	PVC	2 m	IP 67, IP 68 & IP 69K	**S08-4FVW-020-NNLN**	**T**
M8	right angle	4-pole	PVC	10 m	IP 67, IP 68 & IP 69K	S08-4FVW-100-NNLN	T
M12	straight	4-pole	PVC	2 m	IP 67, IP 68 & IP 69K	**S12-4FVG-020-NNLN**	**U**
M12	straight	4-pole	PVC	10 m	IP 67, IP 68 & IP 69K	S12-4FVG-100-NNLN	U
M12	right angle	4-pole	PVC	2 m	IP 67, IP 68 & IP 69K	**S12-4FVW-020-NNLN**	**U**
M12	right angle	4-pole	PVC	10 m	IP 67, IP 68 & IP 69K	S12-4FVW-100-NNLN	U
M12	straight	5-pole	PVC	2 m	IP 67, IP 68 & IP 69K	**S12-5FVG-020-NNLN**	**V**
M12	straight	5-pole	PVC	10 m	IP 67, IP 68 & IP 69K	S12-5FVG-100-NNLN	V

Bold: preferred types

FIELD-ATTACHABLE CONNECTORS

SOCKET			CABLE	REFERENCE	FOR CABLES WITH WIRE CROSS-SECTION
M8	straight	3-pole	-	S08-3FNG-000-NNT2	0.14 ... 0.34 mm² / AWG 22 ... 26
M8	right angle	3-pole	-	S08-3FNW-000-NNT2	0.14 ... 0.34 mm² / AWG 22 ... 26
M8	straight	4-pole	-	S08-4FNG-000-NNT2	0.14 ... 0.34 mm² / AWG 22 ... 26
M8	right angle	4-pole	-	S08-4FNW-000-NNT2	0.14 ... 0.34 mm² / AWG 22 ... 26
M12	straight	4-pole	-	S12-4FNG-000-NNT2	0.14 ... 0.34 mm² / AWG 22 ... 26
M12	right angle	4-pole	-	S12-4FNW-000-NNT2	0.14 ... 0.34 mm² / AWG 22 ... 26
M12	straight	5-pole	-	S12-5FNG-000-NNT2	0.14 ... 0.34 mm² / AWG 22 ... 26
M12	right angle	5-pole	-	S12-5FNW-000-NNT2	0.14 ... 0.34 mm² / AWG 22 ... 26

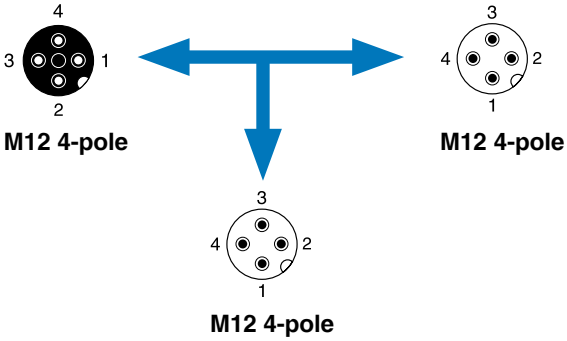
DISTRIBUTION BOXES

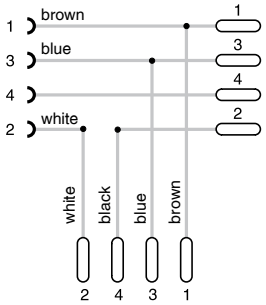
SOCKET		NUMBER OF CONNECTIONS	CONNECTION	REFERENCE
M8	3-pole	4	Cable 5 m	V08-34PD-050-UYN
M8	3-pole	4	Cable 10 m	V08-34PD-100-UYN
M8	3-pole	8	Cable 5 m	V08-38PD-050-UYN
M8	3-pole	8	Cable 10 m	V08-38PD-100-UYN
M12	5-pole	4	Connector 11-pole	V12-54PG-000-NYN
M12	5-pole	4	Cable 5 m	V12-54PD-050-UYN
M12	5-pole	4	Cable 10 m	V12-54PD-100-UYN
M12	5-pole	8	Connector 19-pole	V12-58PG-000-NYN
M12	5-pole	8	Cable 5 m	V12-58PD-050-UYN
M12	5-pole	8	Cable 10 m	V12-58PD-100-UYN

CONNECTION CABLES FOR DISTRIBUTION BOXES

SOCKET			CABLE	LENGTH	REFERENCE
M23	straight	11-pole	PUR	5 m	S23-BFUG-050
M23	straight	11-pole	PUR	10 m	S23-BFUG-100
M23	straight	19-pole	PUR	5 m	S23-JFUG-050
M23	straight	19-pole	PUR	10 m	S23-JFUG-100

T CONNECTOR





SOCKET		PLUG		CABLE	LENGTH	PLUG		REFERENCE
M12	4-pole	M12	4-pole	PUR	0.3 m	M12	4-pole	V12-42PW-012-003-UNN

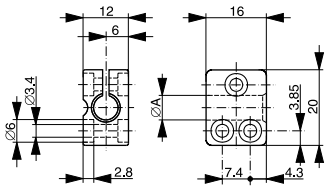
SENSOR CABLE SPECIFICATIONS

TYPE	SECTION	CONDUCTOR	SLEEVE MATERIAL	WIRE INSULATION
Type 1	0.055 mm^2	30 x 0.05 mm ∅	PUR	PVC
Type 2	0.14 mm^2	18 x 0.10 mm ∅	PVC	PVC
Type 3	0.14 mm^2	72 x 0.05 mm ∅	PUR	PVC
Type 4	0.25 mm^2	32 x 0.10 mm ∅	PVC	PVC
Type 5	0.25 mm^2	19 x 0.13 mm ∅	PUR	PVC
Type 6	0.25 mm^2	67 x 0.07 mm ∅	PUR	PVC
Type 7	0.25 mm^2	128 x 0.05 mm ∅	PUR	PVC
Type 8	0.34 mm^2	42 x 0.10 mm ∅	PVC	PVC
Type 9	0.25 mm^2	32 x 0.10 mm ∅	PUR	PVC
Type 10	0.34 mm^2	88 x 0.07 mm ∅	PUR	PVC
Type 11	0.34 mm^2	180 x 0.05 mm ∅	PUR	PVC
Type 12	0.25 mm^2	128 x 0.05 mm ∅	PVC	PVC
Type 13	0.34 mm^2	180 x 0.05 mm ∅	TPE-S	TPE-S
Type 14	0.34 mm^2	7 x 0.25 mm ∅	PVC	PVC
Type 15	0.50 mm^2	16 x 0.20 mm ∅	PUR	PP

ACCESSORIES

SENSOR MOUNTING CLAMPS

∅3, ∅4, ∅5, ∅6.5, ∅8

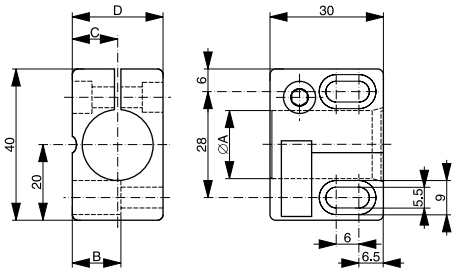


TECHNICAL DATA

Part reference	Type	A			
ASU-0001-030	without limit stop	∅ 3 mm			
ASU-0001-040	without limit stop	∅ 4 mm			
ASU-0001-050	without limit stop	∅ 5 mm			
ASU-0001-065	without limit stop	∅ 6.5 mm			
ASU-0001-080	without limit stop	∅ 8 mm			
ASU-0002-080	with limit stop	∅ 8 mm			

Material: PA 6 black
Screw: DIN 912, M3 zinc-plated
Nut: DIN 934, M3 zinc-plated

∅12, ∅18

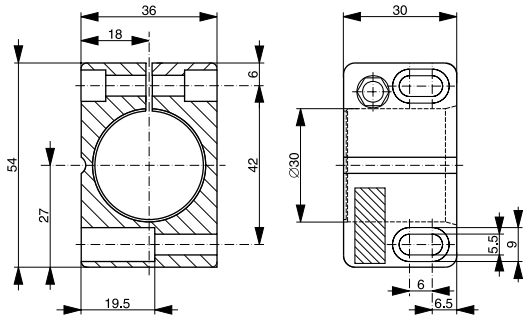


TECHNICAL DATA

Part reference	Type	A	B	C	D
ASU-0001-120	without limit stop	∅ 12 mm	9.75 mm	9 mm	18 mm
ASU-0002-120	with limit stop	∅ 12 mm	9.75 mm	9 mm	18 mm
ASU-0001-180	without limit stop	∅ 18 mm	12.85 mm	12 mm	24 mm
ASU-0002-180	with limit stop	∅ 18 mm	12.85 mm	12 mm	24 mm

Material: PA 6 GK (∅ 18 mm), PA 6 (∅ 12 mm) black
Screw: DIN 912, M5 zinc-plated
Nut: DIN 934, M5 zinc-plated

∅30

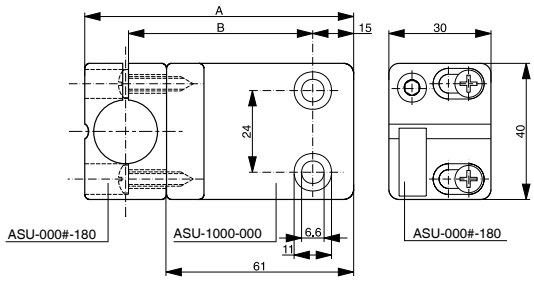


TECHNICAL DATA

Part reference	Type				
ASU-0001-300	without limit stop	∅ 30 mm			
ASU-0002-300	with limit stop	∅ 30 mm			

Material: PA 6 GK black
Screw: DIN 912, M5 x 25 zinc-plated
Nut: DIN 934, M5 zinc-plated

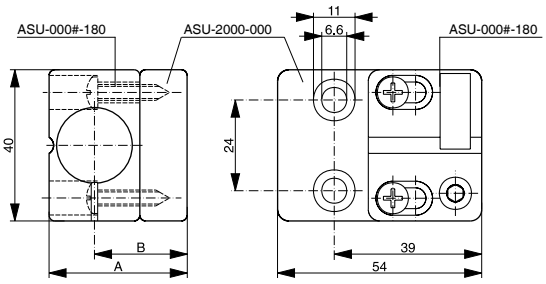
BASES FOR MOUNTING CLAMPS ∅12, ∅18



TECHNICAL DATA

Part reference	Type	A with ∅ 12 mm / ∅ 18 mm	B with ∅ 12 mm / ∅ 18 mm
ASU-1000-000	horizontal	79 mm / 85 mm	55 mm / 58 mm

Material: PA 6 black
Screws: DIN 7981, ∅ 4.2 zinc-plated



TECHNICAL DATA

Part reference	Type	A with ∅ 12 mm / ∅ 18 mm	B with ∅ 12 mm / ∅ 18 mm
ASU-2000-000	vertical	30.5 mm / 36.5 mm	21.5 mm / 24.5 mm

Material: PA 6 black

Screws: DIN 7981, ∅ 4.2 zinc-plated

SENSOR TESTER

ATE-0000-002

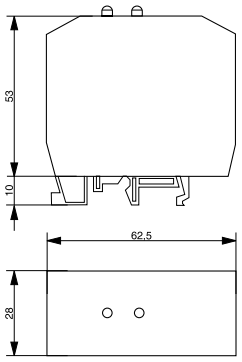
For fast field checks of various sensor types (inductive, capacitive, photoelectric and ultrasonic) 10 ... 30 V.

- Suitable for PNP and NPN devices, N.O. and N.C. versions
- Automatic PNP/NPN recognition
- LED and acoustic indicators
- Built-in steel target (non-standardized) for checking inductive sensors
- Power supply from a single 9 V battery (type IEC 6LR61)
- LED battery-state indication
- Built-in step-up voltage converter
- Automatic switch off after approx. 30 sec. of non-use

POWER SUPPLY UNIT, AMPLIFIERS

These devices are built into user-friendly clamping frames that can be snapped onto various standard rails, thanks to their universal foot.

Dimensions (all types):

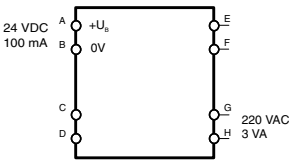


POWER SUPPLY UNIT

TECHNICAL DATA

DW-AZ-100-24	
Supply voltage	220 VAC
Power drain	3 VA
Output voltage	24 VDC
Output current	100 mA max.

Wiring diagram:



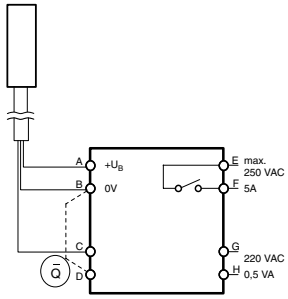
AMPLIFIERS FOR 3-WIRE SENSORS

DW-AZ-100-A3

These devices are suitable for NPN and PNP N.O. sensors. Operating the switch activates the relay, and the contact closes. A wire bridge between B and D inverts this function.

TECHNICAL DATA	
Supply voltage	220 VAC
Power drain	0.5 VA
Output voltage	18.5 VDC
Output current	20 mA max.

Wiring diagram:

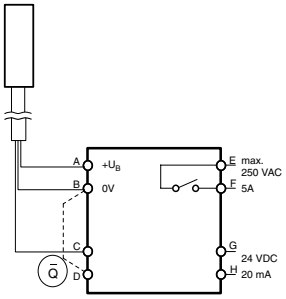


DW-AZ-100-D3

These devices are suitable for NPN and PNP N.O. sensors. Operating the switch activates the relay, and the contact closes. A wire bridge between B and D inverts this function.

TECHNICAL DATA	
Supply voltage	24 VDC
No-load supply current	20 mA max.
Output voltage	18.5 VDC
Output current	20 mA max.

Wiring diagram:



AMPLIFIERS FOR NAMUR SENSORS

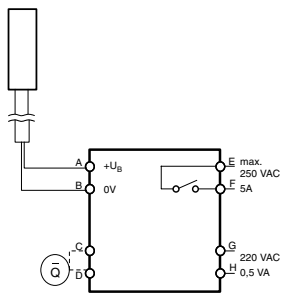
DW-AZ-100-AN

These devices are suitable for NAMUR sensors. Operating the switch activates the relay, and the contact closes. A wire bridge between C and D inverts this function.

Output current and impedance correspond to NAMUR standard (DIN 19234).

TECHNICAL DATA	
Supply voltage	220 VAC
Power drain	0.5 VA

Wiring diagram:



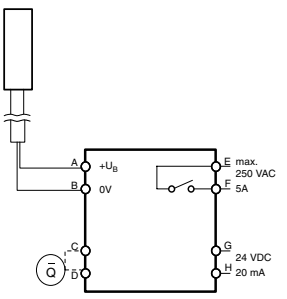
DW-AZ-100-DN

These devices are suitable for NAMUR sensors. Operating the switch activates the relay, and the contact closes. A wire bridge between C and D inverts this function.

Output current and impedance correspond to NAMUR standard (DIN 19234).

TECHNICAL DATA	
Supply voltage	24 VDC
No-load supply current	20 mA max.

Wiring diagram:



INDUCTIVE SENSORS

PHOTOELECTRIC SENSORS

A

ADJUSTMENT (POTENTIOMETER)

The sensitivity is adjusted by means of the built-in single or multi-turn potentiometer (if provided). Turning it clockwise increases the sensitivity. Multi-turn potentiometers cannot be turned over their end position (no stops).

THROUGH-BEAM SENSORS / REFLEX SENSORS

The potentiometer is normally set to the maximum sensitivity (turned clockwise). This provides the maximum system reserve (excess-gain) signal. A reduction in sensitivity may only be necessary to detect transparent objects.

DIFFUSE SENSORS

Set the sensitivity so that the target is reliably detected; for reliable operation, the green LED should light up, or the yellow LED should not flash (series 1040/1050/0507). On removing the object, if the output remains ON (detection of the background), the sensitivity must be reduced slightly.

DIFFUSE SENSORS WITH BACKGROUND SUPPRESSION

The setup must ensure that the target is clearly identified, and any background excluded. The target should first be positioned at the maximum foreseen distance from the emitter, and the potentiometer adjusted so that the output just switches. The target is then removed and the potentiometer adjusted so that the background just causes the output to switch. Finally, the potentiometer is set to half way between the two previous readings. Where there is no background, the potentiometer should be set to the maximum distance.

ALIGNMENT

THROUGH-BEAM SENSORS

First place the receiver and fix it in its final position. Then align the emitter accurately onto the receiver.

REFLEX SENSORS

First place the reflector as required, and fix it firmly in place. Cover the reflector all around with adhesive tape so that only the center (approx. 25% of the surface area) remains free. Fit the reflex sensor with the optical axis aligned on the reflector so that it switches reliably. Finally, remove the adhesive tape from the reflector.

DIFFUSE SENSORS

Align the unit's optical axis with the target so that switching occurs reliably. Check that enough system reserves (excess gain) are available, i.e. the green LED must light up (series 1120, 1180, 1180W, 3030, 3031, 3060, 4040, 4050, 5050 and 6080), and with the series 1040/1050/0507, the yellow LED should not flash. Finally, fix the device firmly.

DIFFUSE SENSORS WITH BACKGROUND SUPPRESSION

Line up the beam on the center of the target, before fixing the device firmly.

AMBIENT LIGHT LIMIT

Ambient light is that which is produced by external light sources. The illumination intensity is measured on the light incidence surface. The sensors are basically insensitive to ambient light due to the use of modulated light. There is nevertheless an upper limit for the intensity of any external light and this is referred to as the ambient light limit. It is given for sunlight (unmodulated light) and halogen lamps (light modulated at twice the mains frequency). Reliable operation of the units is no longer possible at light intensities above the relevant ambient light limit.

AMBIENT TEMPERATURE

The specified ambient temperature range **must not be exceeded** in order to avoid damaging the sensor and rendering its performance unreliable.

ANALOG OUTPUT

Devices with analog output deliver an analog output signal approximately proportional to the target distance. For most models, voltage and current outputs are available **simultaneously**.

AUTOCOLLIMATION

Photoelectric sensors using the autocollimation principle are characterized by the fact that the optical axes of the emitting and receiving channels are identical. This is possible with light from one of the channels being deflected by means of a semi-transparent mirror (Fig. 17). This principle completely eliminates the interfering blind zone often found in the proximity of the sensor, which is of special advantage when using reflex sensors. Reflex sensors with autocollimation are especially suitable for foil reflectors.

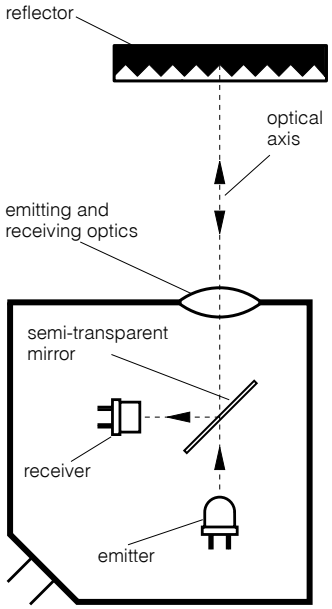


Fig. 17

B

BACKGROUND SUPPRESSION

The light pulse from the emitting diode leaves the optical system as a focused, almost parallel, light beam. On meeting an object in its path, part of the beam is diffusely reflected, and in turn, part of this reflected light falls on the PSD (**P**osition-**S**ensitive **D**evice) housed in the same sensor (Fig. 18).

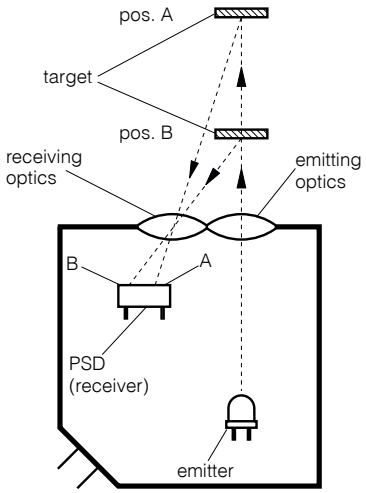


Fig. 18

Depending on the distance of the target from the device, the light falls on a particular spot of the PSD, and a corresponding reception signal is emitted, indicating that an object is present at a certain distance from the device. The analyzing circuit compares the signal received with the preset operating distance (adjusted by means of the built-in potentiometer), and, if the distance of the object is less than, or equal to, the preset operating distance, the output is switched. Contrary to an energetic diffuse sensor, the operating distance depends only to a very small extent on the target's size or color, or on the nature of its surface. The object can therefore be easily discerned, even against a light background. These devices are not suitable for objects having shiny surfaces.

C

CAPACITANCE

The maximum switchable capacitance is the greatest permissible total capacitance at the device's output so that **reliable switching** is still guaranteed. Contributing to this total capacitance in particular are the lead capacitance (approx. 100 ... 200 pF per m) and the load's input capacitance. The value is given in the individual data sheets. These can be found on the Contrinex website (www.contrinex.com), or ordered from our sales offices.

CE MARK

All sensors in this catalog meet the requirements of European standards EN 60947-1 and EN 60947-5-2, and therefore correspond to EMC directive 2004/108/EC, as well as low-tension directive 2006/95/EC. Consequently, they are labeled with the CE mark.

However, this mark is **neither a quality seal, nor an official test label** certified by any authority. By applying the CE mark, the manufacturer confirms (under his own responsibility) that the protective requirements for the product meet the applicable EU directives, and consequently that the corresponding EU standards have been complied with. The CE mark enables the free importation of goods into the EU, as well as their free circulation within the EU.

CHANGEOVER

Devices with changeover outputs provide one output for the light-ON or N.O. signal, and another for the dark-ON or N.C. signal. Both functions are available simultaneously for maximum connection flexibility to the control unit. Moreover, logical connections may be implemented without using series connection. Connecting both outputs to the control unit allows for additional security monitoring.

CLEARANCE

Inductive sensors must not mutually influence each other. For this reason, a minimum distance **A** between devices of diameter **D** must be observed (Fig. 19).

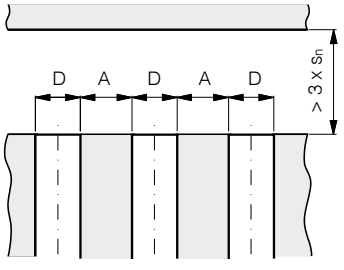


Fig. 19

SERIES 300, 400, 420, 600, 620*

Size D	embeddable A (mm)	non-emb. A (mm)
Ø 3	0 / *2	---
M4	0 / *1	---
Ø 4	0 / *1	---
M5	0 / *1	---
C 5	0 / *1	---
Ø 6.5	3 / *3.5	--- / *15.5
M8	2 / *4	10 / *14
C8	2 / *2	---
M12	4 / *12	28 / *33
M18	7 / *22	32
M30	10	50
C44	35	120
C40	35	140
C60	---	120
C80	---	420

SERIES 500, 520*

Size D	(quasi)-embed. A (mm)	non-emb. A (mm)
Ø 4	6 (embeddable)	---
M5	5 (embeddable)	---
Ø 6.5	9.5	---
M8	8 / *16	20
C8	8	---
M12	18 / *34	30
M18	26	60
M30	50	120

SERIES 700

Size D	embeddable A (mm)	non-emb. A (mm)
M8	14	52
M12	38	108
M18	42	182
M30	80	270

Photoelectric sensors must not mutually influence each other. For this reason, a minimum distance **"a"** between them has to be respected, which depends strongly on the model used and the actual sensitivity setting. The following values should therefore be considered as rough guidelines only. The values given are for maximum sensitivity.

DIFFUSE SENSORS (FIG. 20)

Series	distance **a** (mm)
Series 1040 / 50	50
Series 1040 / 50...505	15
Series 1040 / 50...506	30
Series 1120	150
Series 1180 / 1180W	500
Series 3030	500
Series 3031	250
Series 4040	750
Series 4050	150
Series 5050	200
Series 6080	500

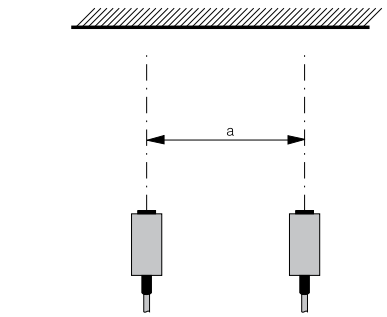


Fig. 20

DIFFUSE SENSORS WITH BACKGROUND SUPPRESSION

Series	distance **a** (mm)
Series 1180 / 1180W	50
Series 3130	50
Series 3131	50
Series 4050	100
Series 6080	150

REFLEX SENSORS (FIG. 21)

Series	distance **a** (mm)
Series 1120	150
Series 1180 / 1180W	250
Series 3030	500
Series 3031	250
Series 4040	750
Series 4050	200
Series 5050	200
Series 6080	500

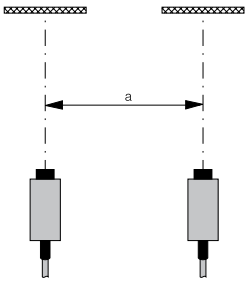


Fig. 21

THROUGH-BEAM SENSORS (FIG. 22)

Series	distance **a** (mm)
Series 1040 / 50	50
Series 1120	150
Series 1180 / 1180W	250
Series 3030	500
Series 3031	250
Series 4040	750
Series 4050	500
Series 5050	200
Series 6080	500

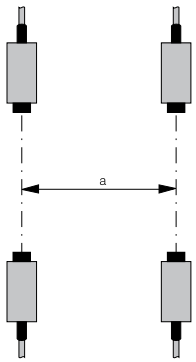


Fig. 22

FIBER-OPTIC AMPLIFIERS

The value **"a"** depends strongly on the specific type of fiber used. General recommendations are therefore not possible.

CONDET® TECHNOLOGY

An innovative technology for producing inductive sensors. Contrary to conventional technology, in which a high-frequency magnetic field is generated in front of the sensing face, here the coil is triggered by an alternating polarity **pulsed current**. This technology is used in the 700 series (see also page 13). It permits:

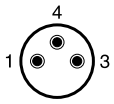
- generally long operating distances
- long operating distances also on non-ferrous metals, such as aluminum, brass, copper, etc.
- **one-piece** stainless steel housing (sensing face included)

CONDIST® TECHNOLOGY

Developed and patented by Contrinex, this innovative technology makes use of a high-performance oscillator for inductive sensors. Operating distances from **2.2 to 4 times** the standard values are possible thanks to excellent temperature and voltage stability. Devices of the 500 and 520 series work with such an oscillator (see also page 12).

CONNECTORS

PIN ASSIGNMENT SIZE S8:



N.O. and N.C.

$+U_B$	pin 1	brown
0V	pin 3	blue
output	pin 4	black

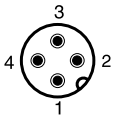
Namur

L+	pin 1	brown
L-	pin 4	blue

Analog output

+U_B	pin 1	brown
0V	pin 3	blue
voltage output	pin 4	black

PIN ASSIGNMENT SIZE S12:



N.O.

+U_B	pin 1	brown
0V	pin 3	blue
output	pin 4	black

N.C.

+U_B	pin 1	brown
0V	pin 3	blue
output	pin 2	white

2-wire DC / N.O.

L-	pin 3	brown
L+	pin 4	blue

2-wire DC / N.C.

L-	pin 1	brown
L+	pin 2	blue

Analog output

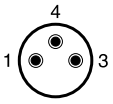
+U_B	pin 1	brown
0V	pin 3	blue
voltage output	pin 4	black
current output	pin 2	white

PIN ASSIGNMENT SIZE 1/2":

2-wire AC/DC / N.O. and N.C.

L1	pin 3	blue
L2	pin 2	brown
GND	pin 1	yellow/green

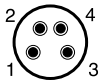
PIN ASSIGNMENT SIZE S8 3 POLE:



N.O. and N.C.

+U_B	pin 1	brown
0V	pin 3	blue
output	pin 4	black

PIN ASSIGNMENT SIZE S8 4 POLE:



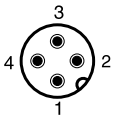
N.O. and N.C.

+U_B	pin 1	brown
output 2	pin 2	white
0V	pin 3	blue
output 1	pin 4	black

Teach

+U_B	pin 1	brown
output 2	pin 2	white
0V	pin 3	blue
output 1	pin 4	black

PIN ASSIGNMENT SIZE S12 3 POLE:



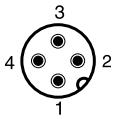
N.O.

+U_B	pin 1	brown
0V	pin 3	blue
output	pin 4	black

N.C.

+U_B	pin 1	brown
0V	pin 3	blue
output	pin 2	white

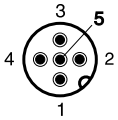
PIN ASSIGNMENT SIZE S12 4 POLE:



N.O. and N.C.

+U_B	pin 1	brown
output 2	pin 2	white
0V	pin 3	blue
output 1	pin 4	black

PIN ASSIGNMENT SIZE S12 5 POLE:



N.O. and N.C.

+U_B	pin 1	brown
output 2	pin 2	white
0V	pin 3	blue
output 1	pin 4	black
test	pin 5	gray

CORRECTION FACTORS

The specified operating distance **s** of inductive sensors refers to exactly defined measuring conditions (see **OPERATING DISTANCE**).

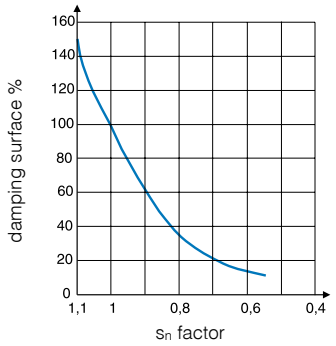
Other arrangements generally result in a reduction of the operating distance. The following data are to be considered as **guidelines** only; according to size and version, there can be wide variations. Exact values are given in the individual data sheets. These can be found on the Contrinex website (www.contrinex.com), or ordered directly from our sales offices.

SERIES 300 / 400 / 420 / 600 / 620

Material influence (indicative values):

Target material	Operating distance
Steel type FE 360	s_n x 1.00
Aluminum	s_n x 0.55
Brass	s_n x 0.64
Copper	s_n x 0.51
Stainless steel (V2A)	s_n x 0.85

Geometrical influence:



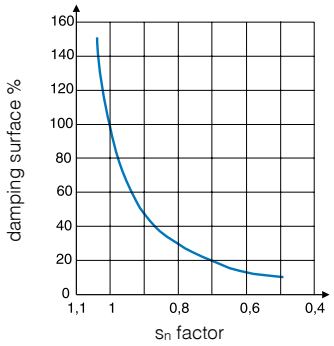
When using foils, an increase in the usable operating distance can be expected.

SERIES 500 / 520*

Material influence (indicative values):

Target material	Operating distance
Steel type FE 360	s_n x 1.00
Aluminum	s_n x 0.36 / *0.28
Brass	s_n x 0.44 / *0.37
Copper	s_n x 0.32 / * 0.24
Stainless steel (V2A)	s_n x 0.69

Geometrical influence:



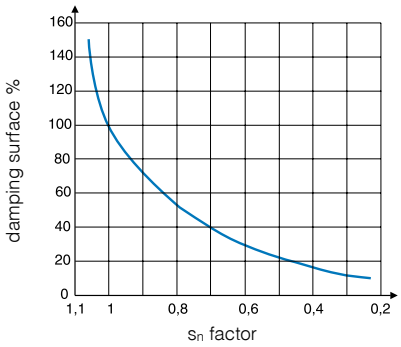
When using foils, an increase in the usable operating distance can be expected.

SERIES 700

Material influence (indicative values):

Target material	Operating distance
Steel type FE 360	s_n x 1.0
Aluminum	s_n x 1.0
Brass	s_n x 1.3
Copper	s_n x 0.8
Stainless steel (1 mm thick)	s_n x 0.5
Stainless steel (2 mm thick)	s_n x 0.9

Geometrical influence:



When using foils, a **decrease** in the usable operating distance can be expected.

Test card (Kodak paper, white)	100%
Paper, white	80%
PVC, gray	57%
Newspaper, printed	60%
Wood, lightly colored	73%
Cork	65%
Plastic, white	70%
Plastic, black	22%
Neoprene, black	20%
Automobile tires	15%
Aluminum sheet, untreated	200%
Aluminum sheet, black anodized	150%
Aluminum sheet, matt (brushed finish)	120%
Stainless steel, polished	230%

The specified sensing ranges of energetic diffuse sensors are achieved using standard matt white paper of the specified dimensions as the target surface. For other target surface materials, the correction factors given below apply (these are guideline values only).

D

DARK-ON

The “dark-ON” function means that the relevant output is switched (carrying current) when **no** light is reaching the receiver.

DEGREES OF PROTECTION

The IP degrees of protection are defined in DIN 40050 / IEC 60529. The meaning of the **first numeral** is:

6 The housing provides complete protection against contact with electrically conducting or moving parts, and full protection against dust penetration.

and the **second numeral:**

4 Protection against water splashes: water splashed against the housing from any direction must have no harmful effect.

Test conditions: spraying with oscillating tube or spray nozzle; water pressure 1 bar; delivery rate 10 l/min ± 5%; duration 5 minutes.

5 Protection against water jets: water projected by a nozzle from any direction under specified conditions must have no harmful effect.

Test conditions: nozzle with 6.3 mm diameter; delivery rate 12.5 l/min ± 5%; distance 3 m; duration 3 minutes.

7 Protection against water when device is immersed in water under specified pressure and time conditions. Water must not penetrate in damaging quantities.

Test conditions: immersion depth in water 1 m; duration 30 minutes.

8 Protection against water when device is immersed in water indefinitely under specified pressure conditions. Water must not penetrate in damaging quantities.

Test conditions used by Contrinex: immersion depth in water 5 m; duration ≥ 1 month.

9K Protection against water, which directed against the housing from any direction and under considerably increased pressure, must have no harmful effect.

Test conditions: sensor mounted on table turning at 5 ± 1 rpm; spraying with flat nozzle; delivery rate 14 - 16 l/min; distance 100 - 150 mm; angles 0°, 30°, 60° and 90°; temperature 80 ± 5 °C; pressure 8,000 - 10,000 kPa (80 - 100 bar); duration 30 sec per position.

Devices with degree of protection **IP 67** are thus **not intended for prolonged operation in water**, or in prolonged humid conditions. Tolerance to liquids other than water must be examined from case to case.

E

EMBEDDABLE MOUNTING

See **MOUNTING**.

EMC

The EMC (**E**lectro**m**agnetic **C**ompatibility) resistance of the devices satisfies the highest demands.

For inductive sensors, as a rule, the following requirements are met (for exact values, please refer to the data sheets):

SERIES 300/400/420/500/520/700

IEC 61000-4-2	level 2
IEC 61000-4-3	level 3
IEC 61000-4-4	level 2
IEC 60947-5-2	5 kV

SERIES 600 / 620

IEC 61000-4-2	level 2
IEC 61000-4-3	level 3
IEC 61000-4-4	level 3
IEC 60947-5-2	1 kV / 5 kV*

*(M12 - C80)

For photoelectric sensors, see “technical data”.

All devices comply with the EU directive no. 2004/108/EC. In addition, they undergo severe field testing.

EXCESS-GAIN INDICATION (SYSTEM RESERVE INDICATION)

The excess-gain indication circuit detects the excess radiation power which falls on the light incidence surface and is processed by the light receiver. The excess gain can decrease in time due to dirt, a change in the target’s reflection factor, and aging of the emitter diode, so that reliable operation can no longer be guaranteed. Some devices are therefore equipped with a second LED (green), which lights up when less than approximately 80% of

the available operating distance is used. In others, the yellow LED flashes when the available excess gain is insufficient. Models with an excess-gain output make the excess-gain signal available to the user for further processing. Thus, operating conditions which are no longer reliable can be recognized in time.

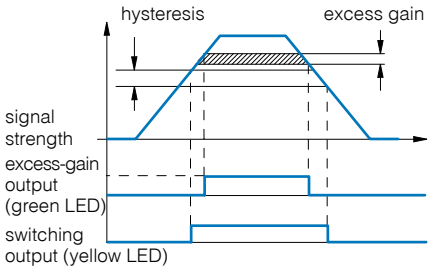


Fig. 23

H

HYSTERESIS

Hysteresis (differential travel) causes a defined switching behavior of the device (Fig. 24). The sensing range always refers to the switch-on point.

Distance hysteresis is only useful for the diffuse sensor model and its related fiber version.

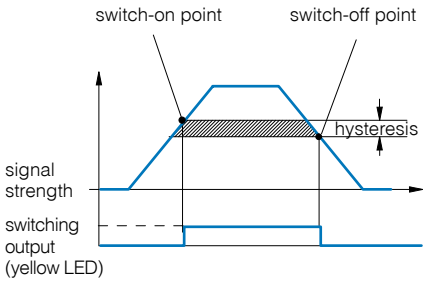


Fig. 24

Hysteresis (differential travel) causes a defined switching behavior of the device (Fig. 25). The operating distance always refers to the switch-on point. Namur devices and those with analog output have continuous transmission behavior, i.e. there is no hysteresis.

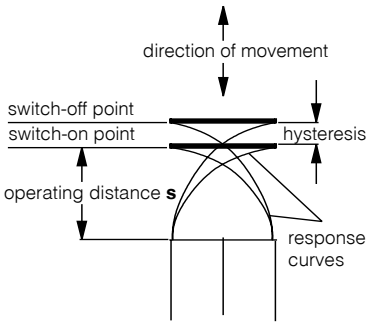


Fig. 25

INDUCTION PROTECTION

When inductive loads are switched off, the output voltage, without a protective circuit, would increase to a high value, which could destroy the output transistor. Contrinex sensors therefore contain a **Zener diode** at the output to limit the switch-off voltage to a safe value (3-wire types). When connecting an inductive load with a current >100 mA and simultaneously a switching frequency >10 Hz, the mounting of a **roller diode** directly to the load is recommended (due to the leakage power in the built-in Zener diode).

INSTALLATION

Photoelectric sensors can be easily and reliably installed in any position, using the mounting accessories supplied with most devices. The installation position should preferably protect the units against dirt and other contamination.

For inductive sensors, see **MOUNTING**.

INSULATION VOLTAGE

The devices in this catalog are designed for an insulation voltage (between connecting leads and housing) of **500 VAC** (supply voltage up to 50 VAC / 75 VDC), or **1500 VAC** (supply voltage over 50 VAC / 75 VDC).

IP 64 / IP 65 / IP 67 / IP 68 / IP 69K

Refer to **DEGREES OF PROTECTION**.

IR LIGHT

IR is the abbreviation of "**I**nfra-**R**ed". This refers to any electromagnetic radiation with a wavelength exceeding that of normal visible light, which is approx. 380 to 780 nm. Wavelengths of approx. 780 to 1500 nm are typically used. IR light cannot be used with synthetic fibers, due to high attenuation. Instead, visible red light is used. As the usual polarization filters cannot be used in the IR range, visible red light is also used for reflex sensors.

L

LEAD LENGTHS

For the sensor, long leads mean:

- a capacitive load at the output (see **CAPACITANCE**)
- increased influence of interference signals

Even under favorable conditions, lead lengths should not exceed **300 m**.

LEADS

The standard built-in leads are **not** suitable for **repeated bending stresses**. In such cases, high-flexibility PUR cables (special executions) or connectors with corresponding connecting cables (see page 268) must be used.

LEAKAGE CURRENT

Leakage current is the current that flows through the output transistor and thereby through the load when the output is OFF (to be taken into account particularly where switches are connected in parallel).

LED

Most of the inductive devices in this catalog are equipped with a built-in yellow light-emitting diode (LED). It indicates the switching state: **output activated = yellow LED on**. In case of a short-circuit, the LED remains off.

All photoelectric sensors have one or two **L**ight **E**mitting **D**iodes (LEDs) built in. The yellow LED lights up when the output is switched (for switches with 2 outputs: the light-ON output). During a short-circuit or overload, the yellow LED does not operate. The green LED (if provided) lights up when enough system reserves (excess gain) for reliable operation are available, i.e. when an object is present in the reliable sensing area (diffuse sensors), or when enough light from the uninterrupted beam reaches the receiver (reflex and through-beam sensors). Switches without a green LED have the yellow LED flashing if the available system reserves are insufficient.

LIGHT-ON

Light-ON means that the relevant output is switched (carrying current) when light is reaching the receiver.

LOAD RESISTANCE

From the selected supply voltage U_B and the specified maximum output current of the sensor, the lowest permissible load resistance for trouble-free operation can be calculated.

Example: With a voltage of 24 V and a specified maximum permissible output current of 200 mA, the minimum load resistance is 120 ohm; at 15 V, it is 75 ohm.

M

MAGNETIC FIELDS

Permanent and low-frequency alternating magnetic fields do not normally influence the operation of sensors.

Strong fields, on the other hand, can saturate the ferrite core of inductive sensors, thereby increasing the operating distance, or even provoking through-connection. However, no lasting damage is caused. **High-frequency fields** of several kHz (700 series), or several hundred kHz (other series), may seriously interfere with the switch functioning, since the oscillator frequency of the devices lies in this range. If difficulties with interfering magnetic fields are encountered, shielding is recommended.

MODULATED LIGHT

The photoelectric sensors listed in this catalog operate with modulated light, i.e. the light emitter is switched on only for a short period and remains switched off for much longer (ratio approx. 1:25). In diffuse and reflex sensors, the receiver is only active during the light pulse, and is disabled during the pulse gap. Operation with modulated light provides the following advantages:

- The devices are largely insensitive to ambient light
- Longer sensing ranges are possible
- Heat generation is reduced, which prolongs the operating life of the emitting diodes

MODULATION FREQUENCY

The photoelectric devices in this catalog are operated with modulated light, which makes them largely insensitive to ambient light. The modulation frequency f_{cy} is in the range of several kHz.

If a device is operated in the proximity of another device with the same modulation frequency, interference can occur.

If the problem cannot be solved by suitable alignment of the units or by shielding, sensors with different modulation frequencies can be supplied as an option.

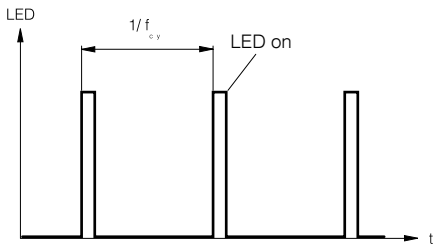


Fig. 26

MOUNTING

For photoelectric sensors, see **INSTALLATION**.

EMBEDDABLE SENSORS

Embeddable sensors may be flush mounted in all metals. For trouble-free operation, a free zone according to Fig. 27 should be observed.

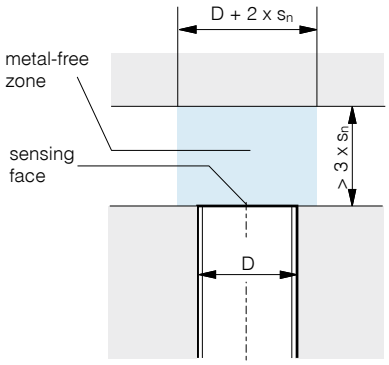


Fig. 27

QUASI-EMBEDDABLE SENSORS

When installing quasi-embeddable series 500 and 520 sensors in conductive materials (metals), the devices must **protrude** by a distance **X**, according to Fig. 28. Further, a free zone of 3 x s_n must be observed. Flush mounting in non-conducting materials is permitted.

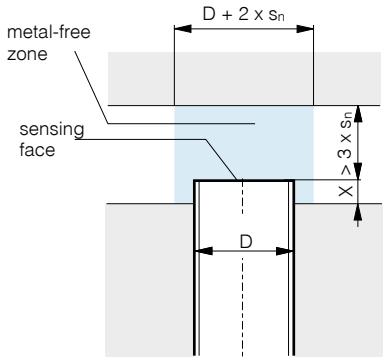


Fig. 28

Mounting in steel and in non-ferrous metals:

Housing size D	X (mm)
Ø 6.5	1
C8	1
M12	2
M18	4
M30	6

Mounting in stainless steel:

Housing size D	X (mm)
Ø 6.5	0.0
C8	0.0
M12	1.0
M18	1.5
M30	2.0

NON-EMBEDDABLE SENSORS

When mounting non-embeddable sensors in conducting materials (metals), minimum distances to the conducting material must be maintained according to Fig. 29. Flush mounting in non-conducting materials is permitted.

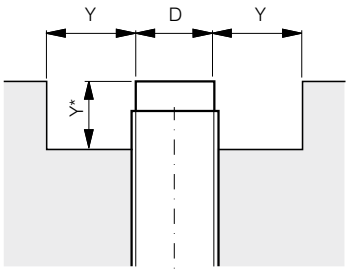


Fig. 29

Housing size D	Y (mm)
M8	8
M12	12
M18	22
M30	40
C44	60 / *40
C40	70 / *40
C60	60 / *40
C80	110 / *40

N

N.C.

The output is closed when the switch is not activated. It is open when the switch is activated.

N.O.

The output is open when the switch is not activated. It is closed when the switch is activated.

NO-LOAD SUPPLY CURRENT

No-load supply current is understood as the inherent consumption of the sensor for operating the LED, amplifier, etc., in the non-activated state. It does not include the current flowing through the load.

NON-EMBEDDABLE MOUNTING

See **MOUNTING**.

NPN CONFIGURATION

The output device contains an NPN transistor, which switches the load towards zero voltage. The load is connected between the output terminal and the positive supply voltage $+U_B$ (Fig. 30).

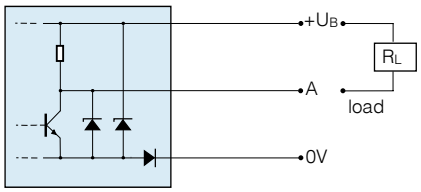


Fig. 30

O

OIL RESISTANCE

Long-term contact with any oils may affect plastics and weaken their resistance. However, inductive series 700 sensors, as well as the sealed (series E) and high-pressure-resistant (series P) types can be used in **oily environments** without restriction. For all other types, this is not necessarily the case.

Thus, please observe the following:

Lubricating oils:

Generally cause no problems. Use versions with oil-resistant PUR cable (special executions).

Hydraulic oils, cutting oils:

These attack most plastics. In particular, PVC cables discolor and become brittle. Measures:

- Wherever possible, avoid contact with these liquids, particularly at the sensing face.
- Use versions with oil-resistant PUR cable.

For photoelectric sensors, housing, optical unit, and cable should be considered separately:

Housing

The PBTP / polybutyleneterephthalate (Crastin) used for the housing is highly resistant to all conventional types of oil, in particular, to cutting and hydraulic oils, as well as drilling emulsions.

Optics

The windows are generally of glass (with the exception of series 5050), and are therefore not affected. However, oil on the light in- and outputs changes their optical properties. The effects should be examined from case to case.

Cable

The PVC cable used as standard is not resistant to most types of oil, and becomes brittle in long-term use. The optional PUR cable should therefore be used in oily environments.

OPERATING DISTANCE

The operating distance of inductive sensors is the distance at which a target approaching the sensing face triggers a signal change. The operating distance is measured according to IEC 60947-5-2 / EN 60947-5-2, using a **standard square target** moving **axially** (Fig. 31). This target is made of steel, e.g. type FE 360 in accordance with ISO 630, with a smooth surface, square shape, and thickness of 1 mm (Fig. 32). The sides equal the **diameter** of the inscribed circle of the sensing face or **three times the rated operating distance s_n** of the sensor, whichever is the greater.

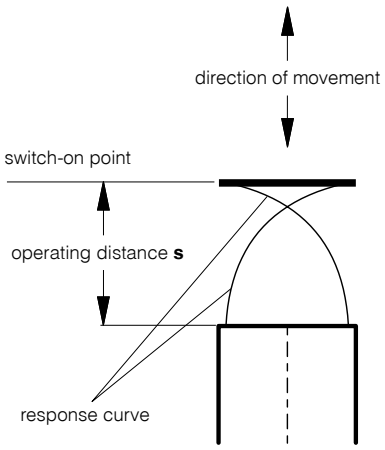


Fig. 31

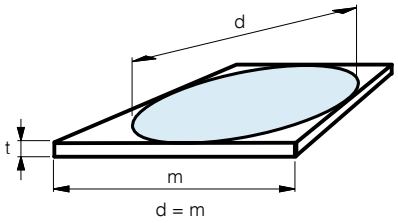


Fig. 32

Rated operating distance s_n

This is the operating distance for which the sensor is designed. It can be found under “technical data”.

Effective operating distance s_r

The measured operating distance for a given switch according to IEC 60947-5-2 / EN 60947-5-2.

$$0.9\ s_n \leq s_r \leq 1.1\ s_n$$

This means that the manufacturing tolerance must not exceed ± 10%.

Usable operating distance s_u

This distance takes into account expected additional deviations caused by temperature and supply voltage fluctuations within the specified range.

$$0.9\ s_r \leq s_u \leq 1.1\ s_r$$

The temperature and supply voltage ranges can be found under “technical data”.

Assured operating distance s_a

$$0 \leq s_a \leq 0.81\ s_n$$

This operating distance is guaranteed by the manufacturer for all specified operating conditions. It is the **basis for a safe design**.

See **SENSING RANGE**.

OPTICAL FIBERS

An optical fiber can consist of a bundle of glass fibers, or one or more synthetic fibers. It is used to conduct light from one place to another, even around bends and curves. This is possible thanks to the phenomenon of total reflection. Total reflection always occurs when light coming from a material with a higher refractive index falls on an interface with a medium having a lower refractive index, in such a way that the critical angle required for total reflection is never reached.

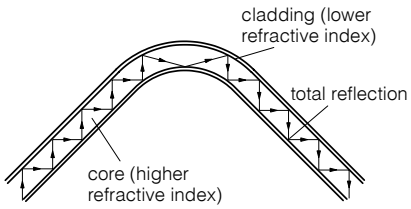


Fig. 33

The fibers consist of a core (with a higher refractive index) and a cladding (with a lower refractive index). Due to total reflection, the light is reflected backwards and forwards in the core, and can thus go round bends and curves.

OUTPUT CURRENT

The devices are designed for a given maximum output current. If this current is exceeded, even for only a short time, the **overload protection** trips. Incandescent lamps, capacitors, and other heavily capacitative loads (e.g. long leads) have a similar effect to overload (see also **CAPACITANCE**).

OUTPUT RESISTANCE

In order that the output voltage, even without external load, follows the switching state, Contrinex sensors contain a built-in output resistance (pull-up resistor). For operation at high switching frequencies, an additional external load resistor must be added (to reduce the electrical time constant).

OVERVOLTAGE PROTECTION

For maximum operating reliability and ease of use, Contrinex sensors feature a built-in protection circuit against very short, non-periodic supply voltage peaks, which complies with the requirements of IEC 60947-5-2.

P

PARALLEL CONNECTION

Connecting sensors in parallel, in order to perform logic functions, is possible without any problem (Figs. 34 and 35).

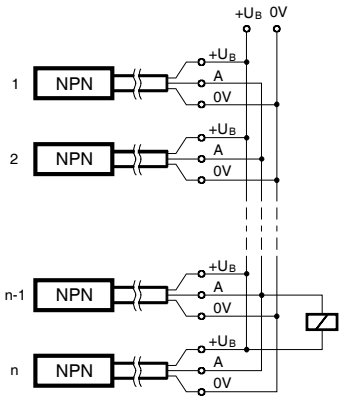


Fig. 34

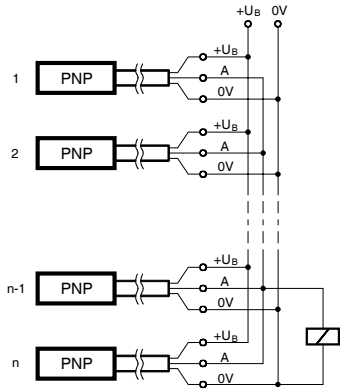


Fig. 35

Please note:

- The no-load supply current increases.
- Leakage currents add up, so that, even when closed, an inadmissible voltage drop can occur at the output.

PNP CONFIGURATION

The output device contains a PNP transistor, which switches the load towards the positive supply voltage $+U_B$. The load is connected between the output terminal and the negative supply voltage 0V (Fig. 36).

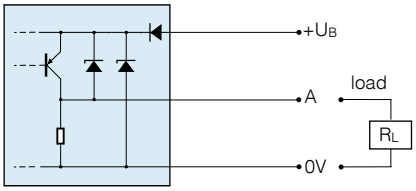


Fig. 36

POLARITY REVERSAL PROTECTION

Virtually all sensors in this catalog are protected against **any polarity reversal** at all terminals.

POLARIZATION FILTER

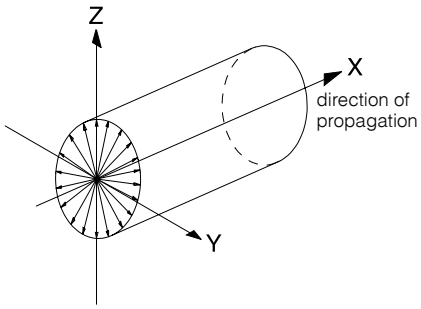


Fig. 37

Natural light (including the light from the emitter diodes) is not polarized (Fig. 37). When light has passed through a polarizing filter however, only that part of the original light which oscillates in the filter polarization direction is still present (Fig. 38). Polarization is retained after reflection by mirrored surfaces, only the direction of polarization may be altered. Diffuse reflection, on the other hand, destroys polarization. This difference can be used to suppress the disruptive effects caused by mirrored surfaces, by means of selection and configuration of suitable filters.

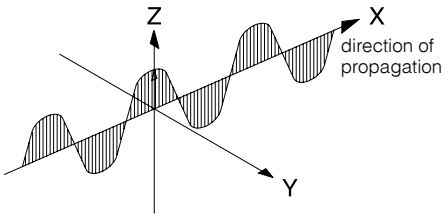


Fig. 38

POWER-ON RESET

When switched on, the sensor output is activated for a short time due to physical reasons, even without the presence of a target in front of the sensing face. Sensors with power-on reset therefore include an additional circuit that closes the output for a short time during the switching-on phase, so suppressing an error signal (this function is also known as “switch-on pulse suppression”).

POWER SUPPLY UNITS

Circuit recommendations for suitable power supply units are shown in Figs. 39 and 40.

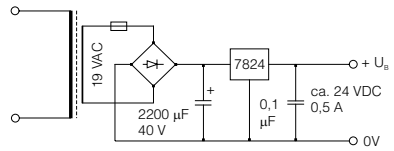


Fig. 39

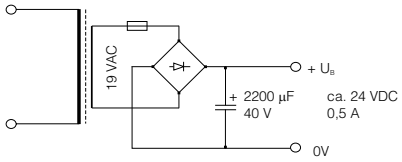


Fig. 40

The Contrinex accessory program also includes a suitable power supply unit (page 274).

Please observe:

– Unsuitable power supply units are the most frequent reason for sensor problems!

– A transformer and rectifier are not sufficient; at least a smoothing capacitor is essential (due to the ripple content).

– Transformers with a 24 V output, rear-position rectifier and smoothing capacitor deliver a no-load voltage of well above 30 V. Consequently, devices with a maximum supply voltage of 30 V can be damaged.

R

REFLECTORS

By means of built-in polarization filters, polarized reflex sensors are designed so that they respond only to the light reflected from special reflectors. These operate according to the principle of the 3-way mirror (Fig. 41). The choice of the correct reflector for a specific application is determined by the required operating distance and installation possibilities. The reflector must be installed perpendicularly to the optical axis (tolerance ± 15º).

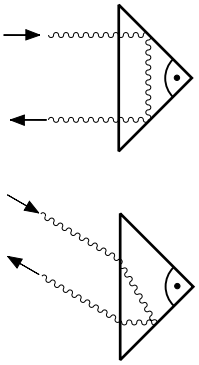


Fig. 41

REPEAT ACCURACY

Repeat accuracy (according to IEC 60947-5-2 / EN 60947-5-2) is understood to be the repeat accuracy of the effective operating distance s_r over an 8-hour period at an ambient temperature of 23 ± 5 °C and with a specified supply voltage U_B. The specified repeat accuracy refers to this definition. Successive measurements made immediately one after the other generally lead to much better repeat accuracy.

RESPONSE DIAGRAM

The specified values for the operating distance refer to an **axial** approach of the target. For staggered or lateral movements, type-specific response curves are valid. Two typical examples are shown below (Fig. 42 and Fig. 43):

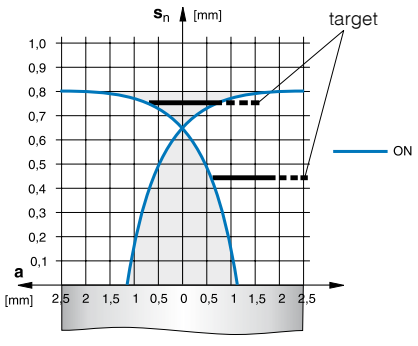


Fig. 42 DW-AD-403-M5

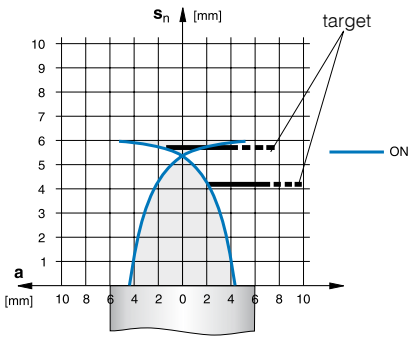


Fig. 43 DW-AD-503-M12

Depending on series, size, and mounting type (embeddable or non-embeddable), the response diagrams differ. Response diagrams for switch types not shown here are readily available from the corresponding individual data sheets. These can be found on the Contrinex website (www.contrinex.com), or ordered from our sales offices.

RIPPLE CONTENT

Too much ripple content causes undefined switching behavior. To remedy this, use a larger smoothing capacitor, or a stabilized power supply unit. The specified maximum supply voltage U_B must not be exceeded, not even during U_{SS} peaks.

$$W = \frac{U_{ss}}{U_d} \times 100\ (\%)$$

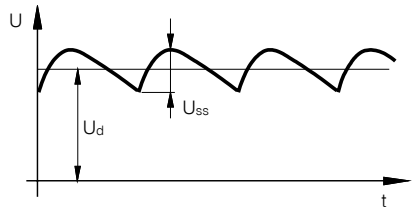


Fig. 44

S

SAFETY

The devices in this catalog have not been designed for safety-relevant use. In cases where the safety of people is dependent on their functioning, it is the user's responsibility to ensure that the relevant standards, in particular ISO 13849-1, and regulations are complied with. Contrinex assumes no liability for personal injury.

SENSING RANGE

The specified sensing range of photoelectric sensors is the maximum usable distance between the device and the standard target (diffuse sensors); between the device and the reference reflector (reflex sensors), and between the emitter and the receiver (through-beam sensors). The potentiometer must be set for maximum sensitivity, or for diffuse sensors with background suppression, for maximum sensing range. Moreover, the specified reflector (reflex sensors) or standard target (diffuse sensors) must be used.

SERIES CONNECTION

The connection of sensors in series in order to achieve logic functions is possible, but not recommended. The same effect can be achieved by the **parallel connection** of sensors with **N.C. function** (instead of the series connection of models with N.O. function), or vice versa. However, please note that, as a result, the output signal is inverted.

SHOCK RESISTANCE

The sensors in this catalog are tested for resistance to a shock of 30 g (30 times gravitational acceleration) for a period of 11 ms, according to IEC 60068-2-27.

SHORT-CIRCUIT PROTECTION

The devices in this catalog feature built-in pulse protection against short-circuits and overloads, which alternately closes and opens the output when the maximum output current is exceeded, until the short-circuit is eliminated. Short-circuits between the output and the supply voltage terminals do not damage the sensor, and are allowed in permanence. The same applies to overloads. During short-circuits, the LEDs do not function.

SPHERICAL OPTICS

Spherical lenses are special cases of double convex lenses. They feature a short focal length and a good light incidence area. They are known for their use in the optical coupling of optical fibers, where the mentioned characteristics can be used to their advantage. New, however, is the use of such optics in coupling the light produced or received by a semiconductor chip (LED or photodiode) into (LED), or out of (photodiode) an optical space. Fig. 45 shows such a design, as it is used in the LT#-1040/1050-30#-50# switches (see pages 147 and 148).

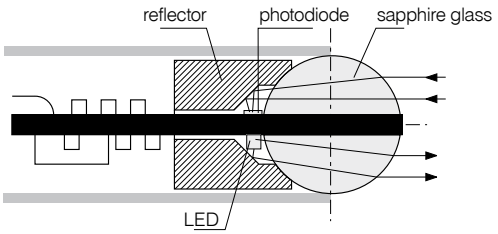


Fig. 45

For the diffuse sensor, the sphere is cut in two, in order to separate the reception from the emission channel. The emitter and receiver semiconductor chips are mounted as closely as possible to the surface of the sphere. As can be seen in Fig. 45, the chips are positioned slightly off the optical axis. In optics, this is usually a disadvantage, but not in this case: The emitted beam and the sensing range of the receiver section "squint" somewhat, i.e. they cross at a specific distance from the device. Consequently, the sensing range is relatively short, but the detection zone is virtu-

ally cylindrical. This is unusual for photoelectric sensors, and allows for interesting new application possibilities, such as, for instance, the detection of targets through narrow holes or gaps.

STANDARDS

The sensors in this catalog comply, either completely or to a great extent, with the following standards:

- IEC 60947-5-1, **IEC 60947-5-2**, EN 60947-5-1, **EN 60947-5-2**
- IEC 61000-4-1, 61000-4-2, 61000-4-3, 61000-4-4, DIN EN 55011, DIN EN 55081-2, DIN EN 50140
- IEC 60529 / DIN 40050
- IEC 60947-1 / EN 60947-1 / DIN VDE 0660, part 100, part 100 A3, part 200, part 208
- DIN EN 50008, 50010, 50025, 50026, 50032, 50036, 50037, 50038, 50040, 50044

SUPPLY VOLTAGE U_B

The specified maximum supply voltages must **not be exceeded**. For maximum operating reliability and ease of use, Contrinex sensors contain a built-in protection circuit against very short, non-periodic, supply voltage peaks, which complies with the requirements of IEC 60947-5-2. Operating voltages below the lower specified limit, even for short periods, do not damage the switches, but impede their operation.

SWITCHING FREQUENCY

The maximum switching frequency of inductive sensors indicates the highest permissible number of pulses per second for a constant pulse/pause ratio of 1 : 2 at **half the rated operating distance s_n**. Measurement is according to IEC 60947-5-2 / EN 60947-5-2 (Fig. 46).

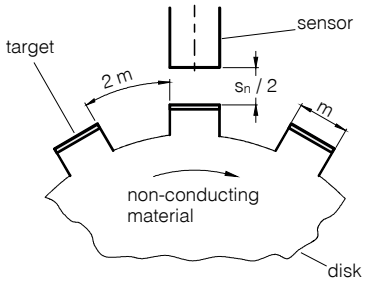


Fig. 46

The maximum switching frequency of photoelectric sensors is determined with the aid of a rotating sector disk. Designed so that a light to dark ratio of 1:1 results, it is placed in the path of the beam. The maximum switching frequency is reached just at the point where no output signal pulses are lost.

T

TEACH-IN

In the majority of applications, each sensor has to be adjusted according to the specific conditions. The adjustment usually concerns the sensing range, and is effected by turning a potentiometer screw. However, an alternative is offered by the teach-in process. Before starting the distance setting by teach-in, the target and/or the eventual background are positioned. Then, by pressing a button on the device, or remotely by means of an electrical signal, the teach process is triggered, in which a built-in microcontroller, starting from the minimum value, increases the switching threshold until the output switches. This switching threshold is digitally stored by the microcontroller in a non-volatile memory (EEPROM), and determines the sensor's subsequent switching behavior. The microcontroller then adapts the switching threshold thus found to the respective application. Depending on the device, or the selected mode, the teach function is applied to the target, the background, or first to the one, and then the other. With newer devices, the teach process can also be remotely triggered by means of a PLC via a control lead, or via IO-Link.

TEMPERATURE DRIFT

The set sensing ranges are subject to slight temperature influences. Due to built-in temperature compensation, this effect is much less important for devices of the 4040 series (approx. 0.1 % / °C) than for the other switches (approx. 0.3 %/°C). The sensing range, as a function of ambient temperature, follows approximately the curves shown in Fig. 47.

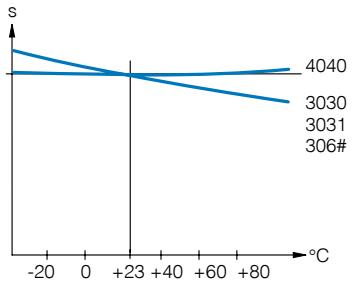


Fig. 47

The specified operating distances refer to a nominal ambient temperature of 23°C. The operating distance, as a function of ambient temperature, follows approximately the curve shown in Fig. 48.

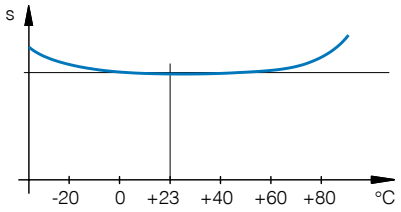


Fig. 48

The temperature of the target itself has practically no influence on the operating distance. Within the permitted temperature range of, as a rule, -25°C to + 70°C, the operating distance varies by a maximum of ± 10% compared to its value at 23°C.

TEST INPUT

The emitters of through-beam sensors, as well as a number of series 6080 types, are provided with a test input. Light emission can be switched on and off by means of this input, which, together with the corresponding evaluation of the receiver reaction, permits very efficient sensor monitoring.

TIGHTENING TORQUE

Over-tightening of the nuts can mechanically damage cylindrical sensors. The specified maximum permissible tightening torques must therefore not be exceeded.

SERIES 300, 400, 420, 500*, 520*, 600, 620

Housing size D	M (Nm)
M4	0.8
M5	1.5
C5	0.2
M8	10 / *4
C8	1
M12	10
M18	25
M30	70

SERIES 700

Housing size D	M (Nm)
M8	6
M12	20
M18	50
M30	150

SERIES 1040 / 50, 1120, 1180, 1180W

Housing size D	M (Nm)
M5	1.5
M12	10
M18 / M18W	20

TIME DELAY BEFORE AVAILABILITY

The time delay before availability is the maximum time the sensor requires for **operating readiness** after the supply voltage has been switched on.

V

VIBRATION RESISTANCE

The sensors in this catalog are tested for resistance to vibrations of 1 mm amplitude at 55 Hz, according to IEC 60068-2-6.

VOLTAGE DROP

In the switched-through condition, a (current dependent) voltage drop develops across the output transistor; the output voltage, therefore, does not entirely reach the corresponding supply voltage (to be particularly taken into account with series connection and electronic inputs).

W

WIRE-BREAK PROTECTION

All sensors in this catalog are equipped with wire-break protection. If a voltage supply lead breaks, the output is disabled, thus avoiding an error signal.

WIRING

Sensor cables must not be laid in parallel in the same cable runs as cables connected to **inductive loads** (i.e. protection solenoids, magnetic rectifiers, motors, etc.), or which conduct currents from **electronic motor drives**. Leads should be kept as short as possible; however, with suitable wiring (low coupling capacitance, small interference voltages), they can be up to 300 m long.

To reduce electromagnetic interference, apply the following measures:

- Maintain the distance to interfering cables > 100 mm
- Use shields
- Install inductances (contactors, magnetic rectifiers, relays) with RC networks or varistors

INDUCTIVE SENSORS

DW-AD-503-M8E (-12X/-XXX)

INDUCTIVE SENSOR — DW

SENSOR TYPE

Conventional	A
2-wire DC (NAMUR excepted)	D
High-temperature	H
Food and sea-water	L

CONNECTION

Cable	D
Connector	S
Cable with molded connector	V

SERIES

300 (ultraminiature)	3
400 / 420 (miniature)	4
500 / 520 (long operating distance)	5
600 / 620 (standard)	6
700 (all-metal)	7

Embeddable / quasi-embeddable	0
Non-embeddable	1
Increased operating distance, (quasi-)embeddable	2
Increased operating distance, non-embeddable	3

OUTPUT

NPN N.O.	1
NPN N.C.	2
PNP N.O.	3
PNP N.C.	4
PNP changeover	A
NPN changeover	B

SHORT / SPECIAL EXECUTIONS

Series E (impervious)	E
Series 700P (all-metal & high-pressure resistant	G

HOUSING SIZE

Threaded	
M4	4
M5	5
M8	8
M12	12
M18	18
M30	30
M50	50
Smooth	
Ø 3 mm	3
Ø 4 mm	4
Ø 6.5 mm	65
Ø 8 mm	80
5 x 5 mm	5
8 x 8 mm	8
40 x 40 mm	44
40 x 120 mm	40
60 x 80 mm	60
80 x 100 mm	80

HOUSING

Threaded cylindrical housing	M
Rectangular housing	C
Smooth cylindrical housing	0
High-pressure resistant	P

OUTPUT

2-wire DC	
N.O. / Namur	5
N.C.	6

2-wire AC/DC	
N.O.	7
N.C.	8
Analog	9

Detailed data sheets for these products can be found on the Contrinex website:

INDUCTIVE SENSORS

INDUCTIVE SENSORS

INDUCTIVE SENSORS

INDUCTIVE SENSORS

INDUCTIVE SENSORS

INDUCTIVE SENSORS

PHOTOELECTRIC SENSORS

LTS-1180-303 (-XXX)

PHOTOELECTRIC SENSOR	L
COLOR SENSOR	F

SENSOR TYPE

With analog output	A
For fibers / fiber	F
With background suppression	H
Through-beam sensor	L
Reflex sensor	R
Diffuse sensor	T
Accessories	X
Device with cable	K
Device with connector	S
Device with screw terminal	T
Device with molded connector	V
Synthetic optical fiber	P
Glass optical fiber	G
Reflector	R
Cutting tool	F
Mounting bracket	W

SERIES

Cylindrical devices	
Ø 4	1040
M5	1050
M12	1120
M12 laser	112#L
M18	1180
M18 laser	118#L
M18 with lateral light emission	1180W
Rectangular devices	
5 x 7 mm	0507
30x30 mm (high-performance)	3#30
30x30 mm (standard)	3#31
31x60 mm (standard)	3#60
31x60 mm (teach-in)	3#65
31x60 mm (teach-in & digital display)	3066
31x60 mm (high frequency)	326#
31x60 mm (blue light)	336#
40 x 40 mm	4040
40 x 50 mm	4#5#
50 x 50 mm	5050
65 x 83 mm	6080
Synthetic optical fibers	
Diffuse sensor	1###
Through-beam sensor	2###
Miniature / standard / coaxial	#0##
Flexible	#1##
Luminous (enhanced brightness)	#2##
Glass optical fibers	
Axial diffuse sensor	1###
Radial diffuse sensor	2###
Axial through-beam sensor	3###
Radial through-beam sensor	4###
Accessories	0###
Universal mounting brackets	
For 3#30 / 3#31 series	3030
For 3#6# series	3060
For 4040 series	4040
For 4#5# series	4050
For 5050 series	5050
For 6080 series	6080

4-wire through-beam sensor	0
4-wire basic device	1
3-wire through-beam sensor	2
3-wire basic device	3
With IO-Link	4

SPECIAL EXECUTIONS

EXECUTION

3- or 4-wire through-beam sensor (emitter)	00
4-wire devices, NPN, output:	
Changeover or switchable	01
Light-ON and excess gain	02
4-wire devices, PNP, output:	
Changeover or switchable	03
Light-ON and excess gain	04
AC/DC devices	
Through-beam sensor (emitter)	10
With relay output	15
With relay output and timer	65
3-wire devices, NPN, output:	
Light-ON	01
Dark-ON	02
3-wire devices, PNP, output:	
Light-ON	03
Dark-ON	04
With built-in timer	+50

DIMENSIONS

Synthetic optical fibers	
Length in dm (2 m)	020
Glass optical fibers	
Length in cm (0.25 m)	025
Length in cm (0.50 m)	050
Length in cm (1 m)	100
Accessories	
General	000-001
Reflector type 12	012
Reflector type 13	013
Reflector type 14	014
Reflector type 15	015
Reflector Ø 25.2 mm	025
Reflector Ø 46 mm	046
Reflector Ø 82 mm	084

Detailed data sheets for these products can be found on the Contrinex website:

PHOTOELECTRIC SENSORS

PHOTOELECTRIC SENSORS

OPTICAL FIBERS

ULTRASONIC SENSORS

UTS-1180C-303 (-XXX)

ULTRASONIC SENSOR — U

SENSOR TYPE

Reflex sensor	R
Diffuse sensor / diffuse and reflex sensor	T
Through-beam sensor	L

CONNECTION

Connector	S
Cable	K

HOUSING TYPE

Cylindrical device	1
Cuboid device	4

HOUSING SIZE

Cylindrical devices	
M18	18
M30	30
Cuboid devices	
40 x 40 mm	04

SPECIAL EXECUTIONS

POLARITY

PNP N.O. (+ analog)	3
2 switching outputs	7
Analog output	9

OUTPUT

Switching output	0
Analog (voltage)	1
Analog (current)	2

Through-beam sensor	0
5-wire, (2 outputs), diffuse / reflex sensor	1
4-wire, (1 output), diffuse / reflex sensor	3

HOUSING

Short	C
For lateral sensing	W

OPERATING DISTANCE

Shortest operating distance	0
Increased operating distance	1
Long operating distance	2
Very long operating distance	3

Detailed data sheets for these products can be found on the Contrinex website:

CAPACITIVE SENSORS

CSK-1120-103

CAPACITIVE SENSOR	**C**

SENSOR TYPE

Standard	**S**

CONNECTION

Cable	**K**
Connector	**S**

DIMENSIONS

M12	**112**
M18	**118**
M30	**130**

OUTPUT

NPN, changeover	**1**
PNP, changeover	**3**
AC/DC N.O.	**7**

MOUNTING

Embeddable	**0**
Non-embeddable	**1**

HOUSING TYPE

Metal housing	**1**
Synthetic housing	**2**
PTFE housing	**3**

OPERATING DISTANCE

Increased operating distance	**0**
Standard operating distance	**1**

CABLE DISTRIBUTION BOXES

V12-58PD-050-UYN (-XXX)

DISTRIBUTION BOX — V

CONNECTIONS

Accessory	00
M8	08
M12	12

POLE NUMBER OF CONNECTIONS

3-pole	3
4-pole	4
5-pole	5

NUMBER OF CONNECTIONS

Hood for all types	0
4 connections	4
6 connections	6
8 connections	8
10 connections	1

MATERIAL

Plastic	P
Metal	M

TYPE

Distribution box with cable	D
Distribution box for straight connection	G
Distribution box for right-angle connection	W
Base element without hood	B
Hood with cable	H
Hood without cable	E
Base element + hood with cable	Y

CONNECTION

No cable	000
Cable 0.3 m	003
Cable 2 m	020
Cable 5 m	050
Cable 10 m	100
Connector S12	012
Connector S23	023

CABLE MATERIAL

No cable	N
PVC	V
PUR	U

LED

Yes	Y
No	N

TECHNOLOGY

Standard (passive distribution box)	N

SPECIAL EXECUTIONS

Detailed data sheets for these products can be found on the Contrinex website:

CABLE DISTRIBUTION BOXES

CONNECTION CABLES / CABLE CONNECTORS

S12-4FAG-020[-NNLN-12MG]-(XXX)

CONNECTION CABLE / CABLE CONNECTOR

S	

SOCKET SIZE

M8	08
M12	12
M23	23

NUMBER OF POLES

3-pole	3
4-pole	4
5-pole	5
11-pole	B
19-pole	J

CONNECTOR TYPE

Female (socket)	F
Male (plug)	M

CABLE MATERIAL

No cable	N
PVC	V
PUR	U
TPE-S	A

CABLE EXIT SOCKET

Straight	G
Right-angle	W

CABLE LENGTH

No cable	000
0.3 m	003
0.6 m	006
1 m	010
1.5 m	015
2 m (standard)	020
5 m	050
10 m	100

3-pole, N.O. & N.C.

3-pole, N.O. & N.C.	015
100 pieces	921

CABLE EXIT PLUG

Straight	G
Right-angle	W

CONNECTOR TYPE

Male (plug)	M
Female (socket)	F

PLUG SIZE

M8	08
M12	12
M23	23

CONNECTION TYPE

Standard	N
Quick-lock	Q
For cable Ø 4.0 - 5.1 mm	1
For wire cross-section 0.14-0.34 mm^2	2
For cable Ø 5.5 - 8.0 mm	3

APPLICATION

Standard	N
Food	L
RFID	R
Field attachable	T
Safety	S

EXECUTION

Standard or no cable	N
Shielded	W

LED

Yes, PNP	Y
Yes, NPN	Z
No	N

Detailed data sheets for these products can be found on the Contrinex website:

CONNECTION CABLES / CABLE CONNECTORS

RADIO FREQUENCY IDENTIFICATION SYSTEMS (RFID)

RFID COMPONENTS

RFID (Radio Frequency IDentification) is used in numerous automation and logistics applications. It allows objects to be identified by means of electronic labels (transponders or tags).

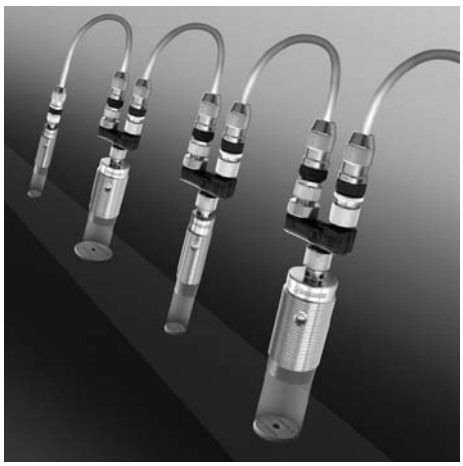
The transponder memory contains a unique preset number as well as a zone in which complementary data relative to the object, either for tracing its history or for programming the parameters of the operations to which it will be subjected, can be inscribed by means of a read/write module.

The advantages of RFID technology compared to classic systems, such as bar codes or laser marking, reside in the fact that, on the one hand, the tag information can be read or written even if there is no direct line of vision between it and the read/write module and, on the other, tag information can be supplemented, modified or deleted.

ALL-METAL SYSTEM (LOW-FREQUENCY TECHNOLOGY)

Since adverse environmental conditions in the industrial domain are not a rare occurrence, Contrinex has developed an RFID system with stainless-steel all-metal components, based on its inductive all-metal technology. The result: an RFID technology that allows for both tags and read/write modules to be executed in one-piece metal housings (including the sensing face).

The product range (low-frequency technology) comprises all-metal tags and all-metal read/write modules which, thanks to their one-piece stainless-steel housings, are extremely rugged, both mechanically and chemically. In addition, the tags can be fully embedded in the object to be identified (even if metallic), and have a usable memory of 2 kbit with various protection possibilities. The range additionally includes hermetically sealed (IP 68 & IP 69K) transponders as well as read/write modules and transponders for operating temperatures of up to 125 °C. Furthermore, there are interface devices for the connection of up to 4 read/write modules to Profibus, EtherNet/IP, DeviceNet and RS485 field-bus systems.



13.56 MHZ SYSTEM (HIGH-FREQUENCY TECHNOLOGY)

In addition to its RFID system with all-metal components for particularly demanding environments, Contrinex has now also developed an RFID product range which works according to the 13.56 MHz technology. This new standard system allows for the integration of all tags complying with the requirements of the ISO/IEC 15693 standard.

The new Contrinex system is distinguished by the fact that the read/write modules can be connected directly to the RS485 field bus. Thus, physically, up to 10 read/write modules, and logically, up to as many as 253 addresses can be accessed from a control console. In order to further simplify the communication processes, Contrinex has moreover developed a USB adaptor that makes the connection of a PC to an RS485 field bus seem like child's play.

Additional information concerning the Contrinex RFID systems can be found on the Contrinex website: www.contrinex.com.

SAFETINEX

SAFETY SYSTEMS

SAFETINEX LIGHT CURTAINS AND ACCESS CONTROL BARRIERS

The Safetinex product line produced by Contrinex offers high-quality safeguarding solutions for both personnel and machinery. The range comprises highly sensitive type-4 devices for finger, hand and access protection in various lengths.

Safetinex products have been developed in compliance with the applicable international safety standards and have obtained the required product certification for use in the European Union, the United States of America and all other countries where the applicable IEC standards have been adopted. Safetinex light curtains and access control barriers feature the highest safety level, i.e. they correspond to safety category 4, PL e, according to EN/ISO 13849-1 (former EN 954-1) and type 4 according to IEC 61496-1 and -2. They have successfully obtained the highly rated TÜV certification.

Additional information concerning Safetinex light curtains and access control barriers can be found on the Contrinex website: www.contrinex.com.

CONTRINEX

ALL OVER THE WORLD

EUROPE

Austria
Belgium
Croatia
Czech Republic
Denmark
Estonia
Finland
France
Germany
Great Britain
Greece
Hungary
Ireland
Italy
Luxembourg
Netherlands
Norway
Poland
Portugal
Romania
Russian Federation
Slovakia
Slovenia
Spain
Sweden
Switzerland
Turkey

AFRICA

South Africa

THE AMERICAS

Argentina
Brazil
Canada
Chile
Colombia
Mexico
United States
Venezuela

ASIA

China
India
Indonesia
Japan
Korea
Malaysia
Pakistan
Philippines
Singapore
Taiwan
Thailand
Vietnam

AUSTRALASIA

Australia
New Zealand

MIDDLE EAST

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Israel
Syria
United Arab Emirates

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