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Sensor Catalog 2013 - 2014

CONTRINEX

NEW

Miniature inductive sensors ($\varnothing 3$ & M5) for harsh or pressurized environments

Weld-immune, full-metal inductive sensors

Cubic inductive sensors with rotatable active face, IP 68 & IP 69K

Full-metal inductive sensors with long operating distance (15 mm in M12 housing)

Ecolab-approved photoelectric sensors with Plexiglas[®] window (40 x 50 mm)

Expanded capacitive sensor range copes with sticky and viscous materials

Food-approved PVC cables and connectors, IP 69K



Swiss
Quality

INTRODUCTION

AT A GLANCE

- ✓ Technology leading manufacturer of inductive and photoelectric sensors as well as Safety and RFID systems
- ✓ World market leader for miniature sensors, sensors with long operating distance and devices for particularly demanding operating conditions
- ✓ Represented in over 60 countries worldwide, headquarters in Switzerland
- ✓ Production sites in Switzerland, Hungary (since 1995), China (since 2003) and Brazil (2009)
- ✓ 14 own subsidiaries in all major markets
- ✓ More than 500 employees worldwide



Contrinex Headquarters, Switzerland

PETER HEIMLICHER HANDS OVER CEO ROLE TO ANNETTE HEIMLICHER

On 1st September 2012 Peter Heimlicher, the founder and President of the Contrinex Group, handed over as CEO to his daughter and fellow member of the Management Board, Annette Heimlicher.

As Director of Corporate Development, Annette Heimlicher has overseen much of the Group's recent expansion, particularly in India and Brazil, and is on the Board of several Contrinex subsidiaries. Annette Heimlicher holds a post-graduate degree in economics from the London School of Economics and formerly held the post of Associate Director at the World Economic Forum in Geneva.

In her new role, Mrs Heimlicher will continue to pursue a growth strategy for the Group.



40 YEARS OF INNOVATION

- 1979 Sensor business starts with self-contained subminiature inductive sensors: Ø4 mm (instead of M8 before)
- 1982 Launch of inductive sensor with patented Condist® technology – market leadership with operating distances 3x standard
- 1986 Launch of Ø3 mm inductive sensors, now market leader for subminiature inductive sensors
- 1996 Market launch of Ø4 mm subminiature photoelectric sensors
- 1999 Launch of world's first inductive sensor with full-metal housing – thanks to patented Condet® technology
- 2005 Integration of Contrinex's excellent performance for inductive sensors in CMOS-ASIC (Application-Specific Integrated Circuit), a proprietary development
- 2007 Launch of RFID products for closed loop industrial applications. First RFID product range with tags and readers in full-metal housing
- 2008 Launch of Safetinx®, the industrial safety product range
- 2009 The smart sensor is born. Launch of next generation ASIC, a "system on a chip", including IO-Link interface
- 2011 Development starts on Contrinex's first ASIC for photoelectric sensors

2012 Contrinex celebrates 40 years:

- More than 500 employees
- Represented in 60 countries
- 8000 products
- 4 production sites
- 14 own subsidiaries in all major markets



Early inductive sensor produced for own use in 1973 (special version for extreme conditions)



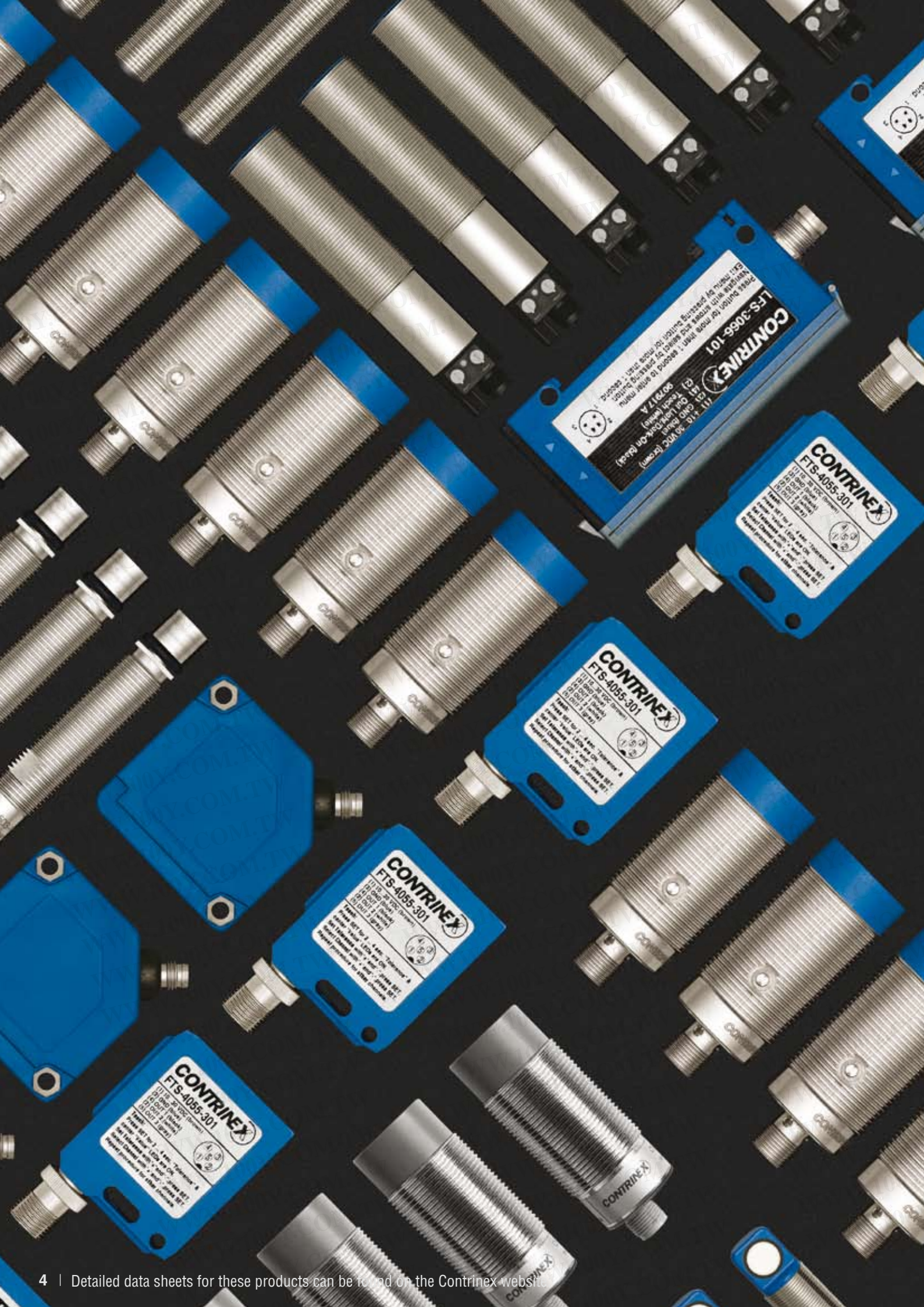
Next generation ASIC



Safety product range



Subminiature photoelectric sensor





INDUCTIVE SENSORS 24-127

**PHOTOELECTRIC SENSORS /
OPTICAL FIBERS** 128-239

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SENSOR SELECTOR

	INDUCTIVE	PHOTOELECTRIC
		
SENSING DISTANCE	1 mm - 40 mm	1 mm - 50,000 mm
TARGET MATERIAL	Metal only	Any material that reflects light
SENSING SPEED	0.02 - 10 kHz	1 - 5 kHz
ENVIRONMENT	Versions for normal or harsh and dirty environments, with protection class up to IP 68 / IP 69K	For clean environments without dust or steam, with protection class up to IP 67
PROGRAM OVERVIEW	p. 14 - 17	p. 130 - 133
TASKS	<ul style="list-style-type: none"> ✓ Presence detection of metal objects ✓ Position control of all kinds of metal targets ✓ Counting tasks ✓ Distance control on end positions ✓ Quality control 	<ul style="list-style-type: none"> ✓ Sensing of light reflective objects ✓ Position control of cartons and other objects on conveyors ✓ Detection of small objects over large distances

ULTRASONIC



10 mm - 6000 mm

Any material that reflects sounds

1 - 10 Hz

For industrial environments, with protection class up to IP 67

p. 242 - 243

- ✓ Detection of all objects that reflect ultrasound
- ✓ Monitoring of winding and un-winding processes
- ✓ Liquid level control
- ✓ Loop tension control
- ✓ Position feedback
- ✓ Distance or height control

CAPACITIVE



1 mm - 40 mm

Metals, non-metals, liquids, powders

15 - 500 Hz

For normal or demanding environments, with protection class up to IP 67

p. 268 - 269

- ✓ Level control of fluids, bulk materials and powder
- ✓ Presence detection of almost all materials
- ✓ Counting tasks for non-metallic materials
- ✓ Detection through non-metallic container walls

APPLICATIONS

AUTOMOTIVE MANUFACTURING INDUSTRY

Today, sensors of all types are common in automotive factories around the globe. Highly automated plants with demanding conformity requirements rely heavily on sensor technology to maintain world-class quality standards, particularly where harsh processes such as welding, metal finishing and high-temperature coating are required.

Manufacturing engineers working for automotive manufacturers and for first- and second-tier suppliers expect robust, reliable sensors that deliver accurate, repeatable results with minimal downtime.



Typical application

See our website or scan this QR code:



Recommended product ranges:

- Inductive - Full Inox - Extreme
- Inductive - Classics - Basic
- Inductive - Full Inox - Weld-Immune
- Inductive - Extra Distance - Basic



PACKAGING MACHINES

On the journey from manufacturer to consumer, packaging protects all types of product, including foods, pharmaceuticals, white goods and cosmetics. Although packaging helps bring competitive products to target markets in the best possible condition, costs are often significant, and automation helps minimize the impact.

The packaging industry is highly innovative, using sensors to identify, select and position packaging of all types. Reducing manufacturing costs and ensuring environmental sustainability are key objectives, and sensors for packaging machines are chosen to maximize efficiency while ensuring reliable, repeatable operation.



Typical application

See our website or scan this QR code:



Recommended product ranges:

- Photoelectric - Cubic small
- Photoelectric - Cylindrical small
- Photoelectric - Cubic miniature



MACHINE TOOLS

Machine tools impose harsh operating conditions on the sensors needed to control cutting, forming and joining processes that run continuously in many metalworking factories. Common hazards include cutting fluid, cooling sprays, swarf particles and electromagnetic interference, making sensor selection particularly difficult where world-class performance is essential.

Size is another key factor, as modern tool-holders allow only limited space for the sensors needed to identify and position individual tools during rapid tool-changing. The right sensors contribute to efficient production, without interruption or error.

Typical application

See our website or scan this QR code:



Recommended product ranges:

Inductive - Classics - Miniature
Photoelectric - Cylindrical subminiature
Inductive - Extra Distance - Basic



LOGISTICS

Whatever the logistics system, choosing the right sensors is crucial to achieving the six “rights” of logistics: ensuring that the right goods, in the right quantities, in the right condition, are delivered to the right place, at the right time, for the right cost.

From large-scale containerized shipping to everyday internal logistics, engineers select the right sensor technology for each container, conveyor, palletizer or robot, ensuring reliable, repeatable detection and identification, together with trouble-free operation.

Typical application

See our website or scan this QR code:



Recommended product ranges:

Inductive - Extra Distance - Basic
Photoelectric - Cubic small
Inductive - Classics - Basic
Photoelectric - Cylindrical small



APPLICATIONS

TEXTILE

Machinery manufacturers supplying the textile, leather and clothing industries rely on sensors for efficiency, reliability and precision. World-class accuracy is essential for production of technical textiles and for making the carbon or chemical fibers used in modern, innovative products, often in highly automated factories.

The high-speed machinery used by textile manufacturers must operate continuously and safely, relying on top-quality sensors for all aspects of access and control. The environmental challenges include industrial cleaning routines that test every sensor to the limit of its capability.



Typical application

See our website or scan this QR code:



Recommended product ranges:

- Inductive - Classics - Basic
- Inductive - Extra Distance - Basic
- Photoelectric - Cylindrical small



FILLING MACHINES

Filling machines are widespread in many industries, including solids handling, chemical, food, beverage and pharmaceutical, often operating continuously around the clock. Industrial sensors detect containers, lids, labels and caps, measure fill levels and more, and play a vital role in keeping automated filling equipment running reliably, accurately and with minimal downtime.

When handling bulk solids or aggressive chemicals, or working in environments that may operate harsh clean-in-place routines, choosing robust, high-quality sensors is essential to maximize operational efficiency and minimize total cost of ownership.



Typical application

See our website or scan this QR code:



Recommended product ranges:

- Photoelectric - Cubic small
- Capacitive - Cylindrical - Basic
- Photoelectric - Cylindrical small



GREEN ENERGY AND ENVIRONMENT

The Green Economy relies heavily on technology for its continued advancement, and sensors are a major component of any eco-friendly strategy. Environmental initiatives include wind-, wave- and solar-power generation, industrial and domestic recycling, energy management and development of alternative fuels.

To deliver the green agenda, all of these sectors utilize sensors extensively for reliable detection and identification of materials, accurate measurement of operational parameters and consistent control of processes.

Typical application

See our website or scan this QR code:



Recommended product ranges:

- Inductive - Full Inox - Washdown
- Inductive - Classics - Basic
- Inductive - Extra Distance - Basic



MOBILE EQUIPMENT

Repairing and servicing equipment on site can be difficult and costly at best, and sometimes impossible. In these circumstances, robust, highly reliable sensors are vital for continuous operation in environments that may be challenging in the extreme. Exposure to dirt and dust, impact, vibration, seawater, corrosive chemicals and extremes of temperature and pressure are all part of a regular day's work.

Manufacturers of mobile and portable equipment, including forklifts, agricultural machines, construction plant, aircraft, vehicles and ships, expect exceptional reliability and life-expectancy when selecting fit-and-forget sensors for these demanding applications.

Typical application

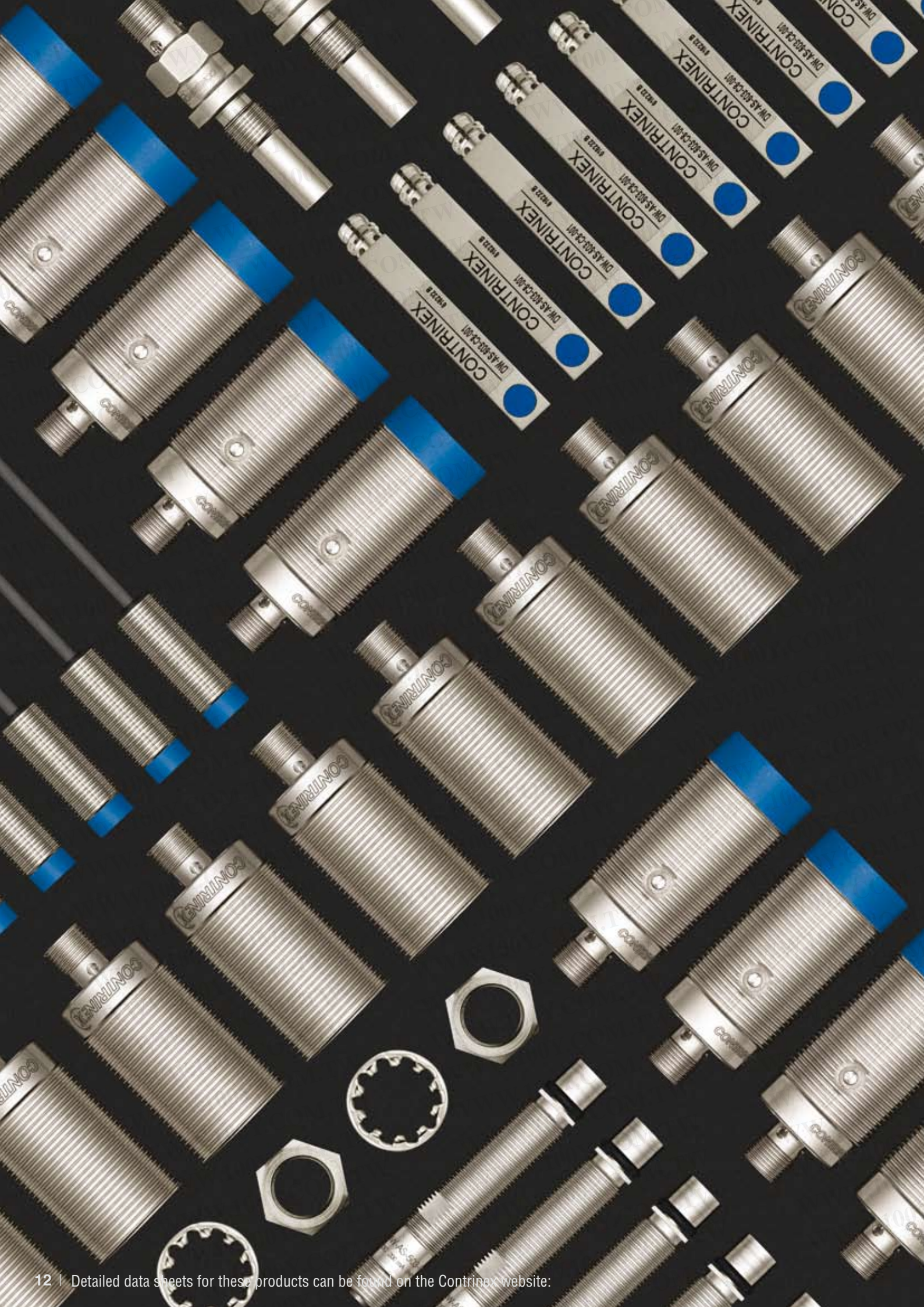
See our website or scan this QR code:




Recommended product ranges:

- Inductive - Extra Distance - High pressure
- Inductive - Full Inox - Extreme
- Inductive - Extra Distance - Basic







INDUCTIVE SENSORS

HIGHLIGHTS:

- ✓ Practically indestructible full-metal sensors for extreme conditions
- ✓ Subminiature sensors with full-size functionality
- ✓ Sensors with 4x standard operating distance
- ✓ Outstandingly durable sensors for high cyclic pressures (peak: 1000 bar / 14510 psi)
- ✓ Highly accurate analog output sensors for distance control
- ✓ Full-metal sensors with Factor 1 on steel and aluminum
- ✓ Sensors to withstand high temperatures (up to 230°C / 446°F)
- ✓ Ecolab-approved sensors

NEW:

- ✓ Smallest self-contained miniature inductive sensors on the market
- ✓ M12 full-metal sensors with increased operating distance (15 mm)
- ✓ Flexible cubic sensors with rotatable active face
- ✓ Weld-immune full-metal sensors

PROGRAM OVERVIEW

FAMILY	HOUSING SIZE	OPERATING DISTANCE	BASIC	MINIATURE	EXTREME	EXTRA PRESSURE up to 100 bar	HIGH PRESSURE up to 1000 bar peak
IO-Link coming soon CLASSICS Series 600 1 x S _n / 2 x S _n	∅ 3	0.6 ... 1 mm		p.65-66		p.85	
	M4	0.6 ... 1 mm		p.66-67			
	∅ 4	0.8 ... 1.5 mm		p.67-68		see online	
	M5	0.8 ... 1.5 mm		p.69-70		p.85	
	C5	0.8 ... 1.5 mm		p.71			
	∅ 6.5	1.5 ... 2 mm	p.27-31				
	M8	1.5 ... 4 mm	p.32-37, 39-40				
	8 x 8	1.5 ... 2 mm	p.41-42				
	M12	2 ... 8 mm	p.43-47, 61				
	M18	5 ... 8 mm	p.50-53, 61				
	M30	10 ... 15 mm	p.55-56, 61				
	M50	25 mm					
	40 x 40 mm	15 ... 40 mm	p.59-60				
	40 x 120 mm	15 ... 40 mm	p.60-61				
EXTRA DISTANCE Series 500 3 x S _n / 4 x S _n	∅ 4	2.5 mm		p.69			
	M5 / P5	1 ... 2.5 mm		p.70			p.89
	∅ 6.5	2.5 ... 3 mm	p.31			p.85	
	M8 / P8	1.5 ... 6 mm	p.38-41			see online	p.89
	8 x 8	2 ... 4 mm	p.42				
	M12 / P12	1.5 ... 10 mm	p.46-50				p.89-91
	M18	10 ... 20 mm	p.53-55				
	M30	20 ... 40 mm	p.57-59				
	M14 / P20	3 mm					p.91-92
FULL INOX Series 700 full-metal housing	∅ 4			coming soon			
	M5			coming soon			
	∅ 6.5				coming soon		
	M8	3 ... 6 mm			p.75-76		
	M12 / P12	1.5 ... 15 mm			p.76-78		p.91
	M18	5 ... 20 mm			p.78-80		
	M30	3 ... 40 mm			p.80-81		

	EXTRA TEMPERATURE -40 to 120°C	HIGH TEMPERATURE up to 230°C	WASHDOWN	ANALOG OUTPUT	WELD-IMMUNE	SPECIAL
						p.125
	p.97					p.125
						p.125
						p.126
	p.97	p.101				
	p.97	p.101	coming soon		see online	p.126-127
	p.97	p.101			see online	p.127
		p.101			see online	
		p.102				
					see online	
				p.113-114		
				p.113		
				p.114-115		
				p.115-116		
				p.116-117		
			p.107		p.121	
			p.107		p.121	
			p.108			p.127

PROGRAM OVERVIEW

MINIATURE + BASIC RANGES

HOUSING SIZE	OPERATING DISTANCE													PAGE
	5 mm	10 mm	15 mm	20 mm	25 mm	30 mm	35 mm	40 mm	45 mm	50 mm	55 mm	60 mm	65 mm	
∅ 3 mm / M4	0.6 mm													65 - 66
	1 mm													65 - 67
∅ 4 mm / M5	0.8 mm													67 - 69
	1.5 mm													68 - 70
	2.5 mm													69 - 70
5 x 5 mm	0.8 mm													71
	1.5 mm													71
∅ 6.5 mm	1.5 mm													27 - 29
	2 mm													29 - 31
	3 mm													31
M8	1.5 mm													31 - 33
	2 mm													34 - 37
	2.5 mm													37
	3 mm													38
	4 mm													39 - 40
8 x 8 mm	6 mm													40 - 41
	1.5 mm													41
	2 mm													41 - 42
M12	3 mm													42
	2 mm													43, 61
	4 mm													44 - 46
M18	6 mm													46 - 47
	8 mm													47 - 49
	10 mm													49 - 50
	5 mm													50 - 51, 61
M30	8 mm													51 - 53
	12 mm													53 - 54
	20 mm													54 - 55
	10 mm													55 - 56
40 x 40 mm	15 mm													56, 61
	22 mm													57
	40 mm													58 - 59
	15 mm													59
40 x 120 mm	20 mm													59
	30 mm													59
	40 mm													60
40 x 120 mm	15 mm													60
	40 mm													61

OTHER RANGES

HOUSING SIZE	OPERATING DISTANCE													PAGE
	5 mm	10 mm	15 mm	20 mm	25 mm	30 mm	35 mm	40 mm	45 mm	50 mm	55 mm	60 mm	65 mm	
EXTREME														
M8	3 mm												75	
M8 / M12	6 mm												75 - 77	
M18	5 mm												78 - 80	
M12 / M18	10 mm												77 - 79	
M12	15 mm												78	
M18 / M30	20 mm												80 - 81	
M30	40 mm												81	
EXTRA PRESSURE														
∅ 3 mm	0.6 ... 0.8 mm												85	
M5	0.6 mm												85	
∅ 6.5 mm	2.5 mm												85	
HIGH PRESSURE														
M5 / P5	1 mm												89	
M8 / P8	1.5 mm												89	
M12 / P12	1.5 mm												89 - 91	
M14 / P20	3.0 mm												91 - 92	
EXTRA TEMPERATURE														
M5	0.8 mm												97	
M8	4 mm												97	
M12	2 ... 4 mm												97	
M18	5 mm												97	
HIGH TEMPERATURE														
M8	2 mm												101	
M12	3 mm												101	
M18	5 mm												101	
M30	10 mm												101	
M50	25 mm												102	
WASHDOWN														
M12	6 mm												107	
M18	10 mm												107	
M30	20 mm												108	
ANALOG OUTPUT														
8 x 8 mm / M8	0 ... 4 mm												113 - 114	
M12	0 ... 6 mm												114 - 115	
M18	0 ... 10 mm												115 - 116	
M18 / M30	0 ... 20 mm												116 - 117	
M30	0 ... 40 mm												117	
WELD-IMMUNE														
M12	6 mm												121	
M18	10 mm												121	
SPECIAL														
∅ 4 mm / M5 / C5	0.8 mm												125	
∅ 6.5 mm	1.5 mm												126	
M12	2 ... 4 mm												126 - 127	
M18	5 ... 8 mm												127	
M30	3 ... 5 mm												127	

INTRODUCTION

TECHNOLOGY

Contrinex inductive devices work according to one of **three different technologies**. All involve the generation of an alternating magnetic field that emerges at the sensing face. The presence of a conductive, generally metallic, object influences this field in a way that can be detected and evaluated by built-in electronics.

TECHNOLOGY FAMILIES

CLASSICS FAMILY:

Conventional technology, engineered by Contrinex

The **Classics** family uses conventional inductive sensor technology, but with the benefit of a Contrinex ASIC (application specific integrated circuit). ASIC technology ensures reliability, stability and ease of commissioning, due to low variation. Sensors in this family achieve operating distances up to 2 x the industry standard.

Classics sensors have a conventional oscillator and coil generating a high-frequency magnetic field that emerges at the sensing face. Any metallic object found in this field absorbs some of the energy, which is in turn detected and evaluated by built-in electronics (Fig. 1).

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

The **Classics** technology family includes devices from the **Basic** and **Miniature** ranges (series 600 and 620) and from the **Extra pressure**, **Extra temperature**, **High temperature**, **Weld-immune** and **Special** ranges.

EXTRA DISTANCE FAMILY:

Increased stability for exceptionally long operating distance

The **Extra Distance** family is based on the patented Condist® oscillator developed by Contrinex. Sensors benefit from **up to 4x the standard** operating distance, keeping them out of harm's way in rugged, industrial environments. Sensor lifetime is therefore increased.

Like **Classics** family sensors, these also generate a high-frequency magnetic field

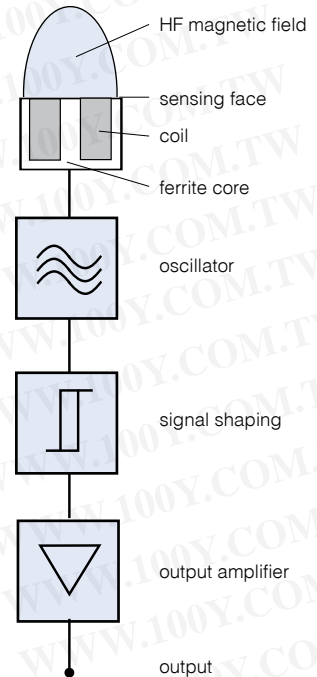


Fig. 1: Conventional inductive sensor technology, as used in the **Classics** family

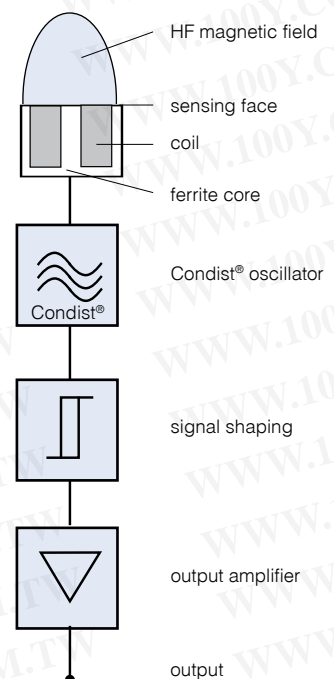


Fig. 2: Contrinex's patented Condist® inductive sensor technology, as used in the **Extra Distance** family

that emerges at the sensing face (Fig. 2). Again, the resulting effect is that any metallic object entering the field absorbs energy from it.

However, the oscillator and the subsequent signal evaluation circuit are 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.

Improved stability permits the switch point to be further away, leading to **long operating distances** on ferromagnetic metals (Fig. 3). Sensors with this technology also react particularly well to **narrow targets**, e.g. small screws, wires and foils.

Apart from the **Condist®** oscillator, all other assemblies are equivalent to the **Classics** family. Material dependencies and other properties are also the same as for **Classics** family 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 very good EMC resistance and on perfect sealing against liquid penetration.

The **Extra Distance** technology family includes devices from the **Basic, Miniature, Extra pressure, High pressure and Analog output** ranges. This technology is used in series 500 and 520 devices.

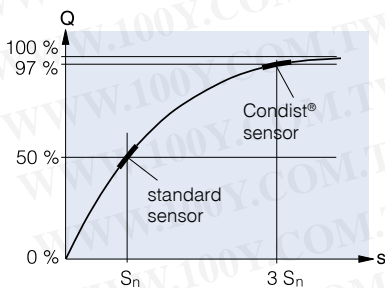


Fig. 3: **Extra Distance** family sensors have a longer operating distance, due to **Condist®** oscillator technology

FULL INOX FAMILY:

All-round stainless steel protection - practically indestructible

The **Full Inox** family is based on Contrinex's patented **Condet®** technology. These one-piece stainless steel sensors are not only the most durable on the market, they also offer long operating distances on any conductive metal.

Full Inox sensors 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 subject to a number of undesirable environmental and material influences. **Condet®** technology allows the sensor, including its face, to be fully encapsulated in a protective, stainless steel housing, with the added security of long operating distances.

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**. Operating distances are therefore identical on steel and aluminum. Only metals which are non-ferromagnetic and also have poor electrical conductivity give a reduced usable signal.

The **Full Inox** technology family includes devices from the **Extreme, High pressure, Washdown, Weld-immune** and **Special** ranges. This technology is used in series 700 devices.

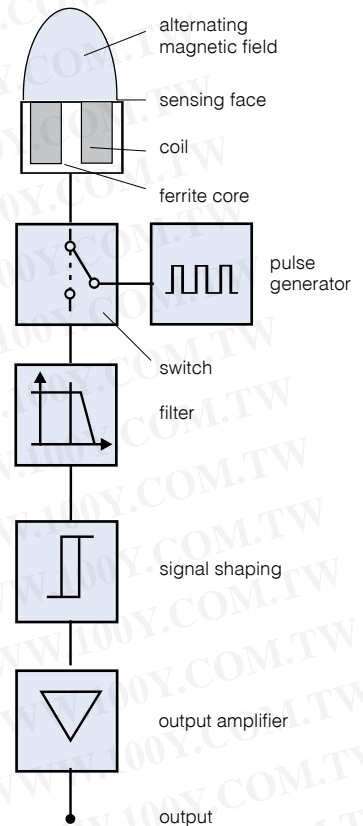


Fig. 4: **Full Inox** family sensors use **Condet®** pulse generator technology instead of an oscillator

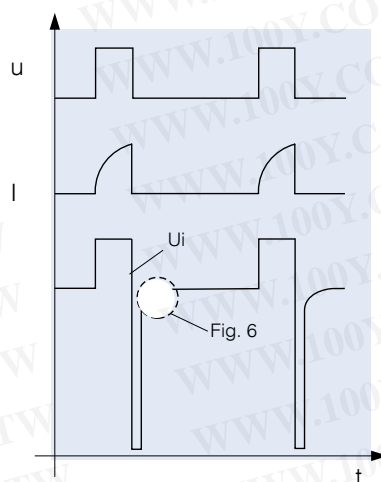


Fig. 5: Evolution of main signals

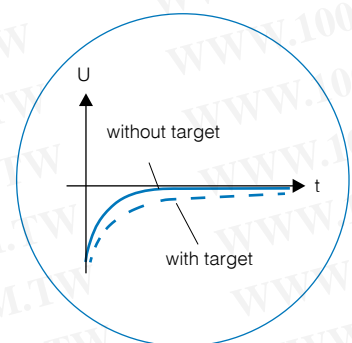


Fig. 6 (detail fig. 5): Effect of a target on the measured signal

INTRODUCTION

PRODUCT RANGES

BASIC

Excellent sensors for normal environments

Contrinex **Basic** range inductive sensors have a worldwide and well-deserved reputation for uncompromising accuracy and exceptional reliability. With best-in-class sensing distances between **1.5 mm** and **40 mm**, the **Basic** range offers fit-and-forget operation, delivering world-class performance and a highly attractive total cost of ownership.

Available in sizes from M8 to M30 and C44, with optional \varnothing 6.5 plain and 8 mm square-section models, **Basic** range inductive sensors are ideal for general position-sensing and presence-sensing applications in almost any industry. Embeddable or non-embeddable variants are available, with either hard-wired, hermetically sealed connecting cables or integral metal connectors. **Basic** range devices, whether from the conventional **Classics** (Fig. 1) or the advanced **Extra Distance** (Fig. 2) technology families, all utilize Contrinex application-specific integrated circuits (ASICs) that ensure highly repeatable results at operating temperatures between -25°C and $+70^{\circ}\text{C}$.



MINIATURE

Full functionality, smallest size

Size is often a critical constraint when selecting sensors for position- or presence-sensing. The Contrinex **Miniature** range, which includes the smallest self-contained inductive sensors on the market, meets this constraint without compromising on functionality.

Sensors from this range use either conventional **Classics** (Fig. 1) or advanced **Extra Distance** (Fig. 2) technology. Available in plain and threaded sizes from \varnothing 3 to \varnothing 6.5 with a 5 mm square-section option, **Miniature** range inductive sensors are ideal for applications where space is limited, including tool-selection, robotic position-sensing and control of micro-mechanisms.

Extremely robust, thanks to chip-scale package (CSP) technology, a glass-fiber reinforced substrate and vacuum encapsulation, the Contrinex **Miniature** range delivers long-term reliability and maximum uptime, even in the most demanding environments. The low mass and **high switching frequency** of these sensors makes them particularly suitable for high-dynamic applications where inertia is a major consideration.

These embeddable devices are available in 3-wire DC, NPN and PNP versions with a choice of N.O. or N.C. configurations. An LED output state indicator is standard. All the important protection functions are included, such as short-circuit and overload protection, full polarity reversal protection, induction protection, EMC protection, power-on reset, etc.

With a sensing range up to **4 mm**, Contrinex miniature inductive sensors combine world-class quality with a highly attractive total cost of ownership.



EXTREME

Extreme durability in harsh environments

Only the toughest sensors survive the most extreme environments, and **Extreme** range inductive sensors from the **Full Inox** family are ideally equipped for the job. Thanks to one-piece stainless-steel (V2A/AISI 304) construction and a hermetically sealed cable entry, **Extreme** sensors are corrosion-resistant, impervious to oil, and pressure-resistant to **80 bar**. Rugged, reliable and highly accurate, the **Extreme** range is at home in the most challenging circumstances.



Developed to withstand the harshest industrial operating conditions, **Extreme** sensors are rated to **IP 68** and **IP 69K**, delivering fit-and-forget performance with minimal downtime. With operating distances up to **40 mm**, the **Extreme** range senses both ferrous and non-ferrous materials with **Factor 1** performance, and is available in sizes from M8 to M30.

EXTRA PRESSURE

Pressure resistant up to 100 bar

Dependable, accurate presence- and position-sensing at pressures up to **100 bar** requires world-class performance and build quality. The **Extra pressure** range of pressure-resistant inductive sensors delivers exactly that, operating continuously in permanently pressurized conditions. This makes the range especially suitable for offshore installations, the chemical industry, motor lubrication systems and atomic fuel element monitoring. A stainless-steel housing with bonded ceramic or brazed sapphire sensing face and protection class **IP 68** guarantees robustness and exceptional reliability in miniature packages sized from **Ø 3** to **M8**.



The **Extra pressure** range is also ideal for high-vacuum environments and satellite applications, offering fit-and-forget capability and a sealed cable-entry that ensures no loss of service or interruptions to production.

Sensors from this range use either conventional **Classics** (Fig. 1) or advanced **Extra Distance** (Fig. 2) technology and have equivalent electrical properties. For optimum impermeability, LED and connector versions are not available in this range.

Sensors from the **Extra pressure** range detect parts at sensing distances up to **2.5 mm**, and offer a highly attractive total cost of ownership.

HIGH PRESSURE

Resistant to pressure and dynamic stress up to 500 bar (peak 1000 bar)

For reliable, accurate sensing in the most demanding pneumatic and hydraulic applications, Contrinex offers a unique range of **High pressure** sensors with permanent operating pressures of **100 ... 500 bar** and peak pressures up to **1000 bar**.

Suitable for operating temperatures up to 100°C and resistant to more than 1 million pressure cycles, their IP 68 and IP 69K protection and oil impermeability make them the robust, reliable choice for the hydraulic industry. Fit-and-forget operation virtually eliminates sensor replacement costs. Exceptional performance and world-class quality are assured in sizes from M5 to M18.

Contrinex **High pressure** sensors are available in either **Extra Distance** (Fig. 2) or **Full Inox** (Fig 4) versions. Both of these patented technologies ensure durability without compromising on usable operating distance. Sensor construction is simple and robust, with the whole electronic unit, ferrite core and coil included, safely on the **no-pressure side**. Sealed connection is by means of either flexible PU cable or an integral connector.

Fig. 7 shows an **Extra Distance** version. The stainless steel housing is heat shrunk onto the ceramic disk, making the sensor mechanically resistant, **exceptionally impervious**, and outstanding for applications with **high dynamic pressure stress**, such as piston-control applications. With operating distances of up to 3 mm, they are gas-tight and meet protection class **IP 68**.

Versions from the **Full Inox** family have a practically indestructible pressure- and corrosion-resistant one-piece stainless steel housing (V4A / AISI 316L / DIN 1.4404). They provide excellent detection of all metals with good conductivity, both ferromagnetic and non-ferromagnetic. These corrosion resistant sensors are suitable for the harshest conditions and meet protection classes **IP 68 & IP 69K**.

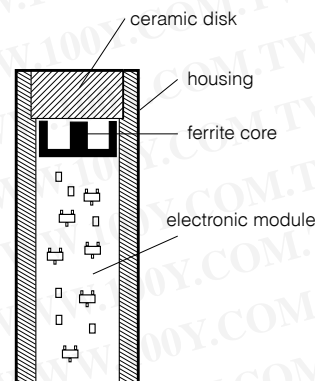


Fig. 7

INTRODUCTION

EXTRA TEMPERATURE

Temperature resistant up to 120°C

Inductive sensors from the **Extra temperature** range offer the ideal solution for position- and presence-sensing applications at temperatures from as low as minus 40°C up to 120°C. Industrial processes often generate heat, resulting in temperatures that would damage a standard sensor, but the stainless-steel construction and robust electronics of Contrinex **Extra temperature** sensors ensure reliable, accurate operation and minimal downtime, even in the most demanding environments.

Sensors from this range use either conventional **Classics** (Fig. 1) or all-metal **Full Inox** (Fig. 4) technology. Individually compensated for repeatable, highly accurate operation across the full operating temperature range, **Extra temperature** inductive sensors accommodate sensing distances up to 25 mm, minimizing the risk of collision damage.

Available in sizes from M5 to M18, the **Extra temperature** range delivers best-in-class performance at elevated temperatures in the harsh environments of the automotive, molding and metal-processing industries.

HIGH TEMPERATURE

Temperature resistant up to 180°C (230°C with external amplifier)

Contrinex **High temperature** inductive sensors are designed for continuous operation at temperatures from 0°C up to 180°C (up to 230°C with remote electronics). The range is ideal for the harshest environments, including automotive paint shops, metal-treatment plants and glass manufacturing.

High temperature sensors use conventional **Classics** (Fig. 1) technology. Embeddable, non-embeddable and quasi-embeddable versions are available. For temperatures up to 180°C, sensors 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. Stainless steel construction and sensing distances up to 25 mm minimize the risk of mechanical damage during operation, ensuring maximum plant availability and a highly attractive total cost of ownership. Contrinex high-temperature sensors are available in sizes from M8 to M50.



WASHDOWN

Ecolab approved for strictest production hygiene

Washdown inductive sensors are certified to operate continuously and reliably in the harsh conditions of the food, beverage and pharmaceutical industries, ensuring uninterrupted production. With **Ecolab** approval and rated to **IP 68** and **IP 69K**, they are pressure resistant up to **80 bar**, **food safe** and **corrosion resistant**.



These sensors have been developed on the platform of **Full Inox** (Fig. 4) technology for a totally impervious one-piece housing in stainless-steel (V4A / AISI 316L), including the sensing face. They are therefore highly resistant to the corrosive chemicals used for clean-in-place or wash-down processes. With Factor 1 on steel and aluminum and extended sensing ranges up to 40 mm, **Full Inox** technology minimizes the possibility of impact damage - a common hazard in confined operating spaces.

Washdown sensors meet the increasingly demanding sensing needs of the food, beverage and pharmaceutical industries, delivering best-in-class performance with an attractive total cost of ownership.

ANALOG OUTPUT

Continuous analog output for precision control

Engineers needing a reliable, repeatable, highly accurate means of measuring the position of a target object should look no further than Contrinex **Analog output** inductive sensors. This range of sensors has been developed on the platform of **Extra Distance** (Fig. 2) technology for excellent temperature stability, repeat accuracy, and the best long-range sensing capability on the market. With a measurement range of **zero to 40 mm** and detection accuracy on the micron scale, the **Analog output** sensor range is ideally suited for measuring linear, angular and rotational position (Fig. 8). They offer world-class performance and an attractive total cost of ownership in applications from vibration monitoring and end-position approach regulation, to position monitoring, metal sorting and sheet-metal forming.

Analog output inductive sensors are available in sizes from M8 to M30, with the option of an 8 mm square-section model. Voltage outputs are included for all sizes, while sizes M12 and above feature both voltage and current outputs.

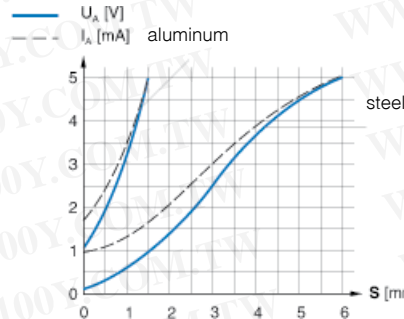


Fig. 8

WELD-IMMUNE

Immune to magnetic fields and resistant to weld spatter

Contrinex **Weld-immune** inductive sensors are ideal for the hostile working environments found in automotive factories and other industrial welding plants. The range includes sensors from two technology platforms: **Classics** (Fig. 1) and **Full Inox** (Fig. 4).

Classics devices, with protection class IP 67, are available either in PTFE-coated cylindrical brass housings or a PBTP 40 x 40 mm cubic form. They resist solder and the strong magnetic fields present during industrial welding processes. They have identical operating distances on steel and non-ferrous metals.

Weld-immune sensors built on the **Full Inox** platform have a long operating distance and Factor 1 on steel and aluminum. One-piece, stainless-steel (V2A / AISI 304) construction makes these sensors the most durable on the market, ensuring minimal down-time. These practically indestructible sensors withstand the welding environment for years, resisting electromagnetic fields, welding spatter, cleaning and impacts.

All **Weld-immune** sensors are embeddable and have an integral S12 connector. Best-in-class sensing ranges of up to **15 mm** eliminate the risk of collision - a frequent hazard when operating in close proximity to moving machine parts.

Developed for extreme accuracy throughout the welding cycle, **Weld-immune** sensors continuously detect part presence and machine position to ensure optimal equipment utilization and prevent errors in production. These sensors provide excellent repeatability at temperatures between -25°C and $+70^{\circ}\text{C}$.



SPECIAL RANGE

Designed to meet special technical requirements

The **Special** range includes sensors for double-sheet detection in metal processing applications and devices with 2 wires: **NAMUR** (DIN / EN 19234) and **DC** versions.

For **double-sheet** detection, sensors from the **Full Inox** (Fig. 4) family are used. Its patented inductive technology enables discrimination between one and two conductive metal sheets of a defined thickness, achieving sensitivity of 0.8 - 1.2 mm per sheet. This discrimination aids in the prevention of double feeds into blanking and forming processes which ultimately saves damage to tooling. The one-piece, stainless-steel construction of these sensors makes them the most durable on the market. They withstand the impacts that are a common hazard in double-sheet detection applications close to moving sheet metal, ensuring minimal down-time.

Two-wire DC and **NAMUR** sensors are constructed on the **Classics** (Fig. 1) technology platform and include sizes from \varnothing 3 to M30, plus a 5 x 5 mm square-section option. Devices are available for embeddable or non-embeddable mounting and connection is by means of cable or connector. With a sensing range up to 15 mm, Contrinex 2-wire sensors ensure optimal equipment utilization.

Conversion of temperature	
Celsius	Fahrenheit
-40	-40
-25	-13
0	+32
+70	+158
+100	+212
+120	+248
+180	+356
+230	+446

Conversion of pressure	
Bar	PSI
1	14.5
80	1160
100	1451
500	7255
1000	14510

1 + 1 = 2



EXCELLENCE IN NORMAL ENVIRONMENTS

BASIC

INDUCTIVE SENSORS

KEY ADVANTAGES

- ✓ Exceptional price-performance ratio
- ✓ Excellent accuracy
- ✓ Outstanding temperature compensation
- ✓ Vibration and shock resistant
- ✓ Long operating distance

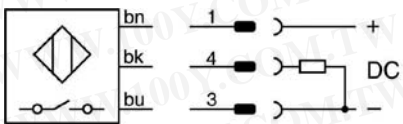
RANGE OVERVIEW	Housing size	Classics	Extra Distance
BASIC	∅ 6.5 mm	p. 27-31	p. 31
	M8	p. 31-37, 39-40	p. 38-41
	C8	p. 41-42	p. 43
	M12	p. 43-47, 61	p. 46-50
	M18	p. 50-53, 61	p. 53-55
	M30	p. 55-56, 61	p. 57-59
	C40	p. 58-60	
C44	p. 60-61		

FAMILY	
HOUSING SIZE MM	
OPERATING DISTANCE MM	

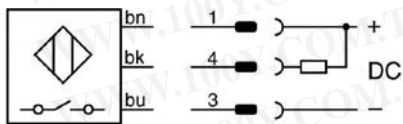
INDUCTIVE

WIRING DIAGRAMS

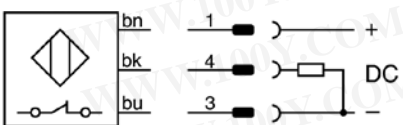
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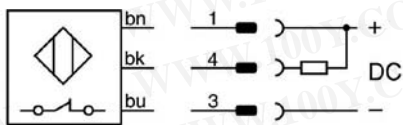
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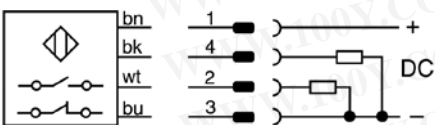
PNP NC



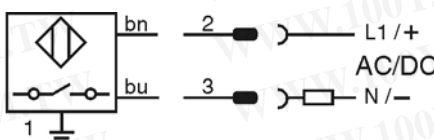
NPN NC



PNP Changeover



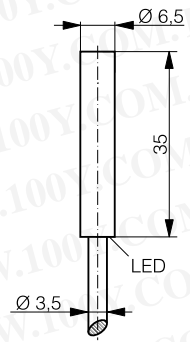
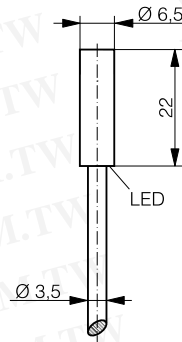
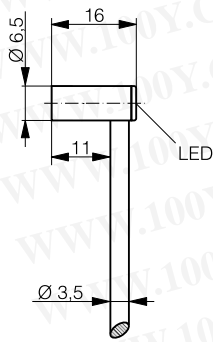
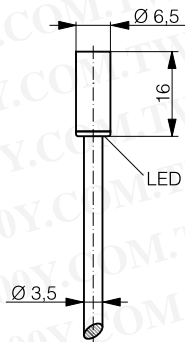
2-wire AC/DC NO



DATA
Housing material
Connection
Degree of protection
Mounting
Max. switching frequency
Supply voltage range
Ambient temperature range
Output current
Description
Part reference
Description
Part reference
Description
Part reference
Other types available
*Part reference change see p. 334

BASIC

CLASSICS	CLASSICS	CLASSICS	CLASSICS
Ø 6.5	Ø 6.5	Ø 6.5	Ø 6.5
1.5	1.5	1.5	1.5

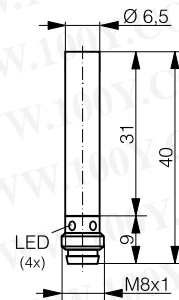
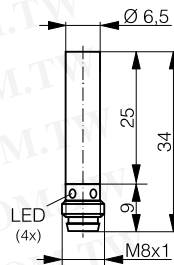
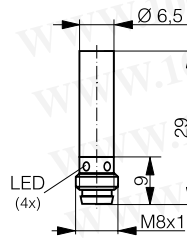


Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PVC cable	PVC cable	PVC cable	PVC cable
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
5000 Hz	5000 Hz	5000 Hz	5000 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AD-603-065-120*	DW-AD-603-065-400*	DW-AD-603-065-121	DW-AD-603-065
NPN NO			NPN NO
DW-AD-601-065-120*			DW-AD-601-065
PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	PNP NC, NPN NC, length 30 mm

BASIC

INDUCTIVE

FAMILY	CLASSICS	CLASSICS	CLASSICS
HOUSING SIZE MM	Ø 6.5	Ø 6.5	Ø 6.5
OPERATING DISTANCE MM	1.5	1.5	1.5

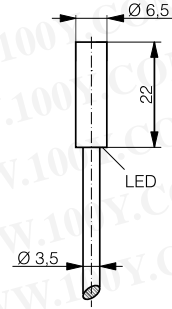
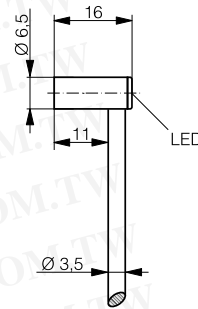
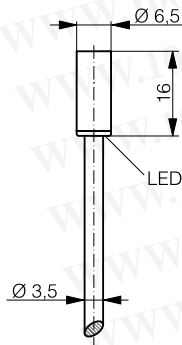
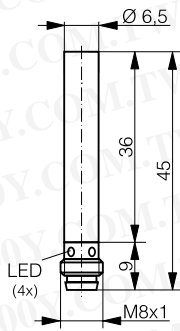


DATA			
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection	Connector S8	Connector S8	Connector S8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5000 Hz	5000 Hz	5000 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AS-603-065-129*	DW-AS-603-065-123	DW-AS-603-065-124
Description	NPN NO		
Part reference	DW-AS-601-065-129*		
Description	PNP NC		
Part reference	DW-AS-604-065-129*		
Other types available	NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC

*Part reference change see p. 334

BASIC

CLASSICS	CLASSICS	CLASSICS	CLASSICS
Ø 6.5	Ø 6.5	Ø 6.5	Ø 6.5
1.5	2	2	2

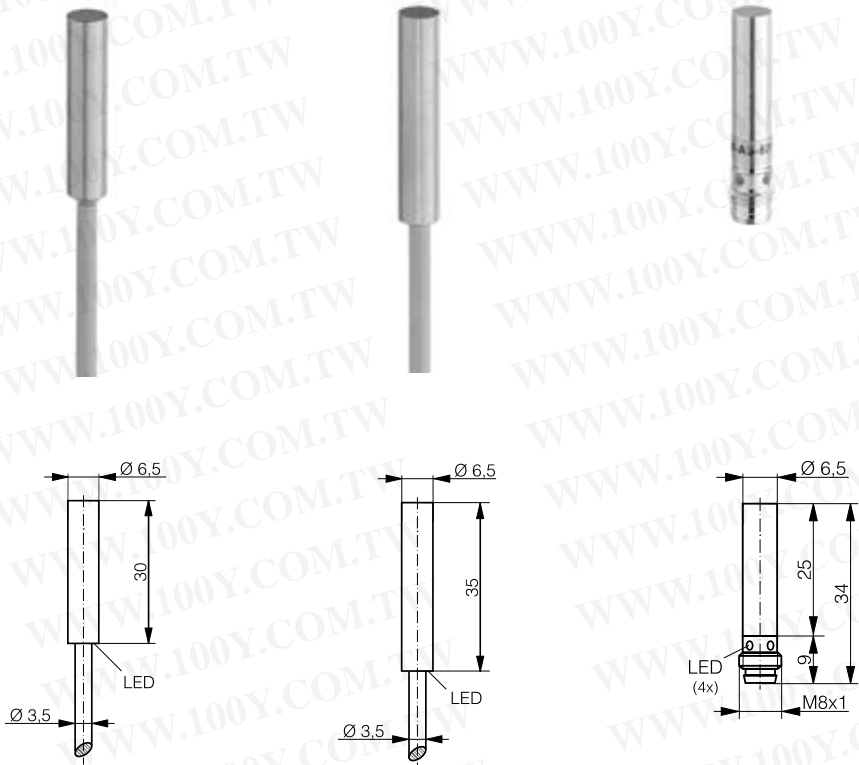





Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connector S8	PVC cable	PVC cable	PVC cable
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
5000 Hz	5000 Hz	5000 Hz	5000 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AS-603-065-001	DW-AD-623-065-120	DW-AD-623-065-400	DW-AD-623-065-121
		NPN NO	NPN NO
		DW-AD-621-065-400	DW-AD-621-065-121
NPN NO, PNP/NPN NC, S12	NPN NO, PNP NC, NPN NC	PNP NC, NPN NC	NPN NC

BASIC

INDUCTIVE

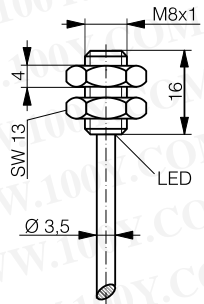
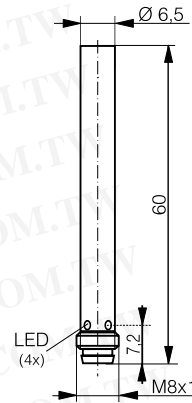
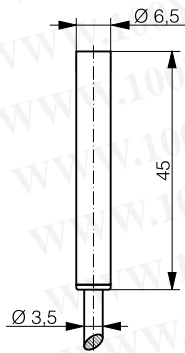
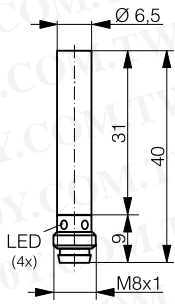
FAMILY	CLASSICS	CLASSICS	CLASSICS
HOUSING SIZE MM	Ø 6.5	Ø 6.5	Ø 6.5
OPERATING DISTANCE MM	2	2	2



DATA			
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection	PVC cable	PVC cable	Connector S8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5000 Hz	5000 Hz	5000 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AD-623-065-122	DW-AD-623-065	DW-AS-623-065-123
Description			
Part reference			
Description			
Part reference			
Other types available	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, PNP/NPN NC, l. 29 mm
*Part reference change see p. 334			

BASIC

CLASSICS	EXTRA DISTANCE	EXTRA DISTANCE	CLASSICS
Ø 6.5	Ø 6.5	Ø 6.5	M8
2	3	3	1.5

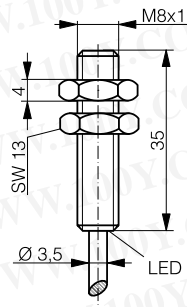
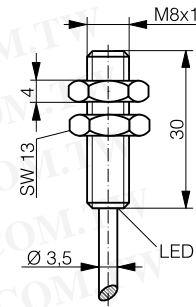
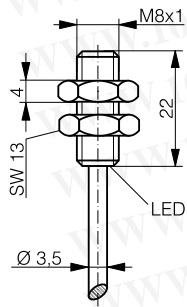





Stainless steel V2A	Chrome-plated brass	Chrome-plated brass	Stainless steel V2A
Connector S8	PVC cable	Connector S8	PVC cable
IP 67	IP 67	IP 67	IP 67
Embeddable	Quasi-embeddable	Quasi-embeddable	Embeddable
5000 Hz	1000 Hz	1000 Hz	5000 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AS-623-065-124	DW-AD-503-065	DW-AS-503-065-001	DW-AD-603-M8-120*
	NPN NO		NPN NO
	DW-AD-501-065		DW-AD-601-M8-120*
NPN NO, PNP/NPN NC, l 145 mm, S12	PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	PNP NC, NPN NC

BASIC

INDUCTIVE

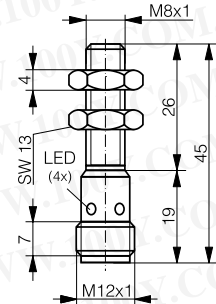
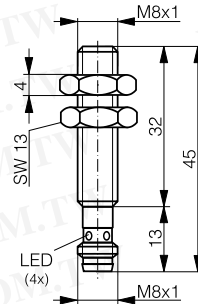
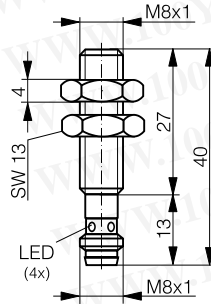
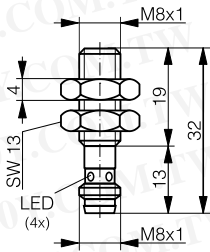
FAMILY	CLASSICS	CLASSICS	CLASSICS
HOUSING SIZE	M8	M8	M8
OPERATING DISTANCE MM	1.5	1.5	1.5



DATA			
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection	PVC cable	PVC cable	PVC cable
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5000 Hz	5000 Hz	5000 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AD-603-M8-121	DW-AD-603-M8-122	DW-AD-603-M8
Description		NPN NO	NPN NO
Part reference		DW-AD-601-M8-122	DW-AD-601-M8
Description			
Part reference			
Other types available	PNP NC, NPN NC	PNP NC, NPN NC	PNP NC, NPN NC

BASIC

CLASSICS	CLASSICS	CLASSICS	CLASSICS
M8	M8	M8	M8
1.5	1.5	1.5	1.5

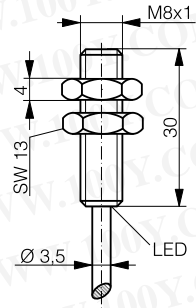
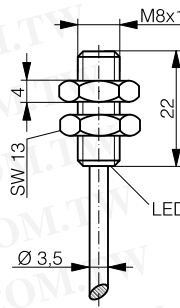
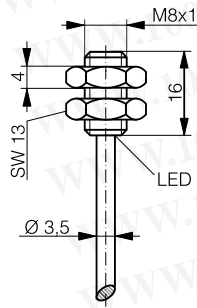


Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connector S8	Connector S8	Connector S8	Connector S12
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
5000 Hz	5000 Hz	5000 Hz	5000 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AS-603-M8-123	DW-AS-603-M8-124	DW-AS-603-M8-001	DW-AS-603-M8
		NPN NO	NPN NO
		DW-AS-601-M8-001	DW-AS-601-M8
		PNP NC	
		DW-AS-604-M8-001	
NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	NPN NC	PNP NC, NPN NC, length 39 mm

BASIC

INDUCTIVE

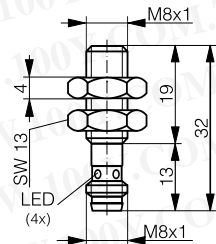
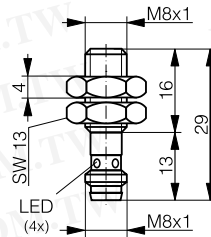
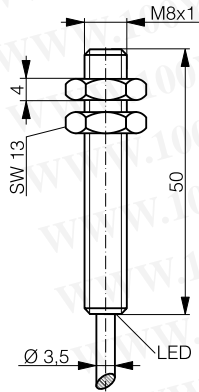
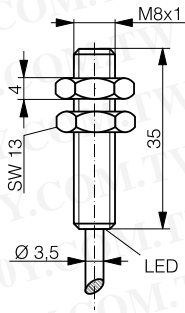
FAMILY	CLASSICS	CLASSICS	CLASSICS
HOUSING SIZE	M8	M8	M8
OPERATING DISTANCE MM	2	2	2



DATA			
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection	PVC cable	PVC cable	PVC cable
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5000 Hz	5000 Hz	5000 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AD-623-M8-120	DW-AD-623-M8-121	DW-AD-623-M8-122
Description	NPN NO	NPN NO	NPN NO
Part reference	DW-AD-621-M8-120	DW-AD-621-M8-121	
Description	NPN NC		
Part reference	DW-AD-622-M8-120		
Other types available	PNP NC	PNP NC	NPN NO, PNP NC, NPN NC

BASIC

CLASSICS	CLASSICS	CLASSICS	CLASSICS
M8	M8	M8	M8
2	2	2	2

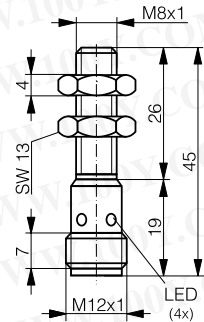
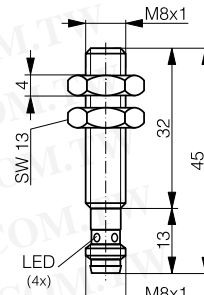
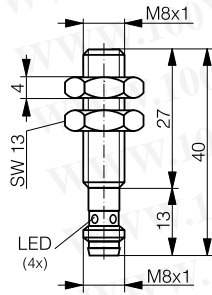





Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PVC cable	PVC cable	Connector S8	Connector S8
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
5000 Hz	5000 Hz	5000 Hz	5000 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AD-623-M8	DW-AD-623-M8-177	DW-AS-623-M8-129	DW-AS-623-M8-123
NPN NO			NPN NO
DW-AD-621-M8			DW-AS-621-M8-123
PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	PNP NC, NPN NC

BASIC

INDUCTIVE

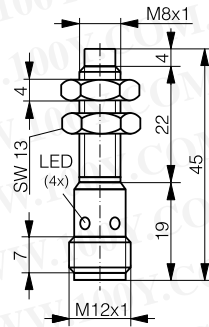
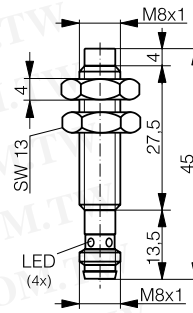
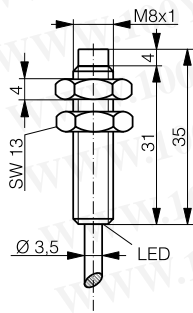
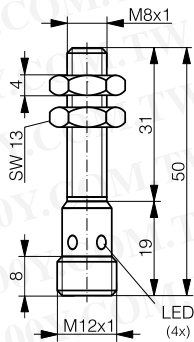
FAMILY	CLASSICS	CLASSICS	CLASSICS
HOUSING SIZE	M8	M8	M8
OPERATING DISTANCE MM	2	2	2



DATA			
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection	Connector S8	Connector S8	Connector S12
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5000 Hz	5000 Hz	5000 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AS-623-M8-124	DW-AS-623-M8-001	DW-AS-623-M8
Description	NPN NO	NPN NO	NPN NO
Part reference	DW-AS-621-M8-124	DW-AS-621-M8-001	DW-AS-621-M8
Description		PNP NC	
Part reference		DW-AS-624-M8-001	
Other types available	PNP NC, NPN NC	NPN NC	PNP NC, NPN NC

BASIC

CLASSICS	CLASSICS	CLASSICS	CLASSICS
M8	M8	M8	M8
2	2.5	2.5	2.5

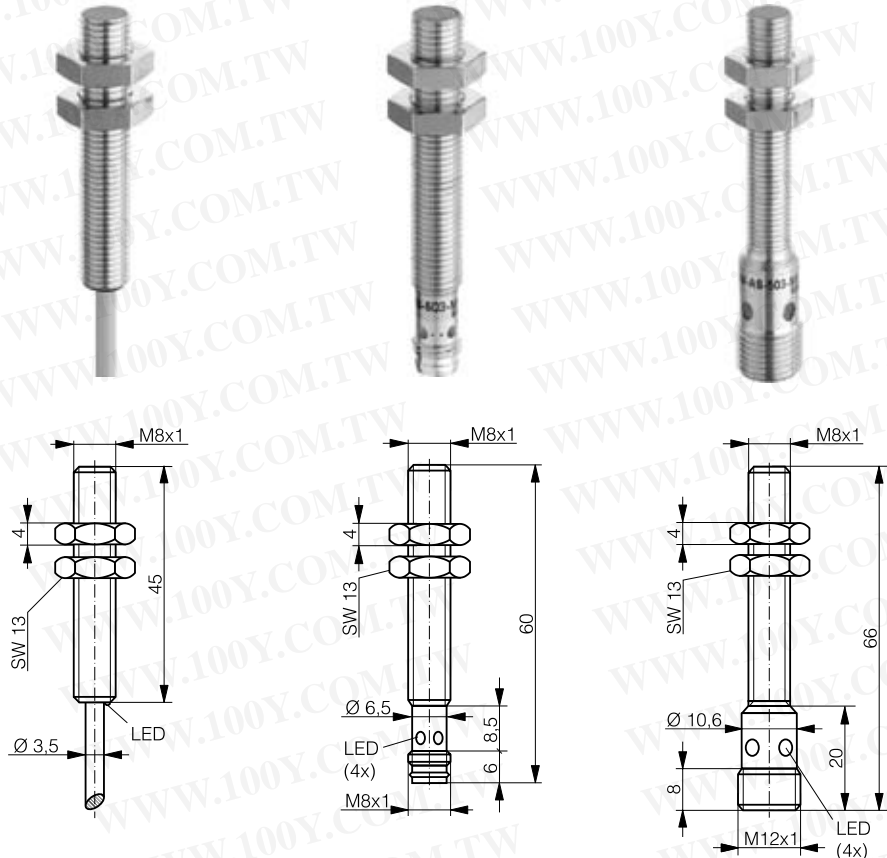





Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connector S12	PVC cable	Connector S8	Connector S12
IP 67	IP 67	IP 67	IP 67
Embeddable	Non-embeddable	Non-embeddable	Non-embeddable
5000 Hz	4500 Hz	4500 Hz	4500 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AS-623-M8-193	DW-AD-613-M8	DW-AS-613-M8-001	DW-AS-613-M8
	NPN NO		
	DW-AD-611-M8		
NPN NO, PNP NC, NPN NC	PNP NC, NPN NC, lengths 22 & 30 mm	NPN NO, PNP NC, NPN NC, lengths 32 & 40 mm	NPN NO, PNP NC, NPN NC

BASIC

INDUCTIVE

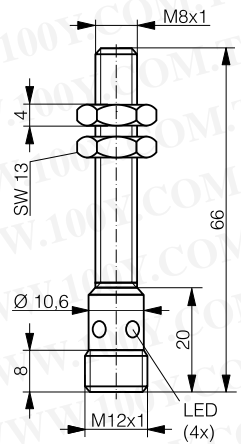
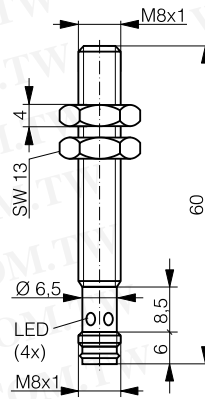
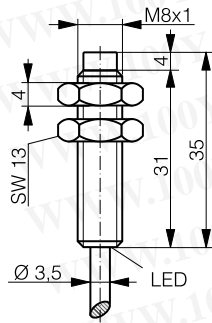
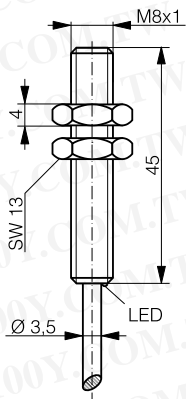
FAMILY	EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE
HOUSING SIZE	M8	M8	M8
OPERATING DISTANCE MM	3	3	3



DATA			
Housing material	Chrome-plated nickel silver	Chrome-plated nickel silver	Chrome-plated nickel silver
Connection	PVC cable	Connector S8	Connector S12
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	1000 Hz	1000 Hz	1000 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AD-503-M8	DW-AS-503-M8-001	DW-AS-503-M8
Description	NPN NO	NPN NO	NPN NO
Part reference	DW-AD-501-M8	DW-AS-501-M8-001	DW-AS-501-M8
Description		PNP NC	
Part reference		DW-AS-504-M8-001	
Other types available	PNP NC, NPN NC, length 35 mm	NPN NC	PNP NC, NPN NC

BASIC

EXTRA DISTANCE	CLASSICS	EXTRA DISTANCE	EXTRA DISTANCE
M8	M8	M8	M8
4	4	4	4

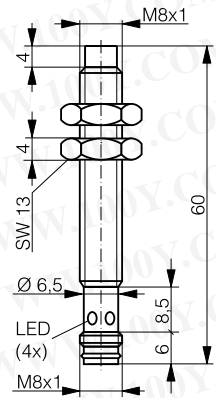
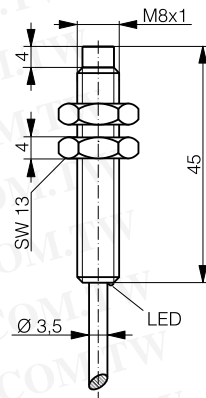
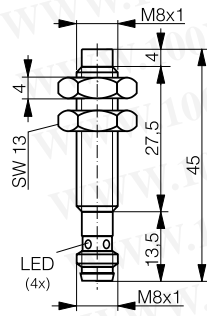





Chrome-plated nickel silver	Stainless steel V2A	Chrome-plated nickel silver	Chrome-plated nickel silver
PVC cable	PVC cable	Connector S8	Connector S12
IP 67	IP 67	IP 67	IP 67
Embeddable	Non-embeddable	Embeddable	Embeddable
500 Hz	3500 Hz	500 Hz	500 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AD-523-M8	DW-AD-633-M8	DW-AS-523-M8-001	DW-AS-523-M8
NPN NO	NPN NO		
DW-AD-521-M8	DW-AD-631-M8		
PNP NC, NPN NC, length 35 mm	PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC

BASIC

INDUCTIVE

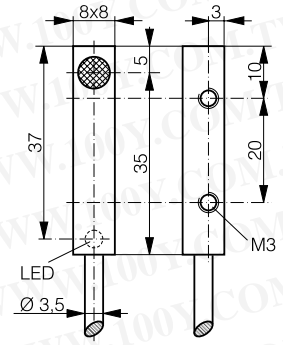
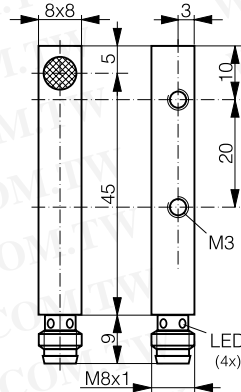
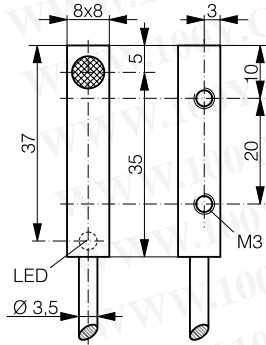
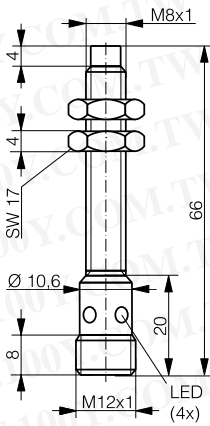
FAMILY	CLASSICS	EXTRA DISTANCE	EXTRA DISTANCE
HOUSING SIZE	M8	M8	M8
OPERATING DISTANCE MM	4	6	6



DATA			
Housing material	Stainless steel V2A	Chrome-plated brass	Chrome-plated brass
Connection	Connector S8	PVC cable	Connector S8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Non-embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	3500 Hz	500 Hz	500 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AS-633-M8-001	DW-AD-513-M8	DW-AS-513-M8-001
Description		NPN NO	PNP NC
Part reference		DW-AD-511-M8	DW-AS-514-M8-001
Description			
Part reference			
Other types available	NPN NO, PNP NC, NPN NC	PNP NC, NPN NC, length 35 mm	NPN NO, NPN NC

BASIC

EXTRA DISTANCE	CLASSICS	CLASSICS	CLASSICS
M8	□ 8 x 8	□ 8 x 8	□ 8 x 8
6	1.5	1.5	2

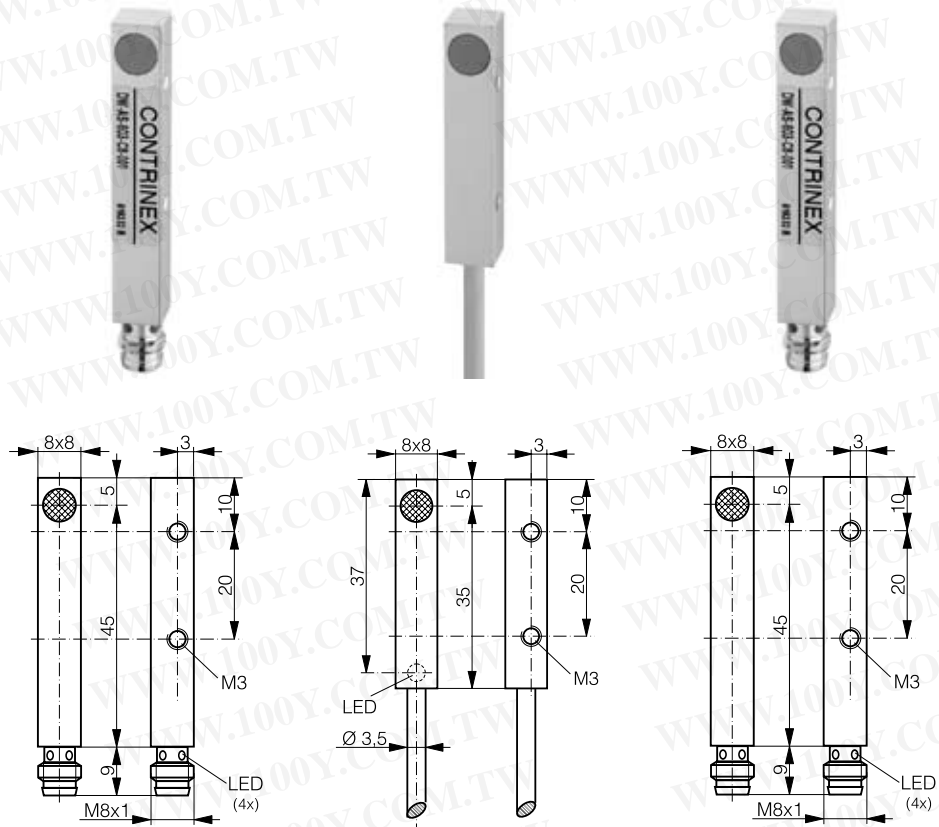





Chrome-plated brass	Zamak	Zamak	Zamak
Connector S12	PVC cable	Connector S8	PVC cable
IP 67	IP 67	IP 67	IP 67
Non-embeddable	Embeddable	Embeddable	Embeddable
500 Hz	3500 Hz	3500 Hz	5000 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AS-513-M8	DW-AD-603-C8	DW-AS-603-C8-001	DW-AD-623-C8
NPN NO			
DW-AS-511-M8			
PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC

BASIC

INDUCTIVE

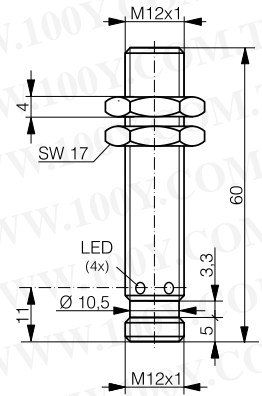
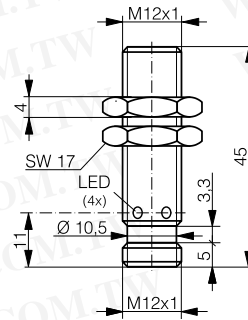
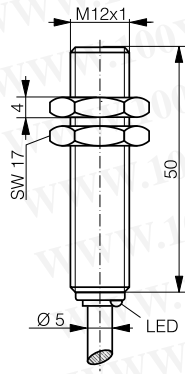
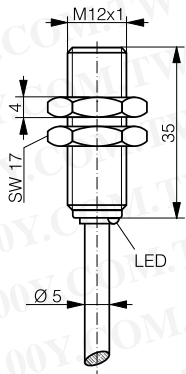
FAMILY	CLASSICS	EXTRA DISTANCE	EXTRA DISTANCE
HOUSING SIZE	□ 8 x 8	□ 8 x 8	□ 8 x 8
OPERATING DISTANCE MM	2	3	3



DATA			
Housing material	Zamak	Zamak	Zamak
Connection	Connector S8	PVC cable	Connector S8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Quasi-embeddable	Quasi-embeddable
Max. switching frequency	5000 Hz	1000 Hz	1000 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AS-623-C8-001	DW-AD-503-C8	DW-AS-503-C8
Description		PNP NC	
Part reference		DW-AD-504-C8	
Description			
Part reference			
Other types available	NPN NO, PNP NC, NPN NC	NPN NO, NPN NC	NPN NO, PNP NC, NPN NC

BASIC

CLASSICS	CLASSICS	CLASSICS	CLASSICS
M12	M12	M12	M12
2	2	2	2

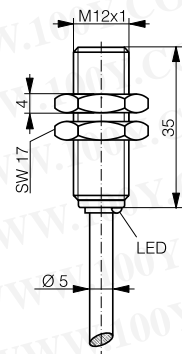
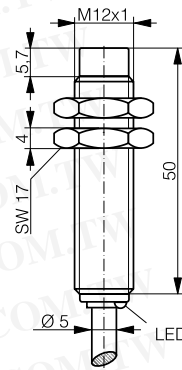
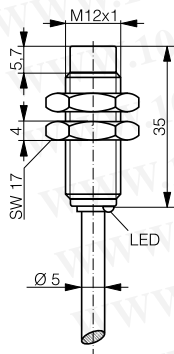





Nickel-plated brass	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass
PVC cable	PVC cable	Connector S12	Connector S12
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
3000 Hz	3000 Hz	3000 Hz	3000 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AD-603-M12-120	DW-AD-603-M12	DW-AS-603-M12-120	DW-AS-603-M12
NPN NO	NPN NO	NPN NO	NPN NO
DW-AD-601-M12-120	DW-AD-601-M12	DW-AS-601-M12-120	DW-AS-601-M12
		PNP NC	PNP NC
		DW-AS-604-M12-120	DW-AS-604-M12
PNP NC, NPN NC	PNP NC, NPN NC	NPN NC	NPN NC

BASIC

INDUCTIVE

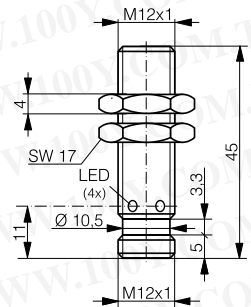
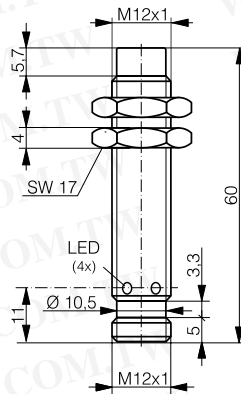
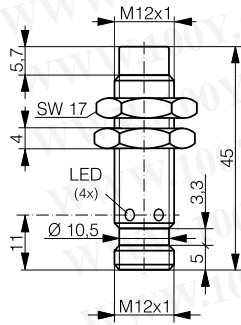
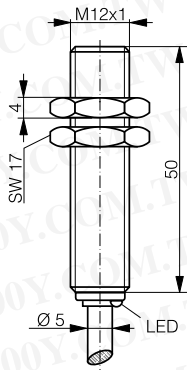
FAMILY	CLASSICS	CLASSICS	CLASSICS
HOUSING SIZE	M12	M12	M12
OPERATING DISTANCE MM	4	4	4



DATA			
Housing material	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass
Connection	PVC cable	PVC cable	PVC cable
Degree of protection	IP 67	IP 67	IP 67
Mounting	Non-embeddable	Non-embeddable	Embeddable
Max. switching frequency	2000 Hz	2000 Hz	2500 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AD-613-M12-120	DW-AD-613-M12	DW-AD-623-M12-120
Description	NPN NO	NPN NO	
Part reference	DW-AD-611-M12-120	DW-AD-611-M12	
Description			
Part reference			
Other types available	PNP NC, NPN NC	PNP NC, NPN NC	NPN NO, PNP NC, NPN NC

BASIC

CLASSICS	CLASSICS	CLASSICS	CLASSICS
M12	M12	M12	M12
4	4	4	4

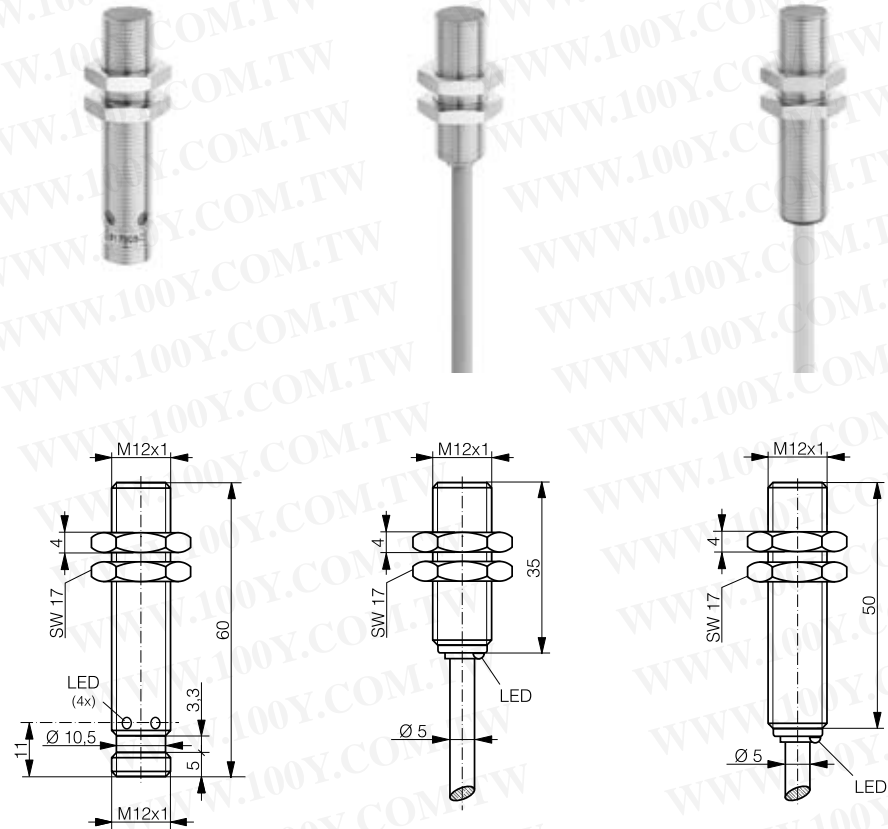





Nickel-plated brass	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass
PVC cable	Connector S12	Connector S12	Connector S12
IP 67	IP 67	IP 67	IP 67
Embeddable	Non-embeddable	Non-embeddable	Embeddable
2500 Hz	2000 Hz	2000 Hz	2500 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AD-623-M12	DW-AS-613-M12-120	DW-AS-613-M12	DW-AS-623-M12-120
NPN NO		NPN NO	NPN NO
DW-AD-621-M12		DW-AS-611-M12	DW-AS-621-M12-120
		PNP NC	PNP NC
		DW-AS-614-M12	DW-AS-624-M12-120
PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	NPN NC	NPN NC

BASIC

INDUCTIVE

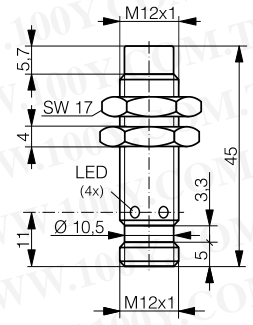
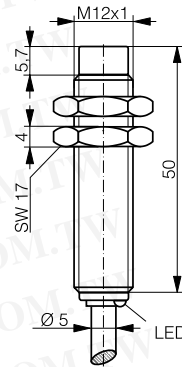
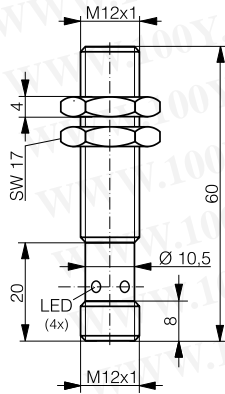
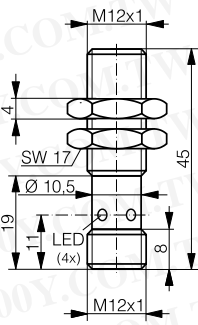
FAMILY	CLASSICS	EXTRA DISTANCE	EXTRA DISTANCE
HOUSING SIZE	M12	M12	M12
OPERATING DISTANCE MM	4	6	6



DATA			
Housing material	Nickel-plated brass	Chrome-plated brass	Chrome-plated brass
Connection	Connector S12	PVC cable	PVC cable
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Quasi-embeddable	Quasi-embeddable
Max. switching frequency	2500 Hz	800 Hz	800 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AS-623-M12	DW-AD-503-M12-120	DW-AD-503-M12
Description	NPN NO		NPN NO
Part reference	DW-AS-621-M12		DW-AD-501-M12
Description	PNP NC		
Part reference	DW-AS-624-M12		
Other types available	NPN NC	NPN NO, PNP NC, NPN NC	PNP NC, NPN NC

BASIC

EXTRA DISTANCE	EXTRA DISTANCE	CLASSICS	CLASSICS
M12	M12	M12	M12
6	6	8	8

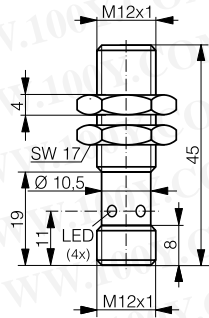
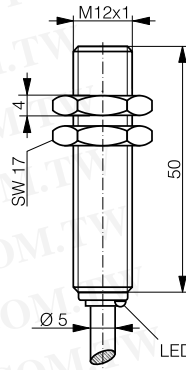
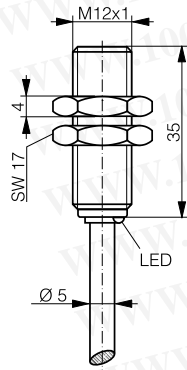





Chrome-plated brass	Chrome-plated brass	Nickel-plated brass	Nickel-plated brass
Connector S12	Connector S12	PVC cable	Connector S12
IP 67	IP 67	IP 67	IP 67
Quasi-embeddable	Quasi-embeddable	Non-embeddable	Non-embeddable
800 Hz	800 Hz	1400 Hz	1400 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AS-503-M12-120	DW-AS-503-M12	DW-AD-633-M12	DW-AS-633-M12-120
NPN NO	NPN NO	NPN NO	NPN NO
DW-AS-501-M12-120	DW-AS-501-M12	DW-AD-631-M12	DW-AS-631-M12-120
	PNP NC	PNP NC	PNP NC
	DW-AS-504-M12	DW-AD-634-M12	DW-AS-634-M12-120
PNP NC, NPN NC	NPN NC	NPN NC, length 35 mm	NPN NC, length 60 mm

BASIC

INDUCTIVE

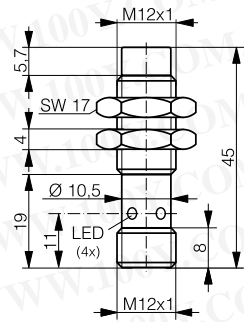
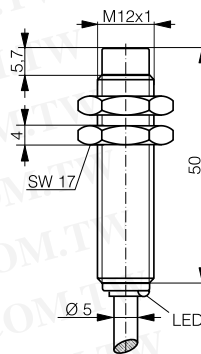
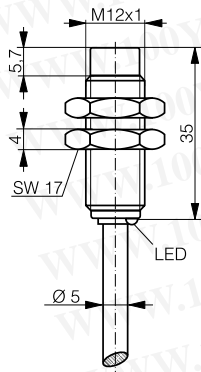
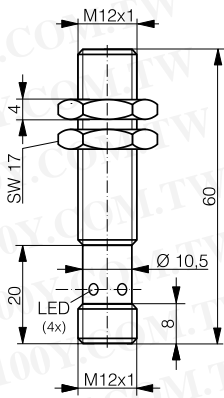
FAMILY	EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE
HOUSING SIZE	M12	M12	M12
OPERATING DISTANCE MM	8	8	8



DATA			
Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection	PVC cable	PVC cable	Connector S12
Degree of protection	IP 67	IP 67	IP 67
Mounting	Quasi-embeddable	Quasi-embeddable	Quasi-embeddable
Max. switching frequency	400 Hz	400 Hz	400 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AD-523-M12-120	DW-AD-523-M12	DW-AS-523-M12-120
Description			
Part reference			
Description			
Part reference			
Other types available	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC

BASIC

EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE
M12	M12	M12	M12
8	10	10	10

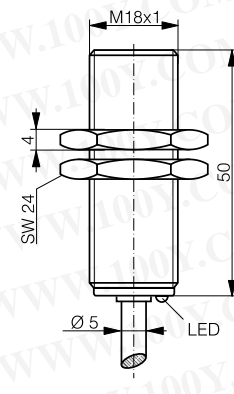
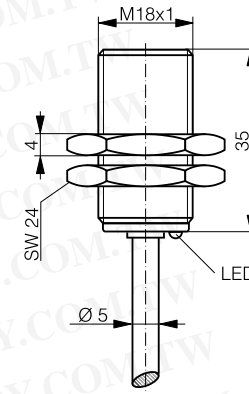
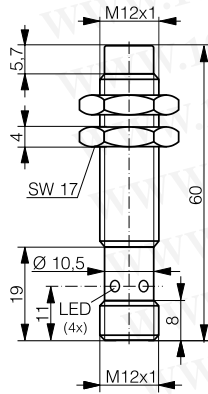





Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connector S12	PVC cable	PVC cable	Connector S12
IP 67	IP 67	IP 67	IP 67
Quasi-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
400 Hz	400 Hz	400 Hz	400 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AS-523-M12	DW-AD-513-M12-120	DW-AD-513-M12	DW-AS-513-M12-120
NPN NO		NPN NO	
DW-AS-521-M12		DW-AD-511-M12	
PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	PNP NC, NPN NC	NPN NO, PNP NC, NPN NC

BASIC

INDUCTIVE

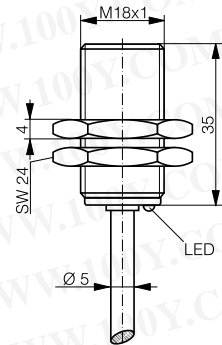
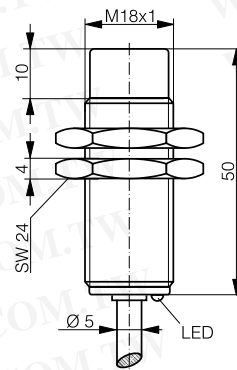
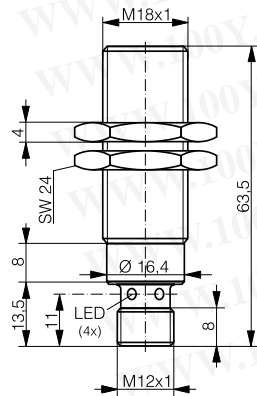
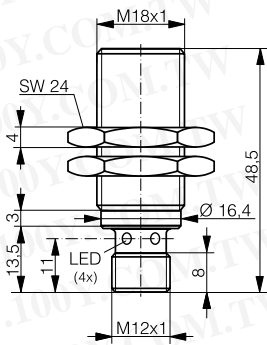
FAMILY	EXTRA DISTANCE	CLASSICS	CLASSICS
HOUSING SIZE	M12	M18	M18
OPERATING DISTANCE MM	10	5	5



DATA			
Housing material	Chrome-plated brass	Nickel-plated brass	Nickel-plated brass
Connection	Connector S12	PVC cable	PVC cable
Degree of protection	IP 67	IP 67	IP 67
Mounting	Non-embeddable	Embeddable	Embeddable
Max. switching frequency	400 Hz	2000 Hz	2000 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AS-513-M12	DW-AD-603-M18-120	DW-AD-603-M18
Description	NPN NO		NPN NO
Part reference	DW-AS-511-M12		DW-AD-601-M18
Description	PNP NC		PNP NC
Part reference	DW-AS-514-M12		DW-AD-604-M18
Other types available	NPN NC	NPN NO, PNP NC, NPN NC	NPN NC

BASIC

CLASSICS	CLASSICS	CLASSICS	CLASSICS
M18	M18	M18	M18
5	5	8	8

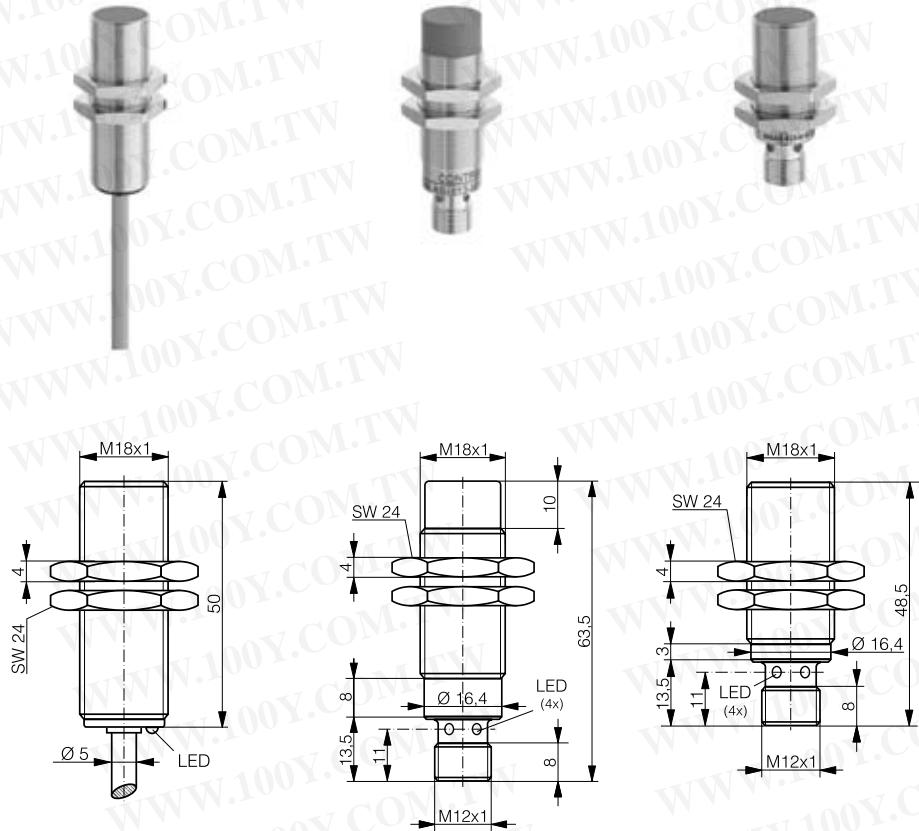





Nickel-plated brass	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass
Connector S12	Connector S12	PVC cable	PVC cable
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Non-embeddable	Quasi-embeddable
2000 Hz	2000 Hz	2000 Hz	1500 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AS-603-M18-120	DW-AS-603-M18-002	DW-AD-613-M18	DW-AD-623-M18-120
	NPN NO	NPN NO	
	DW-AS-601-M18-002	DW-AD-611-M18	
	PNP NC		
	DW-AS-604-M18-002		
NPN NO, PNP NC, NPN NC	NPN NC	PNP NC, NPN NC	NPN NO, PNP NC, NPN NC

BASIC

INDUCTIVE

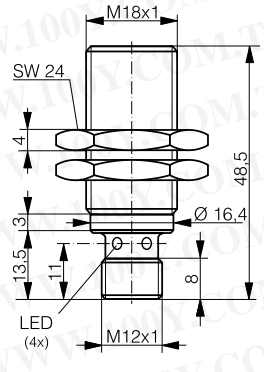
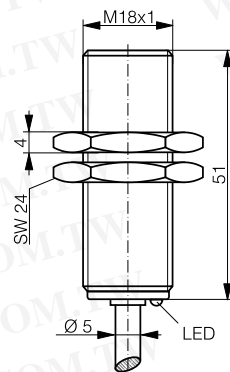
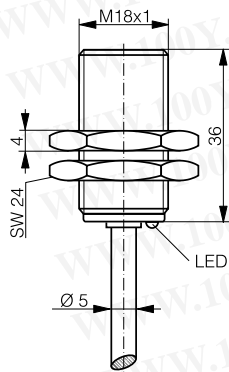
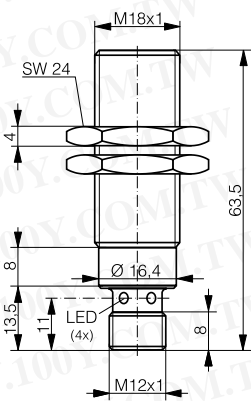
FAMILY	CLASSICS	CLASSICS	CLASSICS
HOUSING SIZE	M18	M18	M18
OPERATING DISTANCE MM	8	8	8



DATA			
Housing material	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass
Connection	PVC cable	Connector S12	Connector S12
Degree of protection	IP 67	IP 67	IP 67
Mounting	Quasi-embeddable	Non-embeddable	Embeddable
Max. switching frequency	1500 Hz	2000 Hz	1500 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AD-623-M18	DW-AS-613-M18-002	DW-AS-623-M18-120
Description		PNP NC	
Part reference		DW-AS-614-M18-002	
Description			
Part reference			
Other types available	NPN NO, PNP NC, NPN NC	NPN NO, NPN NC	NPN NO, PNP NC, NPN NC

BASIC

CLASSICS	EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE
M18	M18	M18	M18
8	12	12	12

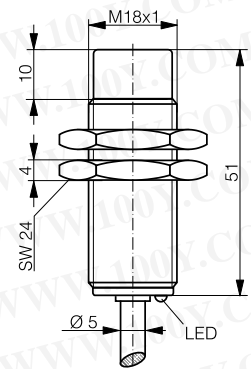
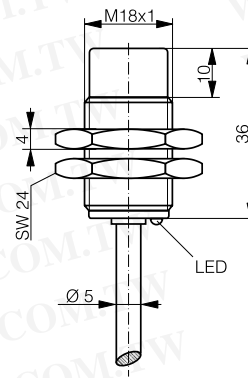
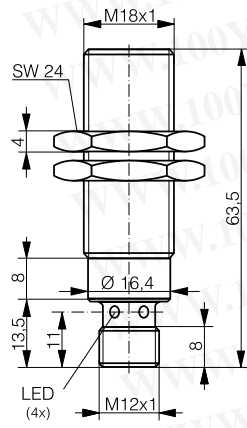





Nickel-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connector S12	PVC cable	PVC cable	Connector S12
IP 67	IP 67	IP 67	IP 67
Embeddable	Quasi-embeddable	Quasi-embeddable	Quasi-embeddable
1500 Hz	500 Hz	500 Hz	500 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AS-623-M18-002	DW-AD-503-M18-120	DW-AD-503-M18	DW-AS-503-M18-120
PNP NC		NPN NO	
DW-AS-624-M18-002		DW-AD-501-M18	
NPN NC, NPN NO	NPN NO, PNP NC, NPN NC	PNP NC, NPN NC	NPN NO, PNP NC, NPN NC

BASIC

INDUCTIVE

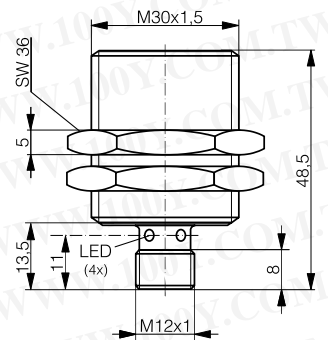
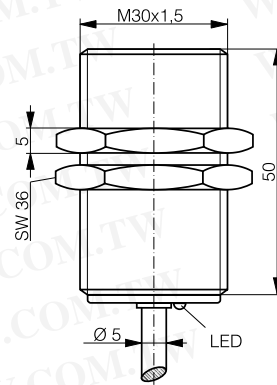
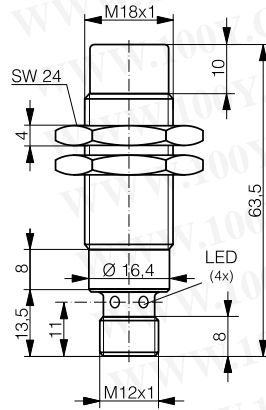
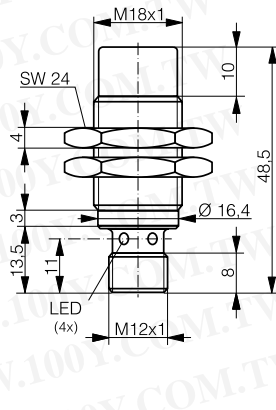
FAMILY	EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE
HOUSING SIZE	M18	M18	M18
OPERATING DISTANCE MM	12	20	20



DATA			
Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection	Connector S12	PVC cable	PVC cable
Degree of protection	IP 67	IP 67	IP 67
Mounting	Quasi-embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	500 Hz	200 Hz	200 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AS-503-M18-002	DW-AD-513-M18-120	DW-AD-513-M18
Description	NPN NO		NPN NO
Part reference	DW-AS-501-M18-002		DW-AD-511-M18
Description	PNP NC		PNP NC
Part reference	DW-AS-504-M18-002		DW-AD-514-M182
Other types available	NPN NC	NPN NO, PNP NC, NPN NC	NPN NC

BASIC

EXTRA DISTANCE	EXTRA DISTANCE	CLASSICS	CLASSICS
M18	M18	M30	M30
20	20	10	10

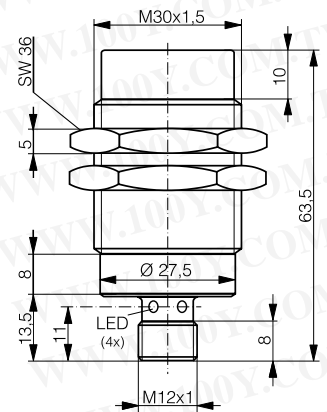
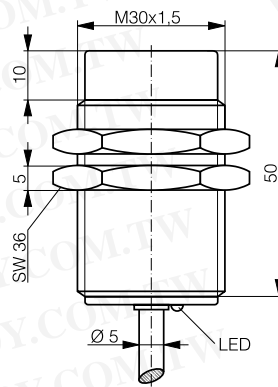
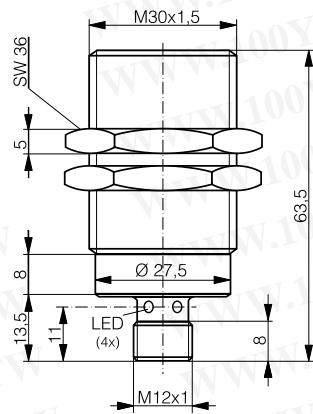





Chrome-plated brass	Chrome-plated brass	Nickel-plated brass	Nickel-plated brass
Connector S12	Connector S12	PVC cable	Connector S12
IP 67	IP 67	IP 67	IP 67
Non-embeddable	Non-embeddable	Embeddable	Embeddable
200 Hz	200 Hz	1200 Hz	1200 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AS-513-M18-120	DW-AS-513-M18-002	DW-AD-603-M30	DW-AS-603-M30-120
	NPN NO		
	DW-AS-511-M18-002		
	PNP NC		
	DW-AS-514-M18-002		
NPN NO, PNP NC, NPN NC	NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC

BASIC

INDUCTIVE

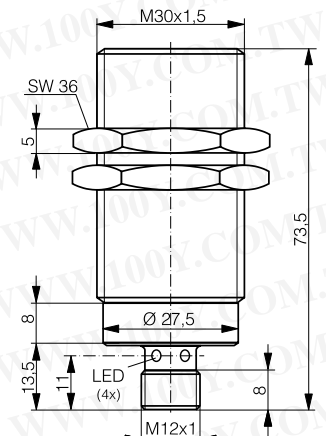
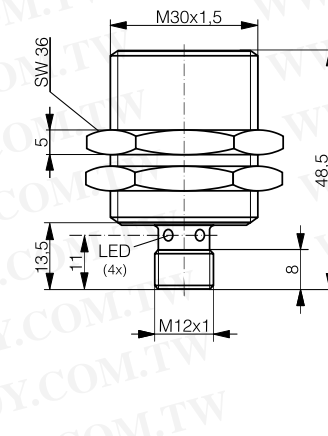
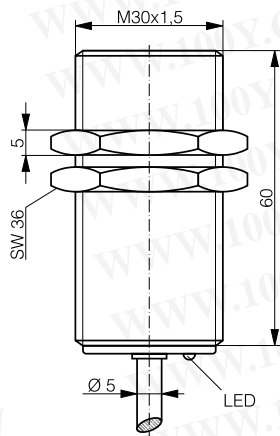
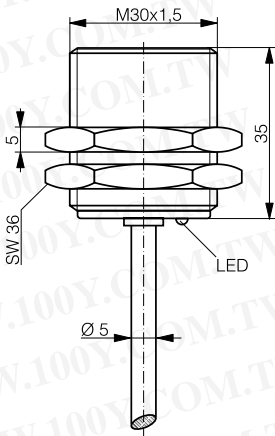
FAMILY	CLASSICS	CLASSICS	CLASSICS
HOUSING SIZE	M30	M30	M30
OPERATING DISTANCE MM	10	15	15



DATA			
Housing material	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass
Connection	Connector S12	PVC cable	Connector S12
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	1200 Hz	700 Hz	700 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AS-603-M30-002	DW-AD-613-M30	DW-AS-613-M30-002
Description			
Part reference			
Description			
Part reference			
Other types available	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC

BASIC

EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE
M30	M30	M30	M30
22	22	22	22

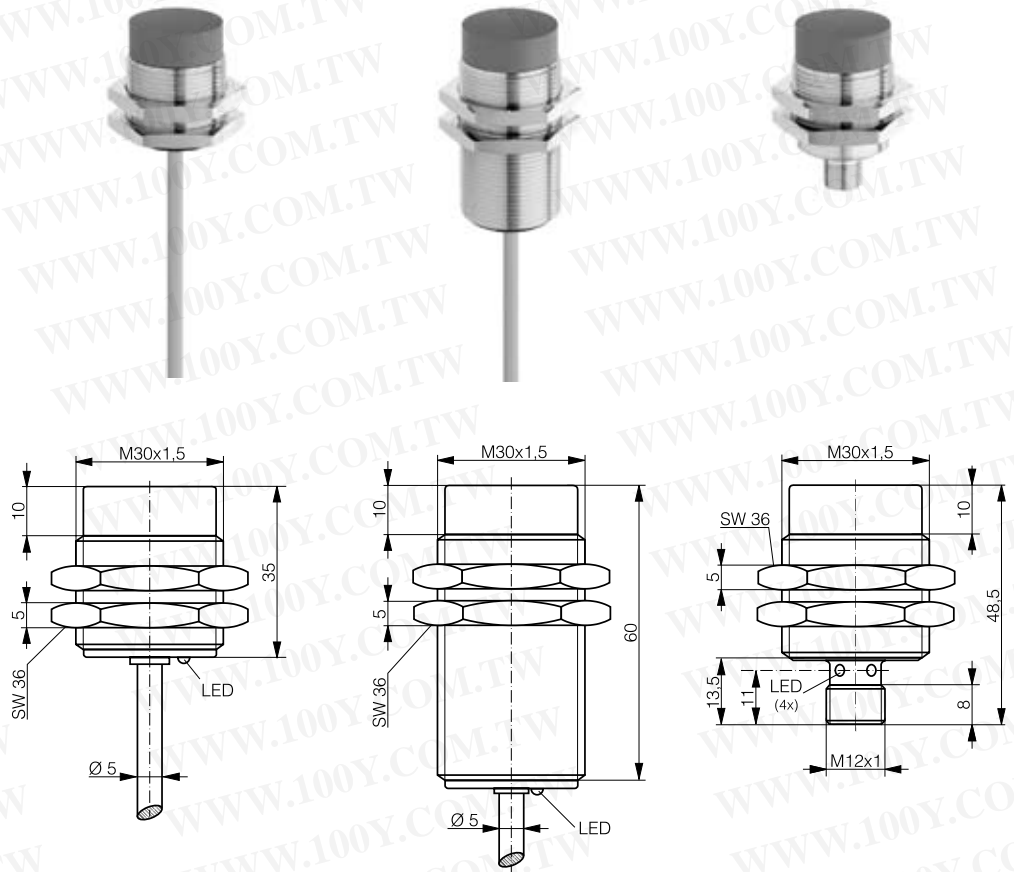





Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
PVC cable	PVC cable	Connector S12	Connector S12
IP 67	IP 67	IP 67	IP 67
Quasi-embeddable	Quasi-embeddable	Quasi-embeddable	Quasi-embeddable
200 Hz	200 Hz	200 Hz	200 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AD-503-M30-120	DW-AD-503-M30	DW-AS-503-M30-120	DW-AS-503-M30-002
	NPN NO		NPN NO
	DW-AD-501-M30		DW-AS-501-M30-002
	PNP NC		PNP NC
	DW-AD-504-M30		DW-AS-504-M30-002
NPN NO, PNP NC, NPN NC	NPN NC	NPN NO, PNP NC, NPN NC	NPN NC

BASIC

INDUCTIVE

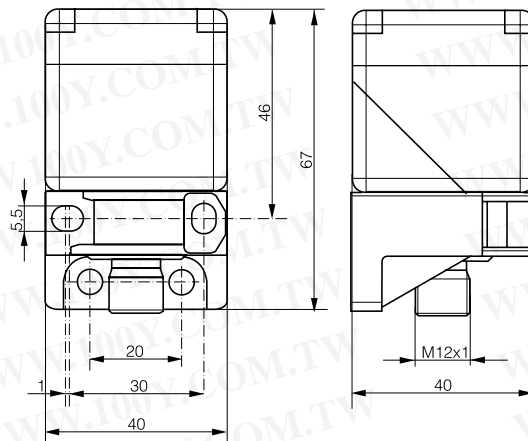
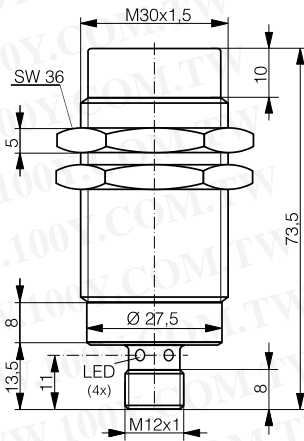
FAMILY	EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE
HOUSING SIZE MM	M30	M30	M30
OPERATING DISTANCE MM	40	40	40



DATA			
Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection	PVC cable	PVC cable	Connector S12
Degree of protection	IP 67	IP 67	IP 67
Mounting	Non-embeddable	Non-embeddable	Non-embeddable
Max. switching frequency	100 Hz	100 Hz	100 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AD-513-M30-120	DW-AD-513-M30	DW-AS-513-M30-120
Description		NPN NO	
Part reference		DW-AD-511-M30	
Description			
Part reference			
Other types available	NPN NO, PNP NC, NPN NC	PNP NC, NPN NC	NPN NO, PNP NC, NPN NC

BASIC

EXTRA DISTANCE	CLASSICS	CLASSICS	CLASSICS
M30	□ 40 x 40	□ 40 x 40	□ 40 x 40
40	15	20	30



Chrome-plated brass	PA GF	PA GF	PA GF
Connector S12	Connector S12	Connector S12	Connector S12
IP 67	IP 68 / IP 69K	IP 68 / IP 69K	IP 68 / IP 69K
Non-embeddable	Embeddable	Embeddable	Non-embeddable
100 Hz	100 Hz	100 Hz	100 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +85 °C / -13 ... +185 °F	-25 ... +85 °C / -13 ... +185 °F	-25 ... +85 °C / -13 ... +185 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP Changeover	PNP Changeover	PNP Changeover
DW-AS-513-M30-002	DW-AS-60A-C44	DW-AS-62A-C44	DW-AS-61A-C44
NPN NO			
DW-AS-511-M30-002			
PNP NC			
DW-AS-514-M30-002			
NPN NC	-	-	-

BASIC

FAMILY

CLASSICS

CLASSICS

HOUSING SIZE MM

□ 40 x 40

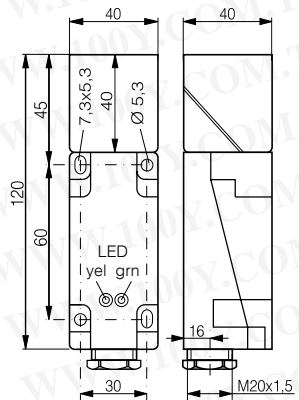
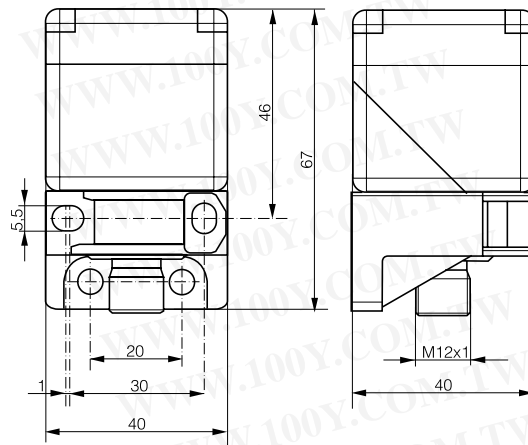
□ 40 x 120

OPERATING DISTANCE MM

40

15

INDUCTIVE




Sensing face can be rotated to 5 different sides.

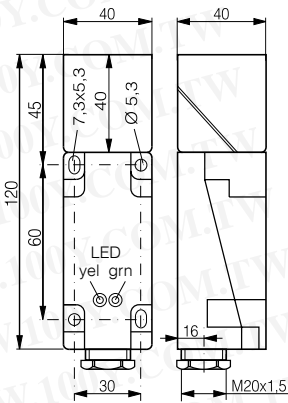
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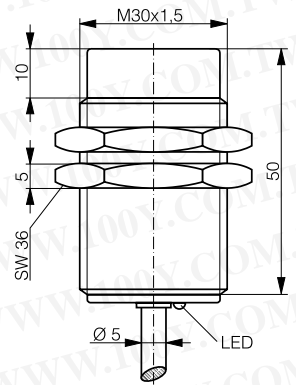
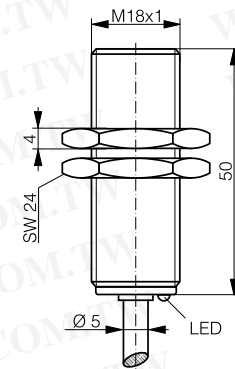
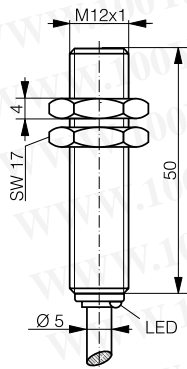
Housing material	PA GF	PBTP
Connection	Connector S12	Screw terminal
Degree of protection	IP 68 / IP 69K	IP 65
Mounting	Non-embeddable	Embeddable
Max. switching frequency	100 Hz	100 Hz
Supply voltage range	10 ... 30 VDC	15 ... 34 VDC
Ambient temperature range	-25 ... +85 °C / -13 ... +185 °F	-25 ... +85 °C / -13 ... +185 °F
Output current	≤ 200 mA	≤ 200 mA / ≤ 150 mA
Description	PNP Changeover	PNP NO
Part reference	DW-AS-63A-C44	DW-AD-603-C40
Description		
Part reference		
Description		
Part reference		
Other types available	-	NPN NO





BASIC

CLASSICS	CLASSICS	CLASSICS	CLASSICS
 40 x 120	M12	M18	M30
40	2	5	15



Sensing face can be rotated to 5 different sides.



			
PBTP	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Screw terminal	PVC cable	PVC cable	PVC cable
IP 65	IP 67	IP 67	IP 67
Non-embeddable	Embeddable	Embeddable	Non-embeddable
20 Hz	25 Hz (AC) / 3000 Hz (DC)	25 Hz (AC) / 1500 Hz (DC)	25 Hz (AC) / 500 Hz (DC)
10 ... 65 VDC	20 ... 265 VAC / 10 ... 320 VDC	20 ... 265 VAC / 10 ... 320 VDC	20 ... 265 VAC / 10 ... 320 VDC
-25 ... +85 °C / -13 ... +185 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 300 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	2-wire AC/DC NO	2-wire AC/DC NO	2-wire AC/DC NO
DW-AD-613-C40*	DW-AD-607-M12	DW-AD-607-M18	DW-AD-617-M30
NPN NO, PNP NC, NPN NC	NC, connector, non-embeddable	NC, connector, non-embeddable	NC, connector, embeddable
* NO/NC switchable			



FULL FUNCTIONALITY, SMALLEST SIZE

MINIATURE

INDUCTIVE SENSORS

KEY ADVANTAGES

- ✓ Smallest self-contained inductive sensors on the market
- ✓ Miniature sensors are ideal for mounting where space is limited
- ✓ Outstanding temperature stability from -25°C (-13°F) to $+70^{\circ}\text{C}$ ($+158^{\circ}\text{F}$)
- ✓ High switching frequency up to 5000 Hz
- ✓ Light weight of the sensor
- ✓ Electronics vacuum potted for optimum long-term reliability under high stress

RANGE OVERVIEW

Housing size

Classics

Extra Distance

MINIATURE

Ø 3 mm

p. 65-66

M4

p. 66-67

Ø 4 mm

p. 67-68

p. 69

M5

p. 69-70

p. 70

C5

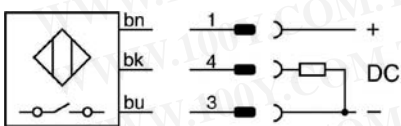
p. 71

INDUCTIVE

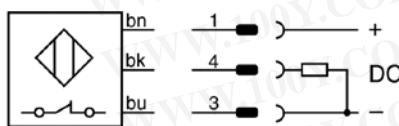
FAMILY	
HOUSING SIZE MM	
OPERATING DISTANCE MM	

WIRING DIAGRAMS

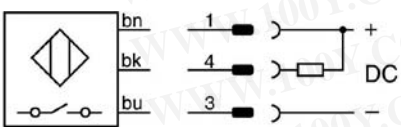
PNP NO



PNP NC



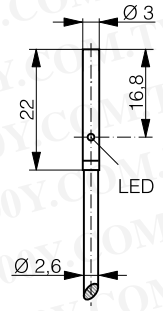
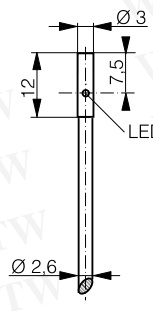
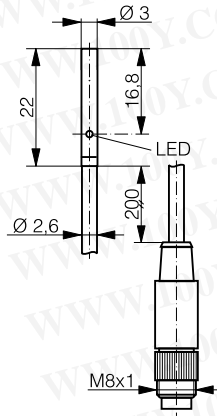
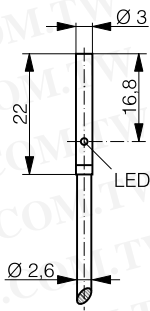
NPN NO



DATA
Housing material
Connection
Degree of protection
Mounting
Max. switching frequency
Supply voltage range
Ambient temperature range
Output current
Description
Part reference
Description
Part reference
Description
Part reference
Other types available
*Part reference change see p. 334

MINIATURE

CLASSICS	CLASSICS	CLASSICS	CLASSICS
Ø 3	Ø 3	Ø 3	Ø 3
0.6	0.6	1	1

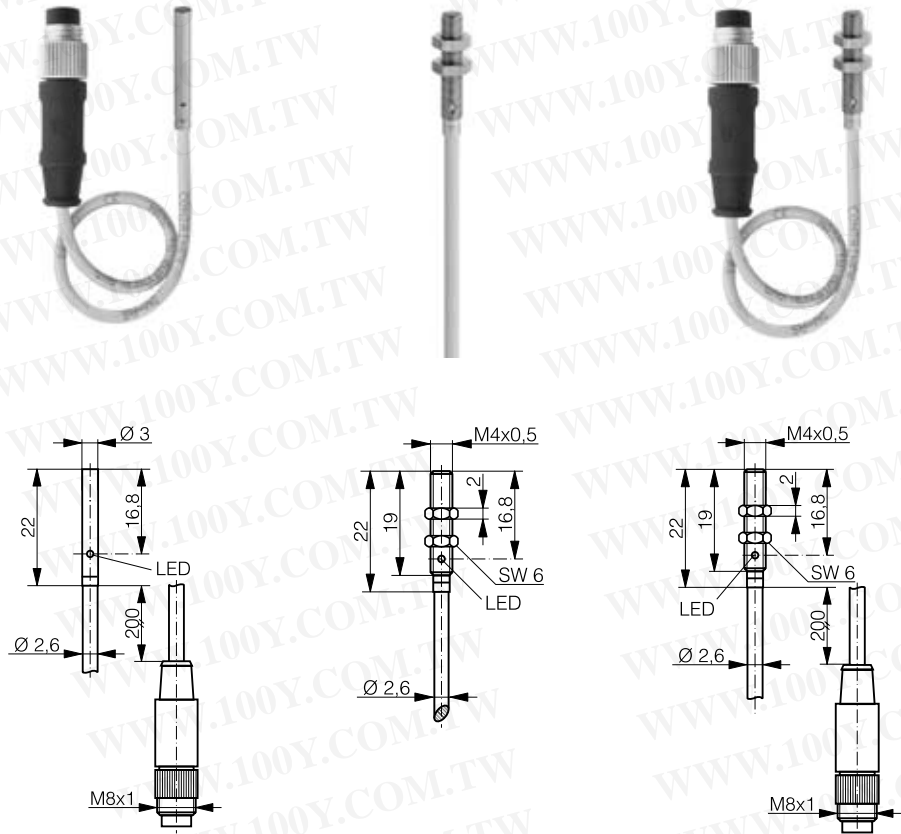





Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PUR cable	PUR cable / Connector S8	PUR cable	PUR cable
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
5000 Hz	5000 Hz	8000 Hz	3000 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 100 mA	≤ 100 mA	≤ 100 mA	≤ 100 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AD-603-03*	DW-AV-603-03-276*	DW-AD-623-03-960	DW-AD-623-03
NPN NO			NPN NO
DW-AD-601-03*			DW-AD-621-03
PNP NC			
DW-AD-604-03*			
NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	PNP NC, NPN NC

MINIATURE

INDUCTIVE

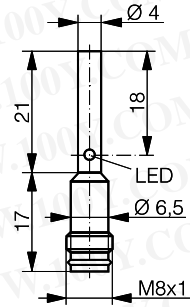
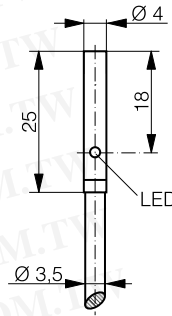
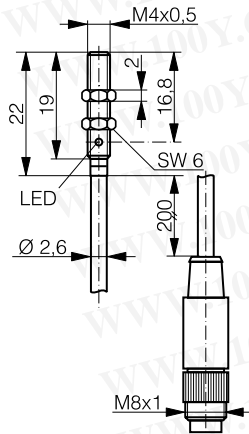
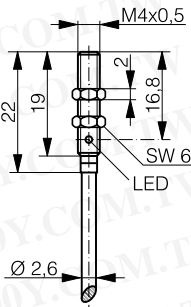
FAMILY	CLASSICS	CLASSICS	CLASSICS
HOUSING SIZE MM	Ø 3	M4	M4
OPERATING DISTANCE MM	1	0.6	0.6



DATA			
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection	PUR cable / Connector S8	PUR cable	PUR cable / Connector S8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	3000 Hz	5000 Hz	5000 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 100 mA	≤ 100 mA	≤ 100 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AV-623-03-276	DW-AD-603-M4*	DW-AV-603-M4-276*
Description		NPN NO	
Part reference		DW-AD-601-M4*	
Description		PNP NC	
Part reference		DW-AD-604-M4*	
Other types available	NPN NO, PNP NC, NPN NC	NPN NC	NPN NO, PNP NC, NPN NC
*Part reference change see p. 334			

MINIATURE

CLASSICS	CLASSICS	CLASSICS	CLASSICS
M4	M4	Ø 4	Ø 4
1	1	0.8	0.8

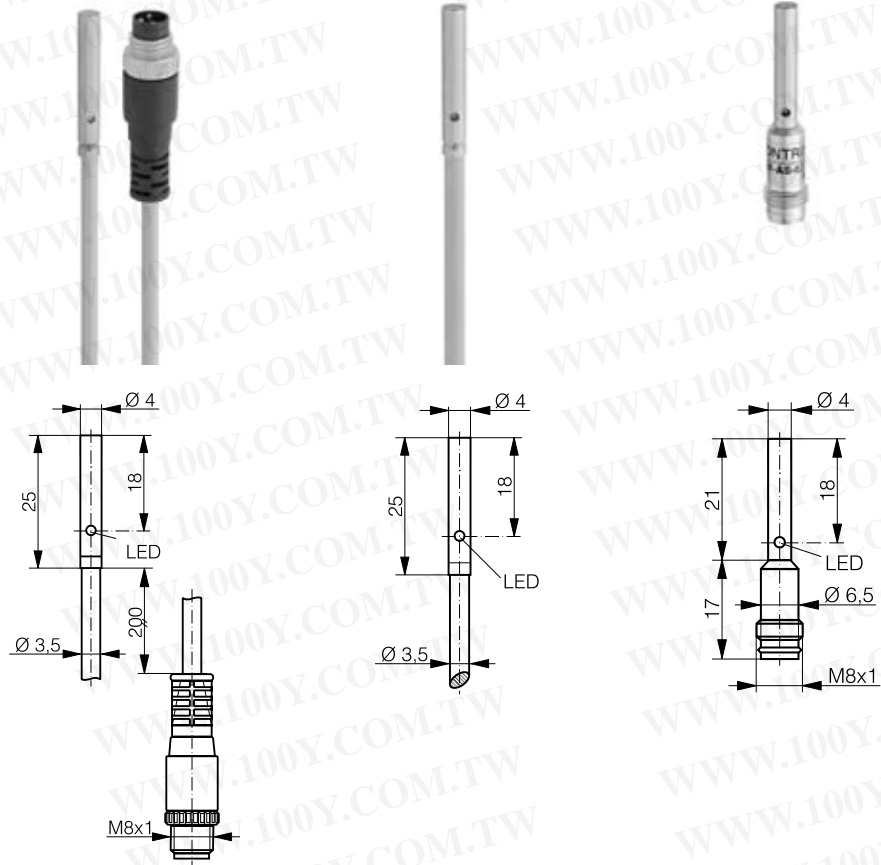





Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PUR cable	PUR cable / Connector S8	PVC cable	Connector S8
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
3000 Hz	3000 Hz	5000 Hz	5000 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 100 mA	≤ 100 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AD-623-M4	DW-AV-623-M4-276	DW-AD-603-04*	DW-AS-603-04*
NPN NO	NPN NO	NPN NO	NPN NO
DW-AD-621-M4	DW-AV-621-M4-276	DW-AD-601-04*	DW-AD-604-04*
		PNP NC	
		DW-AD-604-04*	
PNP NC, NPN NC	PNP NC, NPN NC	NPN NC	NPN NO, PNP NC, NPN NC

MINIATURE

INDUCTIVE

FAMILY	CLASSICS	CLASSICS	CLASSICS
HOUSING SIZE MM	Ø 4	Ø 4	Ø 4
OPERATING DISTANCE MM	0.8	1.5	1.5

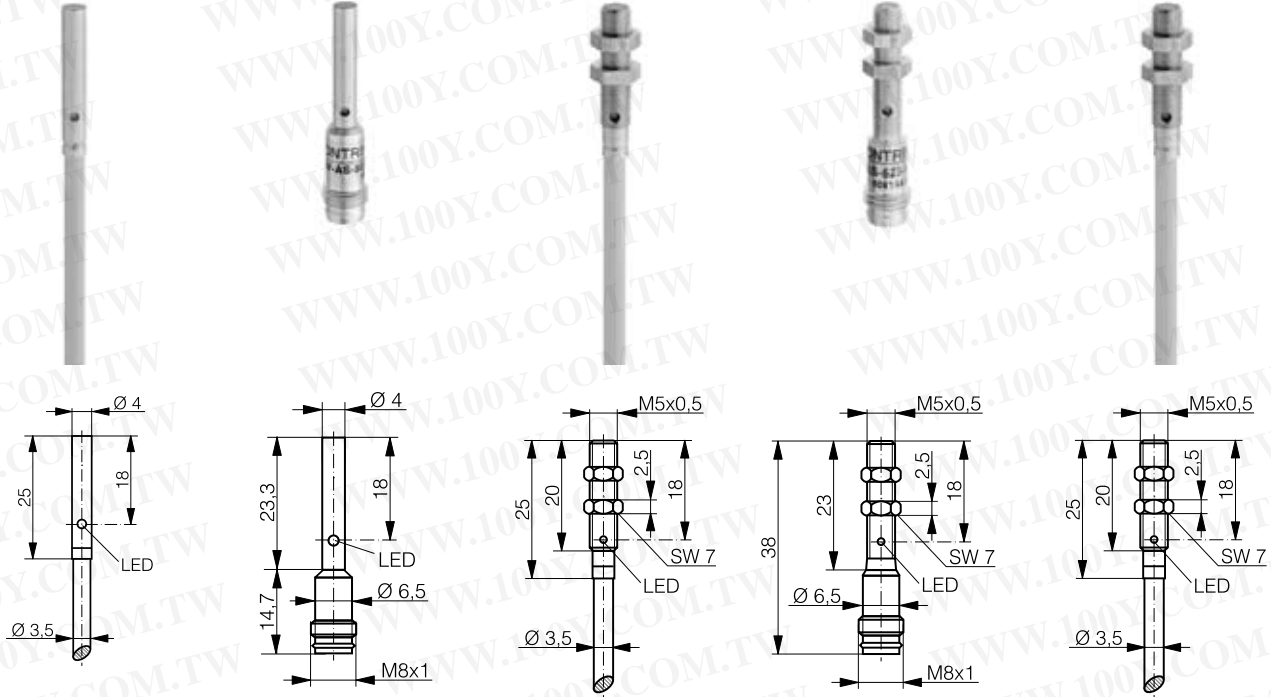







DATA			
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection	PVC cable / Connector S8	PVC cable	Connector S8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	5000 Hz	3000 Hz	3000 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AV-603-04-236*	DW-AD-623-04	DW-AS-623-04
Description		NPN NO	
Part reference		DW-AD-621-04	
Description		PNP NC	
Part reference		DW-AD-624-04	
Other types available	NPN NO, PNP NC, NPN NC	NPN NC	NPN NO, PNP NC, NPN NC

*Part reference change see p. 334

MINIATURE

EXTRA DISTANCE	EXTRA DISTANCE	CLASSICS	CLASSICS	CLASSICS
Ø 4	Ø 4	M5	M5	M5
2.5	2.5	0.8	0.8	1.5

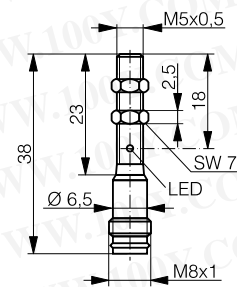
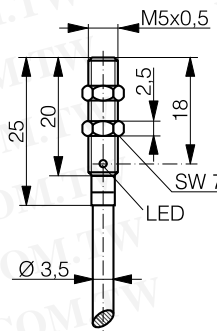
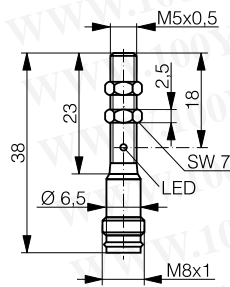





				
Nickel silver	Nickel silver	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PVC cable	Connector S8	PVC cable	Connector S8	PVC cable
IP 67	IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable	Embeddable
800 Hz	800 Hz	5000 Hz	5000 Hz	3000 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25...+70 °C / -13...+158 °F	-25...+70 °C / -13...+158 °F	-25...+70 °C / -13...+158 °F	-25...+70 °C / -13...+158 °F	-25...+70 °C / -13...+158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO	PNP NO
DW-AD-503-04	DW-AS-503-04	DW-AD-603-M5*	DW-AS-603-M5*	DW-AD-623-M5
NPN NO	NPN NO	NPN NO	PNP NC	NPN NO
DW-AD-501-04	DW-AS-501-04	DW-AD-601-M5*	DW-AS-604-M5*	DW-AD-621-M5
	PNP NC	PNP NC		PNP NC
	DW-AS-504-04	DW-AD-604-M5*		DW-AD-624-M5
PNP NC, NPN NC	NPN NC	NPN NC	NPN NO, NPN NC	NPN NC

MINIATURE

INDUCTIVE

FAMILY	CLASSICS	EXTRA DISTANCE	EXTRA DISTANCE
HOUSING SIZE MM	M5	M5	M5
OPERATING DISTANCE MM	1.5	2.5	2.5

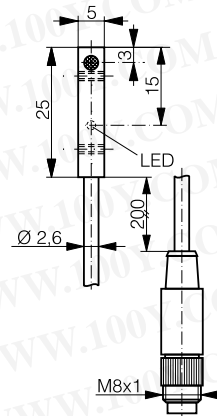
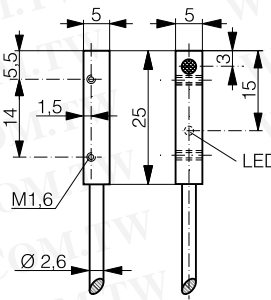
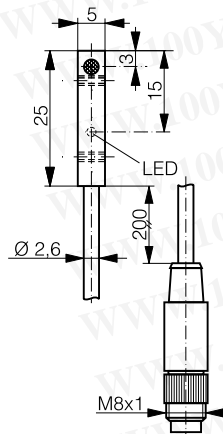
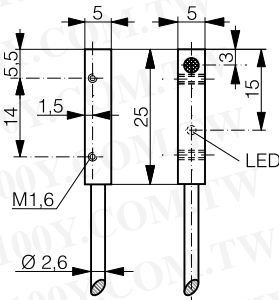


DATA			
Housing material	Stainless steel V2A	Nickel silver	Nickel silver
Connection	Connector S8	PVC cable	Connector S8
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	3000 Hz	800 Hz	800 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AS-623-M5	DW-AD-503-M5	DW-AS-503-M5
Description	NPN NO	NPN NO	NPN NO
Part reference	DW-AS-621-M5	DW-AD-501-M5	DW-AS-501-M5
Description	PNP NC	PNP NC	PNP NC
Part reference	DW-AS-624-M5	DW-AD-504-M5	DW-AS-504-M5
Other types available	NPN NC	NPN NC	NPN NC

*Part reference change see p. 334

MINIATURE

CLASSICS	CLASSICS	CLASSICS	CLASSICS
□ 5 x 5	□ 5 x 5	□ 5 x 5	□ 5 x 5
0.8	0.8	1.5	1.5



Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
PUR cable	PUR cable / Connector S8	PUR cable	PUR cable / Connector S8
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
5000 Hz	5000 Hz	3000 Hz	3000 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AD-603-C5*	DW-AV-603-C5-276*	DW-AD-623-C5	DW-AV-623-C5-276
NPN NO		NPN NO	
DW-AD-601-C5*		DW-AD-621-C5	
PNP NC		PNP NC	
DW-AD-604-C5*		DW-AD-624-C5	
NPN NC	NPN NO, PNP NC, NPN NC	NPN NC	NPN NO, PNP NC, NPN NC



EXTREME DURABILITY IN HARSH ENVIRONMENTS

EXTREME

INDUCTIVE SENSORS

KEY ADVANTAGES

- ✓ Mechanically and chemically extremely robust
- ✓ Corrosion resistant
- ✓ IP 68 and IP 69K, sea water resistant
- ✓ Pressure resistant up to 80 bar (1160 psi)

RANGE OVERVIEW

Housing size

Full Inox

EXTREME

M8

p. 75-76

M12

p. 76-78

M18

p. 78-80

M30

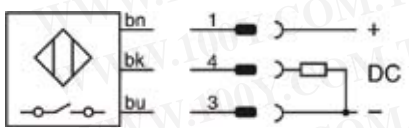
p. 80-81

FAMILY	
HOUSING SIZE	
OPERATING DISTANCE MM	

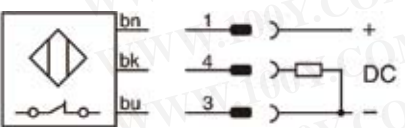
INDUCTIVE

WIRING DIAGRAMS

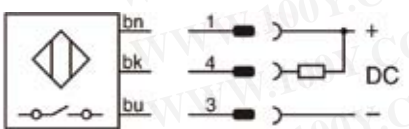
PNP NO



PNP NC



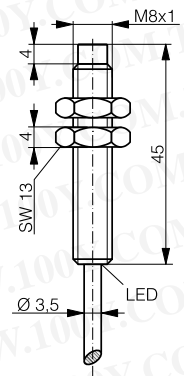
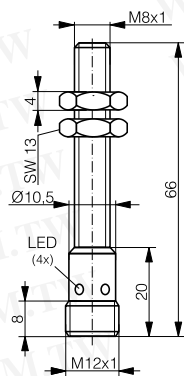
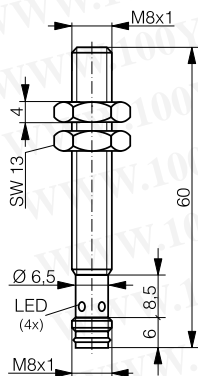
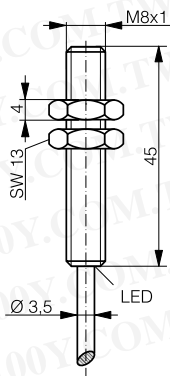
NPN NO



DATA
Sensing face material
Housing material
Connection
Degree of protection
Mounting
Max. switching frequency
Supply voltage range
Ambient temperature range
Output current
Description
Part reference
Description
Part reference
Description
Part reference
Other types available

EXTREME

FULL INOX	FULL INOX	FULL INOX	FULL INOX
M8	M8	M8	M8
3	3	3	6

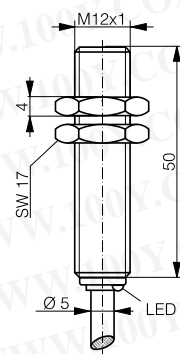
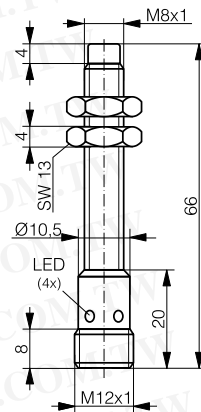
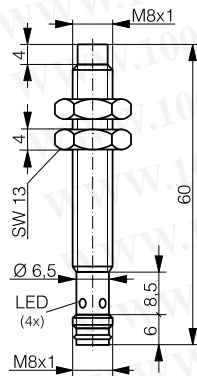





Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PUR cable	Connector S8	Connector S12	PUR cable
IP 68	IP 67	IP 67	IP 68
Embeddable	Embeddable	Embeddable	Non-embeddable
1000 Hz	1000 Hz	1000 Hz	700 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AD-703-M8	DW-AS-703-M8-001	DW-AS-703-M8	DW-AD-713-M8
NPN NO	NPN NO	NPN NO	NPN NO
DW-AD-701-M8	DW-AS-701-M8-001	DW-AS-701-M8	DW-AD-711-M8
PNP NC			PNP NC
DW-AD-704-M8			DW-AD-714-M8
NPN NC	PNP NC, NPN NC	PNP NC, NPN NC	NPN NC

EXTREME

INDUCTIVE

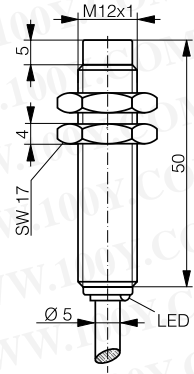
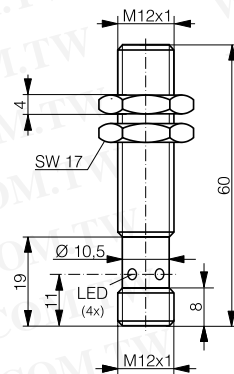
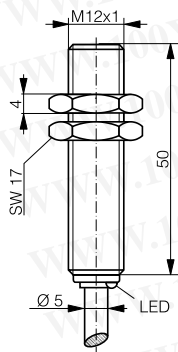
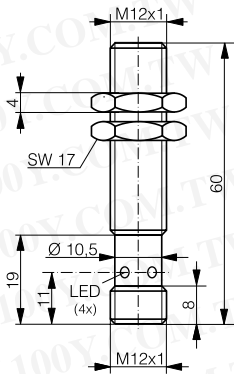
FAMILY	FULL INOX	FULL INOX	FULL INOX
HOUSING SIZE	M8	M8	M12
OPERATING DISTANCE MM	6	6	2



DATA			
Sensing face material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection	Connector S8	Connector S12	PUR cable
Degree of protection	IP 67	IP 67	IP 68 / IP 69K
Mounting	Non-embeddable	Non-embeddable	Embeddable
Max. switching frequency	700 Hz	700 Hz	850 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AS-713-M8-001	DW-AS-713-M8	DW-AD-703-M12-303
Description			NPN NO
Part reference			DW-AD-701-M12-303
Description			
Part reference			
Other types available	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	PNP NC, NPN NC

EXTREME

FULL INOX	FULL INOX	FULL INOX	FULL INOX
M12	M12	M12	M12
2	6	6	10

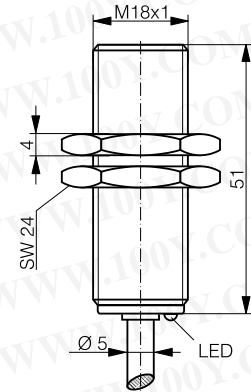
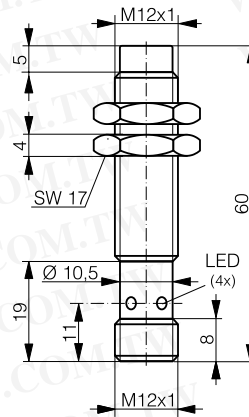
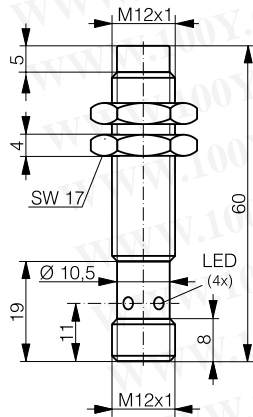





Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connector S12	PUR cable	Connector S12	PUR cable
IP 68 / IP 69K	IP 68 / IP 69K	IP 68 / IP 69K	IP 68 / IP 69K
Embeddable	Embeddable	Embeddable	Non-embeddable
850 Hz	600 Hz	600 Hz	400 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AS-703-M12-303	DW-AD-703-M12	DW-AS-703-M12	DW-AD-713-M12
NPN NO	NPN NO	NPN NO	NPN NO
DW-AS-701-M12-303	DW-AD-701-M12	DW-AS-701-M12	DW-AD-711-M12
		PNP NC	
		DW-AS-704-M12	
PNP NC, NPN NC	PNP NC, NPN NC	NPN NC	PNP NC, NPN NC

EXTREME

INDUCTIVE

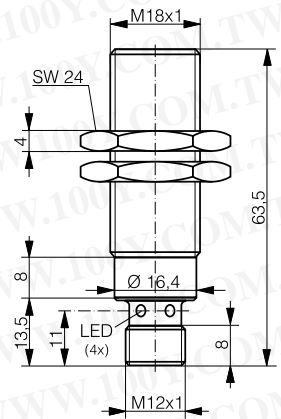
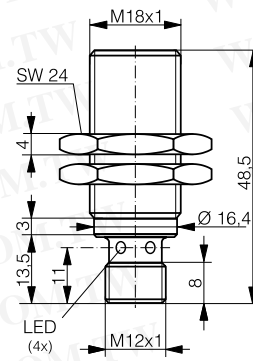
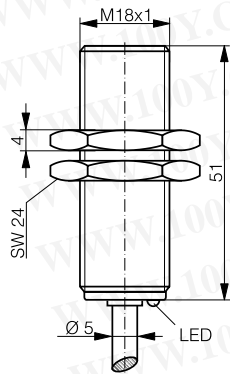
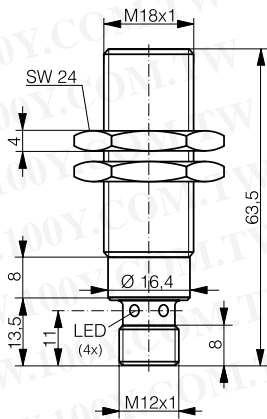
FAMILY	FULL INOX	FULL INOX	FULL INOX
HOUSING SIZE	M12	M12	M18
OPERATING DISTANCE MM	10	15	5



DATA			
Sensing face material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection	Connector S12	Connector S12	PUR cable
Degree of protection	IP 68 / IP 69K	IP 68 / IP 69K	IP 68 / IP 69K
Mounting	Non-embeddable	Non-embeddable	Embeddable
Max. switching frequency	400 Hz	220 Hz	500 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AS-713-M12	DW-AS-733-M12	DW-AD-703-M18-303
Description	NPN NO		NPN NO
Part reference	DW-AS-711-M12		DW-AD-701-M18-303
Description			
Part reference			
Other types available	PNP NC, NPN NC	NPN NO	PNP NC, NPN NC

EXTREME

FULL INOX	FULL INOX	FULL INOX	FULL INOX
M18	M18	M18	M18
5	10	10	10

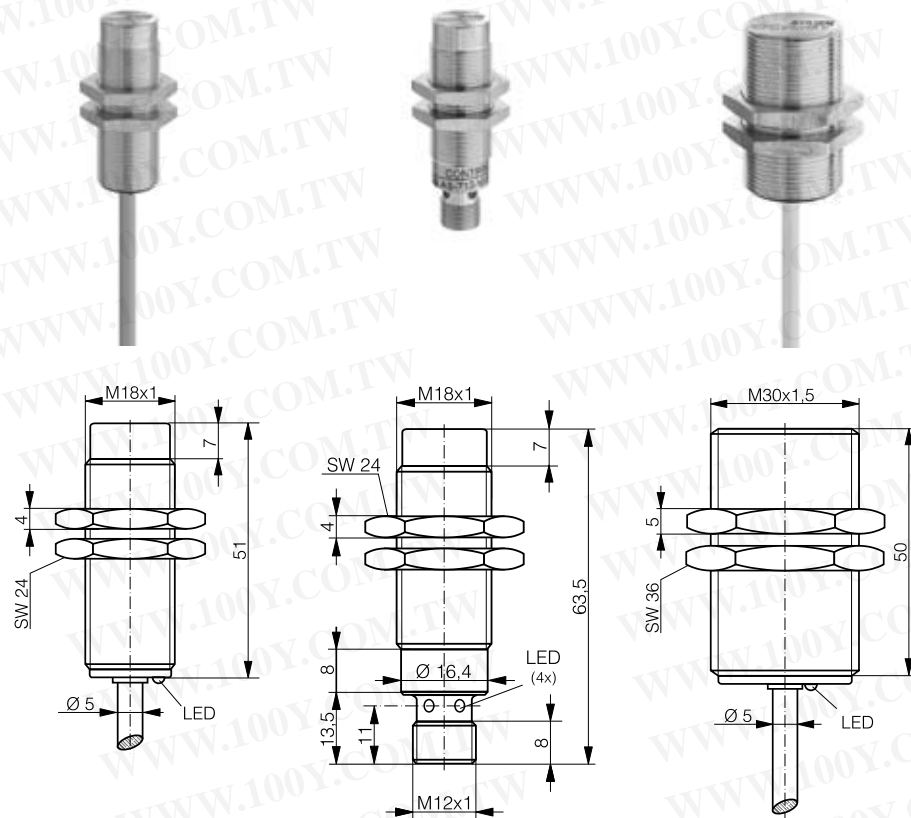





Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connector S12	PUR cable	Connector S12	Connector S12
IP 68 / IP 69K	IP 68 / IP 69K	IP 68 / IP 69K	IP 68 / IP 69K
Embeddable	Embeddable	Embeddable	Embeddable
500 Hz	200 Hz	200 Hz	200 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AS-703-M18-303	DW-AD-703-M18	DW-AS-703-M18-120	DW-AS-703-M18-002
	NPN NO		NPN NO
	DW-AD-701-M18		DW-AS-701-M18-002
	PNP NC		PNP NC
	DW-AD-704-M18		DW-AS-704-M18-002
NPN NO, PNP NC, NPN NC	NPN NC	NPN NO, PNP NC, NPN NC	NPN NC

EXTREME

INDUCTIVE

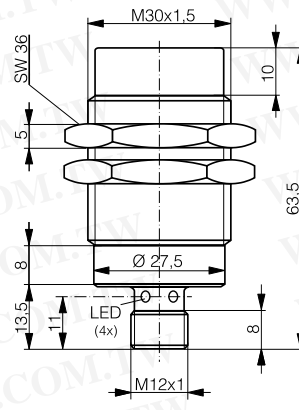
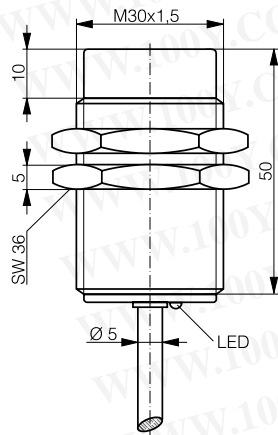
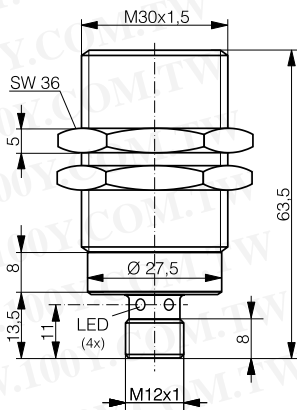
FAMILY	FULL INOX	FULL INOX	FULL INOX
HOUSING SIZE	M18	M18	M30
OPERATING DISTANCE MM	20	20	20



DATA			
Sensing face material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection	PUR cable	Connector S12	PUR cable
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
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AD-713-M18	DW-AS-713-M18-002	DW-AD-703-M30
Description	NPN NO		PNP NC
Part reference	DW-AD-711-M18		DW-AD-704-M30
Description			
Part reference			
Other types available	PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, NPN NC

EXTREME

FULL INOX	FULL INOX	FULL INOX	
M30	M30	M30	
20	40	40	



Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	
Connector S12	PUR cable	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	
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	
≤ 200 mA	≤ 200 mA	≤ 200 mA	
PNP NO	PNP NO	PNP NO	
DW-AS-703-M30-002	DW-AD-713-M30	DW-AS-713-M30-002	
NPN NO			
DW-AS-701-M30-002			
PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	



PRESSURE RESISTANT UP TO 100 BAR (1451 PSI)

EXTRA PRESSURE

INDUCTIVE SENSORS

KEY ADVANTAGES

- ✓ Pressure resistant up to 100 bar (1451 psi)
- ✓ Mechanically and chemically rugged
- ✓ Impervious: IP 68
- ✓ Gas-tight sensing face
- ✓ Miniature devices

RANGE OVERVIEW

Housing size

Classics

Extra Distance

EXTRA PRESSURE

∅ 3 mm

p. 85

M5

p. 85

∅ 6.5 mm

p. 85

FAMILY

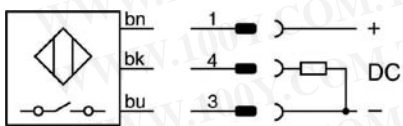
HOUSING SIZE MM

OPERATING DISTANCE MM

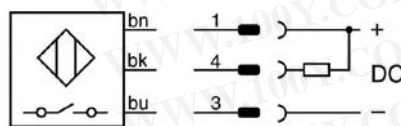
INDUCTIVE

WIRING DIAGRAMS

PNP NO



NPN NO



DATA

Sensing face material

Operating pressure

Housing material

Connection

Degree of protection

Mounting

Max. switching frequency

Supply voltage range

Ambient temperature range

Output current

Description

Part reference

Description

Part reference

Description

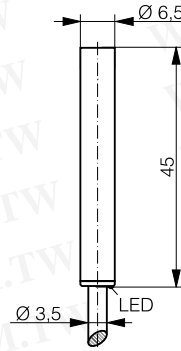
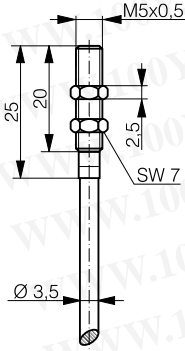
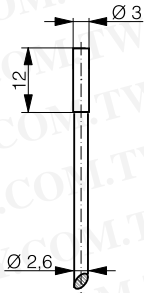
Part reference

Other types available

*Part reference change see p. 334

EXTRA PRESSURE

CLASSICS	CLASSICS	EXTRA DISTANCE	
Ø 3	M5	Ø 6.5	
0.8	0.6	2.5	



Ceramic ZrO₂

200 bar

Stainless steel V2A

PUR cable

IP 68 / IP 69K

Embeddable

8000 Hz

10 ... 30 VDC

-25 ... +70 °C / -13 ... +158 °F

≤ 100 mA

PNP NO

DW-AD-623-03E-961

NPN NO, PNP NC, NPN NC



Sapphire

20 bar

Stainless steel V2A

PUR cable

IP 68

Embeddable

5000 Hz

10 ... 30 VDC

-25 ... +70 °C / -13 ... +158 °F

≤ 200 mA

PNP NO

DW-AD-603-M5E*

NPN NO, PNP NC, NPN NC



Ceramic ZrO₂

20 bar

Stainless steel V2A

PUR cable

IP 68

Embeddable

1000 Hz

10 ... 30 VDC

-25 ... +70 °C / -13 ... +158 °F

≤ 200 mA

NPN NO

DW-AD-501-065E

PNP NO, PNP NC, NPN NC



PRESSURE RESISTANT UP TO 500 BAR (7255 PSI)

HIGH PRESSURE INDUCTIVE SENSORS

KEY ADVANTAGES

- ✓ Highest operating (500 bar / 7255 psi) and peak pressure (1000 bar / 14510 psi) on the market
- ✓ Resistant to pressure cycles - 50 times higher lifetime under pressure than the market standard
- ✓ Gas-tight sensing face
- ✓ Large temperature range -25°C (-13°F) ... +100°C (+212°F)

RANGE OVERVIEW

HIGH PRESSURE

Housing size

Extra Distance

Full Inox

M5 / P5

p. 89

M8 / P8

p. 89

M12 / P12

p. 89-91

p. 91

M14 / P20

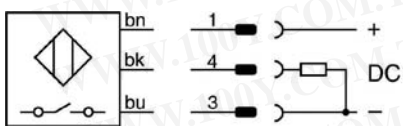
p. 91

FAMILY	
HOUSING SIZE	
OPERATING DISTANCE MM	

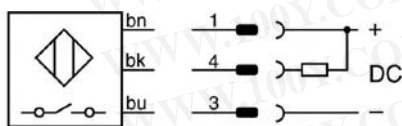
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WIRING DIAGRAMS

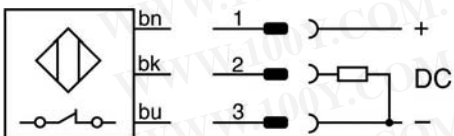
PNP NO



NPN NO



PNP NC

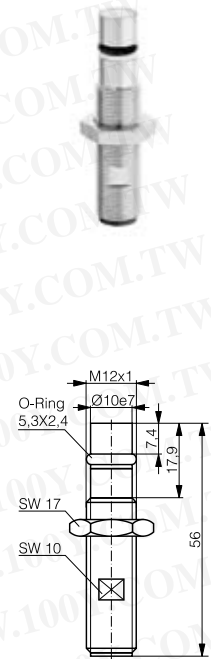
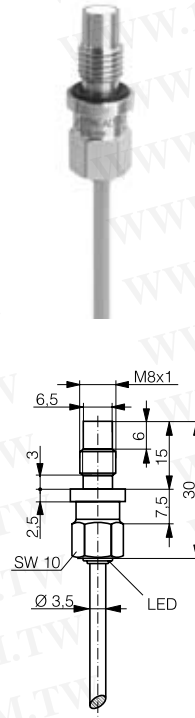
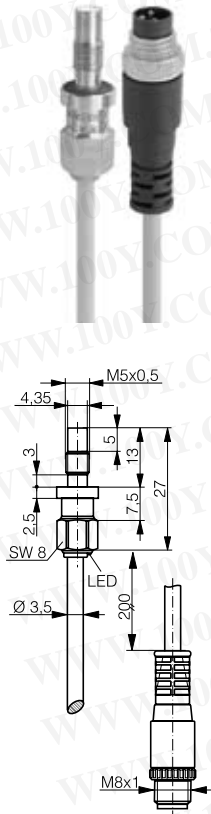
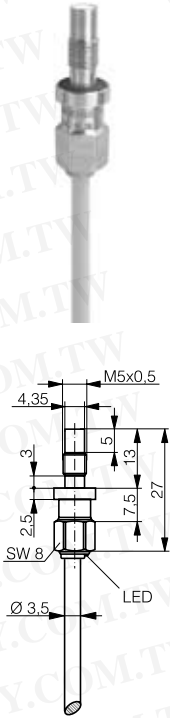


DATA

Sensing face material
Operating pressure
Peak pressure
Housing material
Connection
Degree of protection
Mounting
Max. switching frequency
Supply voltage range
Ambient temperature range
Output current
Description
Part reference
Description
Part reference
Description
Part reference
Other types available

HIGH PRESSURE

EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE
M5 (P5)	M5 (P5)	M8 (P8)	M12 (P12)
1	1	1.5	1.5 / 2.5

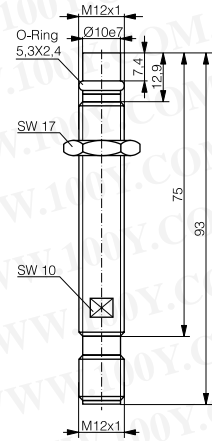
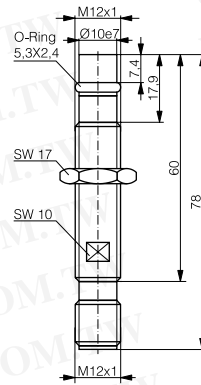
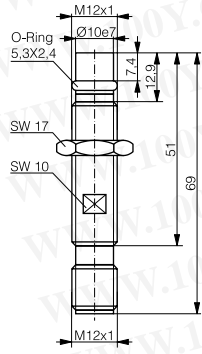





Ceramic ZrO ₂	Ceramic ZrO ₂	Ceramic ZrO ₂	Ceramic ZrO ₂
500 bar	500 bar	500 bar	500 bar
1000 bar	1000 bar	1000 bar	1000 bar
Stainless steel V4A / AISI 316L	Stainless steel V4A / AISI 316L	Stainless steel V4A / AISI 316L	Stainless steel V2A
PUR cable	PUR cable / Connector S8	PUR cable	Connector S12
IP 68	IP 68	IP 68	IP 68
Embeddable	Embeddable	Embeddable	Embeddable
1000 Hz	1000 Hz	800 Hz	600 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +100 °C / -13 ... +212 °F	-25 ... +100 °C / -13 ... +212 °F	-25 ... +100 °C / -13 ... +212 °F	-25 ... +80 °C / -13 ... +176 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO (S _n = 1.5 mm)
DW-AD-503-P5	DW-AV-503-P5-276	DW-AD-503-P8	DW-AS-503-P12-630
			PNP NC (S _n = 1.5 mm)
			DW-AS-504-P12-630
			PNP NO (S _n = 2.5 mm)
			DW-AS-523-P12-630
NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	NPN NO, NPN NC

HIGH PRESSURE

INDUCTIVE

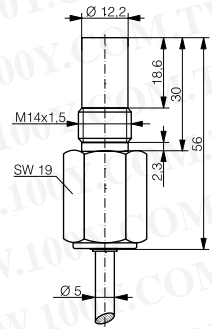
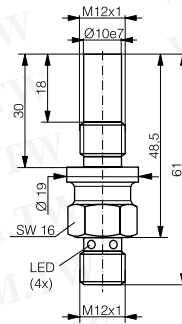
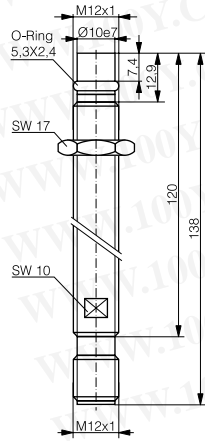
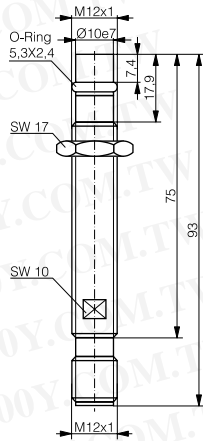
FAMILY	EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE
HOUSING SIZE	M12 (P12)	M12 (P12)	M12 (P12)
OPERATING DISTANCE MM	1.5	1.5	1.5



DATA			
Sensing face material	Ceramic ZrO ₂	Ceramic ZrO ₂	Ceramic ZrO ₂
Operating pressure	500 bar	500 bar	500 bar
Peak pressure	1000 bar	1000 bar	1000 bar
Housing material	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Connection	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
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +80 °C / -13 ... +176 °F	-25 ... +80 °C / -13 ... +176 °F	-25 ... +80 °C / -13 ... +176 °F
Output current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO	PNP NO
Part reference	DW-AS-503-P12	DW-AS-503-P12-627	DW-AS-503-P12-621
Description			
Part reference			
Description			
Part reference			
Other types available	NPN NO, PNP NC, NPN NC, 2.5 mm operating distance	NPN NO, PNP NC, NPN NC, 2.5 mm operating distance	NPN NO, PNP NC, NPN NC, 2.5 mm operating distance

HIGH PRESSURE

EXTRA DISTANCE	EXTRA DISTANCE	FULL INOX	EXTRA DISTANCE
M12 (P12)	M12 (P12)	M12 (P12)	M14 (P20)
1.5	1.5	1.5	3



Ceramic ZrO ₂	Ceramic ZrO ₂	Stainless steel V4A / AISI 316L	Ceramic ZrO ₂
500 bar	500 bar	500 bar	500 bar
1000 bar	1000 bar	800 bar	1000 bar
Stainless steel V2A	Stainless steel V2A	Stainless steel V4A / AISI 316L	Stainless steel V4A / AISI 316L
Connector S12	Connector S12	Connector S12	PUR cable
IP 68	IP 68	IP 68 / IP 69K	IP 68
Embeddable	Embeddable	Embeddable	Embeddable
600 Hz	600 Hz	850 Hz	500 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +80 °C / -13 ... +176 °F	-25 ... +80 °C / -13 ... +176 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +80 °C / -13 ... +176 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-AS-503-P12-635	DW-AS-503-P12-622	DW-LS-703-P12G	DW-AD-503-P20
NPN NO, PNP NC, NPN NC, 2.5 mm operating distance	NPN NO, PNP NC, NPN NC, 2.5 mm operating distance	NPN NO, PNP NC, NPN NC	NPN NO, PNP NC, NPN NC

HIGH PRESSURE

FAMILY

EXTRA DISTANCE

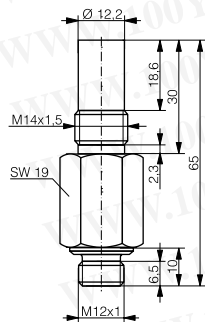
HOUSING SIZE

M14 (P20)

OPERATING DISTANCE MM

3

INDUCTIVE

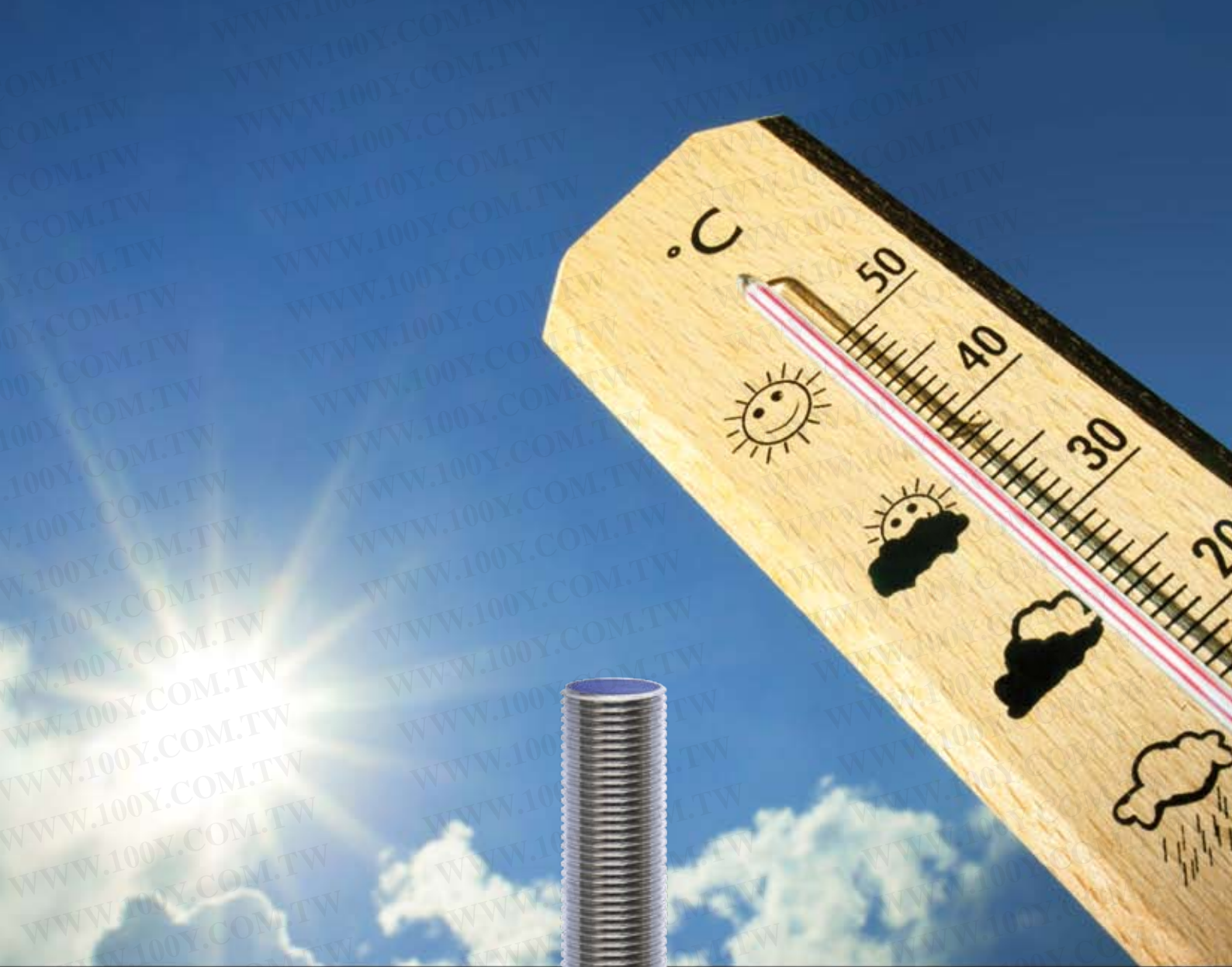


DATA



Sensing face material	Ceramic ZrO ₂
Operating pressure	500 bar
Peak pressure	1000 bar
Housing material	Stainless steel V4A / AISI 316L
Connection	Connector S12
Degree of protection	IP 68
Mounting	Embeddable
Max. switching frequency	500 Hz
Supply voltage range	10 ... 30 VDC
Ambient temperature range	-25 ... +80 °C / -13 ... +176 °F
Output current	≤ 200 mA
Description	PNP NO
Part reference	DW-AS-503-P20
Description	NPN NO
Part reference	DW-AS-501-P20
Description	
Part reference	
Other types available	PNP NC, NPN NC





TEMPERATURE RESISTANT UP TO +120°C (+248°F)

EXTRA TEMPERATURE INDUCTIVE SENSORS

KEY ADVANTAGES

- ✓ Temperature resistant up to +120°C (+248°F)
- ✓ Excellent long term reliability
- ✓ Outstanding accuracy

RANGE OVERVIEW

Housing size

Classics

**EXTRA
TEMPERATURE**

M5
M8
M12
M18

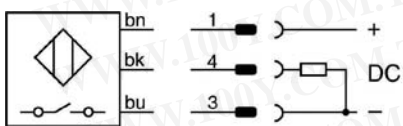
p. 97
p. 97
p. 97
p. 97

FAMILY	
HOUSING SIZE	
OPERATING DISTANCE MM	

INDUCTIVE

WIRING DIAGRAM

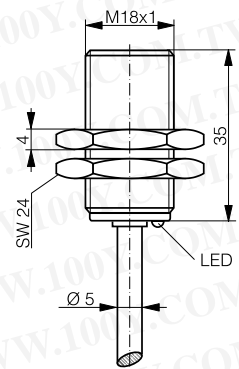
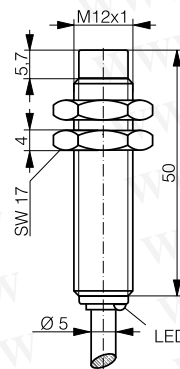
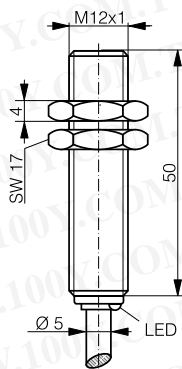
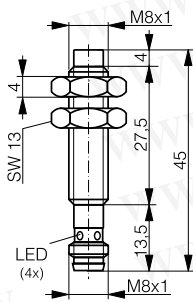
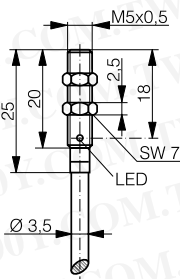
PNP NO



DATA
Housing material
Connection
Degree of protection
Mounting
Max. switching frequency
Supply voltage range
Ambient temperature range
Output current
Description
Part reference
Description
Part reference
Description
Part reference
Other types available
*Part reference change see p. 334

EXTRA TEMPERATURE

CLASSICS	CLASSICS	CLASSICS	CLASSICS	CLASSICS
M5	M8	M12	M12	M18
0.8	4	2	4	5



Stainless steel V2A	Stainless steel V2A	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass
Silicone cable 2 m	Connector S8	PVC cable 6 m	PVC cable 5 m	PUR cable 2 m
IP 67	IP 67	IP 67	IP 67	IP 67
Embeddable	Non-embeddable	Embeddable	Non-embeddable	Embeddable
5000 Hz	3500 Hz	3000 Hz	2000 Hz	2000 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25...+120 °C/-13...+248 °F	0...+80 °C/+32 ...+176 °F	-25...+100 °C/-13...+212 °F	-25...+100 °C/-13...+212 °F	-40...+100 °C/-40...+212 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO	PNP NO
DW-AD-603-M5-735*	DW-AS-633-M8-732	DW-AD-603-M12-734	DW-AD-613-M12-733	DW-AD-603-M18-718
NPN NO	-	-	-	-



TEMPERATURE RESISTANT UP TO +230°C (+446°F)

HIGH TEMPERATURE INDUCTIVE SENSORS

KEY ADVANTAGES

- ✓ Models with external electronics for temperatures of up to +230°C (+446°F)
- ✓ Models with integrated electronics for temperatures of up to +180°C (+356°F)
- ✓ Excellent long term reliability

RANGE OVERVIEW

Housing size

Classics

HIGH TEMPERATURE

M8
M12
M18
M30
M50

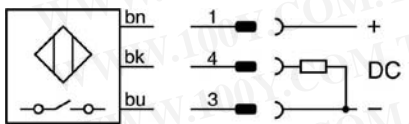
p. 101
p. 101
p. 101
p. 101
p. 102

FAMILY	
HOUSING SIZE	
OPERATING DISTANCE MM	

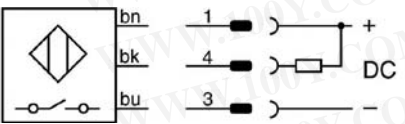
INDUCTIVE

WIRING DIAGRAMS

PNP NO



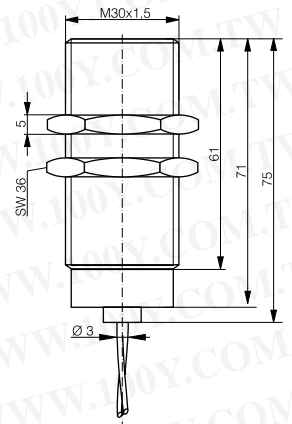
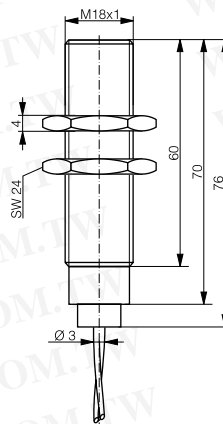
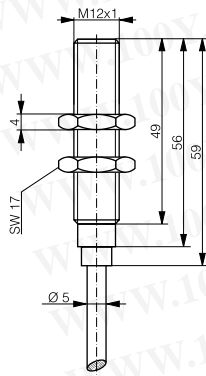
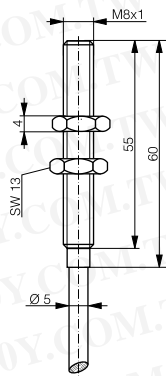
NPN NO



DATA
Amplifier
Housing material
Connection
Degree of protection
Mounting
Max. switching frequency
Supply voltage range
Ambient temperature range
Output current
Description
Part reference
Description
Part reference
Description
Part reference
Other types available

HIGH TEMPERATURE

CLASSICS	CLASSICS	CLASSICS	CLASSICS
M8	M12	M18	M30
2	3	5	10

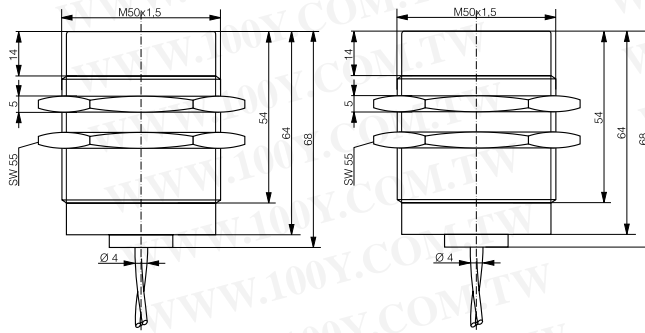




Built-in	Built-in	Built-in	Built-in
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
Silicone cable 2 m	Silicone cable 2 m	Teflon cable 2 m	Teflon cable 2 m
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
600 Hz	500 Hz	400 Hz	200 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
0 ... +140 °C / +32 ... +280 °F	0 ... +150 °C / +32 ... +300 °F	0 ... +180 °C / +32 ... +350 °F	0 ... +180 °C / +32 ... +350 °F
120 mA (≤ 100°C) / 80 mA (> 100°C)	120 mA (≤ 100°C) / 70 mA (> 100°C)	≤ 150 mA	≤ 150 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-HD-623-M8-100	DW-HD-603-M12-200	DW-HD-603-M18-310	DW-HD-603-M30-310
NPN NO		NPN NO	
DW-HD-621-M8-100		DW-HD-601-M18-310	
PNP NC, NPN NC	NPN NO, PNP NC, NPN NC	PNP NC, NPN NC	NPN NO, PNP NC, NPN NC

HIGH TEMPERATURE

INDUCTIVE

FAMILY	CLASSICS	CLASSICS	
HOUSING SIZE	M50	M50	
OPERATING DISTANCE MM	25	25	



DATA		
Amplifier	External	External
Housing material	Stainless steel V2A	Stainless steel V2A
Connection	Teflon cable 5 m	Teflon cable 20 m
Degree of protection	IP 67	IP 67
Mounting	Non-embeddable	Non-embeddable
Max. switching frequency	150 Hz	150 Hz
Supply voltage range	10 ... 30 VDC (amplifier)	10 ... 30 VDC (amplifier)
Ambient temperature range	-40 ... +230 °C / -40 ... +440 °F	0 ... +230 °C / +32 ... +440 °F
Output current	≤ 200 mA (amplifier)	≤ 200 mA (amplifier)
Description	PNP NO	PNP NO
Part reference	DW-HD-613-M50-511	DW-HD-613-M50-503
Description		
Part reference		
Description		
Part reference		
Other types available	For other cable lengths please ask	For other cable lengths please ask





ECOLAB APPROVED FOR HARSHTEST CLEANING PROCESSES

WASHDOWN INDUCTIVE SENSORS

KEY ADVANTAGES

- ✓ Corrosion resistant
- ✓ Food safe
- ✓ Mechanically and chemically rugged
- ✓ Full Inox housing
- ✓ IP 68 / IP 69K protection
- ✓ One-piece full-metal housing

RANGE OVERVIEW

Housing size

Full Inox

WASHDOWN

M12

p. 107

M18

p. 107

M30

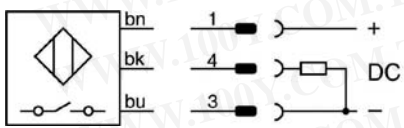
p. 108

FAMILY	
HOUSING SIZE	
OPERATING DISTANCE MM	

INDUCTIVE

WIRING DIAGRAM

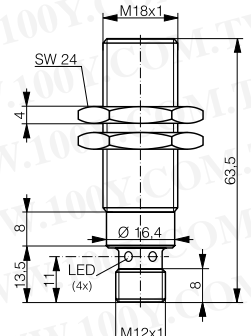
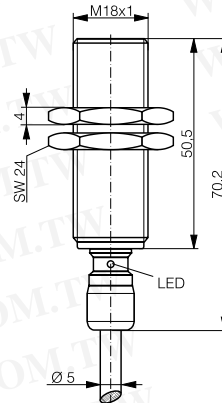
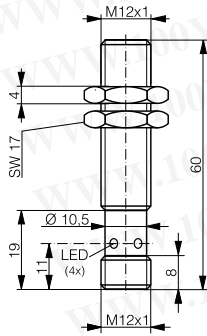
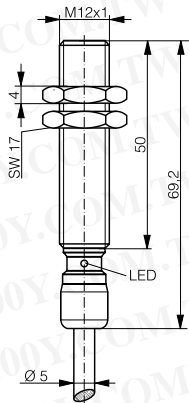
PNP NO



DATA
Operating pressure
Housing material
Connection
Degree of protection
Mounting
Max. switching frequency
Supply voltage range
Ambient temperature range
Output current
Description
Part reference
Description
Part reference
Description
Part reference
Other types available

WASHDOWN

FULL INOX	FULL INOX	FULL INOX	FULL INOX
M12	M12	M18	M18
6	6	10	10

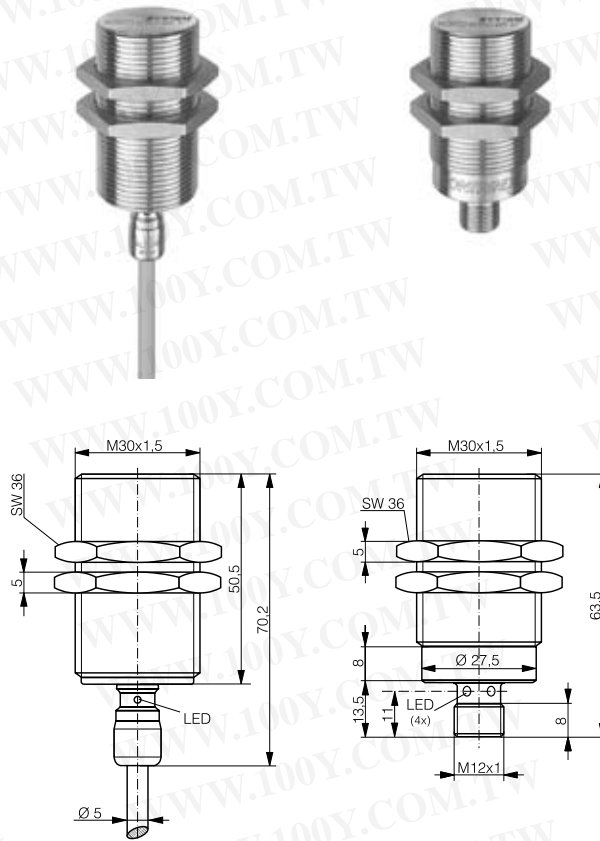




80 bar	80 bar	60 bar	60 bar
Stainless steel V4A/AISI 316L	Stainless steel V4A/AISI 316L	Stainless steel V4A/AISI 316L	Stainless steel V4A/AISI 316L
TPE-S cable	Connector S12	TPE-S cable	Connector S12
IP 68 / IP 69K	IP 68 / IP 69K	IP 68 / IP 69K	IP 68 / IP 69K
Embeddable	Embeddable	Embeddable	Embeddable
600 Hz	600 Hz	300 Hz	300 Hz
10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC	10 ... 30 VDC
-25 ... +85 °C / -13 ... +176 °F	-25 ... +85 °C / -13 ... +176 °F	-25 ... +85 °C / -13 ... +176 °F	-25 ... +85 °C / -13 ... +176 °F
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
PNP NO	PNP NO	PNP NO	PNP NO
DW-LD-703-M12	DW-LS-703-M12	DW-LD-703-M18	DW-LS-703-M18-002
NPN NO, PNP NC, NPN NC, non-embeddable	NPN NO, PNP NC, NPN NC, non-embeddable	NPN NO, PNP NC, NPN NC, non-embeddable	NPN NO, PNP NC, NPN NC, non-embeddable

WASHDOWN

INDUCTIVE

FAMILY	FULL INOX	FULL INOX	
HOUSING SIZE	M30	M30	
OPERATING DISTANCE MM	20	20	



DATA		
Operating pressure	40 bar	40 bar
Housing material	Stainless steel V4A/AISI 316L	Stainless steel V4A/AISI 316L
Connection	TPE-S cable	Connector S12
Degree of protection	IP 68 / IP 69K	IP 68 / IP 69K
Mounting	Embeddable	Embeddable
Max. switching frequency	100 Hz	100 Hz
Supply voltage range	10 ... 30 VDC	10 ... 30 VDC
Ambient temperature range	-25 ... +85 °C / -13 ... +176 °F	-25 ... +85 °C / -13 ... +176 °F
Output current	≤ 200 mA	≤ 200 mA
Description	PNP NO	PNP NO
Part reference	DW-LD-703-M30	DW-LS-703-M30-002
Description		
Part reference		
Description		
Part reference		
Other types available	NPN NO, PNP NC, NPN NC, non-embeddable	NPN NO, PNP NC, NPN NC, non-embeddable





ANALOG OUTPUT FOR DISTANCE CONTROL

ANALOG OUTPUT

INDUCTIVE SENSORS

KEY ADVANTAGES

- ✓ Highest sensing ranges
- ✓ Best temperature stability
- ✓ Excellent repeat accuracy
- ✓ Resolution in μm range

RANGE OVERVIEW

Housing size

Extra Distance

ANALOG

C8

p. 113

M8

p. 113-114

M12

p. 114-115

M18

p. 115-116

M30

p. 116-117

FAMILY

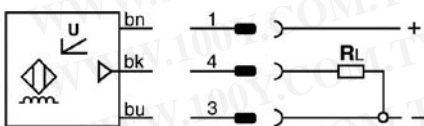
HOUSING SIZE MM

SENSING RANGE MM

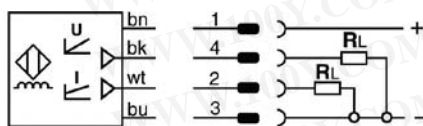
INDUCTIVE

WIRING DIAGRAMS

Analog C8/M8



Analog M12/M18/M30



DATA

Bandwidth (-3 dB)

Output voltage

Housing material

Connection

Degree of protection

Mounting

Supply voltage range

Ambient temperature range

Output current

Description

Part reference

Description

Part reference

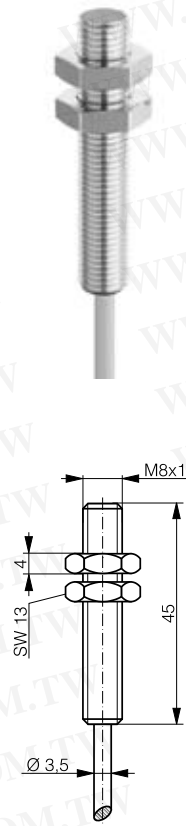
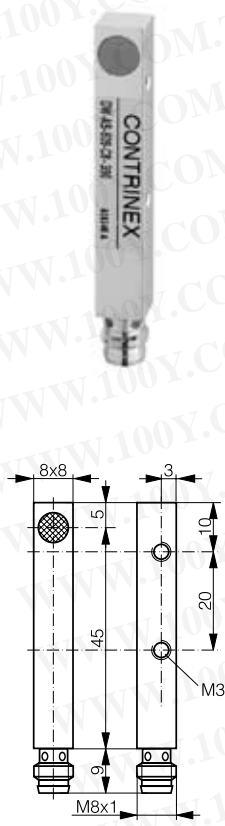
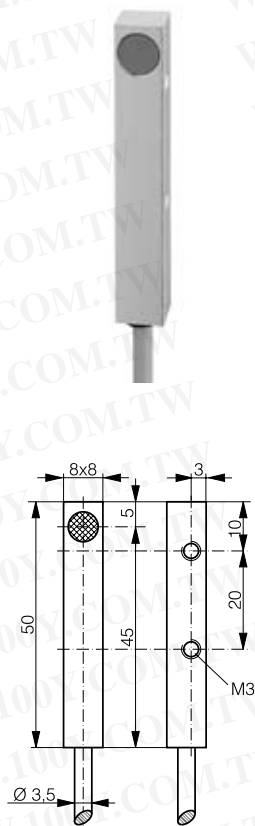
Description

Part reference

Other types available

ANALOG OUTPUT

EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE
□ 8 x 8	□ 8 x 8	M8	M8
0 ... 4	0 ... 4	0 ... 4	0 ... 4

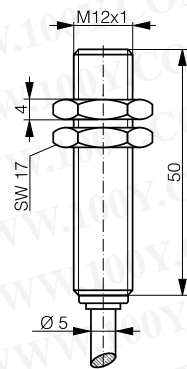
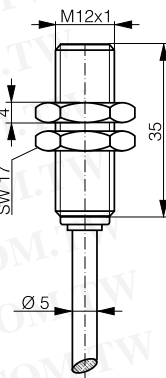
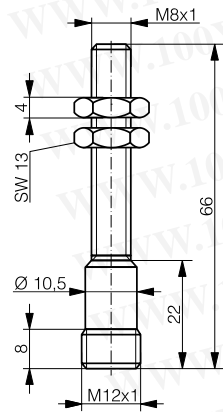





1,600 Hz (at s = 2 mm)	1,600 Hz (at s = 2 mm)	1,600 Hz (at s = 2 mm)	1,600 Hz (at s = 2 mm)
0 ... 10 V	0 ... 10 V	0 ... 5 V / 0 ... 10 V (-390)	0 ... 10 V
Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
PUR cable	Connector S8	PUR cable	Connector S8
IP 67	IP 67	IP 67	IP 67
Quasi-embeddable	Quasi-embeddable	Quasi-embeddable	Quasi-embeddable
15 ... 30 VDC	15 ... 30 VDC	10 ... 30 VDC / 15 ... 30 VDC (-390)	15 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
-	-	-	-
Output 0...10 V	Output 0...10 V	Output 0...5 V	Output 0...10 V
DW-AD-509-C8-390	DW-AS-509-C8-390	DW-AD-509-M8	DW-AS-509-M8-390
-	-	Output 0...10 V	-
-	-	DW-AD-509-M8-390	-
-	-	-	On request

ANALOG OUTPUT

INDUCTIVE

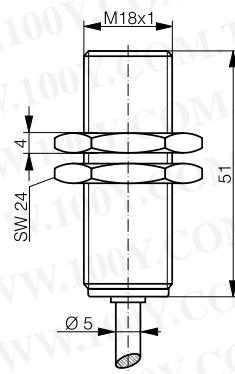
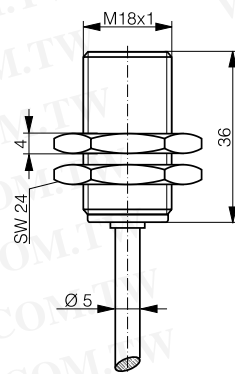
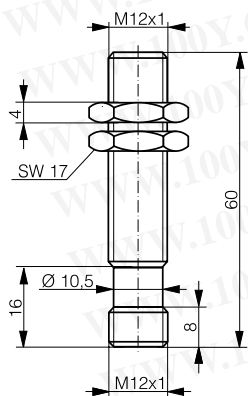
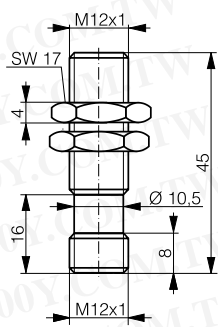
FAMILY	EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE
HOUSING SIZE	M8	M12	M12
SENSING RANGE MM	0 ... 4	0 ... 6	0 ... 6



DATA			
Bandwidth (-3 dB)	1,600 Hz (at s = 2 mm)	1,000 Hz (at s = 3 mm)	1,000 Hz (at s = 3 mm)
Output voltage	0 ... 10 V	0 ... 5 V / 0 ... 10 V (-390)	0 ... 5 V / 0 ... 10 V (-390)
Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection	Connector S12	PUR cable	PUR cable
Degree of protection	IP 67	IP 67	IP 67
Mounting	Quasi-embeddable	Quasi-embeddable	Quasi-embeddable
Supply voltage range	15 ... 30 VDC	10 ... 30 / 15 ... 30 VDC (-320)	10 ... 30 / 15 ... 30 VDC (-390)
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	-	1 ... 5 mA (-120 only)	1 ... 5 mA / 4 ... 20 mA (-390)
Description	Output 0...10 V	Outputs 0...5 V / 1...5 mA	Outputs 0...5 V / 1...5 mA
Part reference	DW-AS-509-M8-393	DW-AD-509-M12-120	DW-AD-509-M12
Description		Output 0...10 V	Outputs 0...10 V / 4...20 mA
Part reference		DW-AD-509-M12-320	DW-AD-509-M12-390
Description			
Part reference			
Other types available	On request	-	-

ANALOG OUTPUT

EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE
M12	M12	M18	M18
0 ... 6	0 ... 6	0 ... 10	0 ... 10

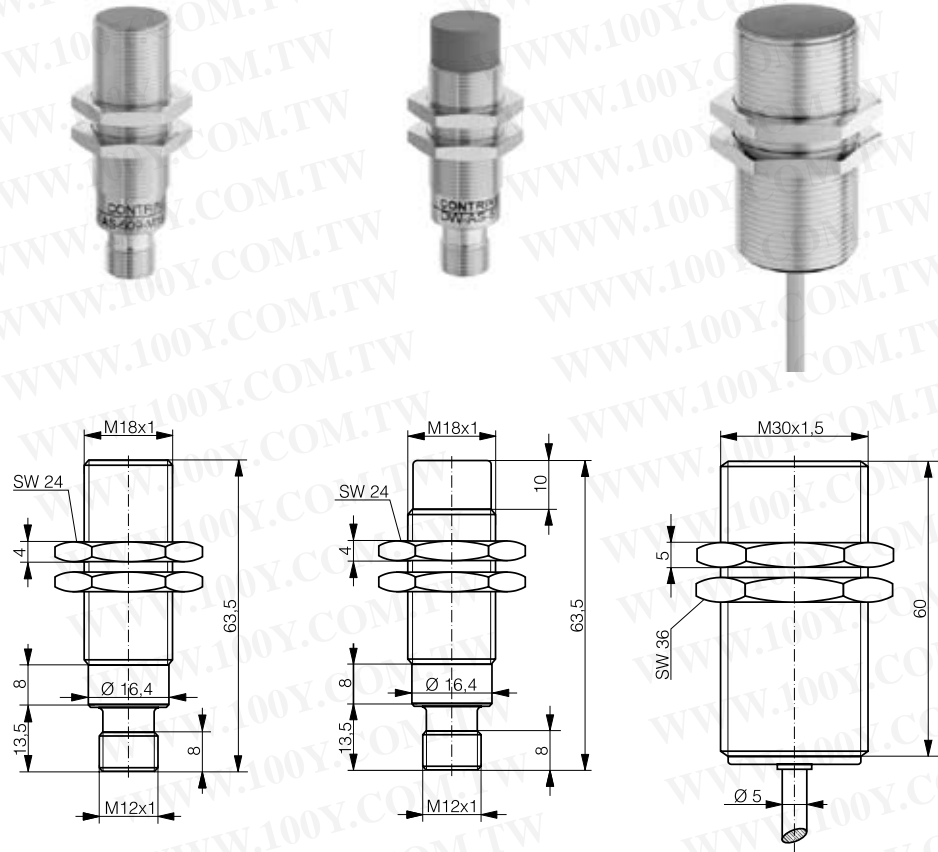





1,000 Hz (at s = 3 mm)	1,000 Hz (at s = 3 mm)	500 Hz (at s = 5 mm)	500 Hz (at s = 5 mm)
0 ... 5 V / 0 ... 10 V (-320)	0 ... 5 V / 0 ... 10 V (-390)	0 ... 5 V / 0 ... 10 V (-320)	0 ... 10 V
Chrome-plated brass	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connector S12	Connector S12	PUR cable	PUR cable
IP 67	IP 67	IP 67	IP 67
Quasi-embeddable	Quasi-embeddable	Quasi-embeddable	Quasi-embeddable
10 ... 30 / 15 ... 30 VDC (-320)	10 ... 30 / 15 ... 30 VDC (-390)	10 ... 30 / 15 ... 30 VDC (-320)	15 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
1 ... 5 mA (-120 only)	1 ... 5 mA / 4 ... 20 mA (-390)	1 ... 5 mA / 4 ... 20 mA (-320)	4 ... 20 mA
Outputs 0...5 V / 1...5 mA	Outputs 0...5 V / 1...5 mA	Outputs 0...5 V / 1...5 mA	Outputs 0...10 V / 4...20 mA
DW-AS-509-M12-120	DW-AS-509-M12	DW-AD-509-M18-120	DW-AD-509-M18-390
Output 0...10 V	Outputs 0...10 V / 4...20 mA	Outputs 0...10 V / 4...20 mA	
DW-AS-509-M12-320	DW-AS-509-M12-390	DW-AD-509-M18-320	
-	-	-	On request

ANALOG OUTPUT

INDUCTIVE

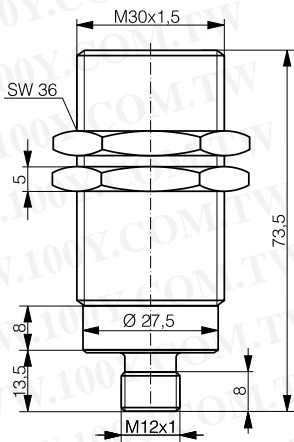
FAMILY	EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE
HOUSING SIZE	M18	M18	M30
SENSING RANGE MM	0 ... 10	0 ... 20	0 ... 20



DATA			
Bandwidth (-3 dB)	500 Hz (at s = 5 mm)	250 Hz (at s = 10 mm)	200 Hz (at s = 10 mm)
Output voltage	0 ... 10 V	0 ... 5 V	0 ... 10 V
Housing material	Chrome-plated brass	Chrome-plated brass	Chrome-plated brass
Connection	Connector S12	Connector S12	PUR cable
Degree of protection	IP 67	IP 67	IP 67
Mounting	Quasi-embeddable	Non-embeddable	Quasi-embeddable
Supply voltage range	15 ... 30 VDC	10 ... 30 VDC	15 ... 30 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	4 ... 20 mA	1 ... 5 mA	4 ... 20 mA
Description	Outputs 0...10 V / 4...20 mA	Outputs 0...5 V / 1...5 mA	Outputs 0...10 V / 4...20 mA
Part reference	DW-AS-509-M18-390	DW-AS-519-M18-002	DW-AD-509-M30-390
Description			
Part reference			
Description			
Part reference			
Other types available	On request	On request	On request

ANALOG OUTPUT

EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE	EXTRA DISTANCE
M30	M30	M30	M30
0 ... 20	0 ... 40	0 ... 40	0 ... 40



200 Hz (at s = 10 mm)

0 ... 10 V

Chrome-plated brass

Connector S12

IP 67

Quasi-embeddable

15 ... 30 VDC

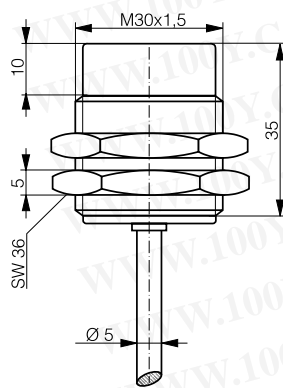
-25 ... +70 °C / -13 ... +158 °F

4 ... 20 mA

Outputs 0...10 V / 4...20 mA

DW-AS-509-M30-390

On request



100 Hz (at s = 20 mm)

0 ... 10 V

Chrome-plated brass

PUR cable

IP 67

Non-embeddable

15 ... 30 VDC

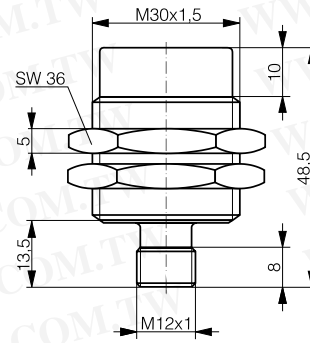
-25 ... +70 °C / -13 ... +158 °F

4 ... 20 mA

Outputs 0...10 V / 4...20 mA

DW-AD-519-M30-320

On request



100 Hz (at s = 20 mm)

0 ... 10 V

Chrome-plated brass

Connector S12

IP 67

Non-embeddable

15 ... 30 VDC

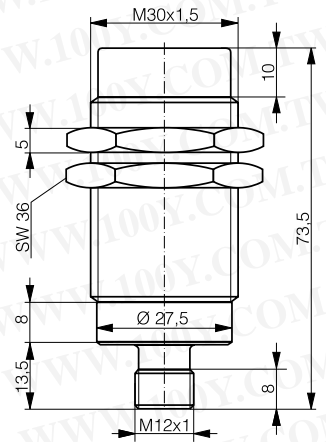
-25 ... +70 °C / -13 ... +158 °F

4 ... 20 mA

Outputs 0...10 V / 4...20 mA

DW-AS-519-M30-320

On request



100 Hz (at s = 20 mm)

0 ... 10 V

Chrome-plated brass

Connector S12

IP 67

Non-embeddable

15 ... 30 VDC

-25 ... +70 °C / -13 ... +158 °F

4 ... 20 mA

Outputs 0...10 V / 4...20 mA

DW-AS-519-M30-390

On request



DURABLE AND RELIABLE IN WELDING CELLS



WELD- IMMUNE

INDUCTIVE SENSORS

KEY ADVANTAGES

- ✓ Resistant to electromagnetic fields of up to 40 millitesla
- ✓ Extremely robust
- ✓ Easy to clean - even using harsh methods
- ✓ No false switching caused by metal dust or chips
- ✓ Factor 1
- ✓ No extra protection needed
- ✓ Long operating distances

RANGE OVERVIEW

Housing size

Full Inox

**WELD-
IMMUNE**

M12

p. 121

M18

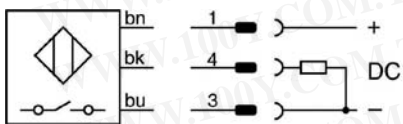
p. 121

FAMILY	
HOUSING SIZE	
OPERATING DISTANCE MM	

INDUCTIVE

WIRING DIAGRAM

PNP NO



DATA	
Sensing face material	
Magnetic field strength	
Housing material	
Connection	
Degree of protection	
Mounting	
Max. switching frequency	
Supply voltage range	
Ambient temperature range	
Output current	
Description	
Part reference	
Description	
Part reference	
Description	
Part reference	
Other types available	

WELD-IMMUNE

FULL INOX

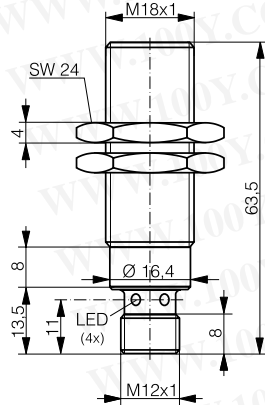
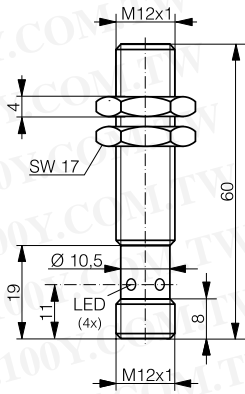
FULL INOX

M12

M18

6

10



Stainless steel V2A

40 mT

Stainless steel V2A

Connector S12

IP 68 / IP 69K

Embeddable

15 Hz

10 ... 30 VDC

-25 ... +70 °C / -13 ... +158 °F

≤ 200 mA

PNP NO

DW-AS-703-M12-673

Stainless steel V2A

40 mT

Stainless steel V2A

Connector S12

IP 68 / IP 69K

Embeddable

15 Hz

10 ... 30 VDC

-25 ... +70 °C / -13 ... +158 °F

≤ 200 mA

PNP NO

DW-AS-703-M18-673

NPN NO, PNP NC, NPN NC

NPN NO, PNP NC, NPN NC



DESIGNED FOR SPECIAL REQUIREMENTS

SPECIAL INDUCTIVE SENSORS

KEY ADVANTAGES

- ✓ 2-wire sensors
- ✓ NAMUR types
- ✓ Double sheet detection

RANGE OVERVIEW

SPECIAL

Housing size

∅ 4 mm
M5
C5
∅ 6.5 mm
M12
M18
M30

Classics

p. 125
p. 125
p. 125
p. 126
p. 126-127
p. 127

Full Inox

p. 127

INDUCTIVE

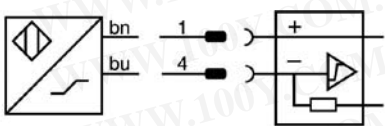
FAMILY

HOUSING SIZE MM

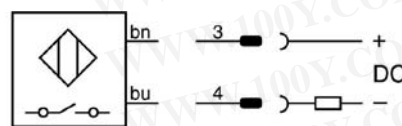
OPERATING DISTANCE MM

WIRING DIAGRAMS

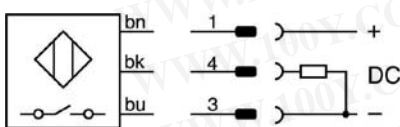
NAMUR



2-wire DC



PNP NO



DATA

Housing material

Connection

Degree of protection

Mounting

Max. switching frequency

Supply voltage range

Ambient temperature range

Output current

Description

Part reference

Description

Part reference

Description

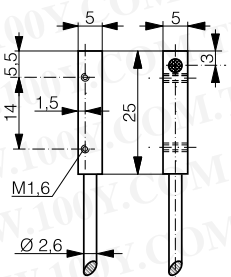
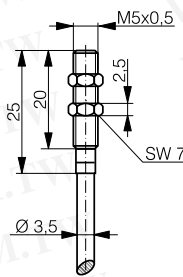
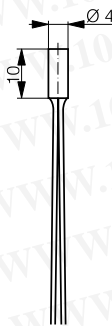
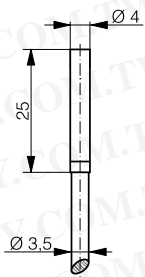
Part reference

Other types available

*Part reference change see p. 334

SPECIAL

CLASSICS	CLASSICS	CLASSICS	CLASSICS
Ø 4	Ø 4	M5	□ 5 x 5
0.8	0.8	0.8	0.8



Stainless steel V2A

PVC cable

IP 67

Embeddable

10,000 Hz

7.7 ... 9 VDC

-25 ... +70 °C / -13 ... +158 °F

≤ 1 / ≥ 2.2 mA

NAMUR

DW-AD-605-04*



Stainless steel V2A

Single wires

IP 67

Embeddable

10,000 Hz

7.7 ... 9 VDC

-25 ... +70 °C / -13 ... +158 °F

≤ 1 / ≥ 2.2 mA

NAMUR

DW-AD-605-04K*



Stainless steel V2A

PVC cable

IP 67

Embeddable

10,000 Hz

7.7 ... 9 VDC

-25 ... +70 °C / -13 ... +158 °F

≤ 1 / ≥ 2.2 mA

NAMUR

DW-AD-605-M5*



Chrome-plated brass

PUR cable

IP 67

Embeddable

10,000 Hz

7.7 ... 9 VDC

-25 ... +70 °C / -13 ... +158 °F

≤ 1 / ≥ 2.2 mA

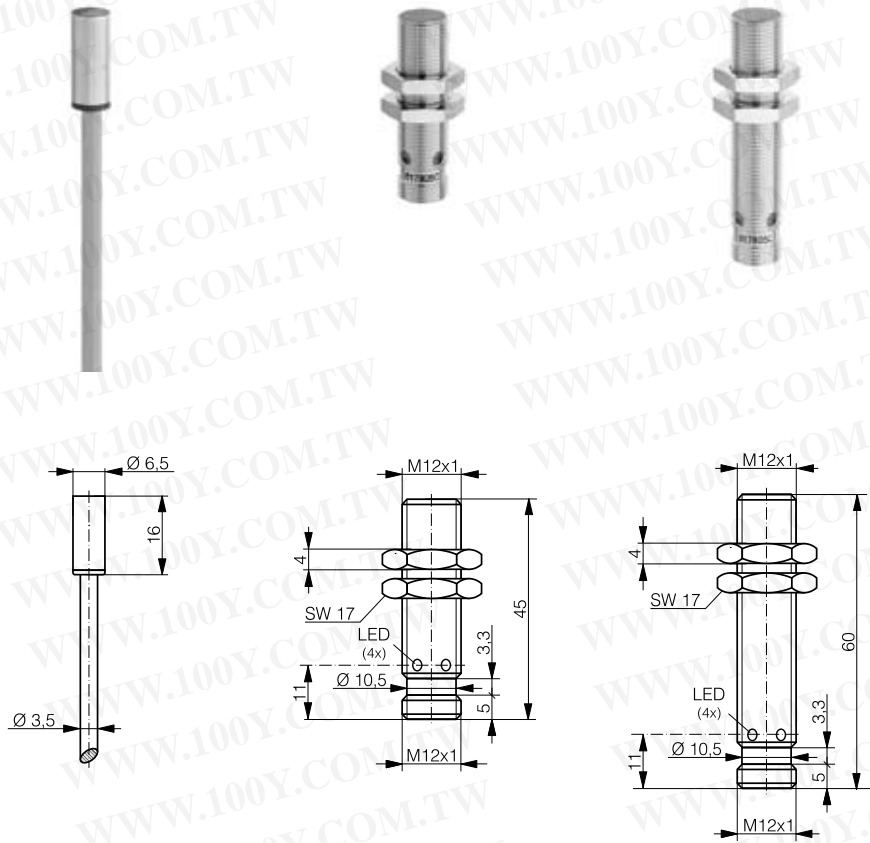
NAMUR




DW-AD-605-C5*

SPECIAL

INDUCTIVE

FAMILY	CLASSICS	CLASSICS	CLASSICS
HOUSING SIZE MM	Ø 6.5	M12	M12
OPERATING DISTANCE MM	1.5	2	2

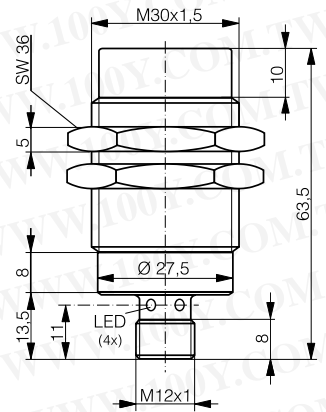
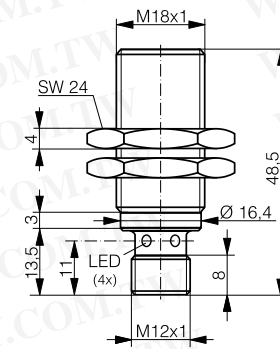
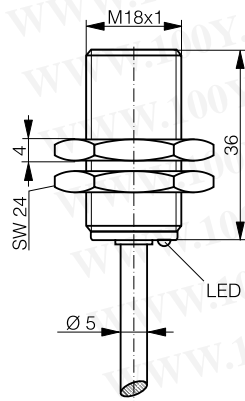
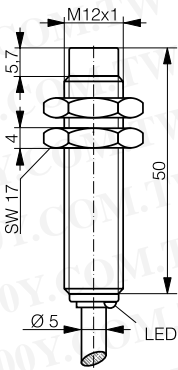


DATA			
Housing material	Stainless steel V2A	Nickel-plated brass	Nickel-plated brass
Connection	PVC cable	Connector S12	Connector S12
Degree of protection	IP 67	IP 67	IP 67
Mounting	Embeddable	Embeddable	Embeddable
Max. switching frequency	10,000 Hz	3000 Hz	3000 Hz
Supply voltage range	7.7 ... 9 VDC	10 ... 65 VDC	10 ... 65 VDC
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Output current	≤ 1 / ≥ 2.2 mA	≤ 100 mA	≤ 100 mA
Description	NAMUR	2-wire DC	2-wire DC
Part reference	DW-AD-605-065-120*	DW-DS-605-M12-120	DW-DS-605-M12
Description			
Part reference			
Description			
Part reference			
Other types available	-	-	-

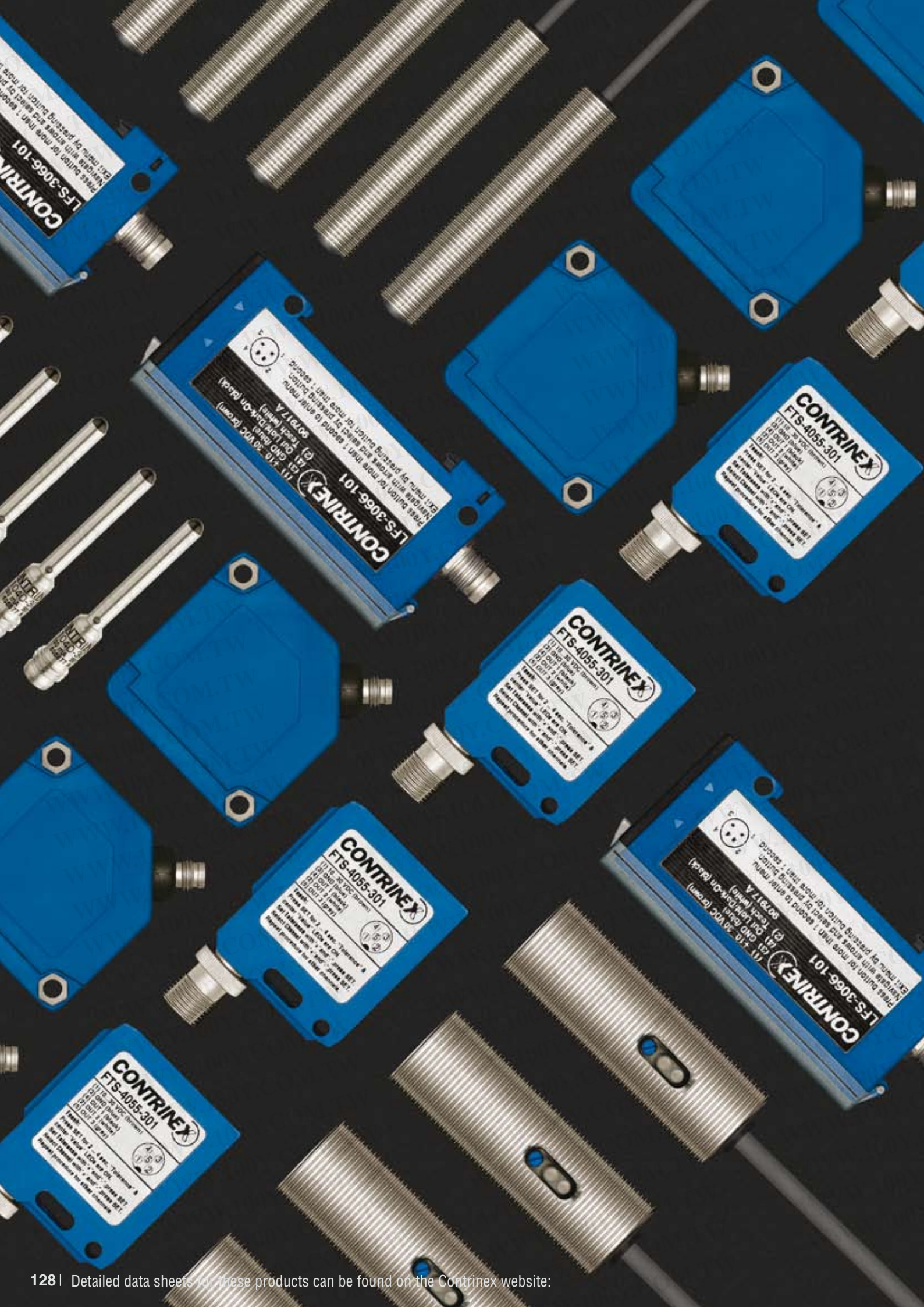
*Part reference change see p. 334

SPECIAL

CLASSICS	CLASSICS	CLASSICS	FULL INOX
M12	M18	M18	M30
4	5	8	3 ... 5



Nickel-plated brass	Nickel-plated brass	Nickel-plated brass	Stainless steel V2A
PVC cable	PVC cable	Connector S12	Connector S12
IP 67	IP 67	IP 67	IP 68 / IP 69K
Non-embeddable	Quasi-embeddable	Embeddable	Non-embeddable
2500 Hz	1000 Hz	1500 Hz	10 Hz
10 ... 65 VDC	10 ... 65 VDC	10 ... 65 VDC	10 ... 30 VDC
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
≤ 100 mA	≤ 100 mA	≤ 100 mA	≤ 200 mA
2-wire DC	2-wire DC	2-wire DC	Double sheet
DW-DD-615-M12	DW-DD-625-M18-120	DW-DS-605-M18-120	DW-AS-713-M30-618
-	-	-	-



CONTRINEX
LFS-3066-101
Please button for more than 1 second to enter menu!
Exit menu with arrow key and select by pressing button.
Please button for more than 1 second to enter menu.
907917 A
(1) 1.10 - 20 VDC (brown)
(2) On LED status (green)
(3) On LED status (red)

CONTRINEX
FTS-4055-301
Please button for more than 1 second to enter menu!
Exit menu with arrow key and select by pressing button.
Please button for more than 1 second to enter menu.
907917 A
(1) 1.10 - 20 VDC (brown)
(2) On LED status (green)
(3) On LED status (red)

CONTRINEX
FTS-4055-301
Please button for more than 1 second to enter menu!
Exit menu with arrow key and select by pressing button.
Please button for more than 1 second to enter menu.
907917 A
(1) 1.10 - 20 VDC (brown)
(2) On LED status (green)
(3) On LED status (red)

CONTRINEX
FTS-4055-301
Please button for more than 1 second to enter menu!
Exit menu with arrow key and select by pressing button.
Please button for more than 1 second to enter menu.
907917 A
(1) 1.10 - 20 VDC (brown)
(2) On LED status (green)
(3) On LED status (red)

CONTRINEX
LFS-3066-101
Please button for more than 1 second to enter menu!
Exit menu with arrow key and select by pressing button.
Please button for more than 1 second to enter menu.
907917 A
(1) 1.10 - 20 VDC (brown)
(2) On LED status (green)
(3) On LED status (red)

CONTRINEX
FTS-4055-301
Please button for more than 1 second to enter menu!
Exit menu with arrow key and select by pressing button.
Please button for more than 1 second to enter menu.
907917 A
(1) 1.10 - 20 VDC (brown)
(2) On LED status (green)
(3) On LED status (red)



PHOTOELECTRIC SENSORS

HIGHLIGHTS:

- ✓ Smallest self-contained subminiature sensors on the market
- ✓ Excellent suppression of light-colored backgrounds
- ✓ Highly accurate laser sensors
- ✓ Analog output sensors for precise distance control
- ✓ Sensors with short housings and 90° sensing
- ✓ Wide range of fiber-optic amplifiers, including IO-Link
- ✓ Fiber-optic solutions for the most demanding environments
- ✓ Through-beam sensors for longest sensing ranges
- ✓ Excellent color recognition sensors

NEW:

- ✓ Ecolab-approved sensors with Plexiglas® window for food industry
- ✓ Color sensors
- ✓ Fiber-optic amplifier with IO-Link

PROGRAM OVERVIEW

PRODUCT RANGE	SUBMINIATURE	MINIATURE	SMALL
			

CYLINDRICAL

SERIES		1040	1050	1120	1120L	1180 / 1180W	1180L
HOUSING SIZE IN MM		∅ 4	M5	M12	M12	M18	M18
SPECIAL					Laser		Laser
FAMILY	SENSING RANGE						
Diffuse	10 ... 2000 mm	p.141-143	p.143-146	p.151-152		p.158-159	p.163
Background suppression	10 ... 500 mm					p.157-158	
Reflex	0 ... 6000 mm			p.152		p.160-161	
Through-beam	0 ... 50'000 mm		p.146	p.153	p.153	p.161-162	p.164
Analog output	10 ... 100 mm						
Color	30 ... 40 mm						
Fiber-optic amplifiers *	0 ... 200 mm						

* Optical amplifiers are presented in the optical fiber section



CUBIC

	0507	3030	3060	4040	4050	4150	5050	6080
	5x7x40	30x30x15	31x60x10	40x40x19	40x50x15	40x50x15	50x50x18	65x83x25
					Color sensor	Color sensor & Ecolab		
	p.169	p.175-176		p.183		p.188	p.197	p.201
		p.173-174			p.187	p.187		p.201
		p.177-178		p.184	p.188	p.189	p.198	p.202
		p.179		p.184	p.189	p.190	p.199	
		p.173						
					p.193			
		p.211-212	p.215-217	p.219				

PROGRAM OVERVIEW

HOUSING SIZE	SENSING RANGE	PAGE
DIFFUSE		
∅ 4 mm / M5	10 mm	141, 143 - 144
∅ 4 mm / M5	20 mm	142, 144 - 145
∅ 4 mm / M5	50 mm	142, 143, 145 - 146
5 x 7 mm	20 mm	169
5 x 7 mm	50 mm	169
5 x 7 mm	90 mm	169
M12	300 mm	151 - 152
M18 (M18W)	600 mm	158 - 159
M18 △	40 ... 250 mm (setting range)	163
M18 △	60 ... 600 mm (setting range)	163
30 x 30 mm	600 mm	175
30 x 30 mm	1200 mm	176
40 x 40 mm	2000 mm	183
40 x 50 mm	30 ... 1200 mm (setting range)	188
50 x 50 mm	300 mm	197
50 x 50 mm	800 mm	197
65 x 83 mm	2000 mm	201
BACKGROUND SUPPRESSION		
M18 (M18W)	10 ... 120 mm (setting range)	157 - 158
30 X 30 mm	15 ... 200 mm (setting range)	173 - 174
40 X 50 mm	30 ... 500 mm (setting range)	187
65 x 83 mm	50 ... 1000 mm (setting range)	201
REFLEX		
M12	1500 mm	152
M18 (M18W)	2000 mm	160 - 161
30 X 30 mm	2000 mm	177
30 X 30 mm	4000 mm	178
40 X 40 mm	6000 mm	184
40 X 50 mm	4000 mm	188 - 189
50 X 50 mm	4000 mm	198
65 X 83 mm	6000 mm	202

HOUSING SIZE	SENSING RANGE	PAGE
ANALOG OUTPUT		
30 x 30 mm	10 ... 100 mm (operating range)	173
THROUGH-BEAM		
M5	250 mm	146
M12	10,000 mm	153
M12 \triangle	50,000 mm	153
M18 (M18W)	20,000 mm	161 - 162
M18 \triangle	50,000 mm	164
30 x 30 mm	6000 mm	179
30 x 30 mm	12,000 mm	179
40 x 40 mm	15,000 mm	184
40 x 50 mm	50,000 mm	189 - 190
50 x 50 mm	15,000 mm	199
FIBER-OPTIC AMPLIFIER		
30 x 30 mm	60 mm	211
30 x 30 mm	120 mm	212
31 x 60 mm	100 mm	215
31 x 60 mm	200 mm	215 - 217
40 x 40 mm	150 mm	219
COLOR		
40 x 50 mm	30 ... 40 mm (operating range)	193

INTRODUCTION

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.

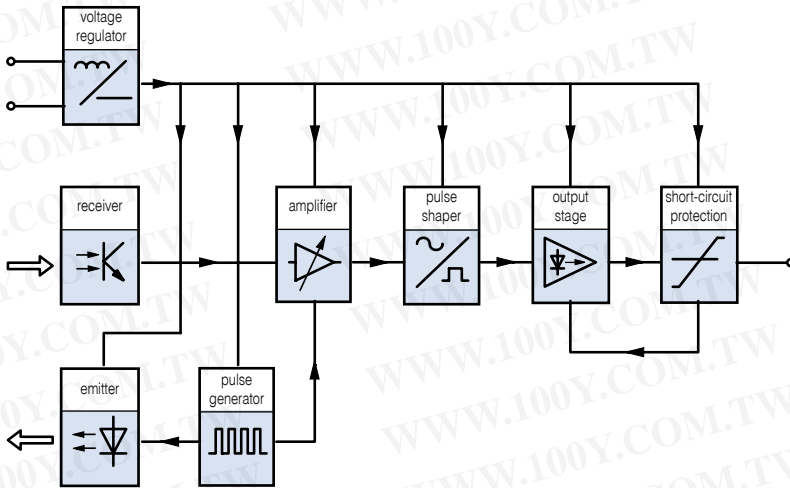


Fig. 9: Functional blocks of a photoelectric sensor

between reflections from the target and reflections from background objects, only triggering the sensor when the signal reaches a value that relates to the preset target distance.

The sensing range is practically insensitive to the target's size, color, shape and surface finish, and background-suppression sensors provide highly reliable detection of "difficult" targets, even against a light background. Stable, accurate detection of small, fast-moving parts on conveyors or automated machinery is possible over the entire sensing range, eliminating false triggering by objects in the background.

REFLEX

Long sensing range in a single-housing device

A reflex, or reflective, photoelectric sensor contains a transmitter and a receiver in a single housing, and emits a pulsed, focused light beam toward a distant reflector. Reflected light returns to the sensor, arriving at the receiver. When a target object interrupts the light beam, the receiver detects the reduced light intensity and triggers the sensor.

TECHNOLOGY FAMILIES

Contrinex photoelectric devices are divided into **seven technology families**, depending on their operating principle and use. The program includes energetic **diffuse** sensors, diffuse sensors with **background suppression**, **reflex** sensors, **through-beam** sensors, sensors with **analog output**, **color** sensors and **optical amplifiers**.

DIFFUSE

Versatile and cost-effective

A diffuse-mode, or energetic-diffuse, photoelectric sensor is a reflective sensor, containing a transmitter and a receiver in a single housing. The sensor emits a light beam toward a distant target that acts as a reflector, returning part of the transmitted light to the sensor. The receiver detects the amount of light reflected by the target, triggering the sensor when the light intensity reaches a threshold value.

Diffuse-mode sensors are cost-effective as they do not require separate reflectors or receivers, and detect reflective targets with ease. Sensing range depends on the target's size, shape, color and surface finish, although sensor sensitivity is adjustable during installation to compensate for targets with poor reflective qualities.

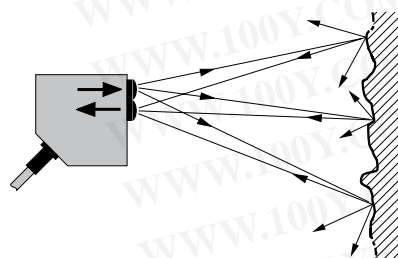


Fig. 10: Diffuse sensing

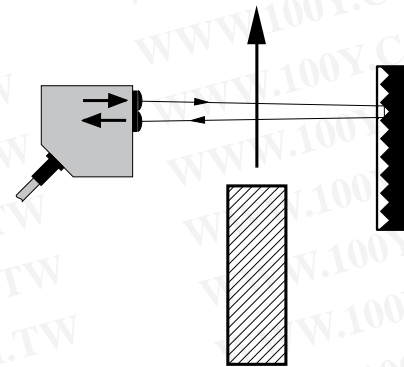


Fig. 11: Reflex sensing

The relatively high level of reflected light allows reflex sensors to achieve sensing distances up to six meters. For applications where the target object itself reflects light back toward the sensor, models with polarization filters are available. The filters ensure that only light returned from the reflector reaches the receiver, ensuring reliable detection, even with reflective targets.

BACKGROUND SUPPRESSION

Excellent suppression of light-colored backgrounds

Diffuse-mode photoelectric sensors with background suppression emit a focused light beam toward a distant target. Part of the beam is reflected from the target and returns to the sensor, striking a position-sensitive receiver. The receiver distinguishes

THROUGH-BEAM

Emitter and receiver in separate housings for sensing ranges from 0 to 50 m

A through-beam photoelectric sensor comprises an emitter and receiver, each mounted in a separate housing. The emitter is aligned so that the greatest possible amount of pulsed light from its emitting diode reaches the receiver (Fig. 12). The receiver, which is mounted beyond the target area, processes incoming light in such a way that it is clearly separated from ambient and other light sources. Any interruption of the light beam by a target triggers the sensor, causing its output signal to switch. 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.

Contrinex through-beam photoelectric sensors are ideal for industrial applications where sensing components must be mounted some distance from the target area. Through-beam sensors utilize infrared, visible and laser light sources to detect opaque and semi-transparent targets, reliably and repeatably, at extended distances. They are available in cylindrical versions from subminiature ($\varnothing 4$) to small (M18) and cubic versions from miniature (30 x 30 x 15) to compact (50 x 50 x 18).

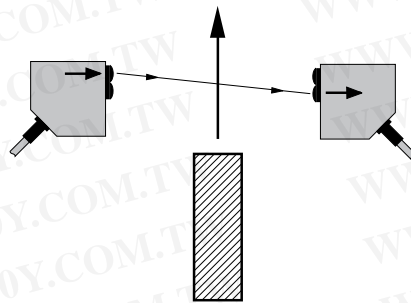


Fig. 12: Through-beam sensing

Distance setting is accomplished either by adjustment of a multi-turn potentiometer or by use of a teach-in function with manual fine adjustment; an optional digital display (model 3066) is also available. Using blue-light sources (models 3360 and 3365), detecting glass and other materials with similar absorption spectra is possible at distances up to 100 mm.

Fiber-optic sensors are common in explosive environments or in the presence of strong electromagnetic fields - in these areas, sensors that rely on electrical signals may present a risk of explosion or fail to operate correctly. Contrinex manufactures world-class fiber-optic sensors and amplifiers that not only meet these needs, but also present a highly practical means of sensing in confined spaces. With bend-radii as small as 2 mm, reliable, accurate sensing is possible even in the most inaccessible areas.

With self-contained fiber-optic sensors available in housings as small as 30 mm x 30 mm x 15 mm, and several models of small DIN-rail mounted amplifiers that accommodate multiple-sensor applications, the Contrinex range is highly versatile. A choice of synthetic optical fibers for general use or glass optical fibers for high ambient temperatures and aggressive environments provides options for even the most demanding applications.

ANALOG OUTPUT

Precise distance control

Photoelectric sensors with analog outputs are ideal for measuring absolute values of distance. Using diffuse-mode technology, analog photoelectric sensors produce an output signal that is accurately calibrated and approximately proportional to the distance of the target from the sensor. Users have a choice of current or voltage outputs that are compatible with all modern control systems.

Contrinex analog photoelectric sensors provide all the advantages of standard diffuse-mode sensors, and measure target distances up to 100 mm. High-precision laser analog sensors offer a resolution of 1 mm at 50 mm range, while visible red-light sensors are accurate to 3 mm at 100 mm range.

COLOR

Reliable detection of fine color variations, even in harsh environments

Color photoelectric sensors utilize energetic-diffuse sensing technology to detect variations in target color, allowing color sorting or color control that is independent of target speed or distance. Using a "teach-in" function to program up to three separate outputs, the sensor recognizes or ignores even the smallest variations of shade.

Ideal for automated production processes that need reliable, repeatable color detection for accurate quality control, Contrinex color photoelectric sensors feature five selectable tolerance levels for each shade of color. Robust design ensures that sensor performance is unaffected by varying ambient light levels.

OPTICAL AMPLIFIER

Reliable short and long-range sensing

Customers requiring intrinsically-safe photoelectric sensors with DIN-rail-mounted electronics need not look beyond the Contrinex 3060 series of fiber-optic amplifiers. Packed with functionality in a Crastin[®] molded-resin housing measuring only 31 mm x 60 mm x 10 mm, every model combines ease of set-up with market-leading features. With switching times as low as 0.1 millisecond, 3060 fiber-optic amplifiers are ideal for sensing fast-moving targets in demanding environments, including robotics, precision handling systems and printed circuit board production.

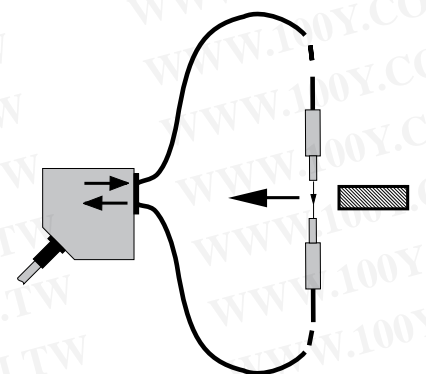


Fig. 13: Optical fiber, through-beam sensing

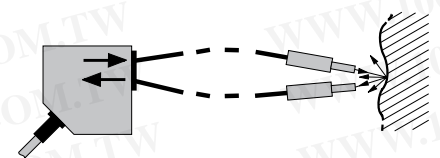


Fig. 14 Optical fiber, diffuse sensing

INTRODUCTION

PRODUCT RANGES

SUBMINIATURE SIZE

Cubic (5 mm x 7 mm) and Cylindrical (∅ 4 and M5)

The Contrinex **Subminiature** range packs exceptional position- and presence-sensing performance into the smallest self-contained photoelectric sensors on the market. Designers have the choice of through-beam or diffuse



sensors in ∅ 4 and M5 cylindrical or 5 mm x 7 mm rectangular stainless-steel housings that offer multiple mounting methods and beam orientation. For fully embedded applications, sensors with spherical sapphire-glass lenses produce focused, cylindrical light beams. Best-in-class sensing distances of up to 90 mm (diffuse) and 250 mm (through-beam) allow sensors to be positioned at a safe distance from the target, ensuring minimal risk of accidental impact damage. Thanks to robust construction that includes rugged glass sensing faces, Contrinex **Subminiature** sensors are resistant to chemical contamination and abrasion, delivering maximum operational uptime and world-class reliability.

MINIATURE SIZE

Cubic (30 mm x 30 mm) and Cylindrical (M12)

Contrinex **Miniature** photoelectric sensors provide market-leading performance and reliability in rugged, industry-standard housings with vacuum-encapsulated electronics to ensure excellent resistance to machine vibration or shock from accidental impact. They are recommended for general automation in the printing, packaging or machine tool industries, and for electronic assembly or mechanical handling systems.

Ideal for applications where space is tight, they also offer excellent sensing distances. Available technologies include diffuse sensing, polarized reflex sensing, through-beam sensing and amplifiers. Versions with excellent background suppression allow ultra-reliable target detection, even against light backgrounds.



Contrinex M12 photoelectric sensors are ideal for high-speed applications in the most challenging environments, with the 1121L capable of detecting even the smallest targets. This laser through-beam sensor is suitable for extended sensing ranges up to 50 meters and has a 1000 Hz maximum switching frequency.

Distance measurement is possible by utilizing the analog voltage outputs available on cubic models. For applications where precise sensing is required but space is limited, the range includes fiber-optic amplifiers that allow the sensor housing to be mounted remotely.



SMALL SIZE

Cubic (40 mm x 40/50 mm) and Cylindrical (M18)

Contrinex **Small** photoelectric sensors are rugged and highly reliable.

Cylindrical M18 models are ideal for demanding industrial environments, including automotive assembly, packaging machinery, conveyor systems and general automation equipment. A comprehensive range comprises diffuse sensors (both energetic and background-suppression variants), reflex sensors and through-beam sensors with the option of either axial or lateral sensing for sensing distances up to 50 meters. The range includes energetic diffuse sensors and through-beam sensors with laser light sources (1180L and 1181L models), allowing extended sensing distances



for objects as small as 0.1 mm in size. Robust construction with metal housings and vacuum-encapsulated electronics on all models ensures maximum reliability and minimum downtime.

Cubic (40 mm x 40/50 mm) models are suitable for industrial applications including packaging and wrapping machinery, filling systems and general automated equipment. Available in diffuse (energetic or background-suppression), polarized and non-polarized reflex or through-beam technologies with glass or coated-plastic windows, they are insensitive to high levels of ambient light. Best-in-class background suppression allows ultra-reliable target detection, even against light backgrounds. The range includes amplifiers and color sensors with 3 different teachable shades of color and 5 levels of toler-



ance. All models feature LED indication of signal degradation if the sensing face is obscured or becomes contaminated, eliminating the risk of errors or lost production. Mounted in a robust, industry-standard 40 mm x 50 mm x 15 mm housing, these sensors are Ecolab approved and rated to IP 67.

COMPACT SIZE

Cubic (50 mm x 50 mm and larger sizes)

Designed to be cost-competitive without compromising performance, Contrinex **Compact** photoelectric sensors pack an exceptional range of features into industry-standard housings. These sensors are tolerant of high levels of ambient light and feature LED indication of signal degradation due to obscuration or contamination of the sensing face.

Contrinex **Compact** sensors are suitable for use with AC and DC supplies and available with an optional volt-free relay output. World-class quality ensures optimum reliability in all conditions, repeatable operation at sensing distances up to 50 meters, and an attractive total cost of ownership.



applications, such as industrial cranes, woodworking machines, conveyor systems and other automated production equipment. The choice of sensing technologies includes diffuse (energetic or background-suppression), polarized-reflex and through-beam models.



The Contrinex 5050 series (50 mm x 50 mm x 18 mm), with a shatter-resistant PMMA acrylic-glass sensing face, is suitable for demanding environments, including packaging and filling lines, conveyor systems and the machine tool industry. The series includes devices with energetic-diffuse, polarized-reflex and through-beam technologies and a choice of visible or infra-red light sources.

The Contrinex 6080 series (65 mm x 83 mm x 25 mm) delivers best-in-class sensing performance in a rugged, industry-standard Crastin® molded-resin housing. It is ideal for demanding industrial



THE SMALLEST ON THE MARKET

CYLINDRICAL SUBMINIATURE

PHOTOELECTRIC SENSORS

KEY ADVANTAGES

- ✓ \varnothing 4 and M5 housings for target detection in limited spaces
- ✓ Rugged metal housing
- ✓ Accurate target detection due to cylindrical light beam
- ✓ Rugged sapphire glass or glass sensing face, scratch and chemically resistant
- ✓ Shock and vibration resistant due to fully vacuum potted electronics
- ✓ High system reserves (excess gain)

RANGE OVERVIEW

CYLINDRICAL SUB- MINIATURE

Distance

10 mm
20 mm
50 mm
250 mm

Diffuse

p. 141, 143-144
p. 142, 144-145
p. 142-143, 145-146

Through-beam

p. 146

OVERVIEW

Housing material	Stainless steel V2A
Emitter	IR LED 880 nm
Hysteresis	10 % typ.
Degree of protection	IP 67
Supply voltage range	10 ... 30 VDC
Ambient temperature range	0 ... +55 °C / 32 ... +131 °F
Output current	≤ 100 mA
Output voltage drop	≤ 2 V
Switching frequency	≤ 250 Hz
Switching time	2 msec
Max. ambient light halogen	5000 Lux
Max. ambient light sun	10,000 Lux

HOUSING SIZE MM

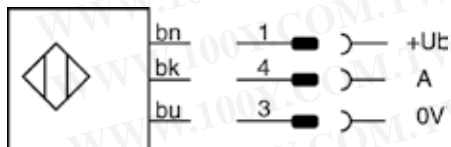
OPERATING PRINCIPLE

SENSING RANGE MM

PHOTOELECTRIC

WIRING DIAGRAM

PNP/NPN Light-ON / Dark-ON



DATA

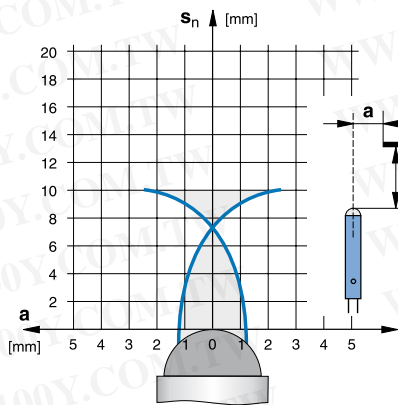
Standard target
No-load supply current
Lens material
Description
Part reference
Description
Part reference
Description
Part reference
Other types available

CYLINDRICAL SUBMINIATURE

Ø 4

DIFFUSE SENSOR

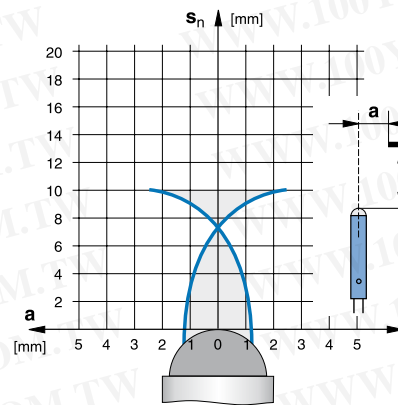
10



Ø 4

DIFFUSE SENSOR

10



100 x 100 mm white
 ≤ 15 mA
 Sapphire glass
 PNP Light-ON
 LTK-1040-303-505

NPN Light-ON



100 x 100 mm white
 ≤ 15 mA
 Sapphire glass
 PNP Light-ON
 LTS-1040-303-505

NPN Light-ON

CYLINDRICAL SUBMINIATURE

HOUSING SIZE MM

Ø 4

Ø 4

OPERATING PRINCIPLE

DIFFUSE SENSOR

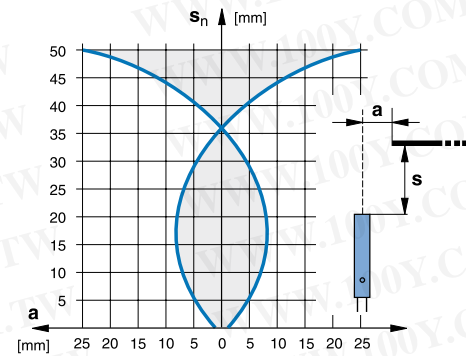
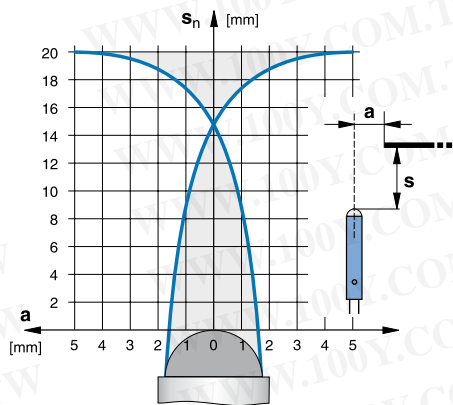
DIFFUSE SENSOR

SENSING RANGE MM

20

50

PHOTOELECTRIC



DATA



Standard target

100 x 100 mm white

100 x 100 mm white

No-load supply current

≤ 15 mA

≤ 15 mA

Lens material

Sapphire glass

Glass

Description

PNP Light-ON

PNP Light-ON

Part reference

LTK-1040-303-506

LTK-1040-303

Description

NPN Light-ON

Part reference

LTK-1040-301-506

Description

Part reference

Other types available

-

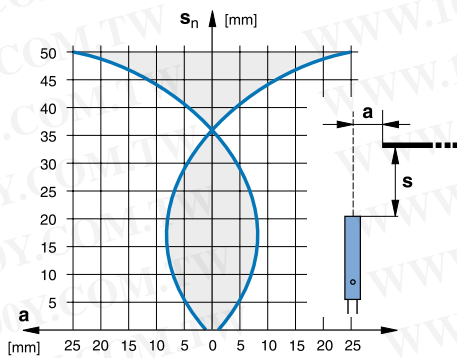
NPN Light-ON

CYLINDRICAL SUBMINIATURE

Ø 4

DIFFUSE SENSOR

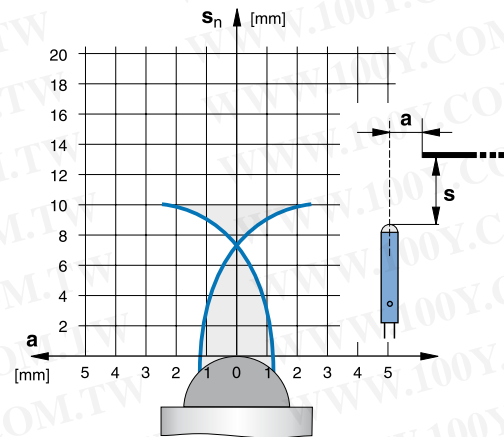
50



M5

DIFFUSE SENSOR

10



100 x 100 mm white

≤ 15 mA

Glass

PNP Light-ON

LTS-1040-303

NPN Light-ON



100 x 100 mm white

≤ 15 mA

Sapphire glass

PNP Light-ON

LTK-1050-303-505

NPN Light-ON

LTK-1050-301-505

PNP Dark-ON

CYLINDRICAL SUBMINIATURE

HOUSING SIZE

M5

M5

OPERATING PRINCIPLE

DIFFUSE SENSOR

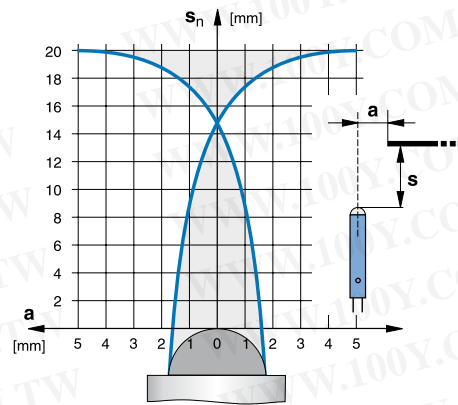
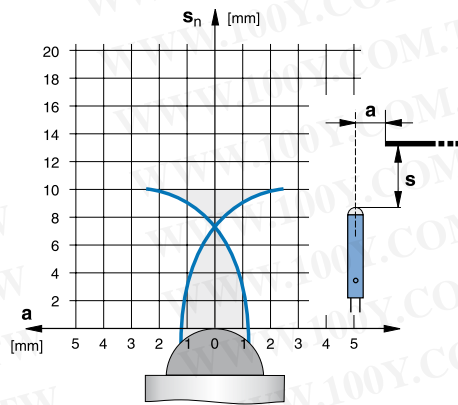
DIFFUSE SENSOR

SENSING RANGE MM

10

20

PHOTOELECTRIC



DATA



Standard target

100 x 100 mm white

100 x 100 mm white

No-load supply current

≤ 15 mA

≤ 15 mA

Lens material

Sapphire glass

Sapphire glass

Description

PNP Light-ON

PNP Light-ON

Part reference

LTS-1050-303-505

LTK-1050-303-506

Description

NPN Light-ON

Part reference

LTK-1050-301-506

Description

PNP Dark-ON

-

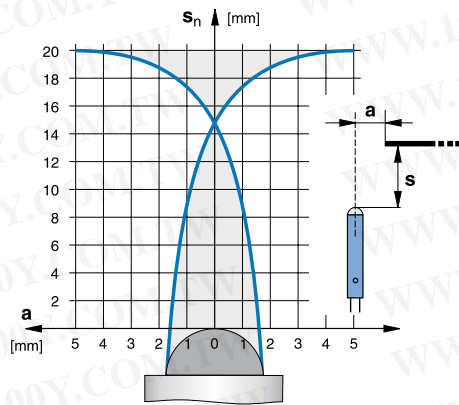
Other types available

CYLINDRICAL SUBMINIATURE

M5

DIFFUSE SENSOR

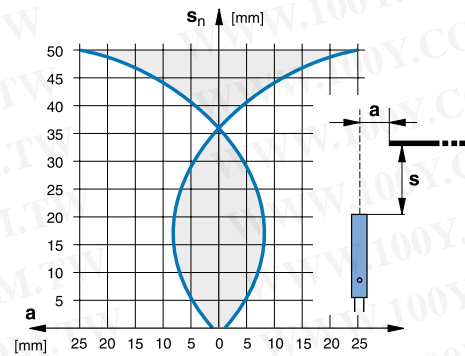
20



M5

DIFFUSE SENSOR

50



100 x 100 mm white
 ≤ 15 mA
 Sapphire glass
 PNP Light-ON
 LTS-1050-303-506
 NPN Light-ON
 LTS-1050-301-506



100 x 100 mm white
 ≤ 15 mA
 Glass
 PNP Light-ON
 LTK-1050-303
 NPN Light-ON
 LTK-1050-301

CYLINDRICAL SUBMINIATURE

HOUSING SIZE

M5

M5

OPERATING PRINCIPLE

DIFFUSE SENSOR

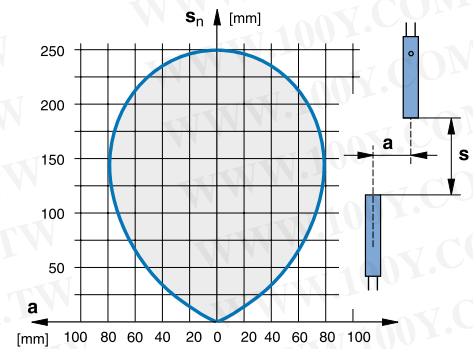
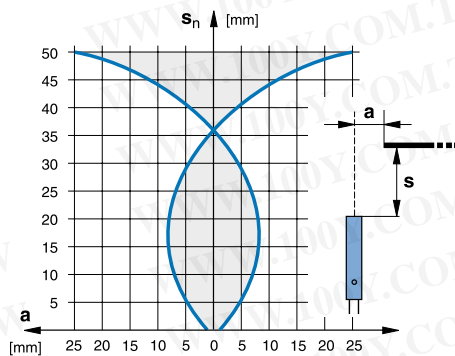
THROUGH-BEAM SENSOR

SENSING RANGE MM

50

250

PHOTOELECTRIC



DATA



Standard target

100 x 100 mm white

-

No-load supply current

≤ 15 mA

≤ 5 mA (receiver) / ≤ 10 mA (emitter)

Lens material

Glass

Glass

Description

PNP Light-ON

Emitter

Part reference

LTS-1050-303

LLS-1050-200

Description

PNP Dark-ON

Part reference

LLS-1050-204 (receiver)

Description

Part reference

Other types available

NPN Light-ON

NPN Dark-ON





M12 STANDARD SIZE FOR MULTIPLE USES

CYLINDRICAL MINIATURE

PHOTOELECTRIC SENSORS

KEY ADVANTAGES

- ✓ M12 miniature sensor series
- ✓ Rugged metal housing
- ✓ Accurate and speed-independent target detection; response time 0.5 msec (laser: 0.1 msec)
- ✓ Shock and vibration resistant due to fully vacuum potted electronics
- ✓ High system reserves (excess gain)
- ✓ Easy adjustment (due to visible red light)
- ✓ Laser sensor (protection class 2)

RANGE OVERVIEW	Distance	Diffuse	Reflex	Through-beam	Laser
CYLINDRICAL MINIATURE	300 mm	p. 151-152			
	1500 mm				
	10,000 mm		p. 152		
	50,000 mm			p. 153	p. 153

OVERVIEW

HOUSING SIZE

OPERATING PRINCIPLE

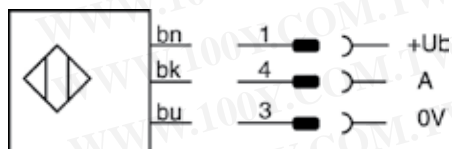
SENSING RANGE MM

	1120	1121L
Housing material	Chrome-plated brass	Stainless steel V2A
Hysteresis	10 % typ.	10 % typ.
Degree of protection	IP 67	IP 67
Laser protection class	--	2
Supply voltage range	10...36 VDC	10 ... 36 VDC
Ambient temperature range	-25...+55 °C / -13...+131 °F	-10...+50 °C / +14...+122 °F
Output current	≤ 200 mA	≤ 200 mA
Output voltage drop	≤ 2 V	≤ 2 V
Switching frequency	≤ 1000 Hz	≤ 5000 Hz
Switching time	0.5 msec	0.1 msec
Max. ambient light halogen	5000 Lux	5000 Lux
Max. ambient light sun	10,000 Lux	10,000 Lux

PHOTOELECTRIC

WIRING DIAGRAM

PNP / NPN Light-ON / Dark-ON / Emitter



DATA

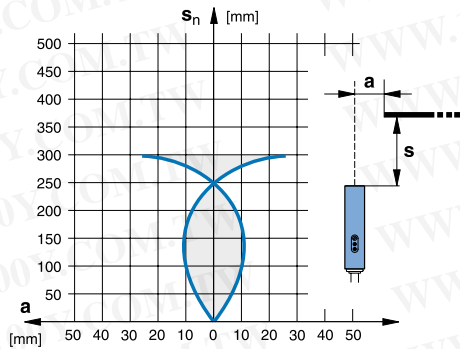
- Standard target
- No-load supply current
- Emitter
- Setup
- Description
- Part reference
- Description
- Part reference
- Description
- Part reference
- Other types available

CYLINDRICAL MINIATURE

M12

DIFFUSE SENSOR

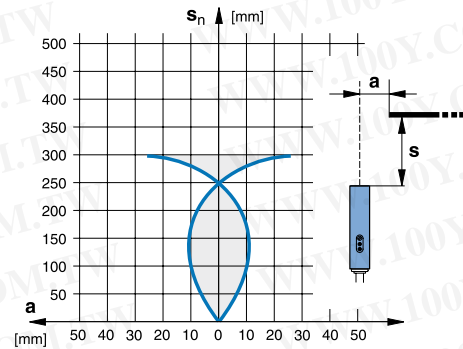
300



M12

DIFFUSE SENSOR

300



100 x 100 mm white

≤ 15 mA

LED red 660 nm

Potentiometer

PNP Light-ON

LTK-1120-303

NPN Light-ON

LTK-1120-301



100 x 100 mm white

≤ 15 mA

LED red 660 nm

Potentiometer

PNP Light-ON

LTS-1120-303

NPN Light-ON

LTS-1120-301

CYLINDRICAL MINIATURE

HOUSING SIZE

M12

M12

OPERATING PRINCIPLE

REFLEX SENSOR

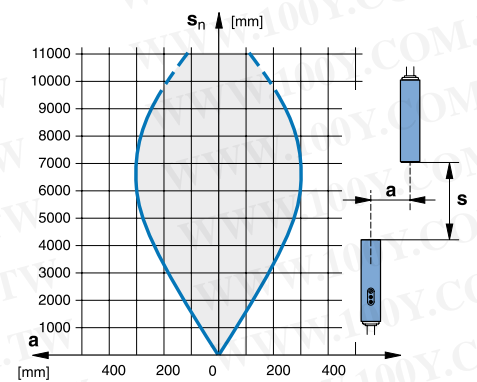
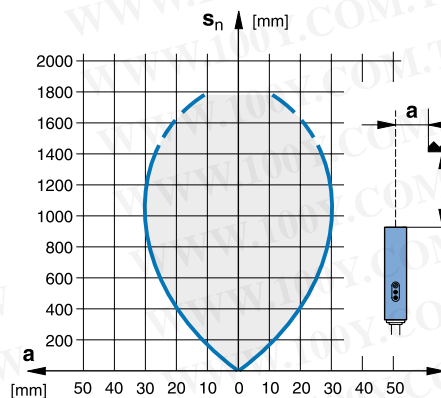
THROUGH-BEAM SENSOR

SENSING RANGE MM

1500

10,000

PHOTOELECTRIC



DATA



Standard target / Reflector type

LXR-0000-084 (see page 205)

-

No-load supply current

≤ 15 mA

≤ 15 mA

Emitter

LED red polarized 660 nm

LED red 660 nm

Setup

-

-

Description

PNP Dark-ON

Emitter

Part reference

LRS-1120-304

LLS-1120-200

Description

PNP Dark-ON

Part reference

LLS-1120-204 (receiver)

Description

Part reference

Other types available

NPN Dark-ON

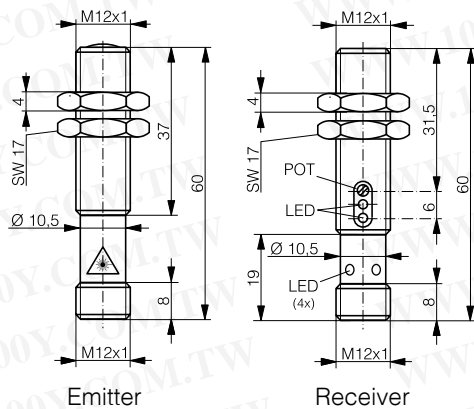
PNP Light-ON, NPN Dark-ON, NPN Light-ON

CYLINDRICAL MINIATURE

M12 LASER

THROUGH-BEAM SENSOR

50,000



≤ 10 mA

Laser red pulsed 660 nm

Emitter

LLS-1121L-200

PNP Dark-ON

LLS-1121L-204 (receiver)

PNP Light-ON, NPN Dark-ON, NPN Light-ON



M18 STANDARD SIZE, INCLUDING 90° SENSING

CYLINDRICAL SMALL

PHOTOELECTRIC SENSORS

KEY ADVANTAGES

- ✓ Small sensor M18
- ✓ Models for lateral sensing
- ✓ Rugged metal housing
- ✓ Accurate and speed-independent target detection
- ✓ Shock and vibration resistant due to fully vacuum potted electronics
- ✓ High system reserves (excess gain)
- ✓ Easy adjustment (due to visible red light)
- ✓ Laser sensor (protection class 2)

RANGE OVERVIEW	Distance	Diffuse	Reflex	Through-beam	Background suppression	Laser
CYLINDRICAL SMALL	120 mm				p. 157-158	
	250 mm					p. 163
	600 mm	p. 158-159				p. 163
	2000 mm		p. 160-161			
	20,000 mm				p. 161-162	
	50,000 mm					p. 164

OVERVIEW

HOUSING SIZE

OPERATING PRINCIPLE

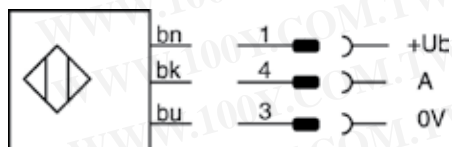
SENSING RANGE MM

	1180 / 1180W	1180L
Housing material	Stainless steel V2A	Stainless steel V2A
Hysteresis	10 % typ.	10 % typ.
Degree of protection	IP 67	IP 67
Laser protection class	-	2
Supply voltage range	10 ... 36 VDC	10 ... 36 VDC
Ambient temperature range	-25...+55 °C / -13...+131 °F	-10...+50 °C / +14...+122 °F
Output current	≤ 200 mA	≤ 200 mA
Output voltage drop	≤ 2 V	≤ 2 V
Switching frequency	≤ 1000 Hz	LT: ≤ 1000 Hz/LL: ≤ 5000 Hz
Switching time	1 msec	0.5 msec
Max. ambient light halogen	5000 Lux	5000 Lux
Max. ambient light sun	10,000 Lux	10,000 Lux

PHOTOELECTRIC

WIRING DIAGRAMS

PNP / NPN Light-ON / Dark-ON / Emitter



PNP/NPN Changeover



DATA

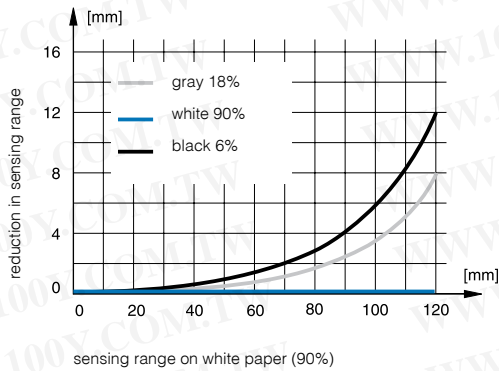
- Standard target
- No-load supply current
- Emitter
- Setup
- Description
- Part reference
- Description
- Part reference
- Description
- Part reference
- Other types available

CYLINDRICAL SMALL

M18

DIFFUSE SENSOR WITH
BACKGROUND SUPPRESSION

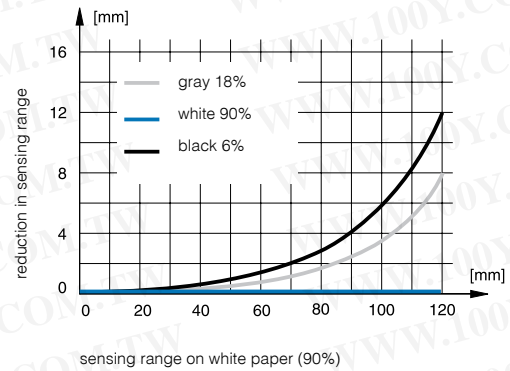
10 ... 120



M18

DIFFUSE SENSOR WITH
BACKGROUND SUPPRESSION

10 ... 120



100 x 100 mm white
≤ 25 mA
LED red 680 nm
Potentiometer
PNP Light-ON
LHK-1180-303
NPN Light-ON
LHK-1180-301



100 x 100 mm white
≤ 25 mA
LED red 680 nm
Potentiometer
PNP Light-ON
LHS-1180-303
NPN Light-ON
LHS-1180-301

CYLINDRICAL SMALL

HOUSING SIZE

M18W

M18

OPERATING PRINCIPLE

DIFFUSE SENSOR WITH BACKGROUND SUPPRESSION

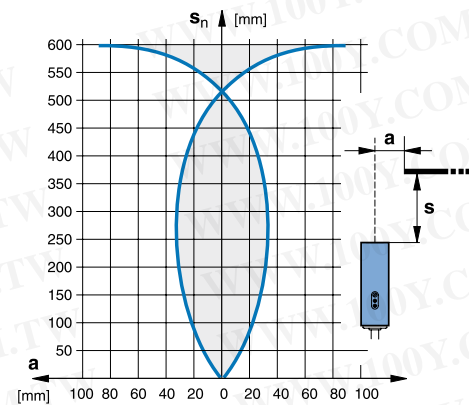
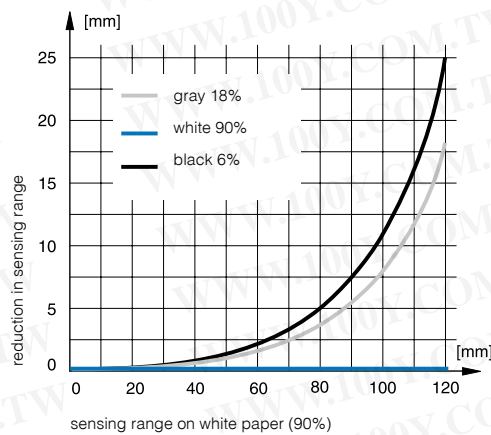
DIFFUSE SENSOR

SENSING RANGE MM

10 ... 120

40 ... 600

PHOTOELECTRIC



DATA



Standard target

100 x 100 mm white

200 x 200 mm white

No-load supply current

≤ 25 mA

≤ 20 mA

Emitter

LED red 680 nm

LED red 630 nm

Setup

Potentiometer

Potentiometer

Description

PNP Light-ON

PNP Changeover

Part reference

LHS-1180W-303

LTK-1180-103

Description

NPN Changeover

Part reference

LTK-1180-101

Description

Part reference

Other types available

NPN Light-ON

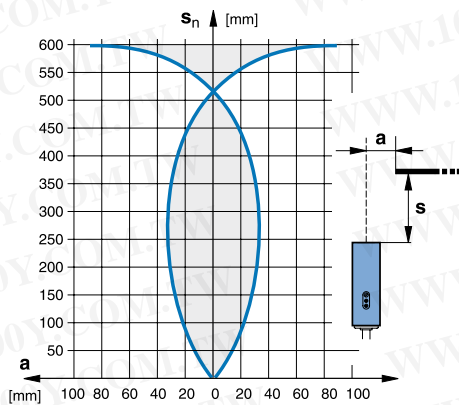
PNP/NPN Light-ON + Excess gain

CYLINDRICAL SMALL

M18

DIFFUSE SENSOR

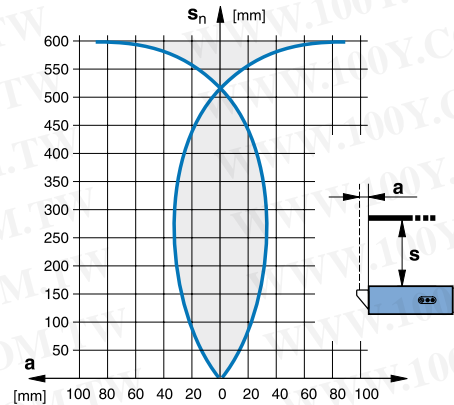
40 ... 600



M18W

DIFFUSE SENSOR

40 ... 600



200 x 200 mm white

≤ 20 mA

LED red 630 nm

Potentiometer

PNP Changeover

LTS-1180-103

NPN Changeover

LTS-1180-101

PNP/NPN Light-ON + Excess gain



200 x 200 mm white

≤ 20 mA

LED red 630 nm

Potentiometer

PNP Changeover

LTS-1180W-103

NPN Changeover / PNP/NPN Light-ON + Excess gain

CYLINDRICAL SMALL

HOUSING SIZE

M18

M18

OPERATING PRINCIPLE

REFLEX SENSOR

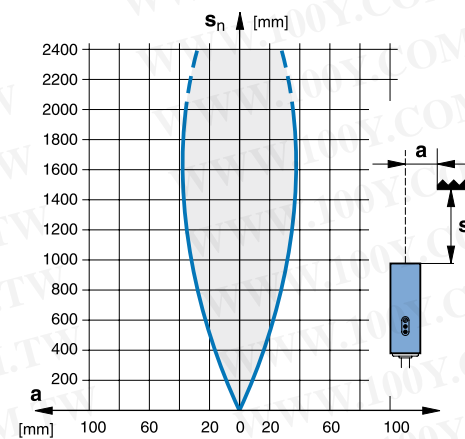
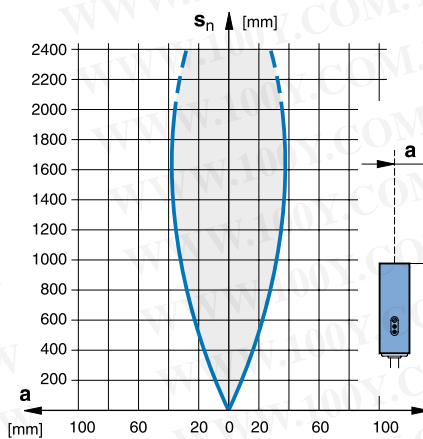
REFLEX SENSOR

SENSING RANGE MM

2000

2000

PHOTOELECTRIC



DATA



Standard target / Reflector type

LXR-0000-084 (see page 205)

LXR-0000-084 (see page 205)

No-load supply current

≤ 15 mA

≤ 15 mA

Emitter

LED red polarized 660 nm

LED red polarized 660 nm

Setup

-

-

Description

PNP Dark-ON

PNP Dark-ON

Part reference

LRK-1180-304

LRS-1180-304

Description

Part reference

Description

Part reference

Other types available

NPN Dark-ON

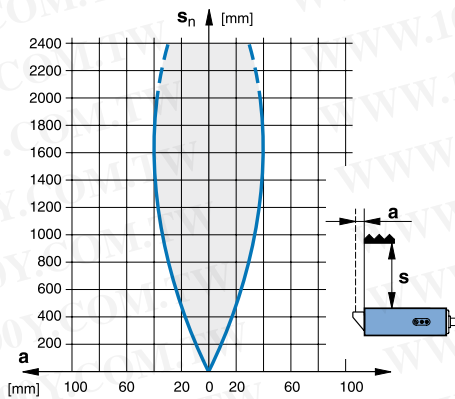
NPN Dark-ON

CYLINDRICAL SMALL

M18W

REFLEX SENSOR

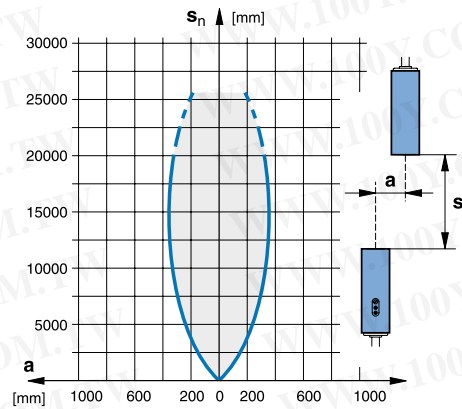
2000



M18

THROUGH-BEAM SENSOR

20,000



LXR-0000-084 (see page 205)

≤ 15 mA

LED red polarized 660 nm

PNP Dark-ON

LRS-1180W-304

NPN Dark-ON



≤ 10 mA (receiver) / ≤ 15 mA (emitter)

LED red 660 nm

Emitter

LLK-1180-000

PNP Changeover

LLK-1180-003 (receiver)

NPN Changeover

LLK-1180-001 (receiver)

PNP/NPN Light-ON + Excess gain

CYLINDRICAL SMALL

HOUSING SIZE

M18

M18W

OPERATING PRINCIPLE

THROUGH-BEAM SENSOR

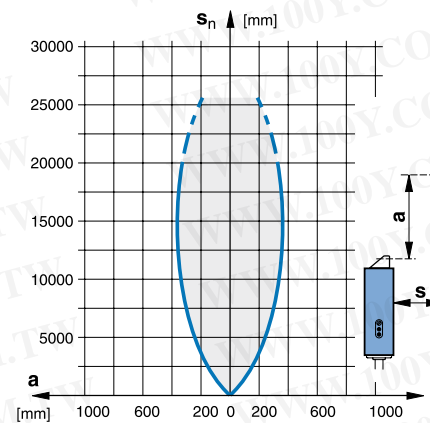
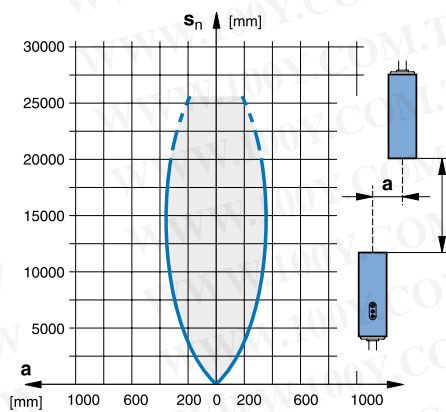
THROUGH-BEAM SENSOR

SENSING RANGE MM

20,000

20,000

PHOTOELECTRIC



DATA



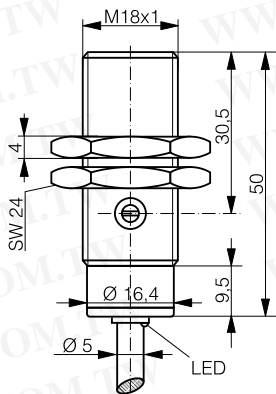
Standard target	-	-
No-load supply current	≤ 10 mA (receiver) / ≤ 15 mA (emitter)	≤ 10 mA (receiver) / ≤ 15 mA (emitter)
Emitter	LED red 660 nm	LED red 660 nm
Setup	-	-
Description	Emitter	Emitter
Part reference	LLS-1180-000	LLS-1180W-000
Description	PNP Changeover	PNP Changeover
Part reference	LLS-1180-003 (receiver)	LLS-1180W-003 (receiver)
Description	NPN Changeover	
Part reference	LLS-1180-001 (receiver)	
Other types available	PNP/NPN Light-ON + Excess gain	NPN Changeover / PNP/NPN Light-ON+Excess gain

CYLINDRICAL SMALL

M18 LASER

DIFFUSE SENSOR

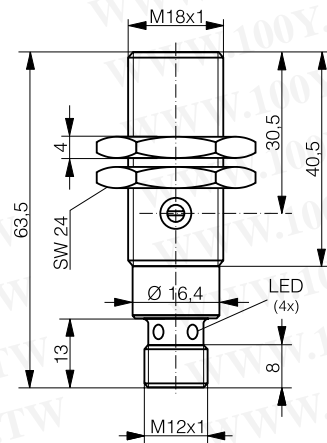
40 ... 250



M18 LASER

DIFFUSE SENSOR

60 ... 600



100 x 100 mm white
 ≤ 20 mA
 Laser red pulsed 660 nm
 Potentiometer
 PNP Changeover
 LTS-1180L-103-516

NPN Changeover / PNP/NPN Light-ON + Excess gain



100 x 100 mm white
 ≤ 20 mA
 Laser red pulsed 660 nm
 Potentiometer
 PNP Changeover
 LTS-1180L-103

NPN Changeover / PNP/NPN Light-ON + Excess gain

CYLINDRICAL SMALL

HOUSING SIZE

M18 LASER

M18 LASER

OPERATING PRINCIPLE

THROUGH-BEAM SENSOR

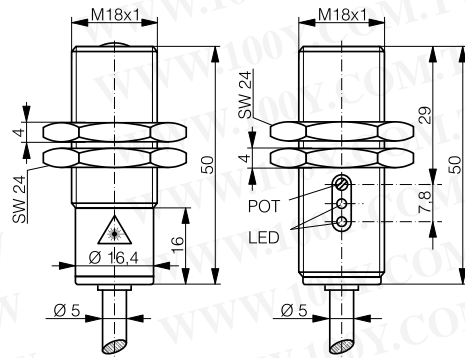
THROUGH-BEAM SENSOR

SENSING RANGE MM

50,000

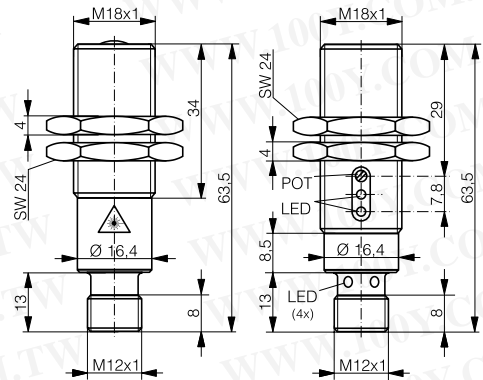
50,000

PHOTOELECTRIC



Emitter

Receiver



Emitter

Receiver

DATA



Standard target

-

-

No-load supply current

≤ 10 mA

≤ 10 mA

Emitter

Laser red pulsed 660 nm

Laser red pulsed 660 nm

Setup

Potentiometer (receiver)

Potentiometer (receiver)

Description

Emitter

Emitter

Part reference

LLK-1181L-000

LLS-1181L-000

Description

PNP Changeover

PNP Changeover

Part reference

LLK-1181L-003 (receiver)

LLS-1181L-003 (receiver)

Description

Part reference

Other types available

NPN Changeover / PNP/NPN Light-ON+Excess gain

NPN Changeover / PNP/NPN Light-ON+Excess gain





5 X 7 MM STEEL HOUSING AND NARROW FOCUS

CUBIC SUBMINIATURE PHOTOELECTRIC SENSORS

KEY ADVANTAGES

- ✓ Cubic \square 5 x 7 x 40 mm sensors
- ✓ Rugged metal housing
- ✓ Accurate target detection due to cylindrical light beam
- ✓ Rugged sapphire-glass sensing face, scratch and chemically resistant
- ✓ Shock and vibration resistant due to fully vacuum potted electronics
- ✓ High system reserves (excess gain)

RANGE OVERVIEW	Distance	Diffuse
CUBIC SUB- MINIATURE	20 mm	p. 169
	50 mm	p. 169
	90 mm	p. 169

OVERVIEW

HOUSING SIZE MM

OPERATING PRINCIPLE

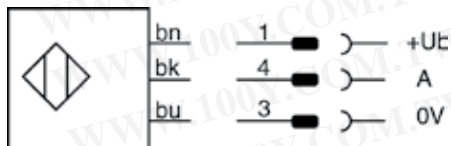
SENSING RANGE MM

	0507
Housing material	Stainless steel V2A
Emitter	IR LED 880 nm
Hysteresis	10 % typ.
Degree of protection	IP 67
Supply voltage range	10 ... 30 VDC
Ambient temperature range	0 ... +55 °C / 32 ... +131 °F
Output current	≤ 100 mA
Output voltage drop	≤ 2 V
Switching frequency	≤ 250 Hz
Switching time	2.5 msec
Max. ambient light halogen	5000 Lux
Max. ambient light sun	10,000 Lux

PHOTOELECTRIC

WIRING DIAGRAM

PNP Light-ON



DATA

Standard target
No-load supply current
Lens material
Description
Part reference
Description
Part reference
Description
Part reference
Other types available

CUBIC SUBMINIATURE

□ 5 X 7 X 40

□ 5 X 7 X 40

□ 5 X 7 X 40

DIFFUSE SENSOR

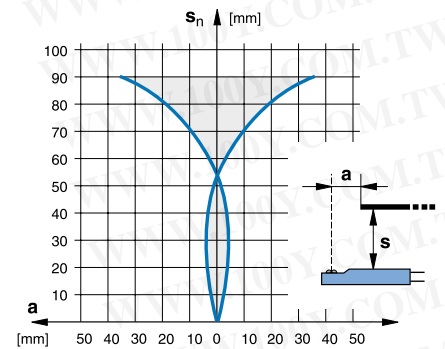
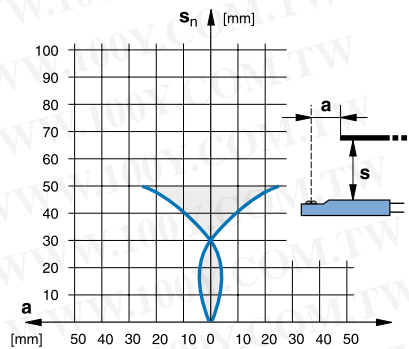
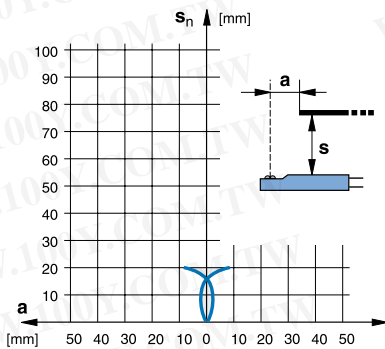
DIFFUSE SENSOR

DIFFUSE SENSOR

20

50

90



100 x 100 mm white

≤ 15 mA

Sapphire glass

PNP Light-ON

LTK-0507-303-501

100 x 100 mm white

≤ 15 mA

Sapphire glass

PNP Light-ON

LTK-0507-303

100 x 100 mm white

≤ 15 mA

Sapphire glass

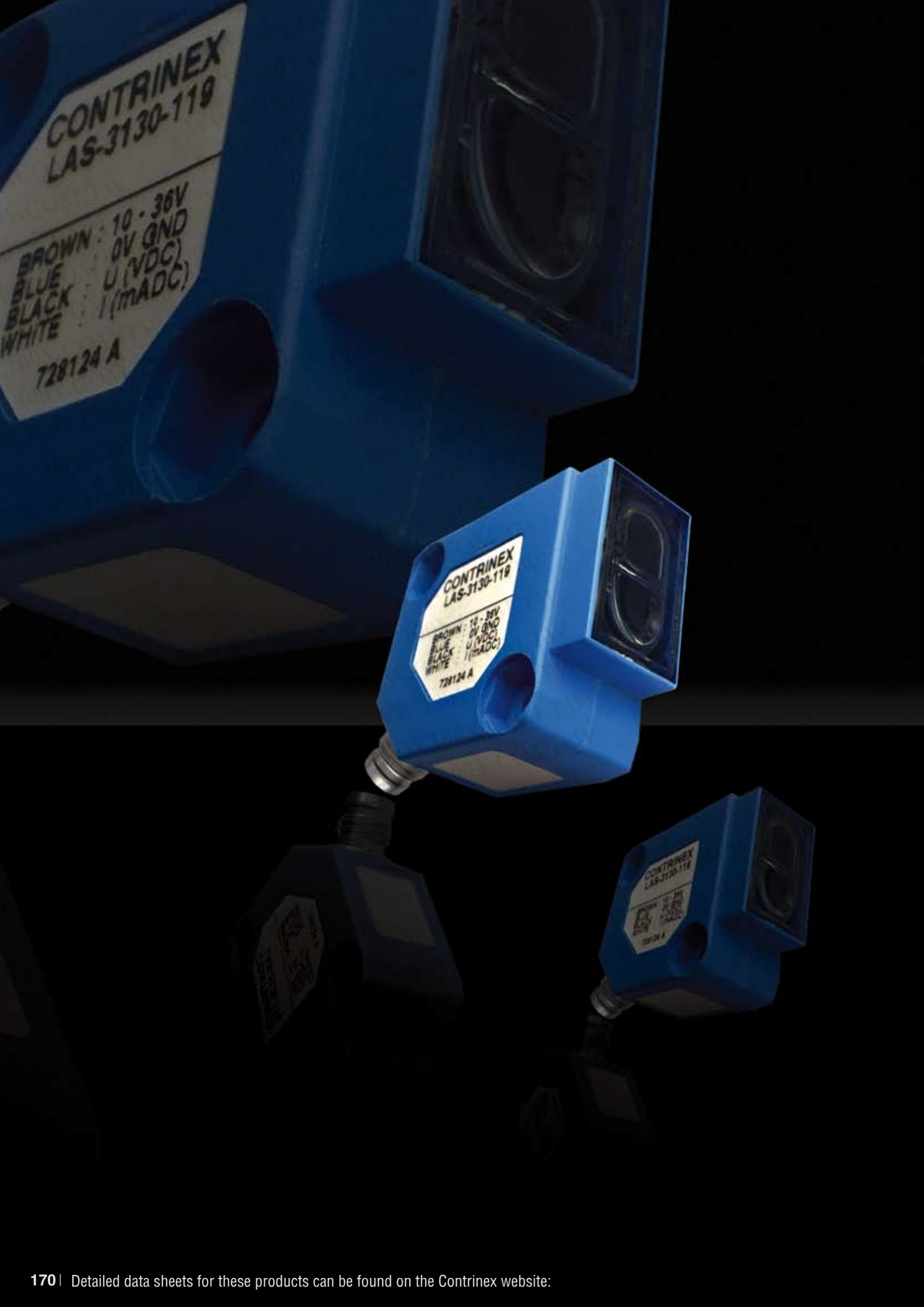
PNP Light-ON

LTK-0507-303-502

NPN Light-ON

NPN Light-ON

NPN Light-ON



POWERFUL SENSORS IN 30 X 30 MM HOUSING

CUBIC MINIATURE

PHOTOELECTRIC SENSORS

KEY ADVANTAGES

- ✓ Complete miniature sensor series \square 30 x 30 x 15 mm in rugged Crastin® housings
- ✓ Shock and vibration resistant due to fully vacuum potted electronics
- ✓ Diffuse sensors with precise background suppression
- ✓ Polarizing filter (reflex sensors)
- ✓ Changeover outputs
- ✓ Analog outputs

RANGE OVERVIEW	Distance mm	Diffuse	Reflex	Through-beam	Background suppression	Analog
CUBIC MINIATURE	600 / 1200	p. 175-176				
	2000 / 4000		p. 177-178			
	6000 / 12'000			p. 179		
	200				p. 173-174	
	10 ... 100					p. 173

OVERVIEW

HOUSING SIZE MM

OPERATING PRINCIPLE

SENSING RANGE MM

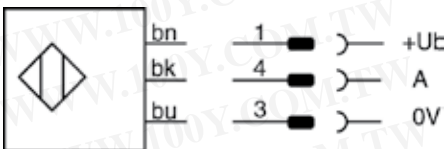
3#3#

Housing material	PBTP (Crastin)
Hysteresis	10 % typ.
Degree of protection	IP 67
Supply voltage range	10 ... 36 VDC / 15 ... 36 VDC (LA#-3130-119)
Ambient temperature range	-25 ... +55 °C / -13 ... +131 °F
Output current (total both outputs)	≤ 200 mA / -- (LA)
Output voltage drop	≤ 2 V / -- (LA)
Max. ambient light halogen	5000 Lux
Max. ambient light sun	10,000 Lux
Setup	Potentiometer
Compatible mounting bracket	See page 204

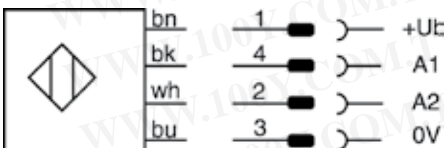
PHOTOELECTRIC

WIRING DIAGRAMS

PNP/NPN Light-ON / Dark-ON / Emitter



PNP/NPN Changeover



Analog



DATA

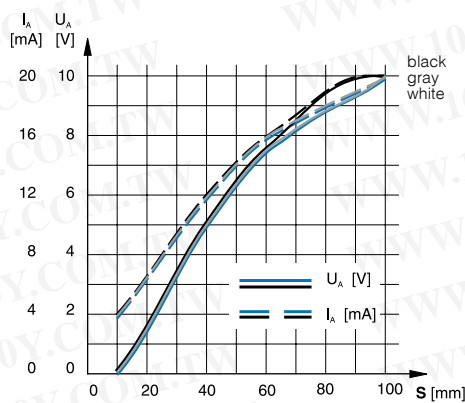
- Standard target
- No-load supply current
- Emitter
- Max. switching frequency
- Switching time
- Description
- Part reference
- Description
- Part reference
- Description
- Part reference
- Other types available

CUBIC MINIATURE

□ 30 X 30 X 15

WITH ANALOG OUTPUT

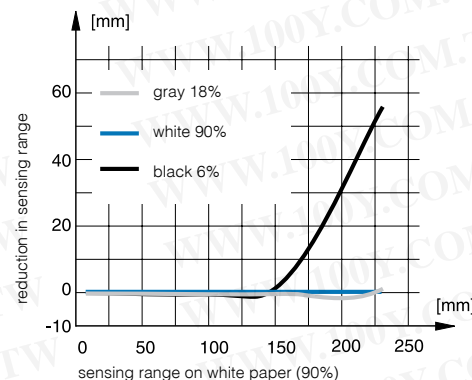
10 ... 100



□ 30 X 30 X 15

DIFFUSE SENSOR WITH BACKGROUND SUPPRESSION

15 ... 200



100 x 100 mm white

≤ 25 mA

LED red 660 nm

-

-

Analog output

LAS-3130-119

-



100 x 100 mm white

≤ 25 mA

LED red 660 nm

500 Hz

1 msec

PNP Changeover

LHS-3130-103

NPN Changeover / PNP/NPN Light-ON + Excess gain

CUBIC MINIATURE

HOUSING SIZE MM

□ 30 X 30 X 15

□ 30 X 30 X 15

OPERATING PRINCIPLE

DIFFUSE SENSOR WITH BACKGROUND SUPPRESSION

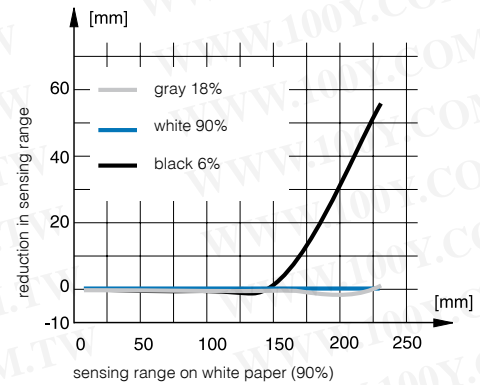
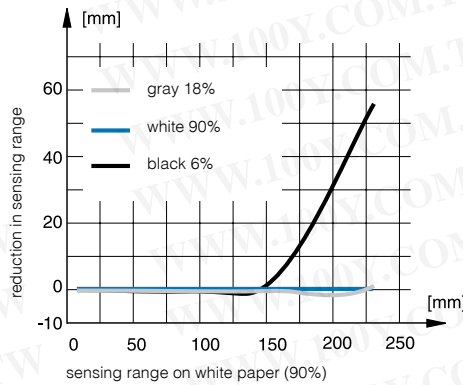
DIFFUSE SENSOR WITH BACKGROUND SUPPRESSION

SENSING RANGE MM

15 ... 200

15 ... 200

PHOTOELECTRIC



DATA



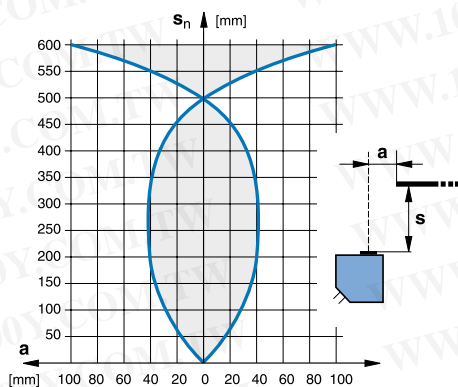
Standard target	100 x 100 mm white	100 x 100 mm white
No-load supply current	≤ 25 mA	≤ 25 mA
Emitter	LED red 660 nm	LED red 660 nm
Max. switching frequency	500 Hz	500 Hz
Switching time	1 msec	1 msec
Description	PNP Light-ON	PNP Light-ON
Part reference	LHK-3131-303	LHS-3131-303
Description	NPN Light-ON	NPN Light-ON
Part reference		LHS-3131-301
Description		
Part reference		
Other types available	NPN Light-ON / PNP Dark-On	PNP / NPN Dark-On

CUBIC MINIATURE

□ 30 X 30 X 15

DIFFUSE SENSOR

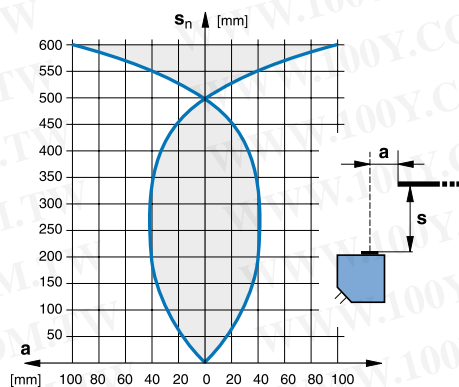
600



□ 30 X 30 X 15

DIFFUSE SENSOR

600



200 x 200 mm white

≤ 15 mA

IR LED 880 nm

1000 Hz

0.5 msec

PNP Light-ON

LTS-3031-303

-



200 x 200 mm white

≤ 15 mA

IR LED 880 nm

1000 Hz

0.5 msec

PNP Light-ON

LTK-3031-303

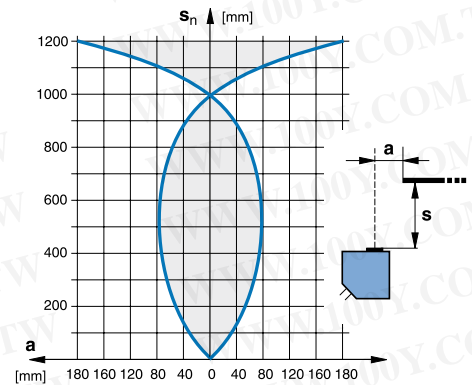
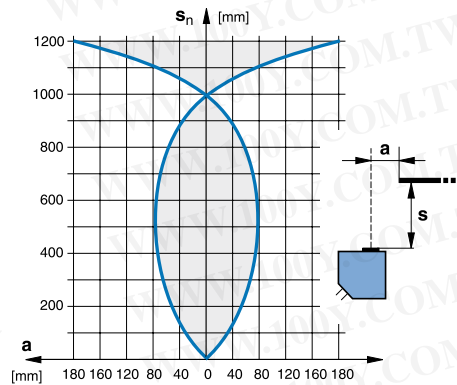
NPN Light-ON



LTK-3031-301

CUBIC MINIATURE

HOUSING SIZE MM	□ 30 X 30 X 15	□ 30 X 30 X 15
OPERATING PRINCIPLE	DIFFUSE SENSOR	DIFFUSE SENSOR
SENSING RANGE MM	1200	1200

PHOTOELECTRIC



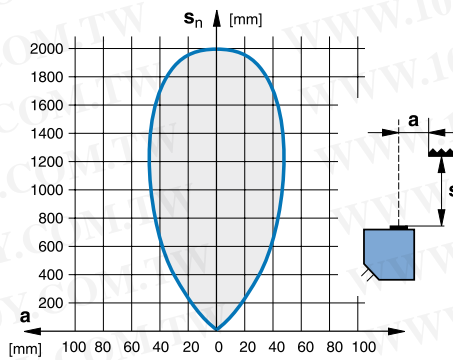
DATA		
Standard target / Reflector type	200 x 200 mm white	200 x 200 mm white
No-load supply current	≤ 20 mA	≤ 20 mA
Emitter	IR LED 880 nm	IR LED 880 nm
Max. switching frequency	1000 Hz	1000 Hz
Switching time	0.5 msec	0.5 msec
Description	PNP Changeover	PNP Changeover
Part reference	LTS-3030-103	LTK-3030-103
Description		NPN Changeover
Part reference		LTK-3030-101
Description		
Part reference		
Other types available	NPN Changeover / PNP/NPN Light-ON + Excess gain	PNP/NPN Light-ON + Excess gain

CUBIC MINIATURE

□ 30 X 30 X 15

REFLEX SENSOR

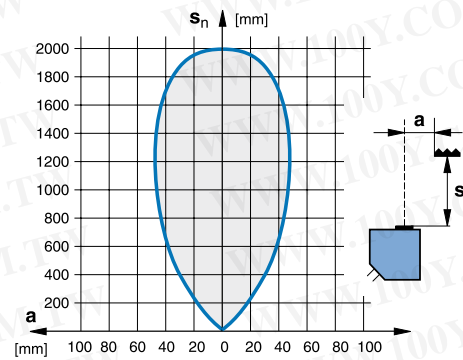
2000



□ 30 X 30 X 15

REFLEX SENSOR

2000



LXR-0000-084 (see page 205)

≤ 15 mA

LED red polarized 660 nm

1000 Hz

0.5 msec

PNP Dark-ON

LRS-3031-304

NPN Dark-ON



LRK-0000-084 (see page 205)

≤ 15 mA

LED red polarized 660 nm

1000 Hz

0.5 msec

PNP Dark-ON

LRK-3031-304

NPN Dark-ON

CUBIC MINIATURE

HOUSING SIZE MM

□ 30 X 30 X 15

□ 30 X 30 X 15

OPERATING PRINCIPLE

REFLEX SENSOR

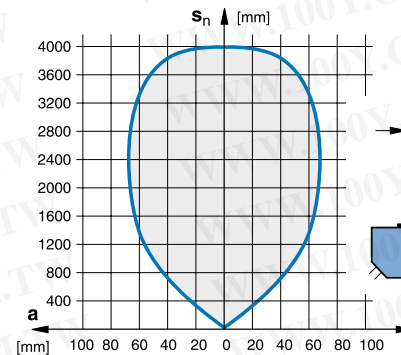
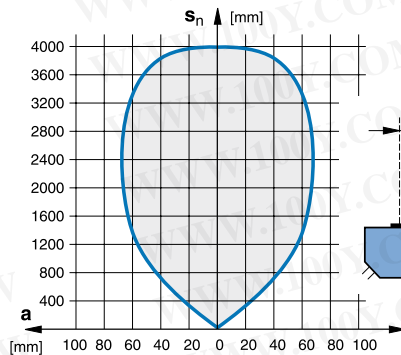
REFLEX SENSOR

SENSING RANGE MM

4000

4000

PHOTOELECTRIC



DATA



Standard target / Reflector type

LXR-0000-084 (see page 205)

LXR-0000-084 (see page 205)

No-load supply current

≤ 20 mA

≤ 20 mA

Emitter

LED red polarized 660 nm

LED red polarized 660 nm

Max. switching frequency

1000 Hz

1000 Hz

Switching time

0.5 msec

0.5 msec

Description

PNP Changeover

PNP Changeover

Part reference

LRS-3030-103

LRK-3030-103

Description

PNP Light-ON + Excess gain

Part reference

LRS-3030-104

Description

Part reference

Other types available

NPN Changeover / Light-ON + Excess gain

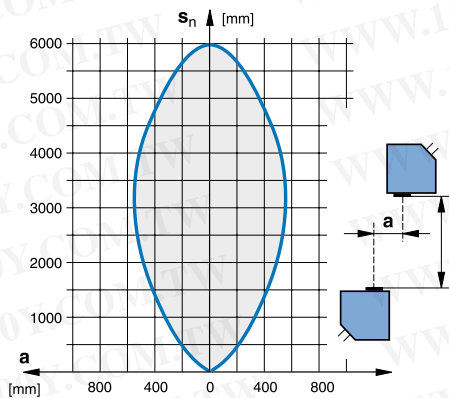
NPN Changeover / PNP/NPN Light-ON+Excess gain

CUBIC MINIATURE

□ 30 X 30 X 15

THROUGH-BEAM SENSOR

6000



≤ 10 mA (receiver) / ≤ 15 mA (emitter)

IR LED 880 nm

1000 Hz

0.5 msec

Emitter

LLS-3031-200

PNP Dark-ON

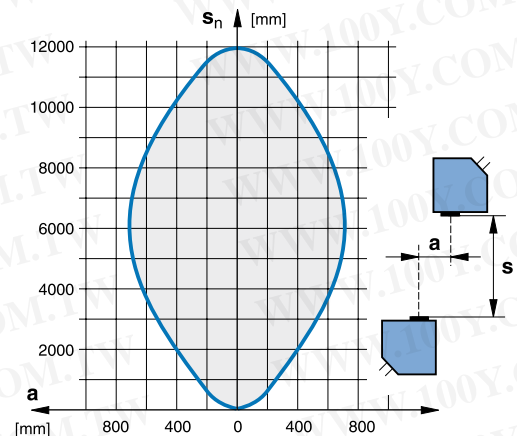
LLS-3031-204 (receiver)

NPN Dark-ON

□ 30 X 30 X 15

THROUGH-BEAM SENSOR

12,000



≤ 10 mA (receiver) / ≤ 15 mA (emitter)

IR LED 880 nm

1000 Hz

0.5 msec

Emitter

LLS-3030-000

PNP Changeover

LLS-3030-003 (receiver)

NPN Changeover / PNP/NPN Light-ON + Excess gain



(1) OUT 1 (black)
(2) OUT 2 (white)
(3) OUT 3 (grey)

Touch:
Press SET for 2...4 sec. "Tolerance" &
center "Value" LEDs are ON.
Set tolerance with "+" and "-": press SET.
Select channel with "+" and "-": press SET.
Repeat procedure for other channels.



CONTRINEX
FTS-4035-301

U.S. 24 VDC (brown)
U.S. 0V (blue)
U.S. OUT 1 (black)
U.S. OUT 2 (white)
U.S. OUT 3 (grey)

Touch:
Press SET for 2...4 sec. "Tolerance" &
center "Value" LEDs are ON.
Set tolerance with "+" and "-": press SET.
Select channel with "+" and "-": press SET.
Repeat procedure for other channels.

CONTRINEX
FTS-4035-301

U.S. 24 VDC (brown)
U.S. 0V (blue)
U.S. OUT 1 (black)
U.S. OUT 2 (white)
U.S. OUT 3 (grey)

Touch:
Press SET for 2...4 sec. "Tolerance" &
center "Value" LEDs are ON.
Set tolerance with "+" and "-": press SET.
Select channel with "+" and "-": press SET.
Repeat procedure for other channels.

EXCELLENT VALUE FOR DEMANDING APPLICATIONS

CUBIC SMALL

PHOTOELECTRIC SENSORS

KEY ADVANTAGES

- ✓ Small sensor series for peak performance
- ✓ Ecolab tested and approved
- ✓ Sensing face of glass or coated plastic
- ✓ Fiber-optic amplifiers (blue light and high frequency)
- ✓ Color sensor

RANGE OVERVIEW	Distance	Diffuse	Reflex	Through-beam	Background suppression	Color
CUBIC SMALL	30 ... 40 mm					p. 193
	500 mm				p. 187	
	1200 mm	p. 188				
	2000 mm	p. 183				
	4000 mm		p. 188-189			
	6000 mm		p. 184			
	15,000 mm				p. 184	
	50,000 mm				p. 189-190	

OVERVIEW

HOUSING SIZE MM

OPERATING PRINCIPLE

SENSING RANGE MM

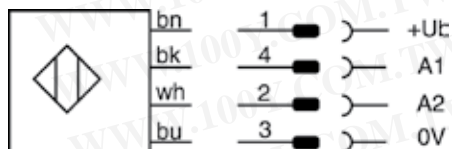
4040

Housing material	PBTP (Crastin)
Hysteresis	10 % typ.
Degree of protection	IP 67
Supply voltage range	10 ... 36 VDC
Ambient temperature range	-25 ... +55 °C / -13 ... +131 °F
Output current (total of both outputs)	≤ 200 mA
Output voltage drop	≤ 2 V
Switching frequency	≤ 1000 Hz
Switching time	0.5 msec
Max. ambient light halogen	5000 Lux
Max. ambient light sun	10,000 Lux
Compatible mounting bracket	See page 204

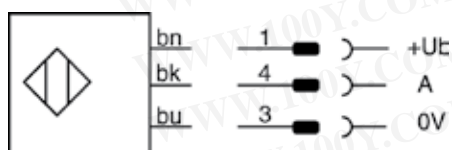
PHOTOELECTRIC

WIRING DIAGRAMS

PNP/NPN Changeover



Emitter



DATA

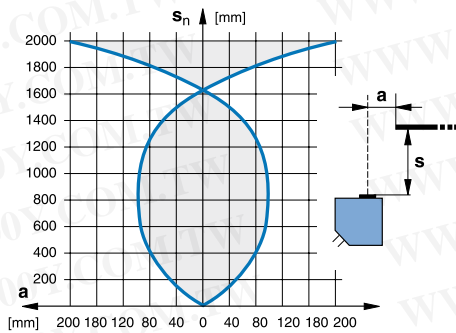
Standard target
No-load supply current
Emitter
Setup
Description
Part reference
Description
Part reference
Description
Part reference
Other types available

CUBIC SMALL

□ 40 X 40 X 19

DIFFUSE SENSOR

2000



400 x 400 mm white

≤ 25 mA

IR LED 880 nm

Potentiometer

PNP Changeover

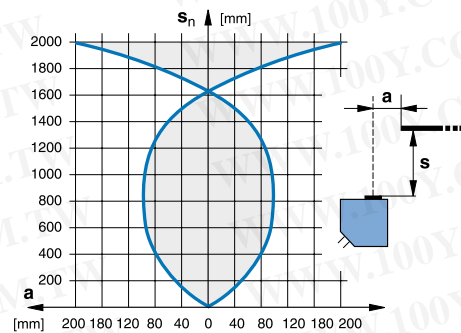
LTK-4040-103

NPN Changeover / PNP/NPN Light-ON + Excess gain

□ 40 X 40 X 19

DIFFUSE SENSOR

2000



400 x 400 mm white

≤ 25 mA

IR LED 880 nm

Potentiometer

PNP Changeover

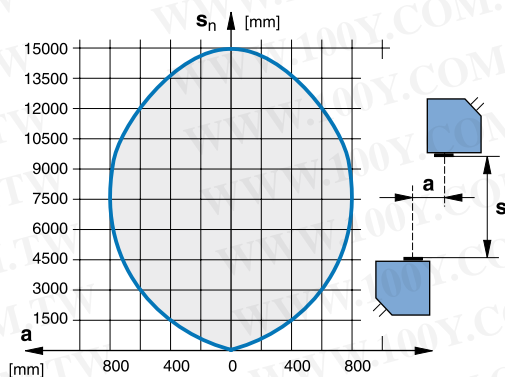
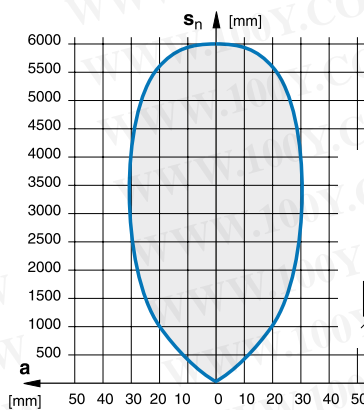
LTS-4040-103



NPN Changeover / PNP/NPN Light-ON + Excess gain

CUBIC SMALL

HOUSING SIZE MM	□ 40 X 40 X 19	□ 40 X 40 X 19
OPERATING PRINCIPLE	REFLEX SENSOR	THROUGH-BEAM SENSOR
SENSING RANGE MM	6000	15,000

PHOTOELECTRIC



DATA		
Standard target / Reflector type	LXR-0000-084 (see page 205)	-
No-load supply current	≤ 20 mA	≤ 15 mA
Emitter	LED red polarized 660 nm	IR LED 880 nm
Setup	Potentiometer	Potentiometer
Description	PNP Changeover	Emitter
Part reference	LRK-4040-103	LLS-4040-000
Description	NPN Changeover	PNP Changeover
Part reference	LRK-4040-101	LLS-4040-003 (receiver)
Description		
Part reference		
Other types available	PNP/NPN Light-ON + Excess gain	NPN Changeover / PNP/NPN Light-ON + Excess gain



OVERVIEW

HOUSING SIZE MM

OPERATING PRINCIPLE

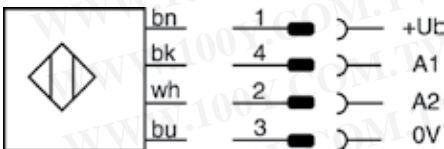
SENSING RANGE MM

	4#50
Housing material	PBTP
Hysteresis	$\leq 10\% s_n$
Degree of protection	IP 67
Supply voltage range	10 ... 36 VDC
Ambient temperature range	-5 ... +55 °C / 23 ... +131 °F
Output current (total of both outputs)	≤ 200 mA
Output voltage drop	≤ 2 V
Max. ambient light halogen	5000 Lux
Max. ambient light sun	10,000 Lux
Compatible mounting bracket	See page 204

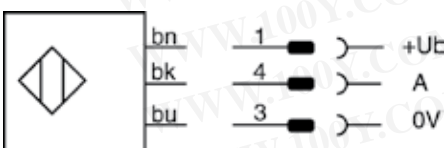
PHOTOELECTRIC

WIRING DIAGRAMS

PNP/NPN Changeover



Emitter



DATA

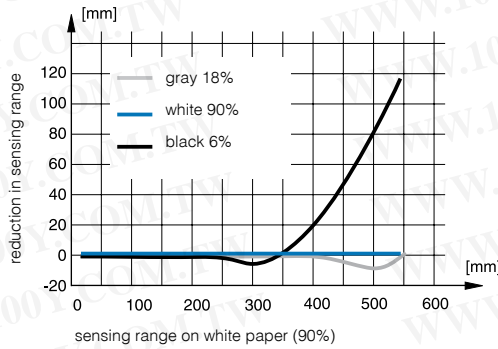
- Standard target
- No-load supply current
- Emitter
- Max. switching frequency
- Switching time
- Sensing face material
- Setup
- Description
- Part reference
- Description
- Part reference
- Description
- Part reference
- Other types available

CUBIC SMALL

□ 40 X 50 X 15

**DIFFUSE SENSOR WITH
BACKGROUND SUPPRESSION**

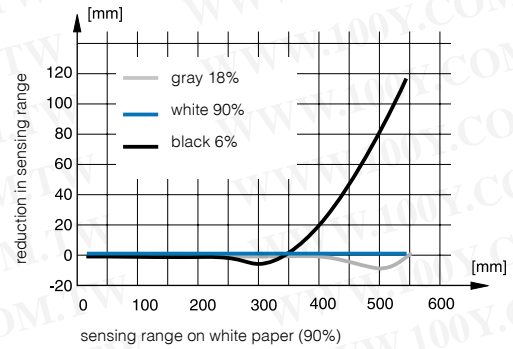
30 ... 500



□ 40 X 50 X 15

**DIFFUSE SENSOR WITH
BACKGROUND SUPPRESSION**

30 ... 500



100 x 100 mm white
 ≤ 30 mA
 LED red 630 nm
 500 Hz
 1 msec
 Glass
 Potentiometer
 PNP Changeover
 LHS-4050-103

NPN Changeover / PNP/NPN Light-ON + Excess gain



100 x 100 mm white
 ≤ 30 mA
 LED red 630 nm
 500 Hz
 1 msec
 Coated plastic
 Potentiometer
 PNP Changeover
 LHS-4150-103

NPN Changeover / PNP/NPN Light-ON + Excess gain

CUBIC SMALL

HOUSING SIZE MM

□ 40 X 50 X 15

□ 40 X 50 X 15

OPERATING PRINCIPLE

DIFFUSE SENSOR

REFLEX SENSOR

SENSING RANGE MM

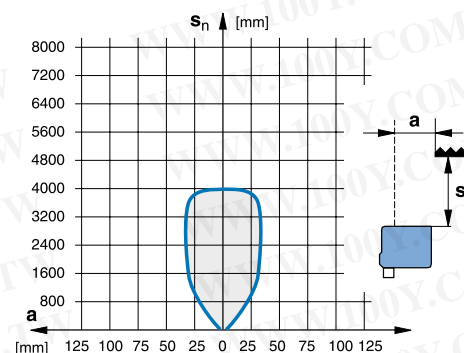
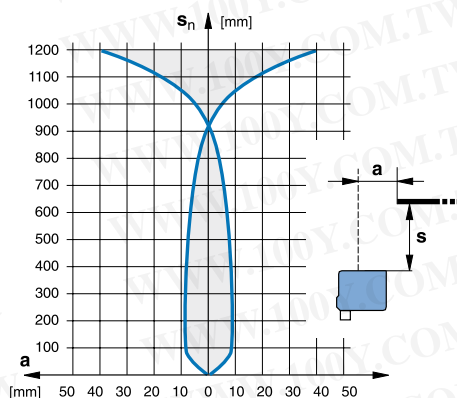
30 ... 1200

4000

PHOTOELECTRIC



AUTOCOLLIMATION



DATA



Standard target / Reflector type

200 x 200 mm white

LXR-0000-084 (see page 205)

No-load supply current

≤ 25 mA

≤ 20 mA

Emitter

LED red 630 nm

LED red polarized 680 nm

Max. switching frequency

4500 Hz

1500 Hz

Switching time

0.5 msec

0.5 msec

Sensing face material

Coated plastic

Glass

Setup

Potentiometer

Potentiometer

Description

PNP Changeover

PNP Changeover

Part reference

LTS-4150-103

LRS-4050-103

Description

Part reference

Description

Part reference

Other types available

NPN Changeover / PNP/NPN Light-ON + Excess gain

NPN Changeover / PNP/NPN Light-ON + Excess gain

CUBIC SMALL

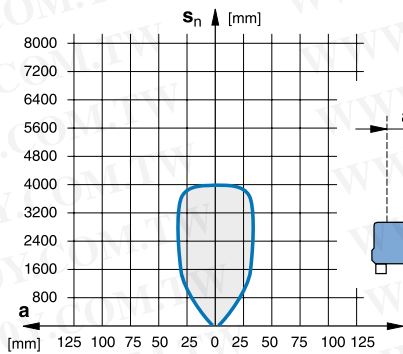
□ 40 X 50 X 15

REFLEX SENSOR

4000



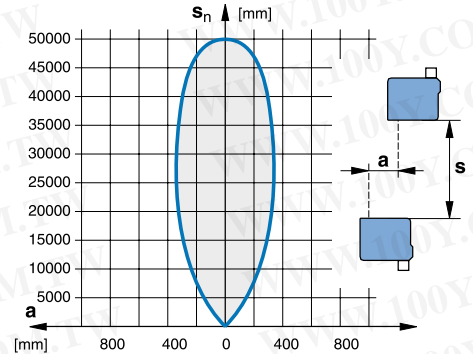
AUTOCOLLIMATION



□ 40 X 50 X 15

THROUGH-BEAM SENSOR

50,000



LXR-0000-084 (see page 205)

≤ 20 mA

LED red polarized 680 nm

1500 Hz

0.5 msec

Coated plastic

Potentiometer

PNP Changeover

LRS-4150-103

NPN Changeover / PNP/NPN Light-ON + Excess gain



-

≤ 15 mA

LED red 630 nm

1500 Hz

0.5 msec

Glass

Potentiometer (receiver)

Emitter

LLS-4050-000

PNP Changeover

LLS-4050-003 (receiver)

NPN Changeover

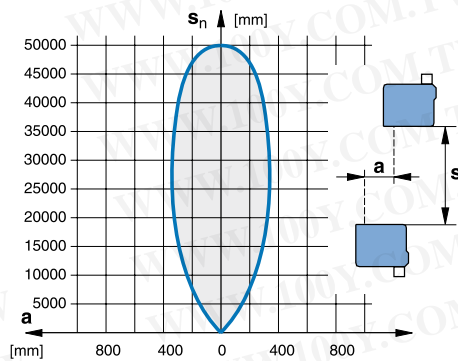
LLS-4050-001 (receiver)


PNP/NPN Light-ON + Excess gain

CUBIC SMALL

HOUSING SIZE MM	□ 40 X 50 X 15
OPERATING PRINCIPLE	THROUGH-BEAM SENSOR
SENSING RANGE MM	50,000

PHOTOELECTRIC



DATA	
Standard target	-
No-load supply current	≤ 15 mA
Emitter	LED red 630 nm
Switching frequency	1500 Hz
Switching time	0.5 msec
Sensing face material	Coated plastic
Setup	Potentiometer (receiver)
Description	Emitter
Part reference	LLS-4150-000
Description	PNP Changeover
Part reference	LLS-4150-003 (receiver)
Description	
Part reference	
Other types available	NPN Changeover / PNP/NPN Light-ON + Excess gain



OVERVIEW

HOUSING SIZE MM

OPERATING PRINCIPLE

SENSING RANGE MM

	4055
Housing material	PBTP
Average positioning tolerance (tol. 3)	± 5 mm
Beam diameter at 35 mm	4 mm
Degree of protection	IP 67
Supply voltage range	10 ... 30 VDC
Ambient temperature range	-5 ... +55 °C / 23 ... +131 °F
Output current	≤ 200 mA
Output voltage drop	≤ 2 V
Switching frequency	4000 Hz
Switching time	0.4 msec
Max. ambient light halogen	5000 Lux
Max. ambient light sun	10,000 Lux
Compatible mounting bracket	See page 204

PHOTOELECTRIC

WIRING DIAGRAM

3xPNP Light-ON / Teach-in



DATA

No-load supply current

Emitter

Description

Part reference

Description

Part reference

Description

Part reference

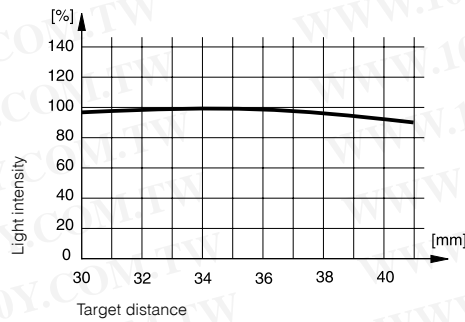
Other types available

CUBIC SMALL

□ 40 X 50 X 15

COLOR SENSOR (DIFFUSE)

30 ... 40



≤ 35 mA

White LED

3 x PNP Light-ON / Teach-in

FTS-4055-303

3 x NPN Light-ON / Teach-in



TOP QUALITY, RUGGED AND COST-EFFECTIVE

CUBIC COMPACT

PHOTOELECTRIC SENSORS

KEY ADVANTAGES

- ✓ Universal sensor series \varnothing 50 x 50 x 18 mm and \varnothing 65 x 83 x 25 mm for rough industrial applications
- ✓ Designed to cost
- ✓ AC/DC models
- ✓ Various connections possible

RANGE OVERVIEW	Distance	Diffuse	Reflex	Through-beam	Background suppression
CUBIC COMPACT	300 mm	p. 197			
	800 mm	p. 197			
	1000 mm				p. 201
	2000 mm	p. 201			
	4000 mm			p. 198	
	6000 mm			p. 202	
	15,000 mm				p. 199

OVERVIEW

HOUSING SIZE MM

OPERATING PRINCIPLE

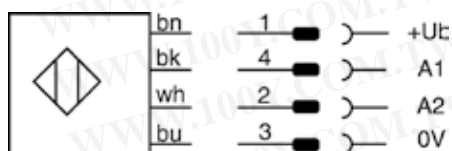
SENSING RANGE MM

	5050
Housing material	ABS
Hysteresis	10 % typ.
Degree of protection	IP 65
Supply voltage range	10 ... 36 VDC
Ambient temperature range	-5 ... +55 °C / 23 ... +131 °F
Output current	≤ 200 mA
Output voltage drop	≤ 2 V
Switching frequency	1000 Hz (DC) / 50 Hz (AC/DC)
Switching time	0.5 msec (DC) / 10 msec (AC/DC)
Max. ambient light halogen	5000 Lux
Max. ambient light sun	10,000 Lux
Compatible mounting bracket	See page 204

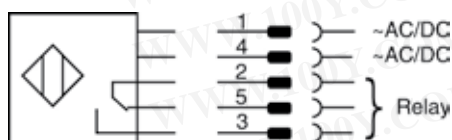
PHOTOELECTRIC

WIRING DIAGRAMS

PNP Changeover



AC/DC Relay



DATA

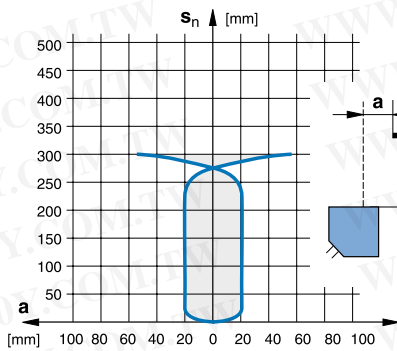
Standard target
No-load supply current
Emitter
Setup
Description
Part reference
Description
Part reference
Description
Part reference
Other types available

CUBIC COMPACT

□ 50 X 50 X 18

DIFFUSE SENSOR

300



100 x 100 mm white

≤ 15 mA

LED red 648 nm

Potentiometer

PNP Changeover

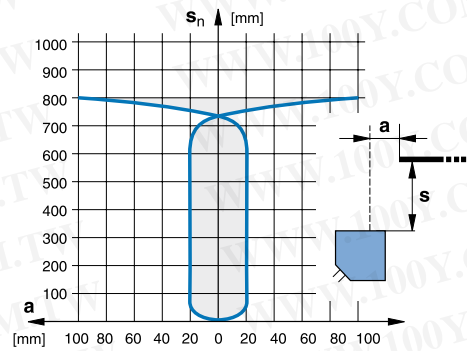
LTK-5050-103-501

PNP/NPN / Changeover / Light-ON+Excess gain / AC/DC relay light-ON

□ 50 X 50 X 18

DIFFUSE SENSOR

800



200 x 200 mm white

≤ 15 mA

LED red 648 nm

Potentiometer

PNP Changeover

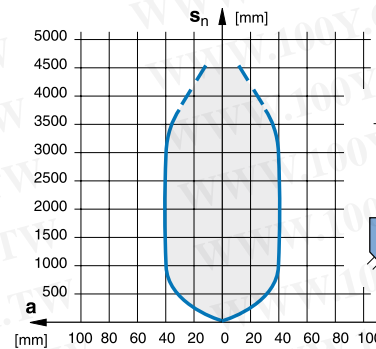
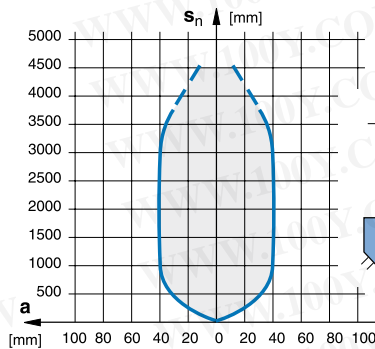
LTK-5050-103



PNP/NPN / Changeover / Light-ON+Excess gain / AC/DC relay light-ON

CUBIC COMPACT

HOUSING SIZE MM	□ 50 X 50 X 18	□ 50 X 50 X 18
OPERATING PRINCIPLE	REFLEX SENSOR	REFLEX SENSOR
SENSING RANGE MM	4000	4000

PHOTOELECTRIC



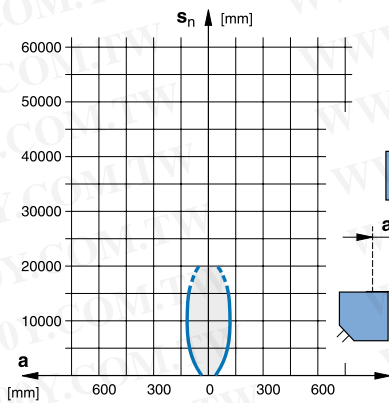
DATA		
Standard target / Reflector type	LXR-0000-084 (see page 205)	LXR-0000-084 (see page 205)
No-load supply current	≤ 15 mA	≤ 15 mA
Emitter	LED red polarized 660 nm	LED red polarized 660 nm
Setup	-	-
Description	PNP Changeover	PNP Changeover
Part reference	LRS-5050-103	LRK-5050-103
Description		AC/DC Relay Light-ON/Dark-ON
Part reference		LRK-5050-115
Description		
Part reference		
Other types available	NPN Changeover / PNP/NPN Light-ON + Excess gain	NPN Changeover / PNP/NPN Light-ON + Excess gain

CUBIC COMPACT

□ 50 X 50 X 18

THROUGH-BEAM SENSOR

15,000



≤ 10 mA

LED red 660 nm

Emitter

LLK-5050-000

PNP Changeover

LLK-5050-003 (receiver)

PNP/NPN / Changeover / Light-ON+Excess gain / AC/DC relay light-ON

OVERVIEW

HOUSING SIZE MM

OPERATING PRINCIPLE

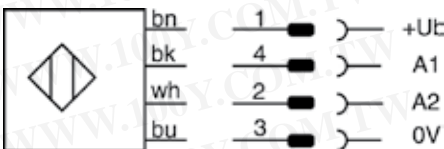
SENSING RANGE MM

	6080
Housing material	PBTP (Crastin)
Hysteresis	10 % typ.
Degree of protection	IP 67
Supply voltage range	10 ... 36 VDC
Ambient temperature range	-5 ... +55 °C / 23 ... +131 °F
Output current	200 mA
Output voltage drop	2 V
Max. ambient light halogen	5000 Lux
Max. ambient light sun	10,000 Lux
Compatible mounting bracket	See page 204

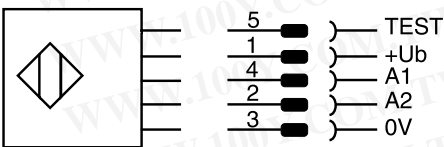
PHOTOELECTRIC

WIRING DIAGRAMS

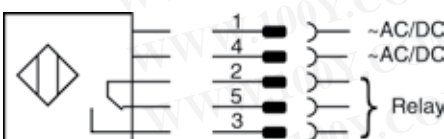
PNP Changeover



PNP timer



AC/DC Relay



DATA

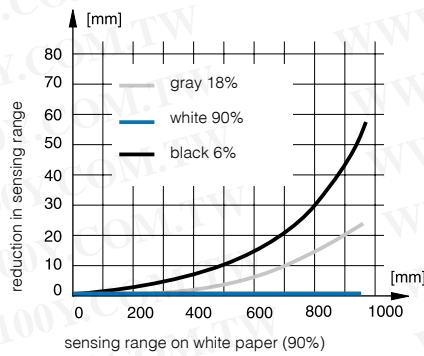
Standard target
No-load supply current
Emitter
Setup
Description
Part reference
Description
Part reference
Description
Part reference
Other types available

CUBIC COMPACT

□ 65 X 83 X 25

**DIFFUSE SENSOR WITH
BACKGROUND SUPPRESSION**

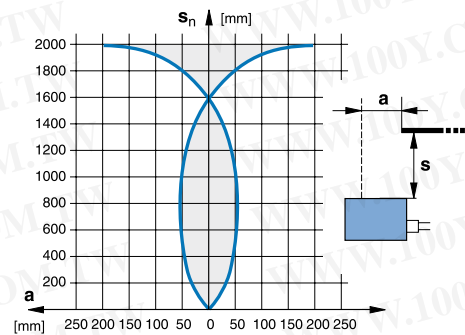
50 ... 1000



□ 65 X 83 X 25

DIFFUSE SENSOR

2000



200 x 200 mm white

≤ 50 mA

IR LED 880 nm

Potentiometer

PNP Changeover

LHS-6080-103

AC/DC relay / timer Light/Dark-ON switchable

LHS-6080-165

-



400 x 400 mm white

≤ 20 mA

IR LED 880 nm

Potentiometer

PNP Changeover

LTS-6080-103

PNP timer Light/Dark-ON switchable

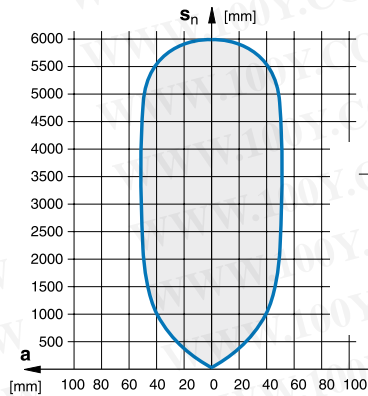
LTS-6080-153


-

CUBIC COMPACT

HOUSING SIZE MM	□ 65 X 83 X 25
OPERATING PRINCIPLE	REFLEX SENSOR
SENSING RANGE MM	6000

PHOTOELECTRIC

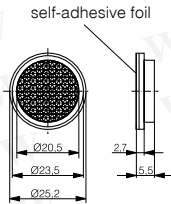


DATA	
	
Reflector type	LXR-0000-084 (see page 205)
No-load supply current	≤ 30 mA
Emitter	LED red polarized 660 nm
Setup	Potentiometer
Description	PNP Changeover
Part reference	LRS-6080-104
Description	
Part reference	
Description	
Part reference	
Other types available	-



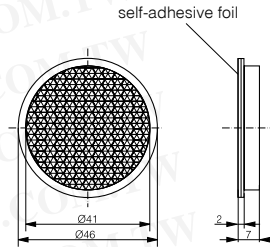
REFLECTOR TYPE 1

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



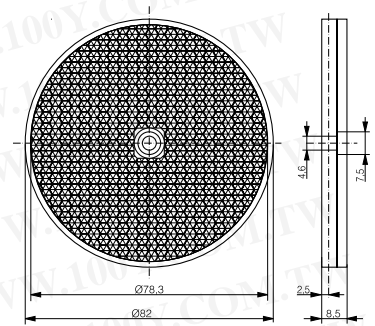
REFLECTOR TYPE 2

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



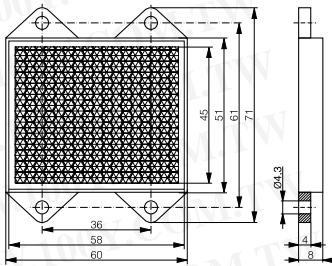
REFLECTOR TYPE 3

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



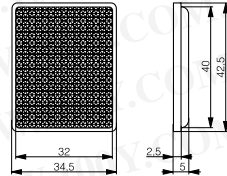
REFLECTOR TYPE 12

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



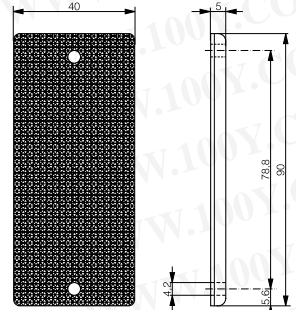
REFLECTOR TYPE 13

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



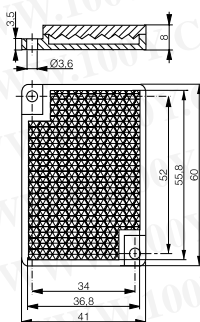
REFLECTOR TYPE 14

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



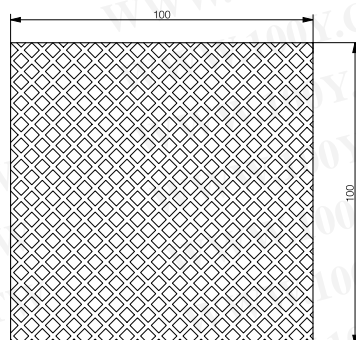
REFLECTOR TYPE 15

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



REFLECTIVE FOIL (SELF-ADHESIVE)

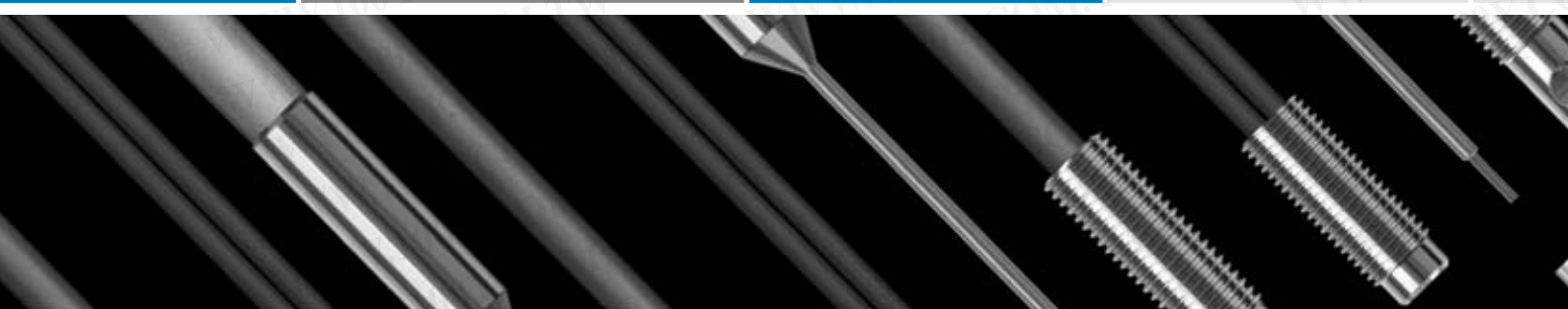
For all reflex sensors (IMOS IRF 6000)
Part reference: **LXR-0000-000**



PROGRAM OVERVIEW

FAMILY	PRODUCT RANGE	SUBMINIATURE					
OPTICAL FIBERS	CYLINDRICAL						
	HOUSING SIZE	No sensing head	Ø 2.3	M3	Ø 3.2	Ø 4	
	SYNTHETIC FIBERS	Diffuse	p.221	p.221	p.221		
		Through-beam	p.224		p.224	p.224	
		Cylindrical light beam					p.227
		Background suppression					
		Liquid level monitoring					
		Low and high temperatures					
		Multi-beam detection					
	GLASS FIBERS	Diffuse					
Through-beam							

FAMILY	PRODUCT RANGE	MINIATURE	SMALL
AMPLIFIERS	CUBIC		
	SERIES	3030	3060
	HOUSING SIZE	30 x 30 x 15 mm	31 x 60 x 10 mm
	MAX. DISTANCE	120 mm	200 mm
	SETUP	Potentiometer	Potentiometer
	FOR USE WITH SYNTHETIC FIBERS	p.211-212	p.217
	FOR USE WITH GLASS FIBERS	p.211-212	

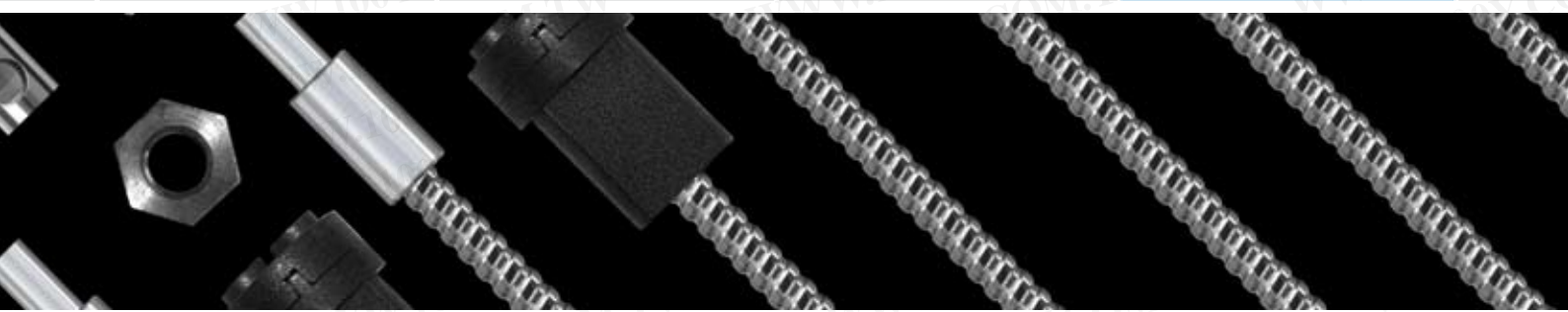


SUBMINIATURE		MINIATURE				SMALL	
CYLINDRICAL						CUBIC	
M4	M5	Ø 6	M6	Ø 8	M8	□ 27 x 30	□ 18 x 32
			p.222-223				
p.225-226			p.226				
	p.227						
					p.229	p.228	
p.230			p.230				
							p.229
		p.233-234	p.238	p.233-234			
p.238		p.235, 237		p.236-237			

SMALL

CUBIC

3065	3066	3360	4040
31 x 60 x 10 mm	31 x 60 x 10 mm	31 x 60 x 10 mm	40 x 40 x 19 mm
200 mm	200 mm	100 mm	150 mm
Teach-in	Teach / IO-Link	Potentiometer	Potentiometer
p.215-216	p.216-217	p.215	p.219

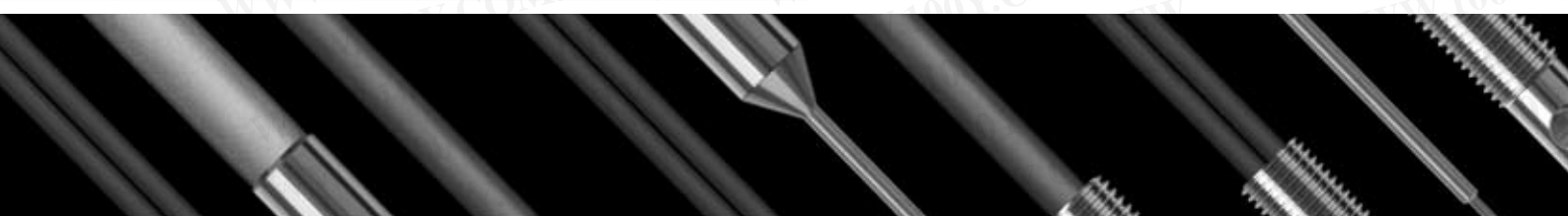


PROGRAM OVERVIEW

HOUSING SIZE	SENSING RANGE														PAGE
	12 mm	20 mm	45 mm	60 mm	70 mm	80 mm	140 mm	150 mm	200 mm	260 mm	550 mm	700 mm	900 mm	1800 mm	

SYNTHETIC OPTICAL FIBERS

DIFFUSE SENSING		
Double fiber (10 m)	60 ... 200 mm	221
∅ 2.3 miniature	20 ... 70 mm	221
M3 miniature	20 ... 70 mm	221
M6 standard	60 ... 200 mm	222-223
M6 flexible	45 ... 150 mm	222-223
M6 luminous	80 ... 260 mm	222
M6 coaxial	60 ... 200 mm	223
THROUGH-BEAM SENSING		
Indiv. fiber (10 m)	200 ... 700 mm	224
M3 miniature	60 ... 200 mm	224
∅ 3.2 standard 90°	60 ... 200 mm	224
M4 standard	200 ... 700 mm	225
M4 flexible	150 ... 550 mm	225-226
M4 luminous	250 ... 900 mm	225
M6 standard 90°	550 ... 1800 mm	226
CYLINDRICAL LIGHT BEAM		
∅ 4 miniature	60 ... 140 mm	227
M5 miniature	60 ... 140 mm	227
BACKGROUND SUPPRESSION		
27 x 30 mm flexible 90°	12 mm	228
27 x 30 mm flexible	12 mm	228
LIQUID LEVEL MONITORING		
M8		229
LOW & HIGH TEMPERATURES		
M4	150 ... 550 mm	230
M6	45 ... 150 mm	230
MULTI-BEAM		
18 x 32 mm	45 ... 150 mm	229



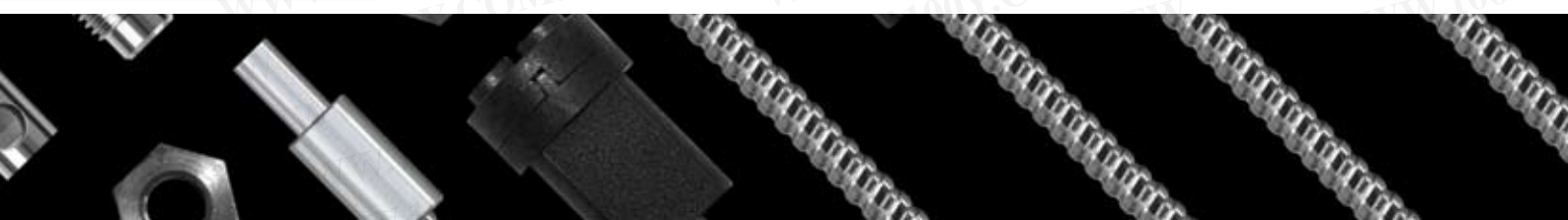
HOUSING SIZE	SENSING RANGE													PAGE
	5 mm	15 mm	30 mm	50 mm	60 mm	120 mm	150 mm	200 mm	250 mm	500 mm	800 mm	1500 mm		

GLASS OPTICAL FIBERS (FOR SERIES 4040 SENSORS)

AXIAL DIFFUSE SENSING		
∅ 6 mm	5 mm	233
	15 mm	233
	15 mm	233
∅ 8 mm	50 mm	233
	150 mm	233
RADIAL DIFFUSE SENSING		
∅ 6 mm	15 mm	234
∅ 8 mm	30 mm	234
	150 mm	234
AXIAL THROUGH-BEAM SENSING		
∅ 6 mm	50 mm	235
	200 mm	235
	200 mm	235
∅ 8 mm	800 mm	236
	1500 mm	236
RADIAL THROUGH-BEAM SENSING		
∅ 6 mm	200 mm	237
∅ 8 mm	800 mm	237
	1500 mm	237

GLASS OPTICAL FIBERS (FOR SERIES 3030/3031 SENSORS - connection as with synthetic fibers)

DIFFUSE AND THROUGH-BEAM SENSING		
M6 diffuse sensing	60 ... 120 mm	238
M4 thru-beam sensing	250 ... 500 mm	238



OVERVIEW

HOUSING SIZE MM

OPERATING PRINCIPLE

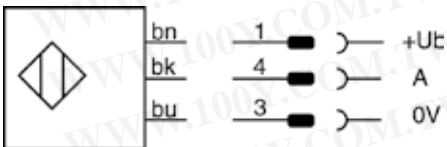
SENSING RANGE MM

	303#
Housing material	PBTP (Crastin)
Hysteresis	10 % typ.
Degree of protection	IP 67
Supply voltage range	10 ... 36 VDC
Ambient temperature range	-25 ... +55 °C / -13 ... +131 °F
Output current (total both outputs)	≤ 200 mA
Output voltage drop	≤ 2 V
Max. ambient light halogen	5000 Lux
Max. ambient light sun	10,000 Lux
Setup	Potentiometer
Compatible mounting bracket	See page 204

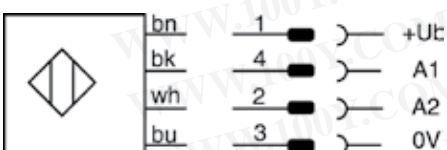
PHOTOELECTRIC

WIRING DIAGRAMS

PNP Light/Dark-ON / NPN Light-ON



PNP/NPN Changeover



DATA

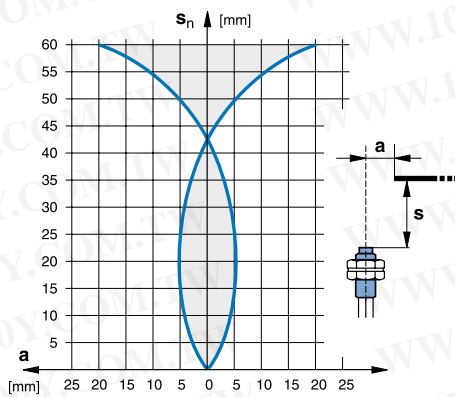
Standard target
No-load supply current
Emitter
Max. switching frequency
Switching time
Description
Part reference
Description
Part reference
Description
Part reference
Other types available

CUBIC MINIATURE

□ 30 X 30 X 15

FIBER-OPTIC AMPLIFIER

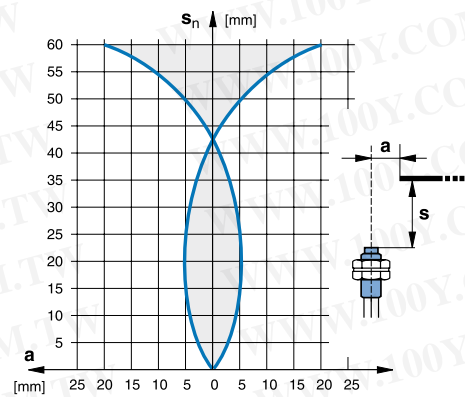
60



□ 30 X 30 X 15

FIBER-OPTIC AMPLIFIER

60



100 x 100 mm white

≤ 15 mA

LED red 660 nm

1000 Hz

0.5 msec

PNP Light-ON

LFS-3031-303

PNP Dark-ON

LFS-3031-304

NPN Light-ON

LFS-3031-301

NPN Dark-ON



100 x 100 mm white

≤ 15 mA

LED red 660 nm

1000 Hz

0.5 msec

PNP Light-ON

LFK-3031-303

PNP Dark-ON

LFK-3031-304

NPN Light-ON

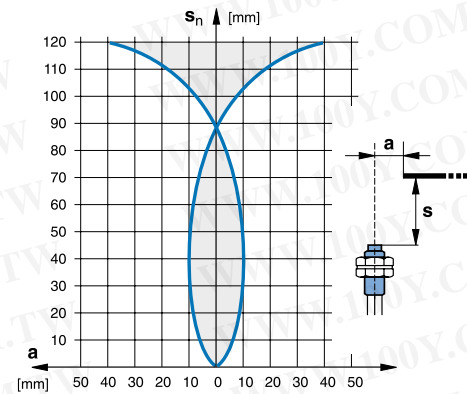
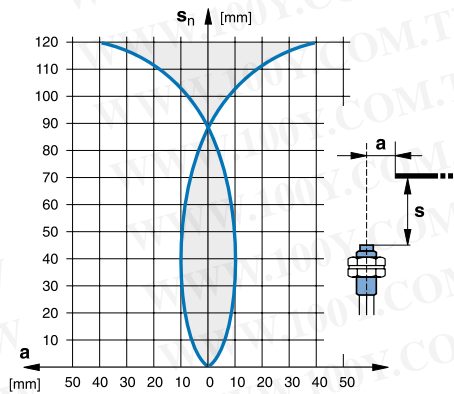
LFK-3031-301



NPN Dark-ON

CUBIC MINIATURE

HOUSING SIZE MM	□ 30 X 30 X 15	□ 30 X 30 X 15
OPERATING PRINCIPLE	FIBER-OPTIC AMPLIFIER	FIBER-OPTIC AMPLIFIER
SENSING RANGE MM	120	120

PHOTOELECTRIC



DATA		
Standard target	100 x 100 mm white	100 x 100 mm white
No-load supply current	≤ 20 mA	≤ 20 mA
Emitter	LED red 660 nm	LED red 660 nm
Max. switching frequency	1000 Hz	1000 Hz
Switching time	0.5 msec	0.5 msec
Description	PNP Changeover	PNP Changeover
Part reference	LFS-3030-103	LFK-3030-103
Description		
Part reference		
Description		
Part reference		
Other types available	NPN Changeover / PNP/NPN Light-ON + Excess gain	NPN Changeover / PNP/NPN Light-ON + Excess gain



OVERVIEW

HOUSING SIZE MM

OPERATING PRINCIPLE

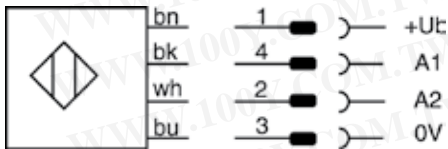
SENSING RANGE MM

	3#6#
Housing material	PBTP (Crastin)
Hysteresis	10 % typ. / ≤ 5 % (3066)
Degree of protection	IP 64
Supply voltage range	10 ... 30 VDC
Ambient temperature range	-25...+55 °C/-13...+131 °F // -5...+55 °C/+23... +131 °F (3066)
Output current	≤ 200 mA
Output voltage drop	≤ 2 V
Max. ambient light halogen	5000 Lux
Max. ambient light sun	10,000 Lux
Compatible mounting bracket	See page 204

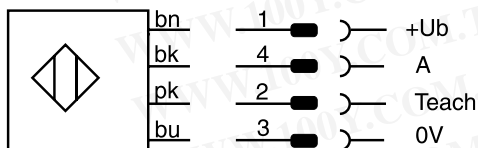
PHOTOELECTRIC

WIRING DIAGRAMS

PNP Light/Dark-ON switchable



PNP Light/Dark-ON with teach-in



DATA

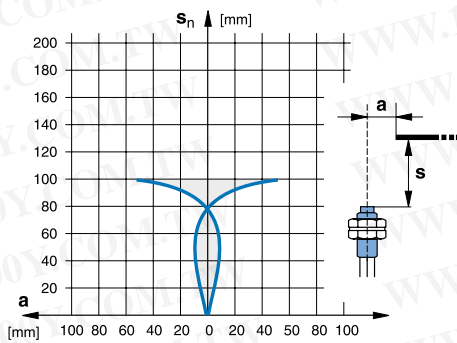
Standard target
No-load supply current
Emitter
Max. switching frequency
Setup
Description
Part reference
Description
Part reference
Description
Part reference
Other types available

CUBIC SMALL

□ 31 X 60 X 10

FIBER-OPTIC AMPLIFIER - BLUE LIGHT

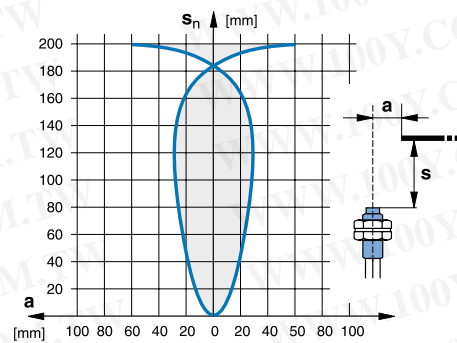
100



□ 31 X 60 X 10

FIBER-OPTIC AMPLIFIER

200



100 x 100 mm white

≤ 15 mA

LED blue 465 nm

1500 Hz

Potentiometer

PNP Light-ON/Dark-ON switchable + Excess gain

LFS-3360-103

NPN Light-ON/Dark-ON + Excess gain



100 x 100 mm white

≤ 25 mA

LED red 680 nm

1500 Hz

Teach-in

PNP Light-ON/Dark-ON switchable + Excess gain

LFK-3065-103

NPN / Blue light devices / Increased switching frequency

CUBIC SMALL

HOUSING SIZE MM

□ 31 X 60 X 10

□ 31 X 60 X 10

OPERATING PRINCIPLE

FIBER-OPTIC AMPLIFIER

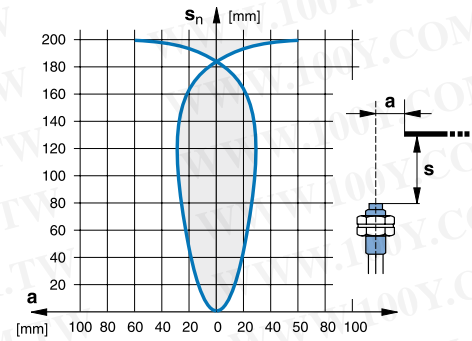
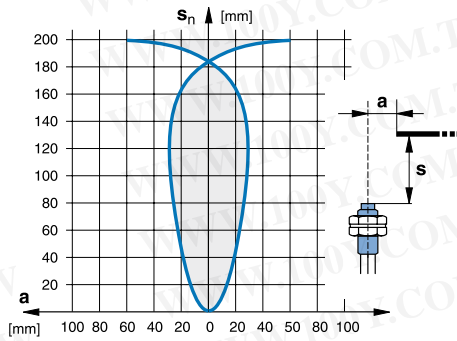
FIBER-OPTIC AMPLIFIER

SENSING RANGE MM

200

200

PHOTOELECTRIC



DATA



Standard target	100 x 100 mm white
No-load supply current	≤ 25 mA
Emitter	LED red 680 nm
Max. switching frequency	1500 Hz
Setup	Teach-in
Description	PNP Light-ON/Dark-ON switchable + Excess gain
Part reference	LFS-3065-103
Description	
Part reference	
Description	
Part reference	
Other types available	NPN / Blue light devices / Increased switching frequency

Standard target	100 x 100 mm white
No-load supply current	≤ 30 mA
Emitter	LED red 680 nm
Max. switching frequency	4000 Hz
Setup	Teach-in
Description	PNP Light-ON/Dark-ON switchable
Part reference	LFS-3066-103
Description	
Part reference	
Description	
Part reference	
Other types available	NPN Light-ON/Dark-ON switchable

CUBIC SMALL

□ 31 X 60 X 10

FIBER-OPTIC AMPLIFIER

200

□ 31 X 60 X 10

FIBER-OPTIC AMPLIFIER

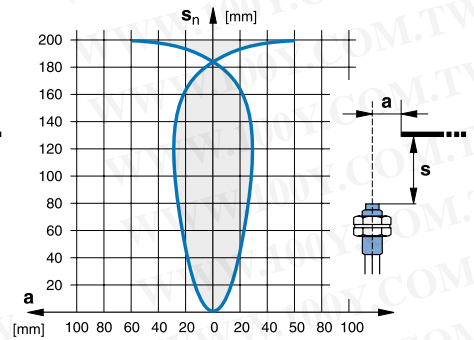
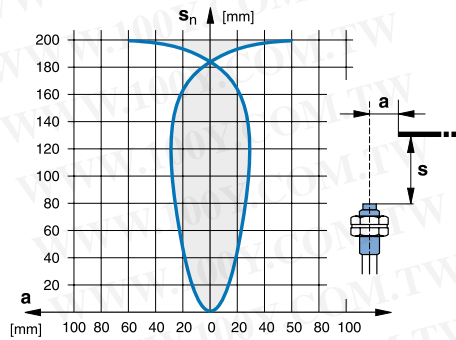
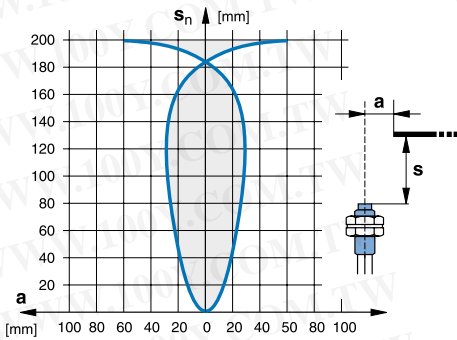
200

□ 31 X 60 X 10

FIBER-OPTIC AMPLIFIER

200

 IO-Link



100 x 100 mm white

≤ 30 mA

LED red 680 nm

4000 Hz

Teach-in

PNP Light-ON/Dark-ON switchable + IO Link
LFS-3066-403



100 x 100 mm white

≤ 15 mA

LED red 680 nm

1500 Hz

Potentiometer

PNP Light-ON/Dark-ON switchable + Excess gain
LFK-3060-103



100 x 100 mm white

≤ 15 mA

LED red 680 nm

1500 Hz

Potentiometer

PNP Light-ON/Dark-ON switchable + Excess gain
LFS-3060-103

-

NPN Light-ON/Dark-ON switchable + Excess gain

NPN Light-ON/Dark-ON switchable + Excess gain

OVERVIEW

HOUSING SIZE MM

OPERATING PRINCIPLE

SENSING RANGE MM

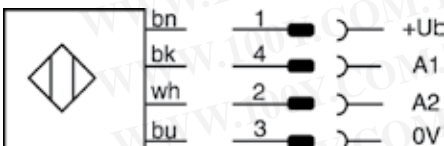
4040

Housing material	PBTP (Crastin)
Hysteresis	10 % typ.
Degree of protection	IP 67
Supply voltage range	10 ... 36 VDC
Ambient temperature range	-25 ... +55 °C / -13 ... +131 °F
Output current (total of both outputs)	≤ 200 mA
Output voltage drop	≤ 2 V
Switching frequency	≤ 1000 Hz
Switching time	0.5 msec
Max. ambient light halogen	5000 Lux
Max. ambient light sun	10,000 Lux
Compatible mounting bracket	See page 204

PHOTOELECTRIC

WIRING DIAGRAM

PNP/NPN Changeover



DATA

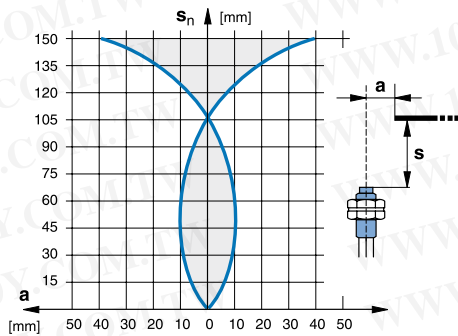
Standard target
No-load supply current
Emitter
Setup
Description
Part reference
Description
Part reference
Description
Part reference
Other types available

CUBIC SMALL

□ 40 X 40 X 19

FIBER-OPTIC AMPLIFIER

150



100 x 100 mm white

≤ 20 mA

IR LED 880 nm

Potentiometer

PNP Changeover

LFS-4040-103

NPN Changeover / PNP/NPN Light-ON + Excess gain

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* (-13 ... +158°F / -67 ... +221°F*)
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 / low & high temperature	0.2 dB / m max. at 660 nm
flexible / coaxial / multi-beam	0.3 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

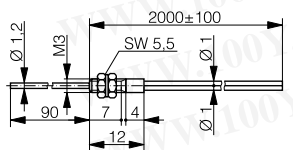
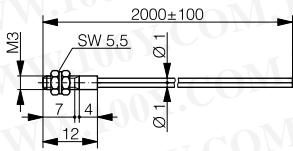
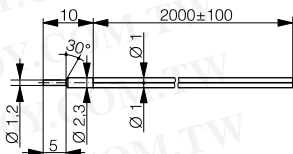
* LFP-1002-020-002 / LFP-2002-020-002

** LFP-1108 / 1109 / 1011-020

SYNTHETIC OPTICAL FIBERS

DIFFUSE SENSING

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, \varnothing 2.2 mm		
Inner fiber	\varnothing 1.0 mm		
Special characteristics	Long sensing range		

Housing size: \varnothing 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, \varnothing 1 mm*		
Inner fiber	\varnothing 0.5 mm		
Special characteristics	Highest resolution		
* Adaptor included in delivery package			

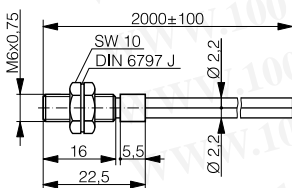
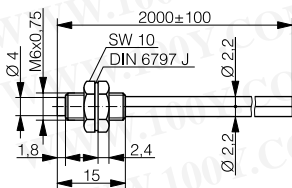
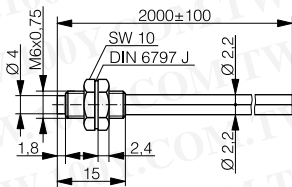
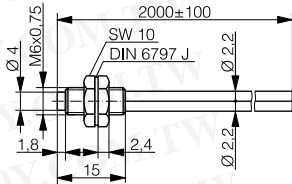
Housing size: M3		Miniature	
Part reference	LFP-1001-020		
Sensing range	with series 3030	40 mm	(with 2 m fiber length)
	with series 3031	20 mm	(with 2 m fiber length)
	with series 3060/65/66	70 mm	(with 2 m fiber length)
Outside fiber	1 separable double fiber, \varnothing 1 mm*		
Inner fiber	\varnothing 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, \varnothing 1 mm*		
Inner fiber	\varnothing 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

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, Ø 2.2 mm	
Inner fiber	Ø 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, Ø 2.2 mm	
Inner fiber	151 x Ø 75 µm	
Special characteristics	Very small bending radius	

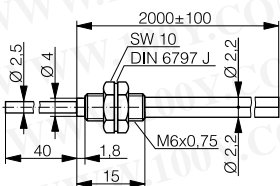
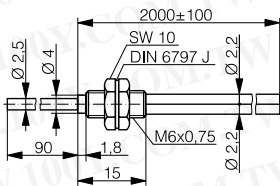
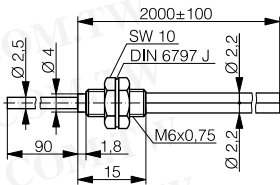
Housing size: M6	Luminous (enhanced brightness)	
Part reference	LFP-1202-020	
Sensing range	with series 3030	160 mm (with 2 m fiber length)
	with series 3031	80 mm (with 2 m fiber length)
	with series 3060/65/66	260 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, Ø 2.2 mm	
Inner fiber	Ø 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, Ø 2.2 mm	
Inner fiber	Ø 1.0 mm	
Special characteristics	Coaxial arrangement of fibers, thus axially symmetric beam	

SYNTHETIC OPTICAL FIBERS

DIFFUSE SENSING

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, \varnothing 2.2 mm
Inner fiber	\varnothing 1.0 mm
Special characteristics	Sensing head with bendable light-outlet tube for ease of positioning Long sensing range

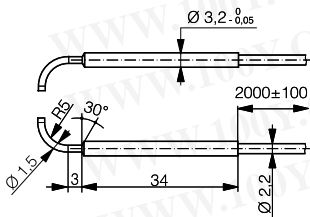
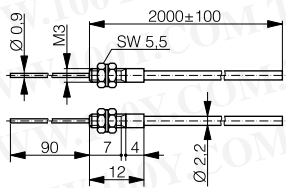
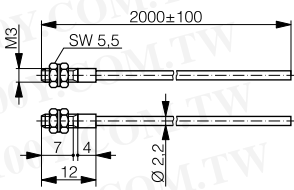
Housing size: M6	Flexible
Part reference	LFP-1105-020
Sensing range	with series 3030 90 mm (with 2 m fiber length) with series 3031 45 mm (with 2 m fiber length) with series 3060/65/66 150 mm (with 2 m fiber length)
Outside fiber	1 separable double fiber, \varnothing 2.2 mm
Inner fiber	151 x \varnothing 75 μ m
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, \varnothing 2.2 mm
Inner fiber	\varnothing 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

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, thru-beam sensing)
	with series 3031	200 mm (2 m fiber, thru-beam sensing)
	with series 3060/65/66	700 mm (2 m fiber, thru-beam sensing)
Outside fiber	individual fiber, Ø 2.2 mm	
Inner fiber	Ø 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, Ø 2.2 mm	
Inner fiber	Ø 0.5 mm	
Special characteristics	Highest resolution	

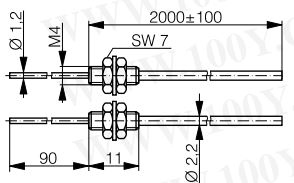
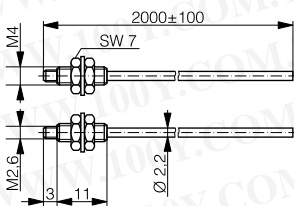
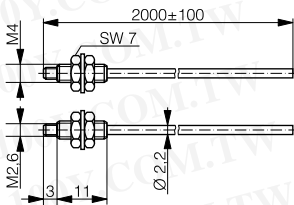
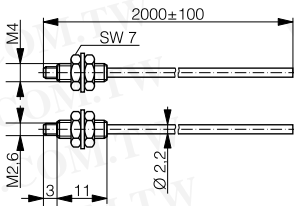
Housing size: M3	Miniature	
Part reference	LFP-2003-020	
Sensing range	with series 3030	120 mm (with 2 m fiber length)
	with series 3031	60 mm (with 2 m fiber length)
	with series 3060/65/66	200 mm (with 2 m fiber length)
Outside fiber	2 individual fibers, Ø 2.2 mm	
Inner fiber	Ø 0.5 mm	
Special characteristics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

Housing size: Ø 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, Ø 2.2 mm	
Inner fiber	Ø 1.0 mm	
Special characteristics	Lateral sensing	

SYNTHETIC OPTICAL FIBERS

THROUGH-BEAM SENSING

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, Ø 2.2 mm	
Inner fiber	Ø 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, Ø 2.2 mm	
Inner fiber	151 x Ø 75 µm	
Special characteristics	Very small bending radius	

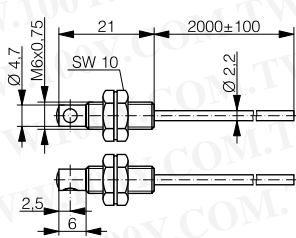
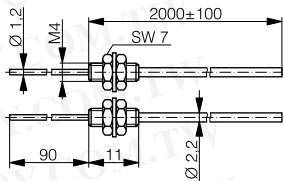
Housing size: M4		Luminous (enhanced brightness)
Part reference	LFP-2202-020	
Sensing range	with series 3030	500 mm (with 2 m fiber length)
	with series 3031	250 mm (with 2 m fiber length)
	with series 3060/65/66	900 mm (with 2 m fiber length)
Outside fiber	2 individual fibers, Ø 2.2 mm	
Inner fiber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

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, Ø 2.2 mm	
Inner fiber	151 x Ø 75 µm	
Special characteristics	Sensing head with bendable light-outlet tube for ease of positioning	
	Very small bending radius	

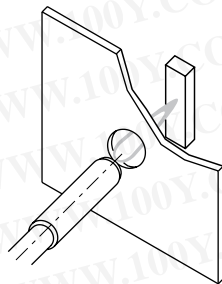
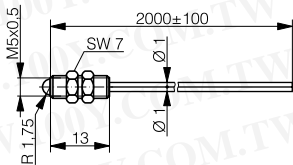
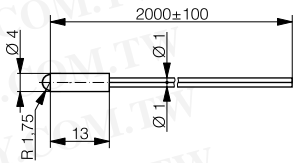
Housing size: M6	Standard 90°	
Part reference	LFP-2005-020	
Sensing range	with series 3030	1100 mm (with 2 m fiber length)
	with series 3031	550 mm (with 2 m fiber length)
	with series 3060/65/66	1800 mm (with 2 m fiber length)
Outside fiber	2 individual fibers, Ø 2.2 mm	
Inner fiber	Ø 1.0 mm	
Special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

SYNTHETIC OPTICAL FIBERS

APPLICATION-SPECIFIC CYLINDRICAL LIGHT BEAM

Dimensions: light emission on the left

- ✓ 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

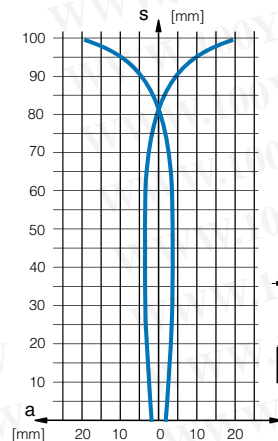


Detection through holes and gaps

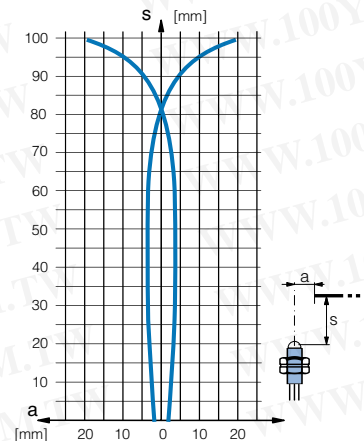
Housing size: $\varnothing 4$ mm		Miniature / spherical optics	
Part reference	LFP-1006-020		
Sensing range	with series 3030	100 mm (with 2 m fiber length)	
	with series 3031	60 mm (with 2 m fiber length)	
	with series 3060/65/66	140 mm (with 2 m fiber length)	
Outside fiber	1 separable double fiber,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

Response curves (with series 3030):



LFP-1006-020

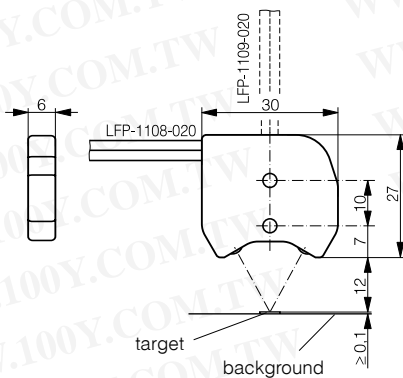


LFP-1007-020

SYNTHETIC OPTICAL FIBERS

APPLICATION-SPECIFIC BACKGROUND SUPPRESSION

- ✓ 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



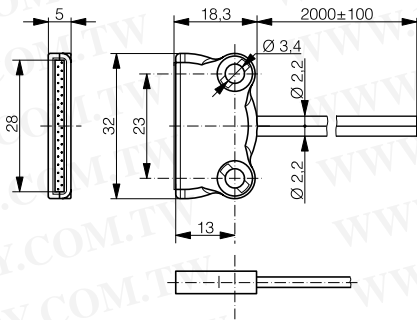
Housing size: □ 27 x 30	Background suppression / flexible / 90°
Part reference	LFP-1108-020
Operating distance	12 mm
Outside fiber	2 separate fibers, Ø 2.2 mm
Inner fiber	151 x Ø 75 µm
Special characteristics	Lateral sensing
	Detectable height difference: 0.1 mm
	Minimum detectable target size: 0.15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

SYNTHETIC OPTICAL FIBERS

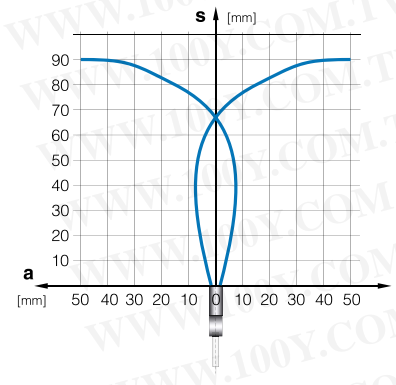
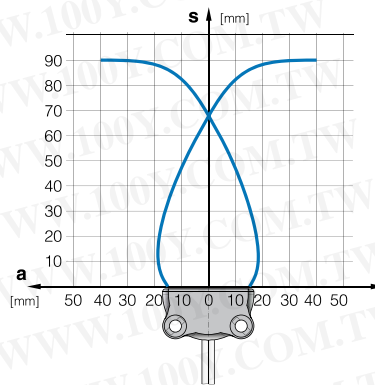
APPLICATION-SPECIFIC MULTI-BEAM

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



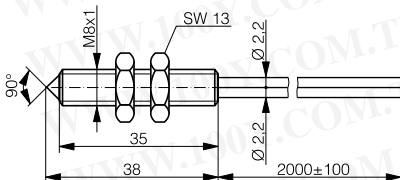
Housing size: □ 18 x 32	Multi-beam	
Part reference	LFP-1011-020	
Sensing range	with series 3030	90 mm (with 2 m fiber length)
	with series 3031	45 mm (with 2 m fiber length)
	with series 3060/65/66	150 mm (with 2 m fiber length)
Outside fiber	2 separate fibers, Ø 2.2 mm	
Inner fiber	16 x Ø 0.265 mm	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

Response curves (with series 3030):



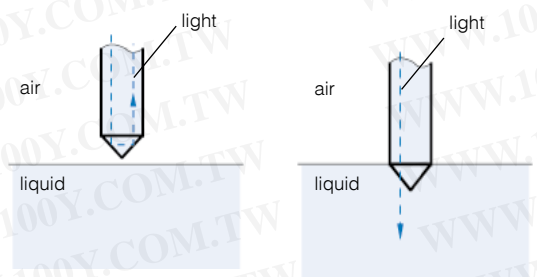
APPLICATION-SPECIFIC LIQUID LEVEL MONITORING

- ✓ 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)



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

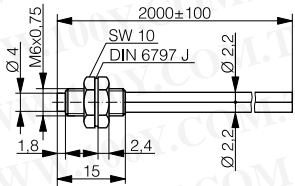
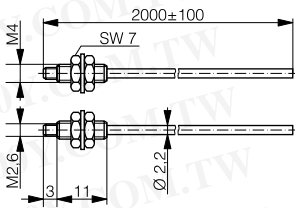
Operating principle:



SYNTHETIC OPTICAL FIBERS

APPLICATION-SPECIFIC LOW & HIGH TEMPERATURES

Dimensions: light emission on the left



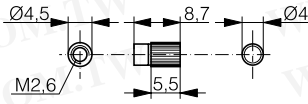
- ✓ Diffuse (LFP-1002-020-002) and through-beam (LFP-2002-020-002) fibers
- ✓ Extended temperature range : -55 ... +105°C / -67 ... +221°F
- ✓ Very small dimensions
- ✓ Long sensing ranges
- ✓ Small bending radii
- ✓ Can be cut on site

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, Ø 2.2 mm	
Inner fiber	Ø 1.0 mm	
Special characteristics	Extended temperature range of -55...+105°C / -67...+221°F	

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, Ø 2.2 mm	
Inner fiber	Ø 1.0 mm	
Special characteristics	Extended temperature range of -55...+105°C / -67...+221°F	

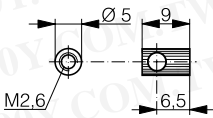
SYNTHETIC OPTICAL FIBERS

ACCESSORIES



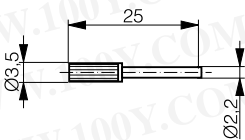
Axial front lens for increased sensing ranges

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	



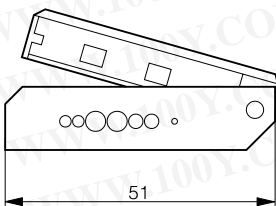
90° front lens for increased sensing ranges

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
		32 ... +158°F
	Wound brass sleeve	-25 ... +160°C
		-13 ... +320°F
	Silicone sleeve	-25 ... +150°C
		-13 ... +302°F
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	0.01 dB / m max. at 880 nm	
Angle of incidence	See data sheets	

Depending on the type involved, glass optical fibers consist of 200 to 5000 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 +160°C (+320°F), 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 (+302°F), and where mechanical strain relief is required.

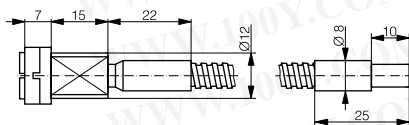
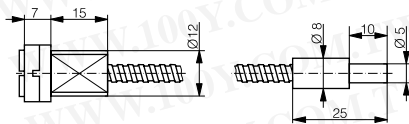
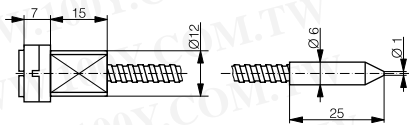
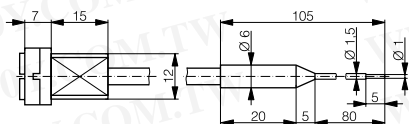
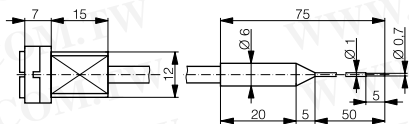
The sensing heads are available with straight or right-angle light outlets. The range comprises models for use as diffuse sensors (emitting and receiving fiber bundles in the same sleeve) and as through-beam sensors (the fiber bundles are in separate sleeves). In order to cover various application needs, 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.

GLASS OPTICAL FIBERS

AXIAL DIFFUSE SENSING

length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)

Dimensions: light emission on the right



Housing size: \varnothing 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, \varnothing 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: \varnothing 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, \varnothing 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: \varnothing 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, \varnothing 4.7 mm
Min. bending radius	23 mm
Max. tensile load	20 N

Housing size: \varnothing 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, \varnothing 4.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N

Housing size: \varnothing 8 mm

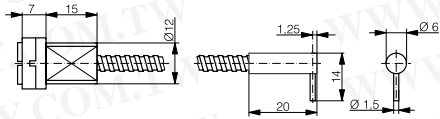
Part reference	LFG-1030-###
Sensing range	with series 4040 150 mm
Special characteristics	For long sensing range
Sleeve	Wound sleeve of chrome-plated brass, \varnothing 6.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N

GLASS OPTICAL FIBERS

RADIAL DIFFUSE SENSING

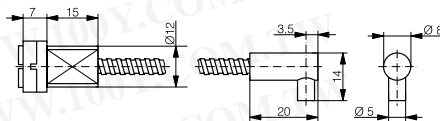
length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)

Dimensions: light emission on the right



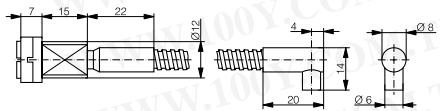
Housing size: \varnothing 6 mm

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, \varnothing 4.7 mm
Min. bending radius	23 mm
Max. tensile load	20 N



Housing size: \varnothing 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, \varnothing 4.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N



Housing size: \varnothing 8 mm

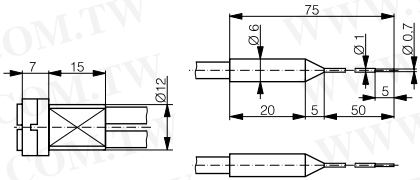
Part reference	LFG-2030-###
Sensing range	with series 4040 150 mm
Special characteristics	For long sensing range
Leg length	14 mm
Sleeve	Wound sleeve of chrome-plated brass, \varnothing 6.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N

GLASS OPTICAL FIBERS

AXIAL THROUGH-BEAM SENSING

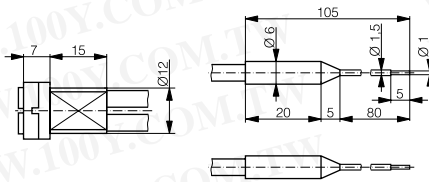
length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)

Dimensions: light emission on the right



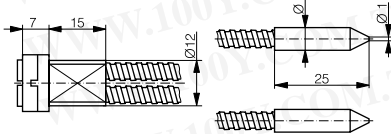
Housing size: Ø 6 mm

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, Ø 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: Ø 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, Ø 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: Ø 6 mm

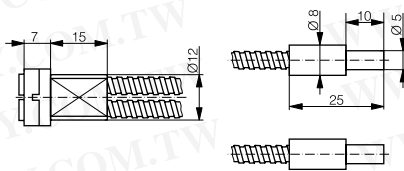
Part reference	LFG-3010-###
Sensing range	with series 4040 200 mm
Special characteristics	For the detection of smallest objects in places difficult to access
Sleeve	Wound sleeve of chrome-plated brass, Ø 4.7 mm
Min. bending radius	23 mm
Max. tensile load	20 N

GLASS OPTICAL FIBERS

AXIAL THROUGH-BEAM SENSING

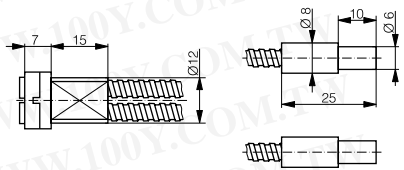
length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)

Dimensions: light emission on the right



Housing size: \varnothing 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, \varnothing 4.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N



Housing size: \varnothing 8 mm

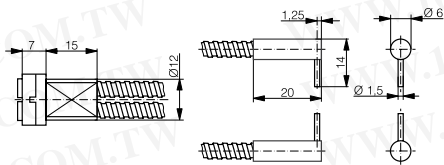
Part reference	LFG-3030-###
Sensing range	with series 4040 1500 mm
Special characteristics	For long sensing range
Sleeve	Wound sleeve of chrome-plated brass, \varnothing 4.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N

GLASS OPTICAL FIBERS

RADIAL THROUGH-BEAM SENSING

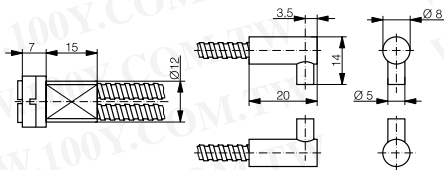
length of glass fiber in cm, standard lengths -025 (250 mm) / -050 (500 mm) / -100 (1000 mm)

Dimensions: light emission on the right



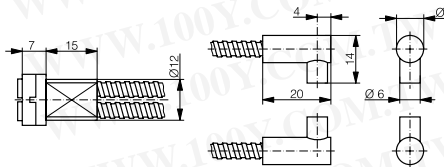
Housing size: \varnothing 6 mm

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, \varnothing 4.7 mm
Min. bending radius	23 mm
Max. tensile load	20 N



Housing size: \varnothing 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, \varnothing 4.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N



Housing size: \varnothing 8 mm

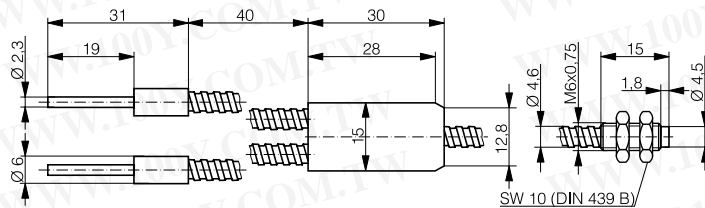
Part reference	LFG-4030-###
Sensing range	with series 4040 1500 mm
Special characteristics	For long sensing range
Leg length	14 mm
Sleeve	Wound sleeve of chrome-plated brass, \varnothing 4.7 mm
Min. bending radius	25 mm
Max. tensile load	50 N

GLASS OPTICAL FIBERS

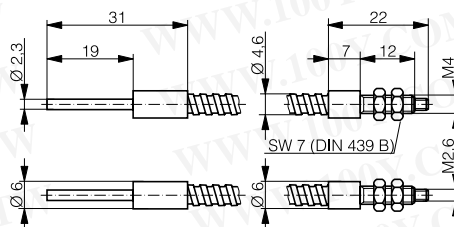
Dimensions: light emission on the right

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

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, $\varnothing 4.6$ mm
Min. bending radius	25 mm
Max. tensile load	20 N

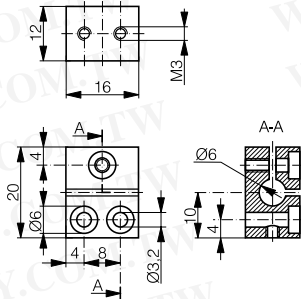


Housing size: M4	Through-beam sensing
Part reference	LFG-3022-050
Sensing range	with series 3030 500 mm with series 3031 250 mm
Special characteristics	For difficult environmental conditions
Sleeve	Wound sleeve of chrome-plated brass, $\varnothing 4.6$ mm
Min. bending radius	25 mm
Max. tensile load	20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

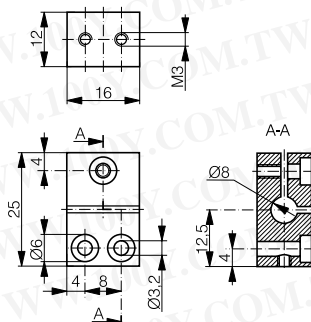


GLASS OPTICAL FIBERS

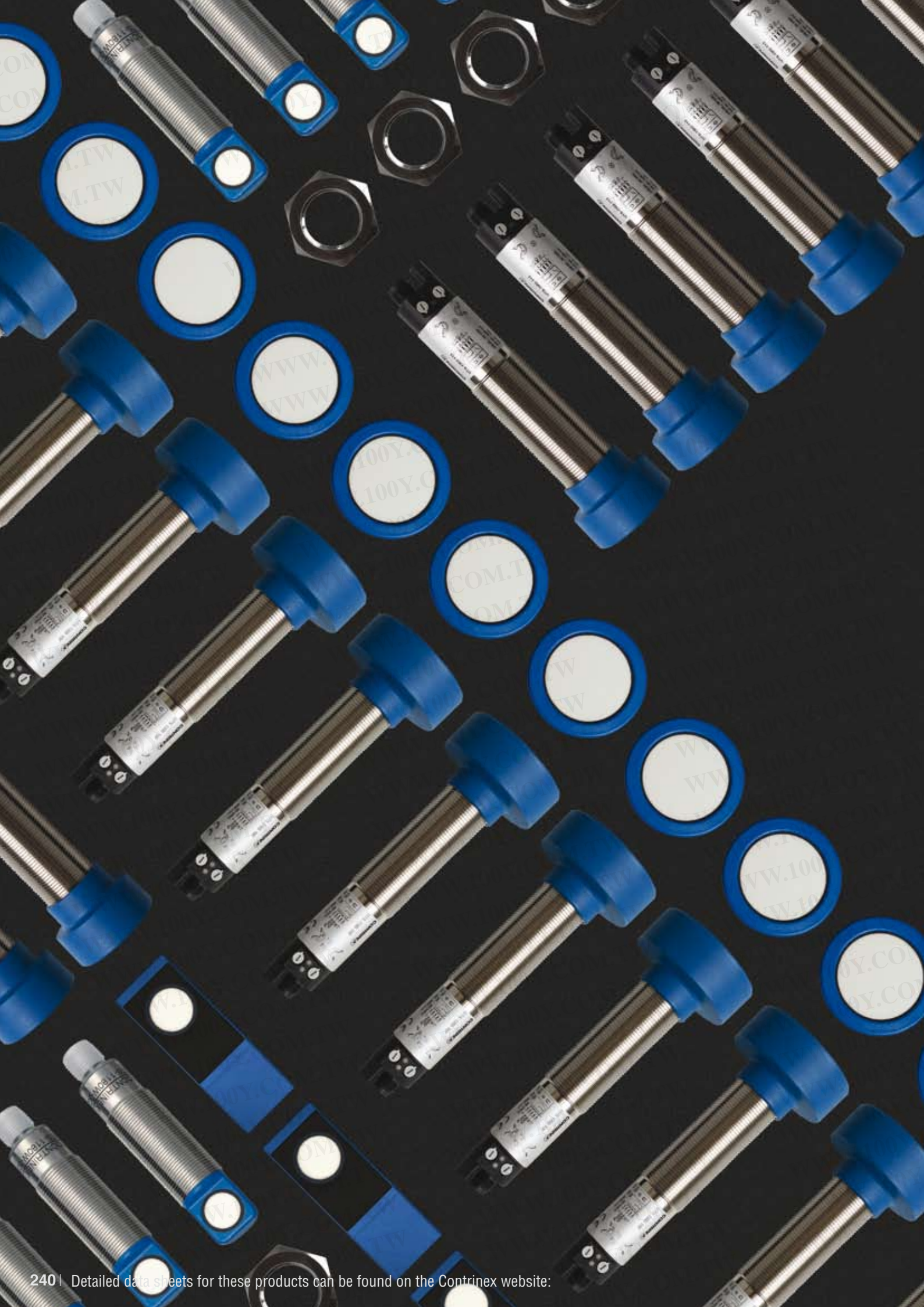
ACCESSORIES



For \varnothing 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 \varnothing 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-###	





ULTRASONIC SENSORS

HIGHLIGHTS:

- ✓ Detection independent of target material, color, shape or surface
- ✓ Ready-to-use cylindrical sensors with integral connector
- ✓ Easy adjustment by either potentiometer or teach-in
- ✓ Dual output sensors, including analog and digital
- ✓ High resolution analog output, current or voltage
- ✓ Normal length or short housings and 90° sensing
- ✓ Reduced blind zone
- ✓ High excess gain – insensitive to dirt and ambient noise

NEW:

- ✓ M12 sensors for applications with limited space
- ✓ M12 sensors with external teach
- ✓ M12 sensors with analog output

PROGRAM OVERVIEW

PRODUCT RANGE	MINIATURE	SMALL	COMPACT
			

HOUSING SIZE	OPERATING DISTANCE
--------------	--------------------

DIFFUSE (WITH BACKGROUND SUPPRESSION)

M12	30 ... 400 mm	p. 249	
M18C (short)	30 ... 700 mm		p.254-255
M18W (90°)	30 ... 700 mm		p.254-255

REFLEX

M18C (short)	0 ... 700 mm		p.253
M18W (90°)	0 ... 700 mm		p.253


DIFFUSE & REFLEX

M18	50 ... 1000 mm		p.255
M30	60 ... 6000 mm		p.261

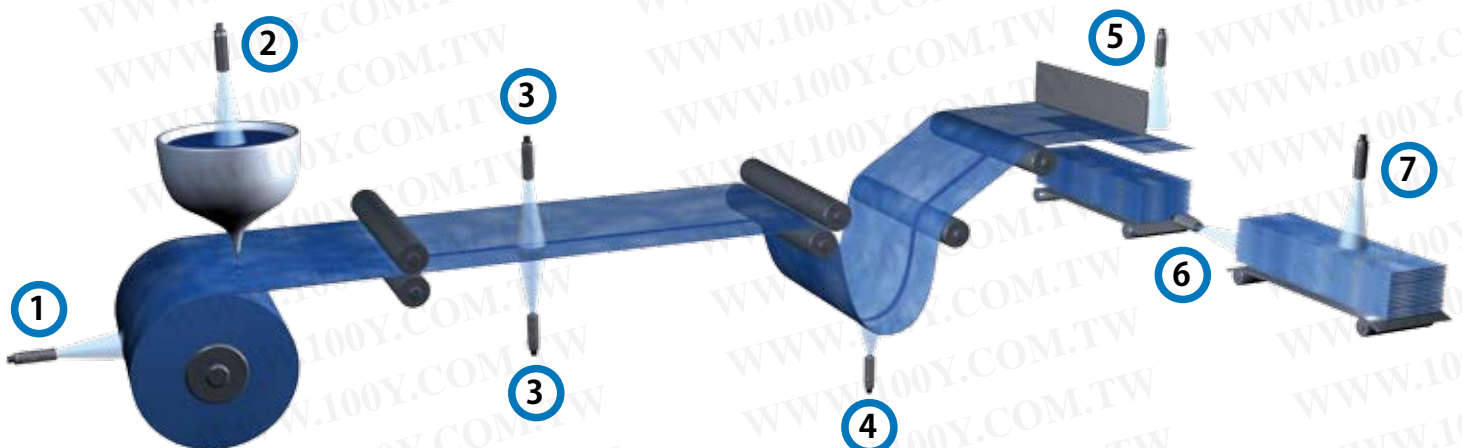
ANALOG

M12	30 ... 400 mm	p.249	
M18	50 ... 1000 mm		p.255-256
M30	60 ... 6000 mm		p.262-263

PROGRAM OVERVIEW

HOUSING SIZE	SENSING RANGE	PAGE
		
DIFFUSE (WITH BACKGROUND SUPPRESSION)		
M12	30 ... 400 mm	249
M18C (short)	30 ... 700 mm	254
M18W (90°)	30 ... 700 mm	254-255
REFLEX		
M18C (short)	0 ... 700 mm	253
M18W (90°)	0 ... 700 mm	253
DIFFUSE & REFLEX		
M18	50 ... 1000 mm	255
M30	60 ... 6000 mm	261
ANALOG		
M12	30 ... 400 mm	249
M18	50 ... 1000 mm	255-256
M30	60 ... 6000 mm	262-263

1. Wind and unwind monitoring
2. Liquid level monitoring
3. Thickness control
4. Loop tension control
5. Detect or count (completeness check)
6. Position feedback
7. Distance / height control



INTRODUCTION

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.

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.

TECHNOLOGY FAMILIES

Contrinex ultrasonic sensors are cylindrical in form and delivered ready-to-connect with an integral 4- or 5-pole S12 connector. In addition to switching outputs, high resolution analog output (current or voltage) and dual-output (analog+digital or digital+digital) sensors are also available. Devices are offered in three technology versions: **Diffuse**, **Reflex** and **Diffuse & Reflex**.

DIFFUSE

Excellent background suppression

With diffuse sensors, the target itself reflects the ultrasonic impulses. When the target enters a preset sensing area, the echo reflected from it causes the device to switch. To eliminate false switching, the Contrinex ultrasonic **Diffuse** family includes excellent background suppression in **Miniature** (M12) and **Small** (M18) devices. The latter are available in normal or short housings, including 90° sensing and teach-in versions. Sensing ranges extend from 30 to 700 mm.

REFLEX

Blind zone elimination

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. The Contrinex ultrasonic **Reflex** family comprises **Small** (M18) devices with short housings, including 90° sensing and teach-in. Use of a reflector eliminates the blind zone, so that sensing ranges extend from 0 to 700 mm.

DIFFUSE & REFLEX

Background suppression or blind zone elimination

These sensors may either be used as a diffuse sensor with background suppression, or with a fixed reflector to function as a reflex sensor with blind zone elimination. The Contrinex ultrasonic **Diffuse & Reflex** family includes **Small** (M18) and **Compact** (M30) devices. The latter are available in versions with greatly extended operating distances and 1 or 2 PNP N.O. outputs. Sensing ranges extend up to 6000 mm.

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.

MULTIPLEX

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. In multiplex mode more than 10 sensors can be mounted close together without mutual interference.

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 264).

The series 1180/1181C and 1180/1181W devices are adjustable by teach-in via the device connection.

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.



M12 STANDARD SIZE FOR TIGHT SPACES

MINIATURE

ULTRASONIC SENSORS

KEY ADVANTAGES

- ✓ External teach function
- ✓ Miniature cylindrical housing
- ✓ Analog and digital outputs available
- ✓ Detection independent of target's color, shape, material and surface structure
- ✓ Excellent temperature compensation

RANGE OVERVIEW	Distance	Diffuse	Diffuse with analog output
MINIATURE	30 ... 400 mm	p. 249	p. 249

HOUSING SIZE

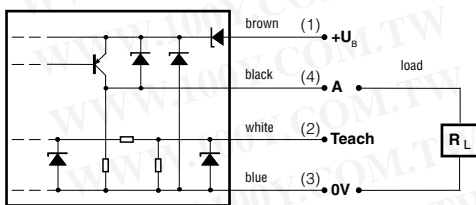
OPERATING PRINCIPLE

SENSING RANGE MM

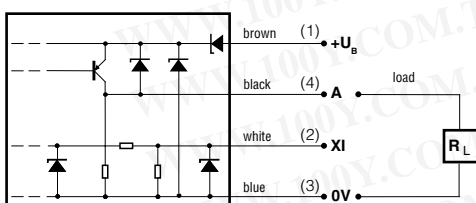
ULTRASONIC

WIRING DIAGRAMS

PNP N.O. with teach-in



PNP N.O. output / Analog output

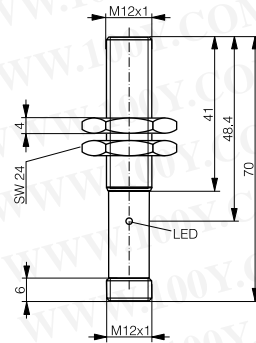
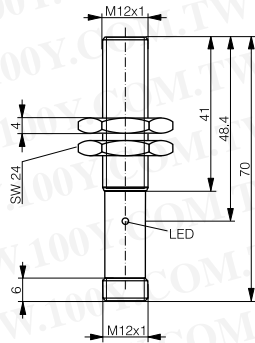
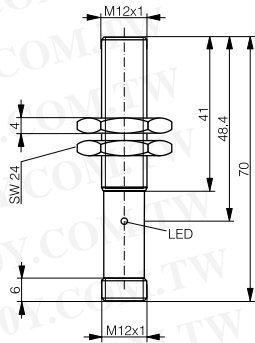


DATA

Housing material
Degree of protection
Rated ultrasonic frequency
Max. switching frequency
Output current
Ambient temperature range
Description
Part reference
Description
Part reference
Description
Part reference
Other types available

MINIATURE

M12	M12 WITH ANALOG OUTPUT	M12 WITH ANALOG OUTPUT
DIFFUSE SENSOR WITH BACKGROUND SUPP.	DIFFUSE SENSOR	DIFFUSE SENSOR
30 ... 400	30 ... 400	30 ... 400



Nickel-plated brass

IP 65

310 kHz

8 Hz

100 mA

-25 ... +70 °C / -13 ... +158 °F

1 x PNP NO / S12

UTS-1121-303



Nickel-plated brass

IP 65

310 kHz

-25 ... +70 °C / -13 ... +158 °F

Analog 4 ... 20 mA

UTS-1121-329



Nickel-plated brass

IP 65

310 kHz

-25 ... +70 °C / -13 ... +158 °F

Analog 0 ... 10 V

UTS-1121-319



M18 STANDARD SIZE, ADAPTABLE MOUNTING

SMALL

ULTRASONIC DIFFUSE OR REFLEX SENSORS

KEY ADVANTAGES

- ✓ Ready-to-connect small devices
- ✓ Can be operated as diffuse or reflex sensors (with interface)
- ✓ Detection independent of target's color, shape, material and surface structure
- ✓ Reduced blind zone
- ✓ 90° sensing, short housings

RANGE OVERVIEW	Distance	Diffuse & Reflex	Reflex	Diffuse with back-ground supp.	Diffuse with analog output
SMALL	0 ... 200 mm		p. 253	p. 254	
	0 ... 700 mm	p. 255	p. 253	p. 254-255	p. 255
	0 ... 1000 mm	p. 255			p. 256

HOUSING SIZE

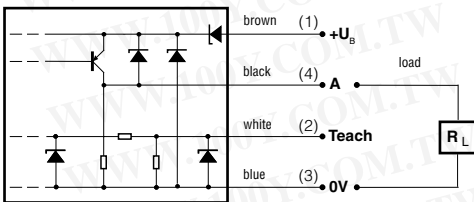
OPERATING PRINCIPLE

SENSING RANGE MM

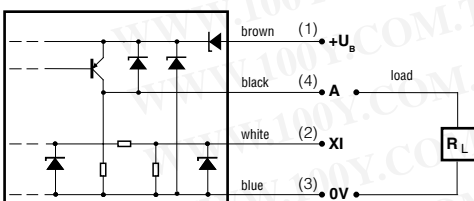
ULTRASONIC

WIRING DIAGRAMS

PNP N.O. with teach-in



PNP N.O. output / Analog output

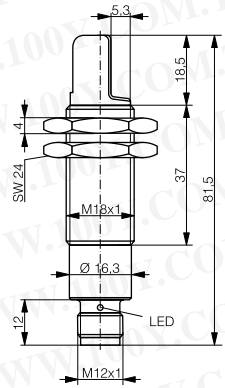
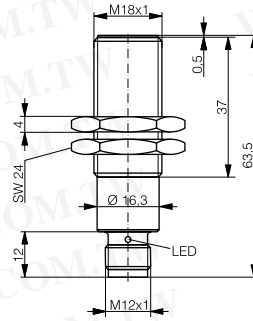
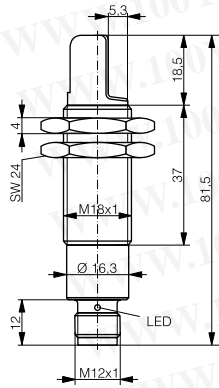
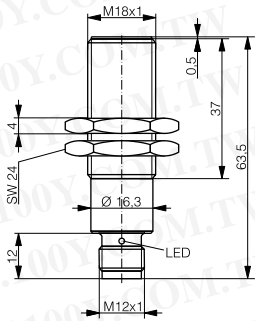


DATA

Housing material
Degree of protection
Rated ultrasonic frequency
Max. switching frequency
Output current
Ambient temperature range
Description
Part reference
Description
Part reference
Description
Part reference
Other types available

SMALL

M18 WITH TEACH-IN	M18 WITH TEACH-IN	M18 WITH TEACH-IN	M18 WITH TEACH-IN
REFLEX SENSOR	REFLEX SENSOR	REFLEX SENSOR	REFLEX SENSOR
0 ... 200	0 ... 200	0 ... 700	0 ... 700

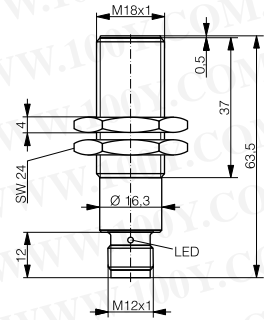
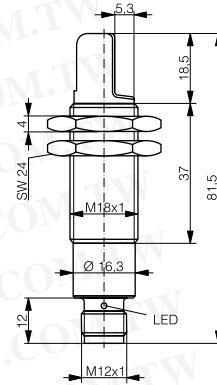
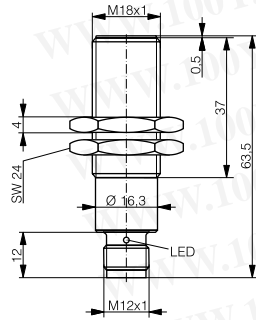





Nickel-plated brass	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass
IP 65	IP 65	IP 65	IP 65
400 kHz	400 kHz	200 kHz	200 kHz
10 Hz	10 Hz	5 Hz	5 Hz
150 mA	150 mA	150 mA	150 mA
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
1 x PNP NO / S12	1 x PNP NO / S12	1 x PNP NO / S12	1 x PNP NO / S12
URS-1180C-303	URS-1180W-303	URS-1181C-303	URS-1181W-303
-	-	-	-

SMALL

ULTRASONIC

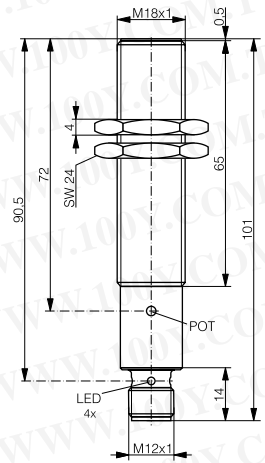
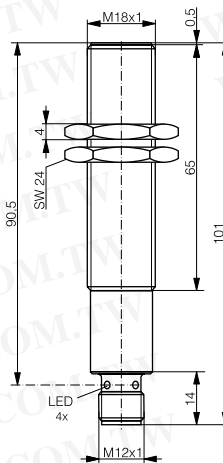
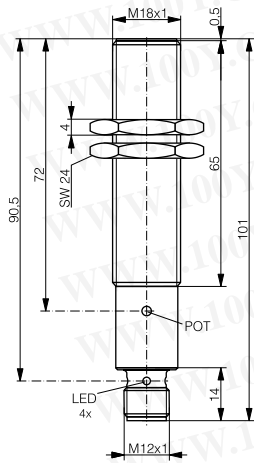
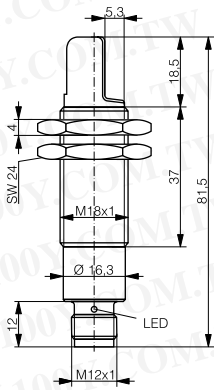
HOUSING SIZE	M18 WITH TEACH-IN	M18 WITH TEACH-IN	M18 WITH TEACH-IN
OPERATING PRINCIPLE	DIFFUSE SENSOR WITH BACKGROUND SUPP.	DIFFUSE SENSOR WITH BACKGROUND SUPP.	DIFFUSE SENSOR WITH BACKGROUND SUPP.
SENSING RANGE MM	30 ... 200	30 ... 200	100 ... 700



DATA			
Housing material	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass
Degree of protection	IP 65	IP 65	IP 65
Rated ultrasonic frequency	400 kHz	400 kHz	200 kHz
Max. switching frequency	10 Hz	10 Hz	5 Hz
Output current	150 mA	150 mA	150 mA
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Description	1 x PNP NO / S12	1 x PNP NO / S12	1 x PNP NO / S12
Part reference	UTS-1180C-303	UTS-1180W-303	UTS-1181C-303
Description			
Part reference			
Description			
Part reference			
Other types available	-	-	-

SMALL

M18 WITH TEACH-IN	M18	M18 WITH ANALOG OUTPUT	M18
DIFFUSE SENSOR WITH BACKGROUND SUPP.	DIFFUSE AND REFLEX SENSOR	DIFFUSE SENSOR	DIFFUSE AND REFLEX SENSOR
100 ... 700	50 ... 300	50 ... 300	150 ... 1000



Nickel-plated brass
IP 65
200 kHz
5 Hz
150 mA
-25 ... +70 °C / -13 ... +158 °F
1 x PNP NO / S12
UTS-1181W-303



Nickel-plated brass
IP 67
400 kHz
5 Hz
150 mA
-25 ... +70 °C / -13 ... +158 °F
1 x PNP NO / S12
UTS-1180-303



Nickel-plated brass
IP 67
400 kHz

-25 ... +70 °C / -13 ... +158 °F
Analog 4 ... 20 mA
UTS-1180-329

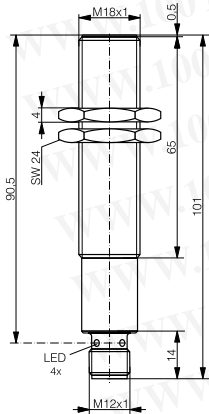



Nickel-plated brass
IP 67
200 kHz
4 Hz
150 mA
-25 ... +70 °C / -13 ... +158 °F
1 x PNP NO / S12
UTS-1181-303

SMALL

HOUSING SIZE	M18 WITH ANALOG OUTPUT		
OPERATING PRINCIPLE	DIFFUSE SENSOR		
SENSING RANGE MM	150 ... 1000		

ULTRASONIC



DATA			
Housing material	Nickel-plated brass		
Degree of protection	IP 67		
Rated ultrasonic frequency	200 kHz		
Max. switching frequency	---		
Output current	---		
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F		
Description	Analog 4 ... 20 mA		
Part reference	UTS-1181-329		
Description			
Part reference			
Description			
Part reference			
Other types available	-		





M30 STANDARD SIZE, FITS MOST SITUATIONS

COMPACT

ULTRASONIC SENSORS WITH 2 OUTPUTS

KEY ADVANTAGES

- ✓ Ready-to-connect compact devices
- ✓ Switching or analog output or a combination of both
- ✓ Detection independent of target's color, shape, material and surface structure
- ✓ Reduced blind zone

RANGE OVERVIEW	Distance	Diffuse and Reflex	Diffuse with analog output
COMPACT	60 ... 300 mm	p. 261	p. 261-262
	200 ... 1300 mm	p. 261	p. 262
	400 ... 3000 mm	p. 261	p. 262
	600 ... 6000 mm	p. 261	p. 263

HOUSING SIZE

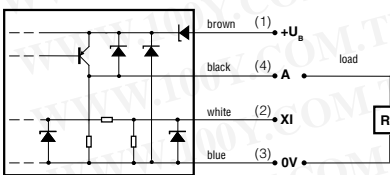
OPERATING PRINCIPLE

SENSING RANGE MM

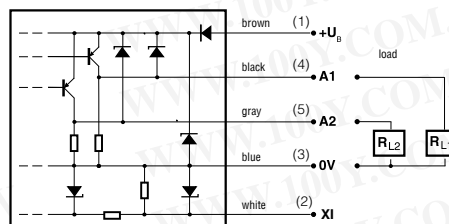
ULTRASONIC

WIRING DIAGRAMS

PNP N.O.

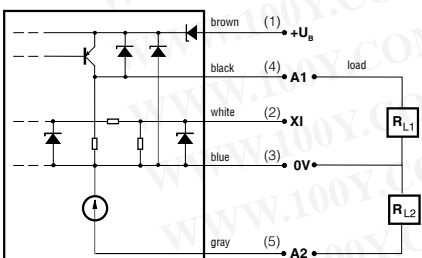


2 x PNP N.O.

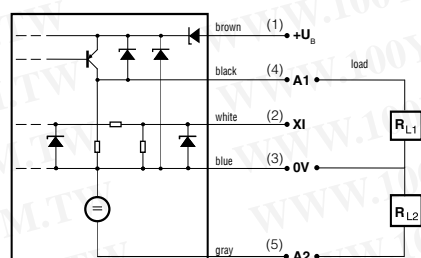


*UTS-130#-107 only

PNP N.O. + analog outputs (current)



PNP N.O. + analog outputs (voltage)

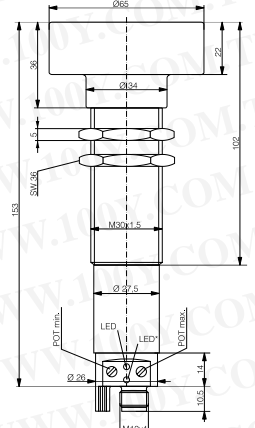
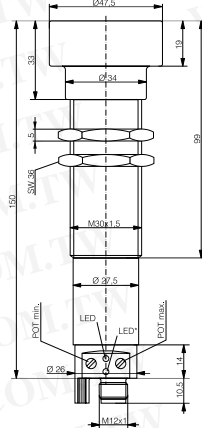
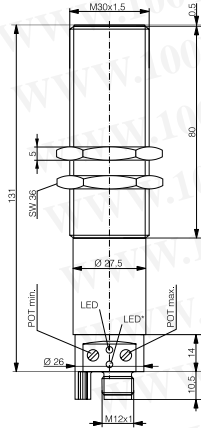
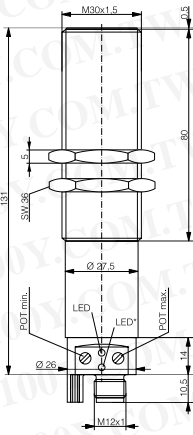


DATA

- Housing material
- Degree of protection
- Rated ultrasonic frequency
- Max. switching frequency
- Output current
- Ambient temperature range
- Description
- Part reference
- Description
- Part reference
- Description
- Part reference
- Other types available

COMPACT

M30	M30	M30	M30
DIFFUSE AND REFLEX SENSOR	DIFFUSE AND REFLEX SENSOR	DIFFUSE AND REFLEX SENSOR	DIFFUSE AND REFLEX SENSOR
60 ... 300	200 ... 1300	400 ... 3000	600 ... 6000

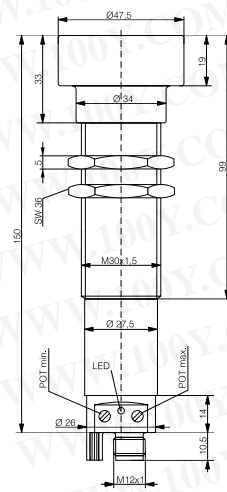
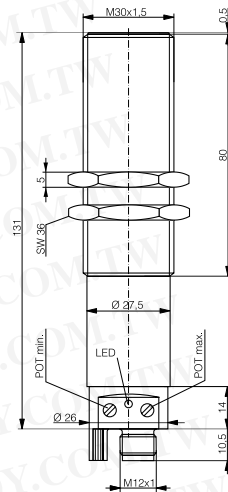
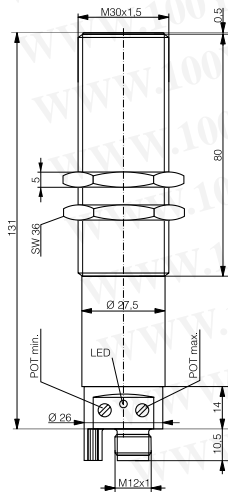





Nickel-plated brass	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass
IP 65	IP 65	IP 65	IP 65
400 kHz	200 kHz	120 kHz	80 kHz
8 Hz	4 Hz	2 Hz	1 Hz
300 mA	300 mA	300 mA	300 mA
-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
1 x PNP NO / S12	1 x PNP NO / S12	1 x PNP NO / S12	1 x PNP NO / S12
UTS-1300-303	UTS-1301-303	UTS-1302-303	UTS-1303-303
2 x PNP NO / S12	2 x PNP NO / S12	2 x PNP NO / S12	2 x PNP NO / S12
UTS-1300-107	UTS-1301-107	UTS-1302-107	UTS-1303-107
-	-	-	-

COMPACT

ULTRASONIC

HOUSING SIZE	M30 WITH ANALOG OUTPUT	M30 WITH ANALOG OUTPUT	M30 WITH ANALOG OUTPUT
OPERATING PRINCIPLE	DIFFUSE AND REFLEX SENSOR	DIFFUSE AND REFLEX SENSOR	DIFFUSE AND REFLEX SENSOR
SENSING RANGE MM	60 ... 300	200 ... 1300	400 ... 3000



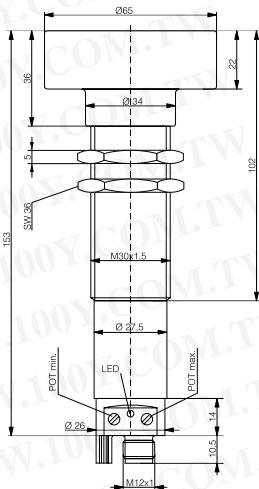
DATA			
Housing material	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass
Degree of protection	IP 65	IP 65	IP 65
Rated ultrasonic frequency	400 kHz	200 kHz	120 kHz
Max. switching frequency	5 Hz	4 Hz	2 Hz
Output current	300 mA	300 mA	300 mA
Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F	-25 ... +70 °C / -13 ... +158 °F
Description	Analog 4 ... 20 mA + PNP NO / S12	Analog 4 ... 20 mA + PNP NO / S12	Analog 4 ... 20 mA + PNP NO / S12
Part reference	UTS-1300-123	UTS-1301-123	UTS-1302-123
Description	Analog 0 ... 10 V + PNP NO / S12	Analog 0 ... 10 V + PNP NO / S12	Analog 0 ... 10 V + PNP NO / S12
Part reference	UTS-1300-113	UTS-1301-113	UTS-1302-113
Description			
Part reference			
Other types available	-	-	-

COMPACT

M30 WITH
ANALOG OUTPUT

DIFFUSE AND
REFLEX SENSOR

600 ... 6000



Nickel-plated brass

IP 65

80 kHz

1 Hz

300 mA

-25 ... +70 °C / -13 ... +158 °F

Analog 4 ... 20 mA + PNP NO / S12

UTS-1303-123

Analog 0 ... 10 V + PNP NO / S12

UTS-1303-113

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 and 1180/1181W) 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 and 1180/1181W.

Part reference: **APE-0000-001**



S12 INTERFACE CABLE WITH TEACH-IN BUTTON

suitable for teach-in of 1180/1181C and 1180/1181W devices.

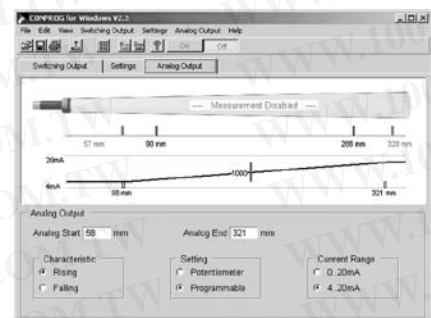
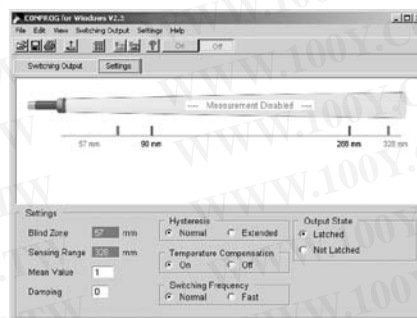
Part reference: **APE-0000-003**



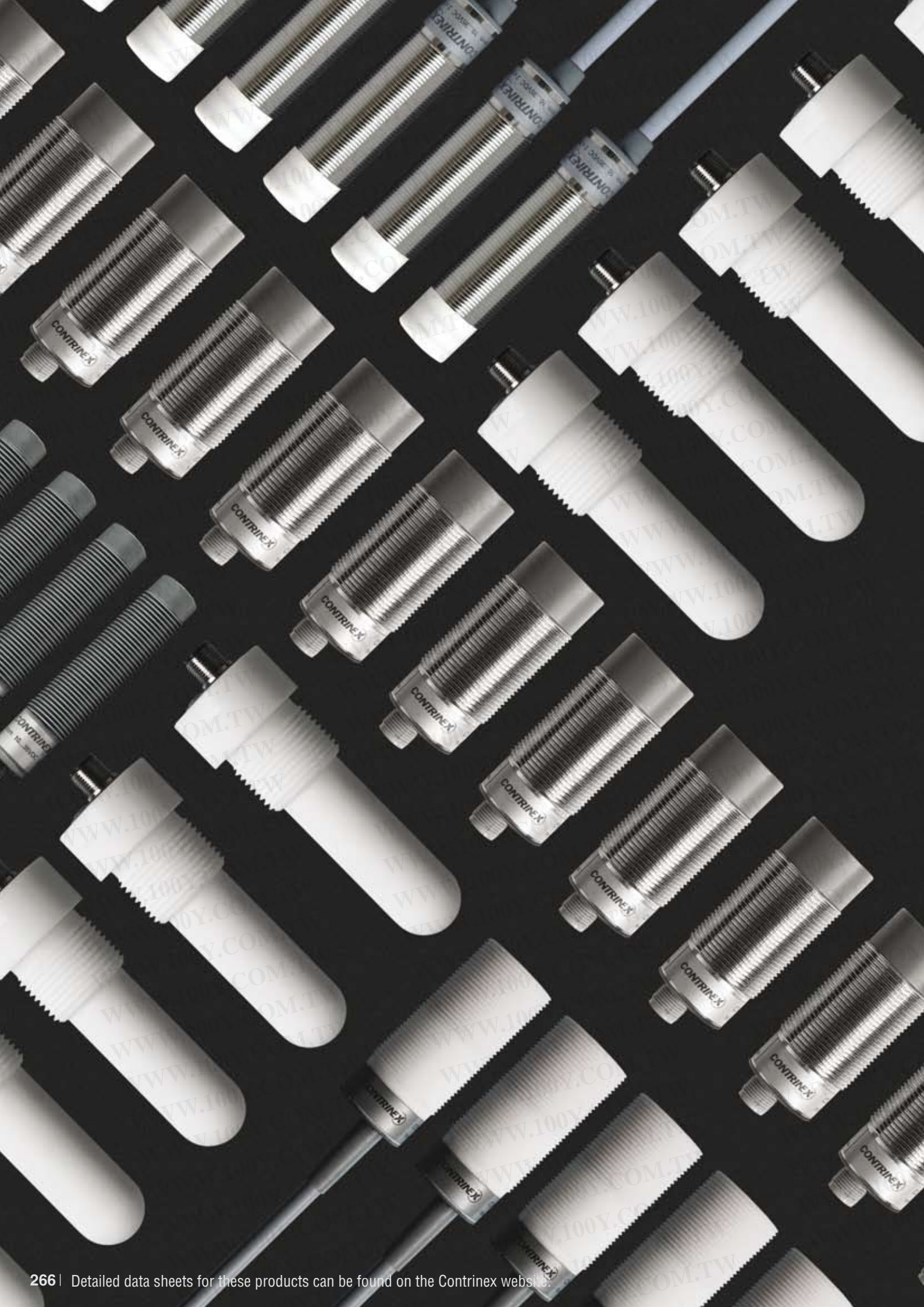
CONPROG PC SOFTWARE

for Windows.

Included with APE-0000-001 interface device









CAPACITIVE SENSORS

HIGHLIGHTS:



- ✓ Detection of virtually all target materials
- ✓ Easy adjustment with potentiometer and LED
- ✓ Detection through non-metallic pipes and containers
- ✓ Sensors for use in harsh chemical environments

NEW:

- ✓ Reliable level control of sticky and viscous materials
- ✓ Sensors with hygienic, FDA-compliant, PTFE housings



PROGRAM OVERVIEW

PRODUCT RANGE	BASIC	HIGH PERFORMANCE
		

HOUSING SIZE	OPERATING DISTANCE
--------------	--------------------

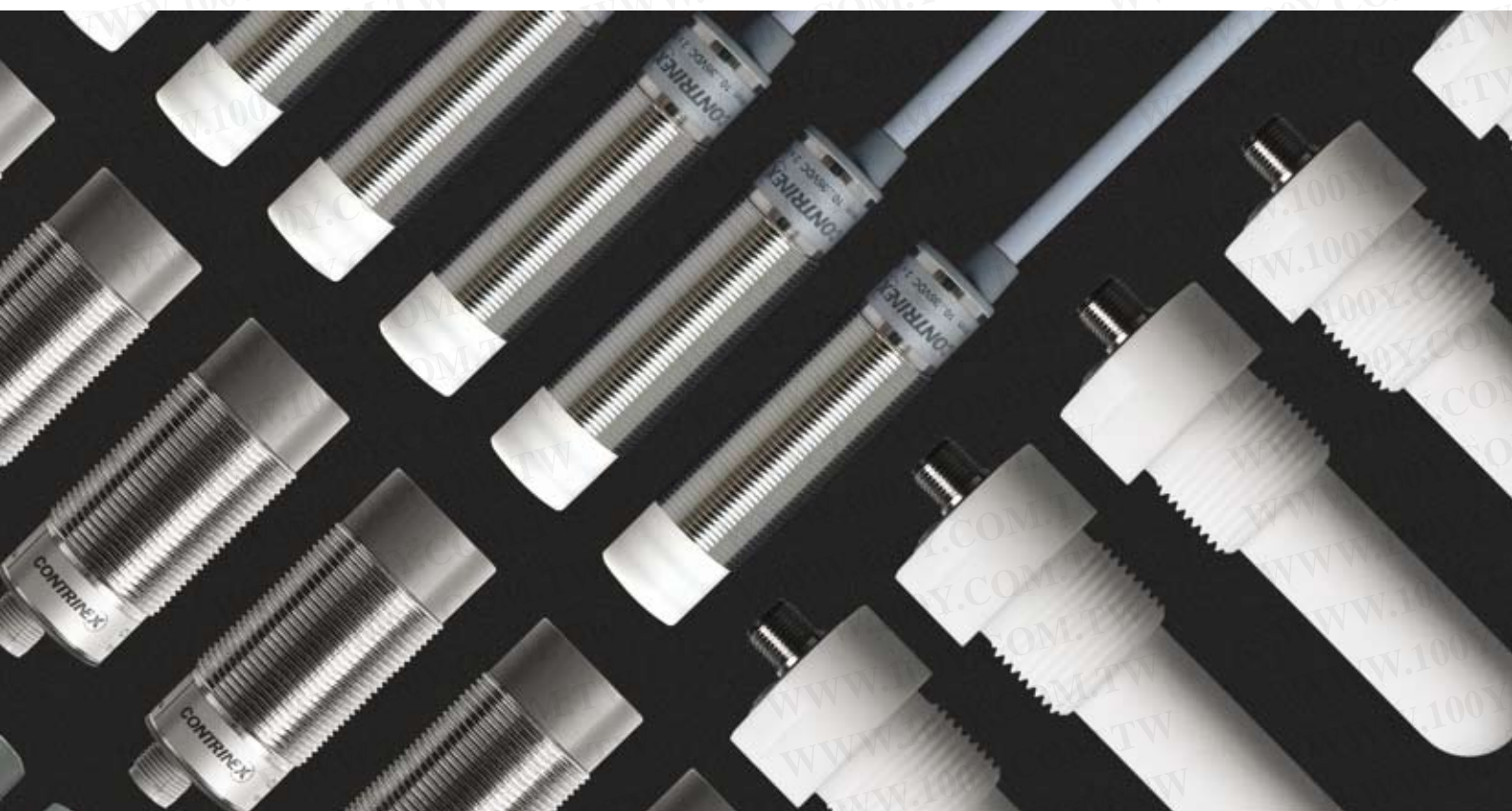
CYLINDRICAL

M12	2 mm	p.275	p.283
	4 mm		p.283
M18	5 mm	p.276	p.284
	8 mm	p.276-277	p.284
M30	10 mm	p.277	p.284
	15 mm	p.278	p.285
∅ 26 / G1	5 mm		p.285

CUBIC

48.5 x 32 x 17 mm	15 mm	p.279
120 x 80 x 30 mm	40 mm	p.279

HOUSING SIZE	OPERATING DISTANCE	PAGE
M12	2 mm	275, 283
	4 mm	283
M18	5 mm	276, 284
	8 mm	276 - 277, 284
M30	10 mm	277, 284
	15 mm	278, 285
∅ 26 / G1	5 mm	285
48.5 x 32 x 17 mm	15 mm	279
120 x 80 x 30 mm	40 mm	279



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 PRINCIPLE

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.

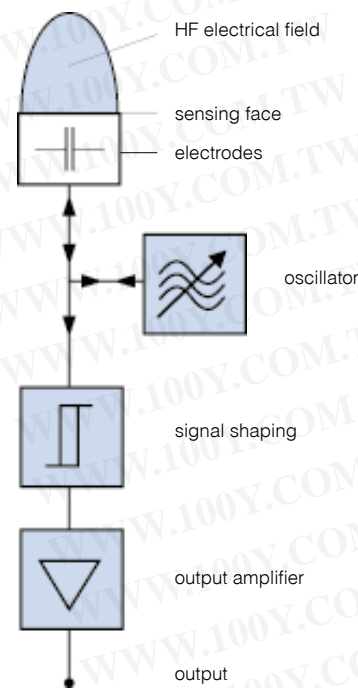


Fig. 16: operating principle

DELIVERY PROGRAM

Contrinex capacitive sensors deliver a reliable solution for all kinds of level sensing tasks. They are suitable for detection and position monitoring with virtually any target material. The program includes sensors in cylindrical (M12, M18 M30 or \varnothing 26/G1) or cubic form. Two ranges are offered: a cost effective **Basic** range, which includes AC/DC output switching, and a **High performance** range for difficult sensing tasks.

BASIC

Cost-effective with any target material – ideal for fill level sensing

The Contrinex **Basic** range consists of cylindrical and cubic devices. Cylindrical devices are available in 4-wire M12, M18 and M30 standard sizes. All 3 sizes may have PNP or NPN changeover outputs, while M30 devices are also available with 2-wire switching outputs (**AC/DC**, N.O.). Housings are either in durable polyphenylene oxide (PPO) or stainless steel (V2A AISI 304) with a PPO sensing face.



Sensor connection is by means of cable or an integral connector. All device types are available in embeddable versions, allowing detection through container walls. In addition, M18 and M30-sized devices are also available in non-embeddable versions that permit longer operating distances.

Cubic devices are available, sized 32 x 34 mm in a PVC housing with 3-wire connection, or 120 x 80 mm in a PBT housing with 4-wire connection.

With operating distances from 0.5 mm to 25 mm, Contrinex **Basic** range capacitive sensors are the cost effective solution for level sensing tasks in the plastics industry, in particular for the level control of granulates in feeders, pipes or silos.

HIGH PERFORMANCE

Challenging environments and viscous or sticky target materials

The Contrinex **High performance** range consists of 4-wire devices in M12, M18 and M30 standard sizes. All 3 sizes may have PNP or NPN changeover outputs. Housings are either in hygienic polytetrafluoro-



ethylene (PTFE/Teflon) or stainless steel (V2A AISI 304) with a PTFE sensing face. Sensor connection is by means of cable or an integral connector. All these device sizes are available in non-embeddable or embeddable versions.

Devices with a PTFE housing are FDA compliant and ideal for applications in food and pharmaceutical industries. This hygienic housing material cannot contaminate produced goods and resists chemical cleaning agents.

For the difficult task of sensing sticky and viscous materials, the **High performance** range includes Ø 26/G1-sized sensors in a non-embeddable PTFE housing with PNP changeover output.

With operating distances from 0 to 30 mm, Contrinex High performance range capacitive sensors are the ideal solution for difficult sensing tasks in demanding industries and environments.

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_{gr} , 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).





COST EFFECTIVE WITH ANY TARGET MATERIAL

BASIC

CAPACITIVE SENSORS

KEY ADVANTAGES

- ✓ Synthetic housings
- ✓ For the detection of all kind of materials
- ✓ Adjustable operating distances
- ✓ Easy potentiometer set-up
- ✓ 4-wire devices

RANGE OVERVIEW	Housing size	Cylindrical	AC / DC	Cubic
BASIC	M12	p. 275		
	M18	p. 276-277		
	M30	p. 277-278	p. 277-278	
	48.5 x 32 x 17 mm			p. 279
	120 x 80 x 30 mm			p. 279

OVERVIEW

HOUSING SIZE

OPERATING DISTANCE MM

Ambient temperature range

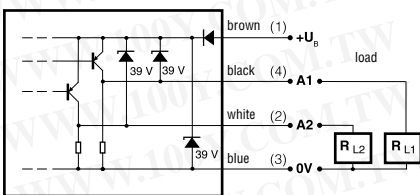
-25 ... +70 °C / -13 ... +158 °F

Setup

Potentiometer

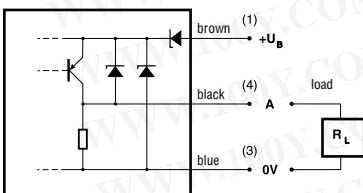
WIRING DIAGRAMS

PNP changeover outputs

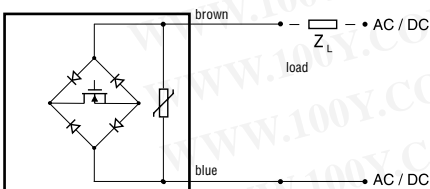


2 NC / 4 NO

PNP normally open (N.O.)



2-wire AC/DC



CAPACITIVE

DATA

Op. distance min./max. adjustable

Housing material

Sensing face material

Degree of protection

Mounting

Max. switching frequency

LED

Supply voltage range

Description

Part reference

Description

Part reference

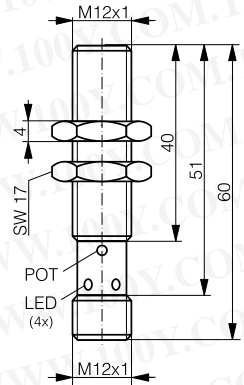
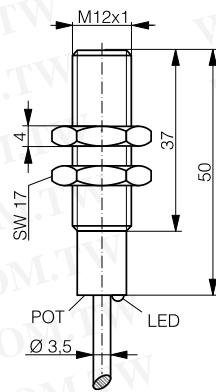
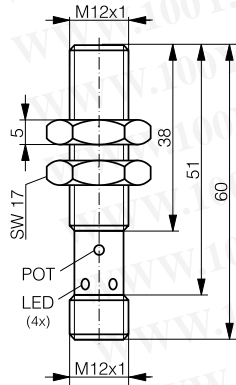
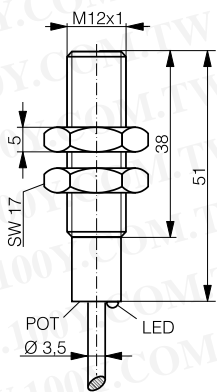
Description

Part reference

Other types available

BASIC

M12	M12	M12	M12
2	2	2	2



0.5 ... 5 mm	0.5 ... 5 mm	0.5 ... 5 mm	0.5 ... 5 mm
PPO	PPO	Stainless steel V2A	Stainless steel V2A
PPO	PPO	PPO	PPO
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Embeddable	Embeddable
300 Hz	50 Hz	300 Hz	300 Hz
Yellow	Yellow / green	Yellow	Yellow
12 ... 30 VDC	10 ... 35 VDC	12 ... 30 VDC	12 ... 30 VDC
PNP Changeover	PNP Changeover	PNP Changeover	PNP Changeover
CSK-1121-203	CSS-1120-203	CSK-1121-103	CSS-1121-103
-	-	-	-

BASIC

HOUSING SIZE

M18

M18

M18

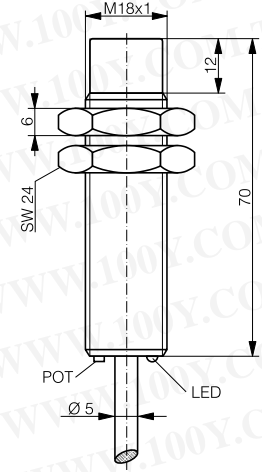
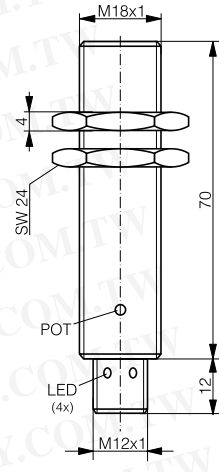
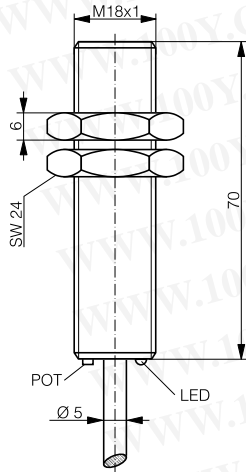
OPERATING DISTANCE MM

5

5

8

CAPACITIVE



DATA



Op. distance min./max. adjustable

1 ... 8 mm

1 ... 8 mm

1 ... 10 mm

Housing material

PPO

PPO

PPO

Sensing face material

PPO

PPO

PPO

Degree of protection

IP 67

IP 67

IP 67

Mounting

Embeddable

Embeddable

Non-embeddable

Max. switching frequency

200 Hz

200 Hz

50 Hz

LED

Yellow

Yellow

Yellow

Supply voltage range

12 ... 30 VDC

12 ... 30 VDC

12 ... 30 VDC

Description

PNP Changeover

PNP Changeover

PNP Changeover

Part reference

CSK-1181-203

CSS-1181-203

CSK-1181-213

Description

Part reference

Description

Part reference

Other types available

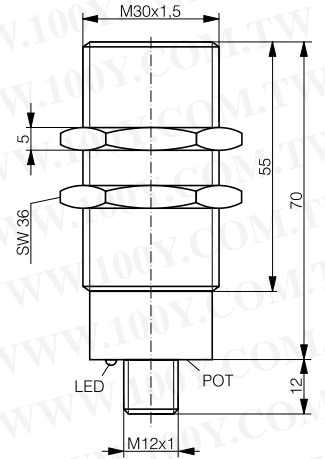
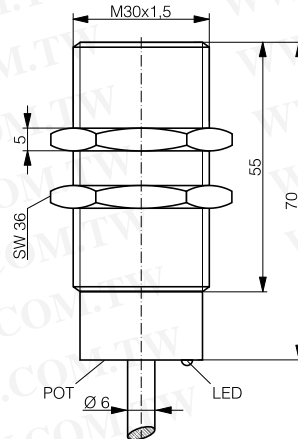
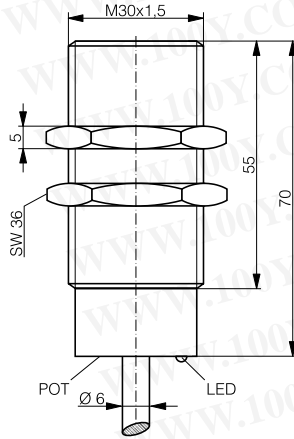
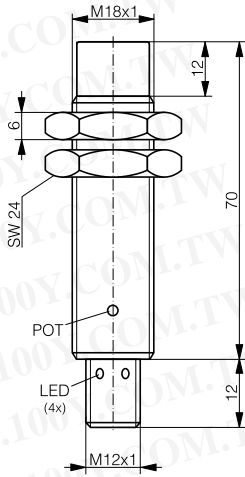
-

-

-

BASIC

M18	M30	M30	M30
8	10	10	10



1 ... 10 mm	2 ... 20 mm	2 ... 20 mm	2 ... 20 mm
PPO	PPO	PPO	PPO
PPO	PPO	PPO	PPO
IP 67	IP 67	IP 67	IP 67
Non-embeddable	Embeddable	Embeddable	Embeddable
50 Hz	25 Hz	150 Hz	150 Hz
Yellow	Yellow	Yellow	Yellow
12 ... 30 VDC	20 ... 250 VDC	12 ... 30 VDC	12 ... 30 VDC
PNP Changeover	AC/DC 2-wire N.O.	PNP Changeover	PNP Changeover
CSS-1181-213	CSK-1300-207	CSK-1301-203	CSS-1301-203
-	-	-	-

BASIC

HOUSING SIZE

M30

M30

M30

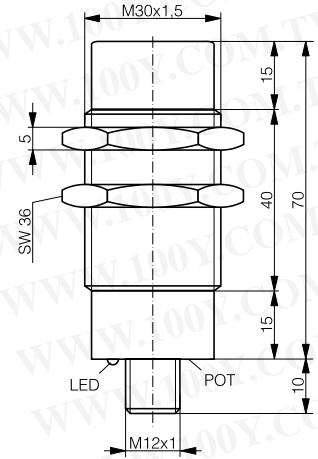
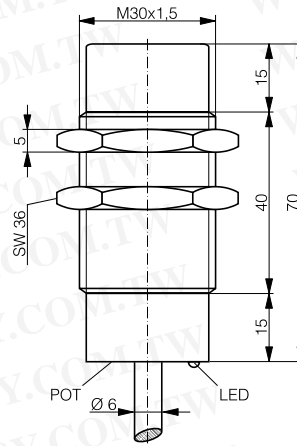
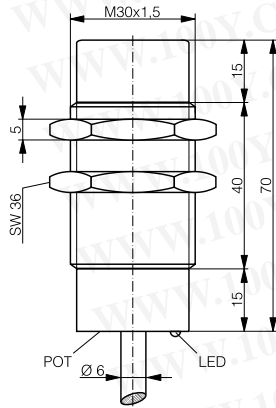
OPERATING DISTANCE MM

15

15

15

CAPACITIVE



DATA



Op. distance min./max. adjustable

2 ... 25 mm

2 ... 25 mm

2 ... 25 mm

Housing material

PPO

PPO

PPO

Sensing face material

PPO

PPO

PPO

Degree of protection

IP 67

IP 67

IP 67

Mounting

Non-embeddable

Non-embeddable

Non-embeddable

Max. switching frequency

25 Hz

50 Hz

50 Hz

LED

Yellow

Yellow

Yellow

Supply voltage range

20 ... 250 VDC

12 ... 30 VDC

12 ... 30 VDC

Description

AC/DC 2-wire N.O.

PNP Changeover

PNP Changeover

Part reference

CSK-1300-217

CSK-1301-213

CSS-1301-213

Description

Part reference

Description

Part reference

Other types available

-

-

-

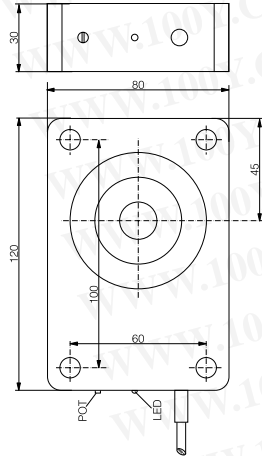
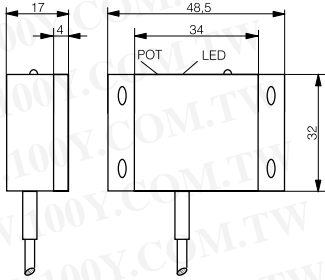
BASIC

□ 48.5 x 32 x 17

□ 120 x 80 x 30

15

40



0 ... 17 mm

PVC

PVC

IP 67

Embeddable

50 Hz

Yellow / green

10 ... 30 VDC

PNP N.O.

CSK-3320-208

2 ... 70 mm

PBTP

PBTP

IP 67

Non-embeddable

50 Hz

Yellow / green

10 ... 35 VDC

PNP changeover

CSK-3800-213



RELIABLE IN CHALLENGING SITUATIONS

HIGH PERFORMANCE CAPACITIVE SENSORS

KEY ADVANTAGES

- ✓ Metal or PTFE housing
- ✓ Medium optimized performance
- ✓ FDA compliant housings for hygienic applications
- ✓ Reliable detection of viscous and sticky materials
- ✓ Adjustable operating distances
- ✓ 3- and 4-wire devices

RANGE OVERVIEW	Housing size	Cylindrical
HIGH PERFORMANCE	M12	p. 283
	M18	p. 284
	M30	p. 284-285
	∅ 26 / G1	p. 285

OVERVIEW

Ambient temperature range	-25 ... +70 °C / -13 ... +158 °F
Setup	Potentiometer

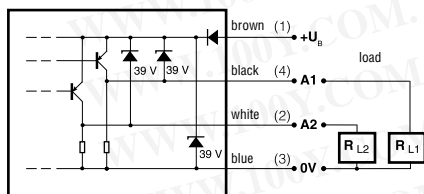
HOUSING SIZE

OPERATING DISTANCE MM

CAPACITIVE

WIRING DIAGRAM

PNP changeover outputs



DATA

Op. distance min./max. adjustable

Housing material

Sensing face material

Degree of protection

Mounting

Max. switching frequency

LED

Supply voltage range

Description

Part reference

Description

Part reference

Description

Part reference

Other types available

HIGH PERFORMANCE

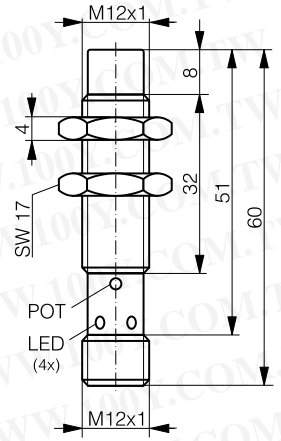
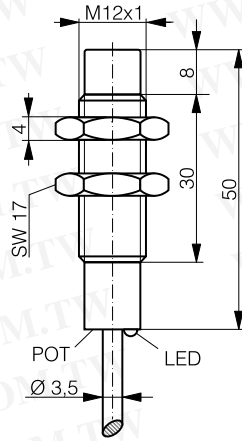
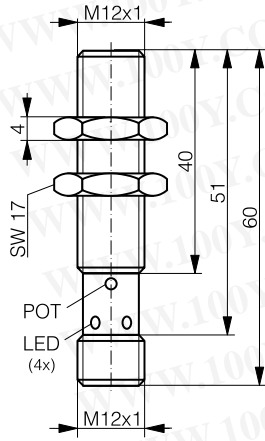
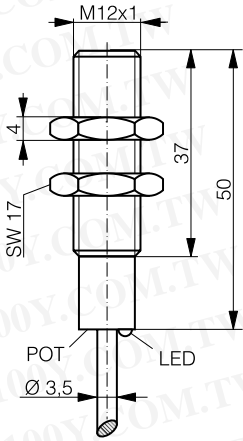
M12	M12	M12	M12
-----	-----	-----	-----

2

2

4

4



0 ... 6 mm	0 ... 6 mm	1 ... 8 mm	1 ... 8 mm
Stainless steel V2A	Stainless steel V2A	Stainless steel V2A	Stainless steel V2A
PTFE	PTFE	PTFE	PTFE
IP 67	IP 67	IP 67	IP 67
Embeddable	Embeddable	Non-embeddable	Non-embeddable
500 Hz	500 Hz	50 Hz	50 Hz
Yellow / green	Yellow / green	Yellow	Yellow
10 ... 35 VDC	10 ... 35 VDC	12 ... 30 VDC	12 ... 30 VDC
PNP changeover	PNP changeover	PNP changeover	PNP changeover
CSK-1120-103	CSS-1120-103	CSK-1120-113	CSS-1120-113
-	-	-	-

HIGH PERFORMANCE

HOUSING SIZE

M18

M18

M30

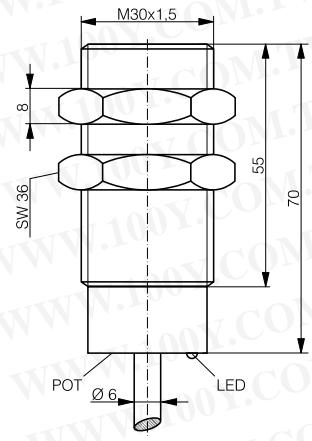
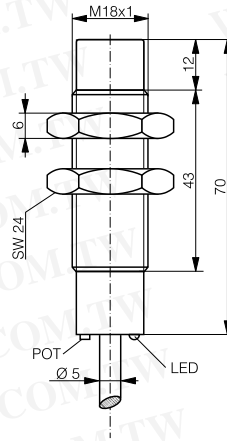
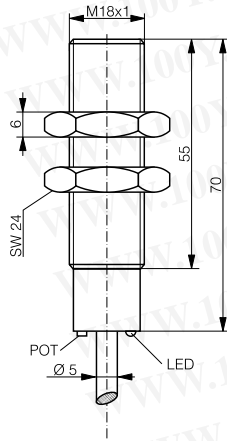
OPERATING DISTANCE MM

5

8

10

CAPACITIVE



DATA



Op. distance min./max. adjustable

0.5 ... 10 mm

0.5 ... 15 mm

0.5 ... 25 mm

Housing material

PTFE

PTFE

PTFE

Sensing face material

PTFE

PTFE

PTFE

Degree of protection

IP 67

IP 67

IP 67

Mounting

Embeddable

Non-embeddable

Embeddable

Max. switching frequency

300 Hz

50 Hz

200 Hz

LED

Yellow / green

Yellow / green

Yellow / green

Supply voltage range

10 ... 35 VDC

10 ... 35 VDC

10 ... 35 VDC

Description

PNP changeover

PNP changeover

PNP changeover

Part reference

CSK-1180-303

CSK-1180-313

CSK-1300-303

Description

Part reference

Description

Part reference

Other types available

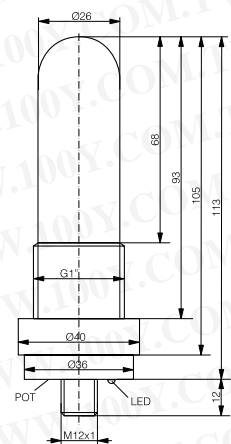
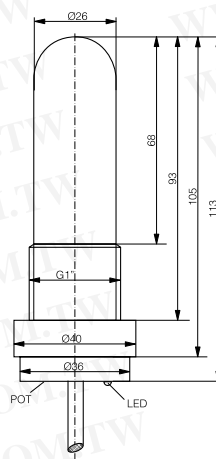
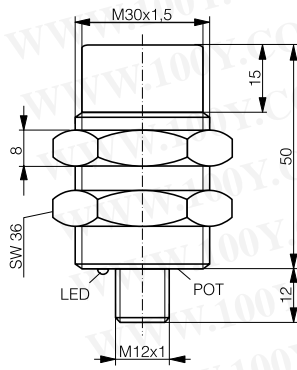
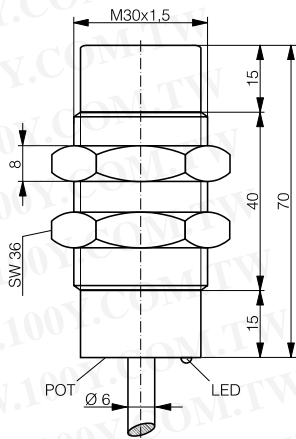
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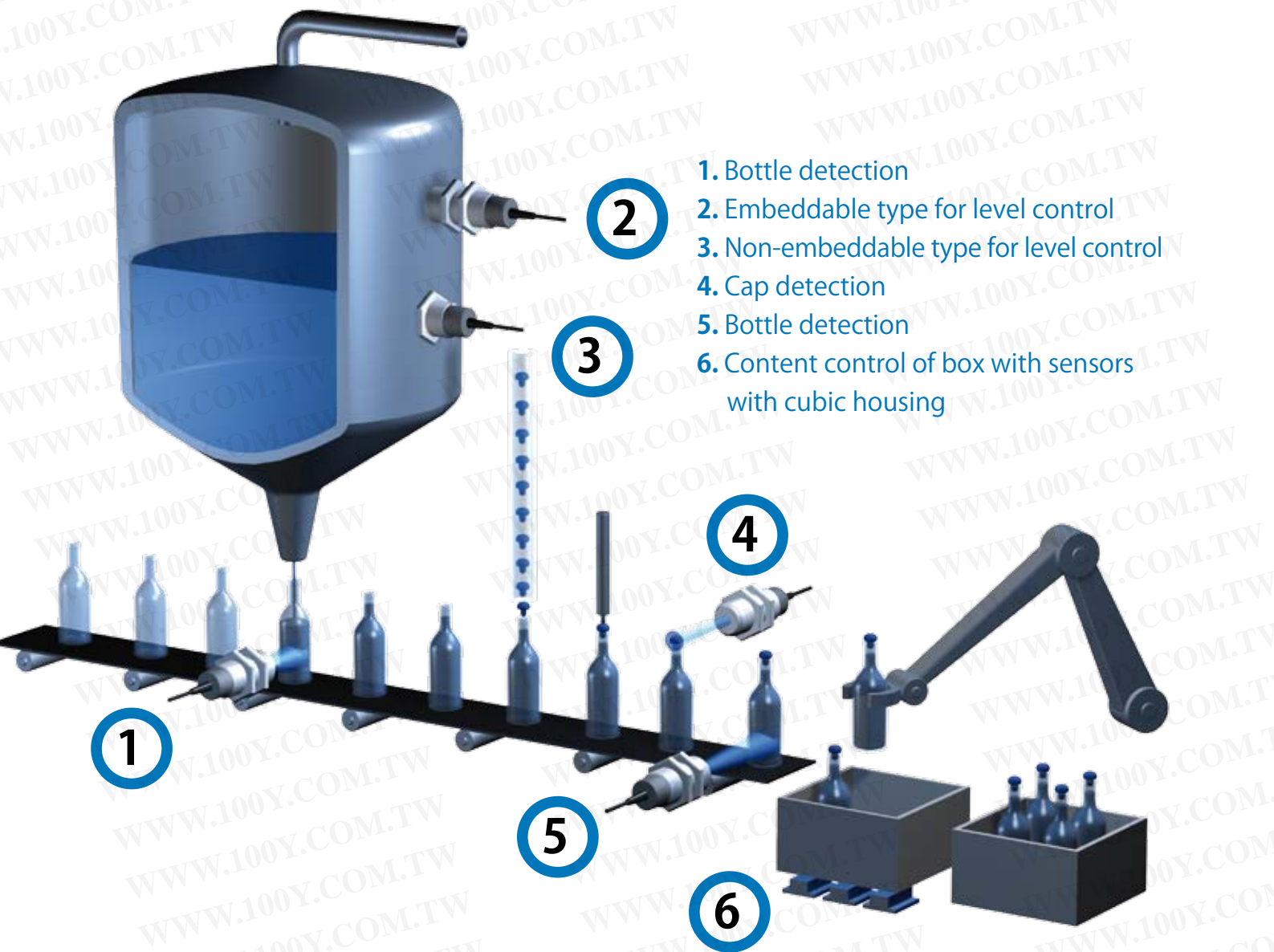
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HIGH PERFORMANCE

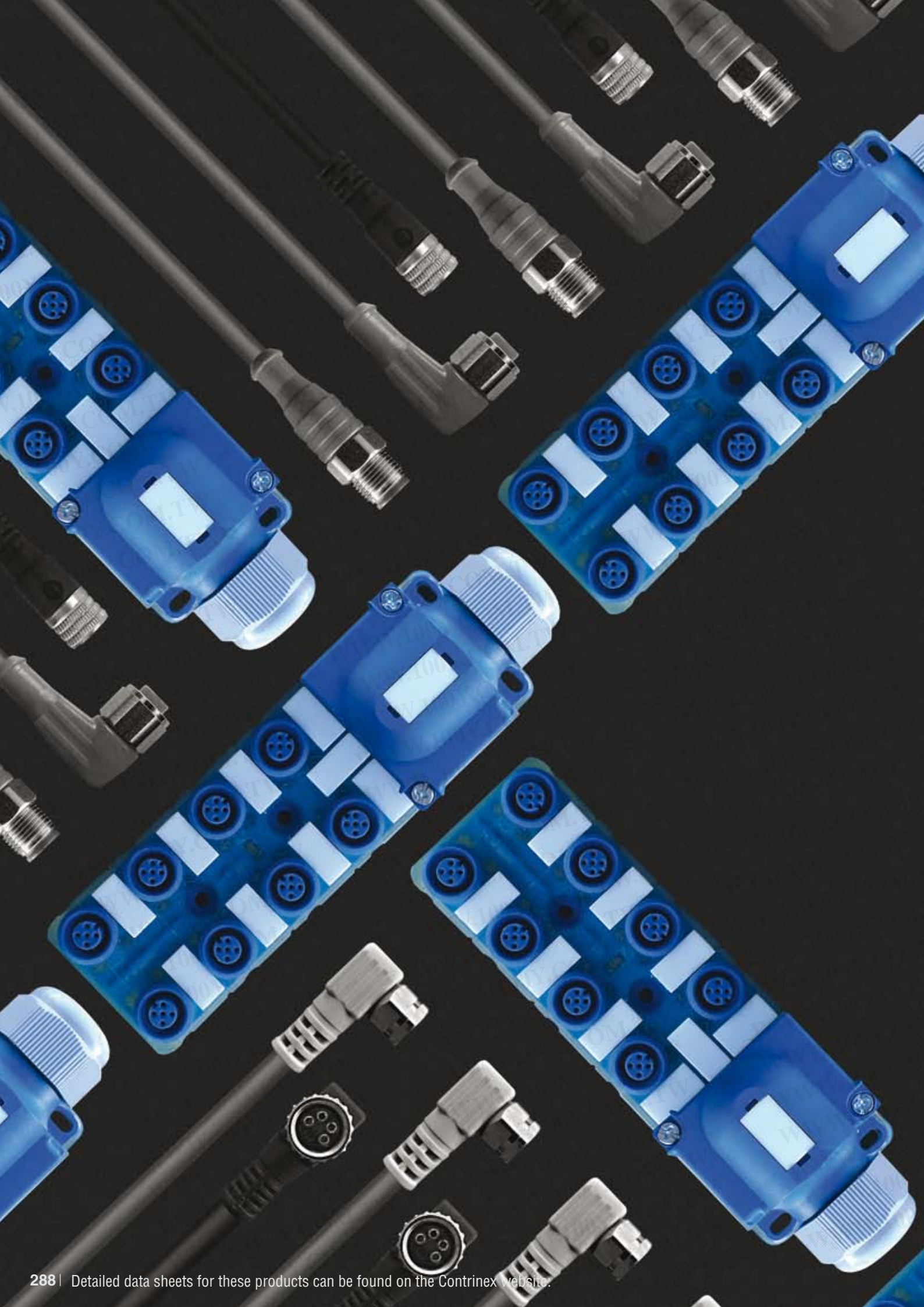
M30	M30	Ø 26/G1	Ø 26/G1
15	15	5	5



1 ... 30 mm	1 ... 30 mm	0 ... 20 mm	0 ... 20 mm
PTFE	PTFE	PTFE	PTFE
PTFE	PTFE	PTFE	PTFE
IP 67	IP 67	IP 67	IP 67
Non-embeddable	Non-embeddable	Non-embeddable	Non-embeddable
50 Hz	50 Hz	50 Hz	50 Hz
Yellow / green	Yellow / green	Yellow / green	Yellow / green
10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC	10 ... 35 VDC
PNP changeover	PNP changeover	PNP changeover	PNP changeover
CSK-1300-313	CSS-1300-313	CSK-2260-313	CSS-2260-313
-	-	-	-








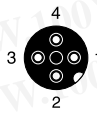














CONNECTIVITY

HIGHLIGHTS:

- ✓ Comprehensive cable and connector program
- ✓ IP 69K and Ecolab-tested cables for the food and beverage industry
- ✓ UL-approved cables and connectors
- ✓ Cables with straight or right-angle sockets
- ✓ Distribution boxes
- ✓ Field-attachable connectors
- ✓ T-connectors
- ✓ User-friendly standard portfolio

CABLES / CONNECTORS DESCRIPTION

SOCKET	TYPE	PIN ASSIGNMENT TYPE
	M8 straight socket	 M12 4-pole socket
	M12 straight socket	 M8 3-pole socket
	M8 right angle socket	 M8 4-pole socket
	M12 right angle socket	 M12 4-pole plug
	M12 right angle socket	 M8 3-pole plug
	M12 right angle socket	 M12 3-pole dual key plug (S13)
PLUG	TYPE	
	M8 straight plug	
	M12 straight plug	



CONNECTING CABLES PVC WITH OPEN ENDED WIRES

PART REFERENCE	SOCKET			CABLE	
	Size	Pins	Config.	Material	Length
S08-3FVG-020	M8	3-pole	straight	PVC	2 m
S08-3FVG-050	M8	3-pole	straight	PVC	5 m
S08-3FVG-100	M8	3-pole	straight	PVC	10 m
S08-4FVG-020	M8	4-pole	straight	PVC	2 m
S08-4FVG-050	M8	4-pole	straight	PVC	5 m
S08-4FVG-100	M8	4-pole	straight	PVC	10 m
S08-3FVW-020	M8	3-pole	right angle	PVC	2 m
S08-3FVW-050	M8	3-pole	right angle	PVC	5 m
S08-3FVW-100	M8	3-pole	right angle	PVC	10 m
S08-4FVW-020	M8	4-pole	right angle	PVC	2 m
S08-4FVW-050	M8	4-pole	right angle	PVC	5 m
S08-4FVW-100	M8	4-pole	right angle	PVC	10 m
S12-3FVG-020	M12	3-pole	straight	PVC	2 m
S12-3FVG-050	M12	3-pole	straight	PVC	5 m
S12-3FVG-100	M12	3-pole	straight	PVC	10 m
S12-4FVG-020	M12	4-pole	straight	PVC	2 m
S12-4FVG-050	M12	4-pole	straight	PVC	5 m
S12-4FVG-100	M12	4-pole	straight	PVC	10 m
S12-5FVG-020	M12	5-pole	straight	PVC	2 m
S12-5FVG-100	M12	5-pole	straight	PVC	10 m
S12-3FVW-020	M12	3-pole	right angle	PVC	2 m
S12-3FVW-050	M12	3-pole	right angle	PVC	5 m
S12-3FVW-100	M12	3-pole	right angle	PVC	10 m
S12-4FVW-020	M12	4-pole	right angle	PVC	2 m
S12-4FVW-050	M12	4-pole	right angle	PVC	5 m
S12-4FVW-100	M12	4-pole	right angle	PVC	10 m
S12-5FVW-020	M12	5-pole	right angle	PVC	2 m
S12-5FVW-100	M12	5-pole	right angle	PVC	10 m



CONNECTING CABLES PUR WITH OPEN ENDED WIRES

PART REFERENCE	SOCKET			CABLE	
	Size	Pins	Config.	Material	Length
S08-3FUG-020	M8	3-pole	straight	PUR	2 m
S08-3FUG-050	M8	3-pole	straight	PUR	5 m
S08-3FUG-100	M8	3-pole	straight	PUR	10 m
S08-4FUG-020	M8	4-pole	straight	PUR	2 m
S08-4FUG-050	M8	4-pole	straight	PUR	5 m
S08-4FUG-100	M8	4-pole	straight	PUR	10 m
S08-3FUW-020	M8	3-pole	right angle	PUR	2 m
S08-3FUW-050	M8	3-pole	right angle	PUR	5 m
S08-3FUW-100	M8	3-pole	right angle	PUR	10 m
S08-4FUW-020	M8	4-pole	right angle	PUR	2 m
S08-4FUW-050	M8	4-pole	right angle	PUR	5 m
S08-4FUW-100	M8	4-pole	right angle	PUR	10 m
S12-3FUG-020	M12	3-pole	straight	PUR	2 m
S12-3FUG-050	M12	3-pole	straight	PUR	5 m
S12-3FUG-100	M12	3-pole	straight	PUR	10 m
S12-4FUG-020	M12	4-pole	straight	PUR	2 m
S12-4FUG-050	M12	4-pole	straight	PUR	5 m
S12-4FUG-100	M12	4-pole	straight	PUR	10 m
S12-3FUW-020	M12	3-pole	right angle	PUR	2 m
S12-3FUW-050	M12	3-pole	right angle	PUR	5 m
S12-3FUW-100	M12	3-pole	right angle	PUR	10 m
S12-4FUW-020	M12	4-pole	right angle	PUR	2 m
S12-4FUW-050	M12	4-pole	right angle	PUR	5 m
S12-4FUW-100	M12	4-pole	right angle	PUR	10 m



example

CONNECTING CABLES PVC WITH OPEN ENDED WIRES FOR FOOD APPLICATIONS IP 69K

PART REFERENCE	SOCKET			CABLE	
	Size	Pins	Config.	Material	Length
S08-3FVG-020-NNLN	M8	3	straight	PVC	2 m
S08-3FVG-100-NNLN	M8	3	straight	PVC	10 m
S08-4FVG-020-NNLN	M8	4	straight	PVC	2 m
S08-4FVG-100-NNLN	M8	4	straight	PVC	10 m
S08-3FVW-020-NNLN	M8	3	right angle	PVC	2 m
S08-3FVW-100-NNLN	M8	3	right angle	PVC	10 m
S08-4FVW-020-NNLN	M8	4	right angle	PVC	2 m
S08-4FVW-100-NNLN	M8	4	right angle	PVC	10 m
S12-4FVG-020-NNLN	M12	4	straight	PVC	2 m
S12-4FVG-100-NNLN	M12	4	straight	PVC	10 m
S12-5FVG-020-NNLN	M12	5	straight	PVC	2 m
S12-5FVG-100-NNLN	M12	5	straight	PVC	10 m
S12-4FVW-020-NNLN	M12	4	right angle	PVC	2 m
S12-4FVW-100-NNLN	M12	4	right angle	PVC	10 m



example

S13

CONNECTING CABLES PUR WITH OPEN ENDED WIRES FOR AC SENSORS (230 V MAX)

PART REFERENCE	SOCKET			CABLE	
	Size	Pins	Config.	Material	Length
S13-3FUG-020	M12	3	straight	PUR	2 m
S13-3FUW-020	M12	3	right angle	PUR	2 m



CONNECTING CABLES PVC

PART REFERENCE	SOCKET			CABLE		PLUG	
	Size	Pins	Config.	Material	Length	Size	Config.
S08-3FVG-006-08MG	M8	3	straight	PVC	0.6 m	M8	straight
S08-3FVG-020-08MG	M8	3	straight	PVC	2 m	M8	straight
S08-3FVG-050-08MG	M8	3	straight	PVC	5 m	M8	straight
S12-4FVG-006-12MG	M12	4	straight	PVC	0.6 m	M12	straight
S12-4FVG-020-12MG	M12	4	straight	PVC	2 m	M12	straight
S12-4FVG-050-12MG	M12	4	straight	PVC	5 m	M12	straight



CONNECTING CABLES PUR

PART REFERENCE	SOCKET			CABLE		PLUG	
	Size	Pins	Config.	Material	Length	Size	Config.
S08-3FUG-006-08MG	M8	3	straight	PUR	0.6 m	M8	straight
S08-3FUG-020-08MG	M8	3	straight	PUR	2 m	M8	straight
S08-3FUG-050-08MG	M8	3	straight	PUR	5 m	M8	straight
S12-4FUG-006-12MG	M12	4	straight	PUR	0.6 m	M12	straight
S12-4FUG-020-12MG	M12	4	straight	PUR	2 m	M12	straight
S12-4FUG-050-12MG	M12	4	straight	PUR	5 m	M12	straight



CONNECTING CABLES PVC FOR FOOD APPLICATIONS

PART REFERENCE	SOCKET			CABLE		PLUG	
	Size	Pins	Config.	Material	Length	Size	Config.
S08-3FVG-006-NNLN-08MG	M8	3	straight	PVC	0.6 m	M8	straight
S08-3FVG-020-NNLN-08MG	M8	3	straight	PVC	2 m	M8	straight
S08-3FVG-050-NNLN-08MG	M8	3	straight	PVC	5 m	M8	straight
S12-4FVG-006-NNLN-12MG	M12	4	straight	PVC	0.6 m	M12	straight
S12-4FVG-020-NNLN-12MG	M12	4	straight	PVC	2 m	M12	straight
S12-4FVG-050-NNLN-12MG	M12	4	straight	PVC	5 m	M12	straight



example

CONNECTING CABLES PVC M8/M12 FOR FOOD APPLICATIONS

PART REFERENCE	SOCKET			CABLE		PLUG	
	Size	Pins	Config.	Material	Length	Size	Config.
S08-3FVG-006-NNLN-12MG	M8	3	straight	PVC	0.6 m	M12	straight
S08-3FVG-020-NNLN-12MG	M8	3	straight	PVC	2 m	M12	straight
S08-3FVG-050-NNLN-12MG	M8	3	straight	PVC	5 m	M12	straight
S08-4FVG-006-NNLN-12MG	M8	4	straight	PVC	0.6 m	M12	straight
S08-4FVG-020-NNLN-12MG	M8	4	straight	PVC	2 m	M12	straight
S08-4FVG-050-NNLN-12MG	M8	4	straight	PVC	5 m	M12	straight



example

CONNECTING CABLES M8/M12

PART REFERENCE	SOCKET			CABLE		PLUG	
	Size	Pins	Config.	Material	Length	Size	Config.
S08-3FVG-006-12MG	M8	3	straight	PVC	0.6 m	M12	straight
S08-3FVG-020-12MG	M8	3	straight	PVC	2 m	M12	straight
S08-3FVG-050-12MG	M8	3	straight	PVC	5 m	M12	straight
S08-4FVG-006-12MG	M8	4	straight	PVC	0.6 m	M12	straight
S08-4FVG-020-12MG	M8	4	straight	PVC	2 m	M12	straight
S08-4FVG-050-12MG	M8	4	straight	PVC	5 m	M12	straight
S08-3FUG-006-12MG	M8	3	straight	PUR	0.6 m	M12	straight
S08-3FUG-020-12MG	M8	3	straight	PUR	2 m	M12	straight
S08-3FUG-050-12MG	M8	3	straight	PUR	5 m	M12	straight
S08-4FUG-006-12MG	M8	4	straight	PUR	0.6 m	M12	straight
S08-4FUG-020-12MG	M8	4	straight	PUR	2 m	M12	straight
S08-4FUG-050-12MG	M8	4	straight	PUR	5 m	M12	straight



example

T-CONNECTOR

PART REFERENCE	CONNECTION 1		CABLE		CONNECTION 2	CONNECTION 3
	Size	Pins	Material	Length	Size	Size
V12-4TPD-003-UN0	M12 plug	4	PVC	0.3	M12 socket	M12 plug
V12-5TPD-000-NN1	M12 socket	5	n.a.	n.a.	M12 socket	M12 plug



example

DISTRIBUTION BOXES

PART REFERENCE	SOCKET			CONNECTION
	Size	Pins	Number connections	Length
V12-54PD-050-UYN	M12	5	4 Plug Distribution box	5 m
V12-54PD-100-UYN	M12	5	4 Plug Distribution box	10 m
V12-58PD-050-UYN	M12	5	8 Plug Distribution box	5 m
V12-58PD-100-UYN	M12	5	8 Plug Distribution box	10 m
V12-54PG-023-NYN	M12	5	4 Plug Distribution box	M23 connector
V12-58PG-023-NYN	M12	5	8 Plug Distribution box	M23 connector

CONNECTING CABLES PUR WITH OPEN ENDED WIRES FOR DISTRIBUTION BOXES

PART REFERENCE	SOCKET			CABLE	
	Size	Pins	Config.	Material	Length
S23-BFUG-050	M23	11	straight	PUR	5 m
S23-BFUG-100	M23	11	straight	PUR	10 m
S23-JFUG-050	M23	19	straight	PUR	5 m
S23-JFUG-100	M23	19	straight	PUR	10 m



example

FIELD ATTACHABLE CONNECTORS

PART REFERENCE	SOCKET			CABLE	
	Size	Pins	Config.	Outer Ø	Wire Ø
S08-3FNG-000-NNT1	M8	3	straight	3.0 - 5.0	0.14 - 0.38
S08-4FNG-000-NNT1	M8	4	straight	3.0 - 5.0	0.14 - 0.38
S08-3FNW-000-NNT1	M8	3	right angle	3.5 - 5.0	0.08 - 0.34
S08-4FNW-000-NNT1	M8	4	right angle	3.5 - 5.0	0.08 - 0.34
S08-3MNG-000-NNT1	M8	3	straight	3.0 - 5.0	0.14 - 0.38
S08-4MNG-000-NNT1	M8	4	straight	3.0 - 5.0	0.14 - 0.38
S08-3MNW-000-NNT1	M8	3	right angle	3.5 - 5.0	0.08 - 0.34
S08-4MNW-000-NNT1	M8	4	right angle	3.5 - 5.0	0.08 - 0.34
S12-4FNG-000-NNT2	M12	4	straight	4.0 - 8.0	0.14 - 0.50
S12-5FNG-000-NNT2	M12	5	straight	4.0 - 8.0	0.14 - 0.50
S12-4FNW-000-NNT2	M12	4	right angle	4.0 - 8.0	0.14 - 0.50
S12-5FNW-000-NNT2	M12	5	right angle	4.0 - 8.0	0.14 - 0.50
S12-4MNG-000-NNT2	M12	4	straight	4.0 - 8.0	0.14 - 0.50
S12-5MNG-000-NNT2	M12	5	straight	4.0 - 8.0	0.14 - 0.50
S12-4MNW-000-NNT2	M12	4	right angle	4.0 - 8.0	0.14 - 0.50
S12-5MNW-000-NNT2	M12	5	right angle	4.0 - 8.0	0.14 - 0.50



ACCESSORIES

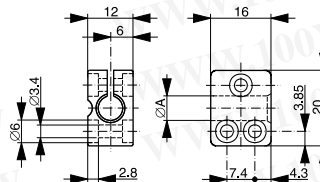
HIGHLIGHTS:

- ✓ Sensor testers for fast field checks
- ✓ Sensor mounting clamps
- ✓ Bases for mounting clamps
- ✓ Snap-on power supply units
- ✓ Amplifiers for 3-wire and NAMUR sensors

ACCESSORIES

SENSOR MOUNTING CLAMPS

Ø3, Ø4, Ø5, Ø6.5, Ø8



TECHNICAL DATA

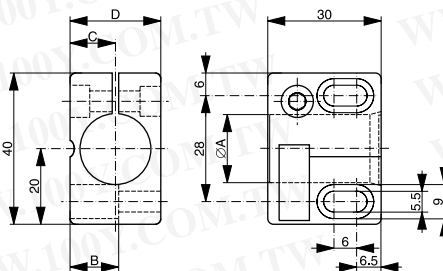
Part reference	Type	A			
ASU-0001-030	without limit stop	Ø 3 mm			
ASU-0001-040	without limit stop	Ø 4 mm			
ASU-0001-050	without limit stop	Ø 5 mm			
ASU-0001-065	without limit stop	Ø 6.5 mm			
ASU-0001-080	without limit stop	Ø 8 mm			
ASU-0002-080	with limit stop	Ø 8 mm			

Material: PA 6 black

Screw: DIN 912, M3 zinc-plated

Nut: DIN 934, M3 zinc-plated

Ø12, Ø18



TECHNICAL DATA

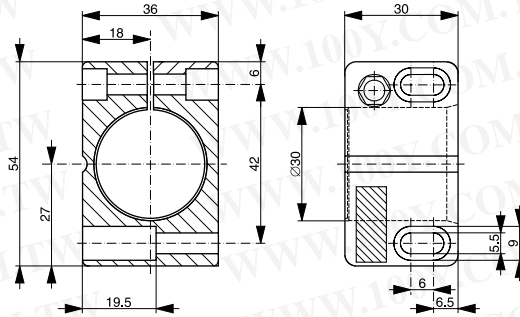
Part reference	Type	A	B	C	D
ASU-0001-120	without limit stop	Ø 12 mm	9.75 mm	9 mm	18 mm
ASU-0002-120	with limit stop	Ø 12 mm	9.75 mm	9 mm	18 mm
ASU-0001-180	without limit stop	Ø 18 mm	12.85 mm	12 mm	24 mm
ASU-0002-180	with limit stop	Ø 18 mm	12.85 mm	12 mm	24 mm

Material: PA 6 GK (Ø 18 mm), PA 6 (Ø 12 mm) black

Screw: DIN 912, M5 zinc-plated

Nut: DIN 934, M5 zinc-plated

Ø30



TECHNICAL DATA

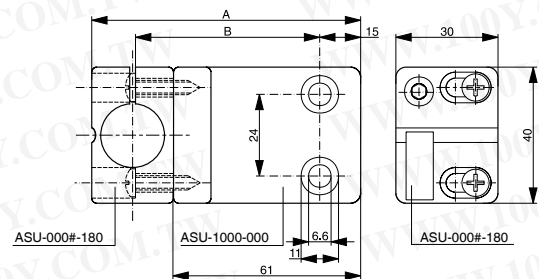
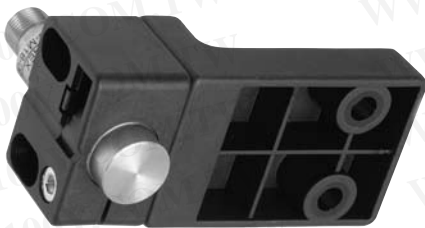
Part reference	Type				
ASU-0001-300	without limit stop	Ø 30 mm			
ASU-0002-300	with limit stop	Ø 30 mm			

Material: PA 6 GK black

Screw: DIN 912, M5 x 25 zinc-plated

Nut: DIN 934, M5 zinc-plated

BASES FOR MOUNTING CLAMPS Ø12, Ø18



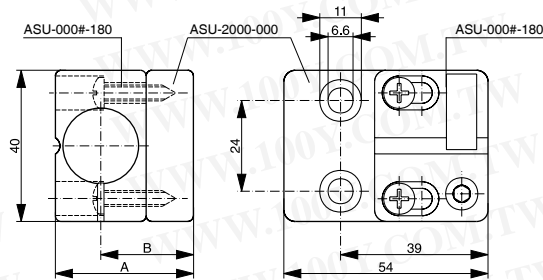
TECHNICAL DATA

Part reference	Type	A with Ø 12 mm / Ø 18 mm	B with Ø 12 mm / Ø 18 mm
ASU-1000-000	horizontal	79 mm / 85 mm	55 mm / 58 mm

Material: PA 6 black

Screws: DIN 7981, Ø 4.2 zinc-plated

ACCESSORIES



TECHNICAL DATA

Part reference	Type	A with \varnothing 12 mm / \varnothing 18 mm	B with \varnothing 12 mm / \varnothing 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, \varnothing 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.

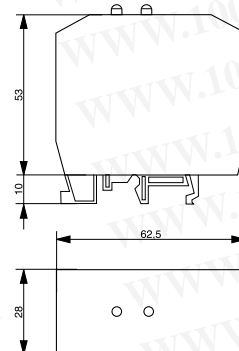
- Suitable for PNP and NPN devices, N.O. and N.C. versions
- Automatic PNP/NPN recognition
- LED and acoustic indicators
- Built-in steel target (non-standardized) for checking inductive sensors
- Power supply from a single 9 V battery (type IEC 6LR61)
- LED battery-state indication
- Built-in step-up 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.

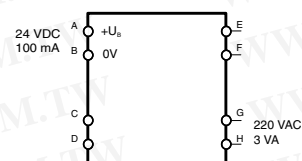
Dimensions (all types):



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:



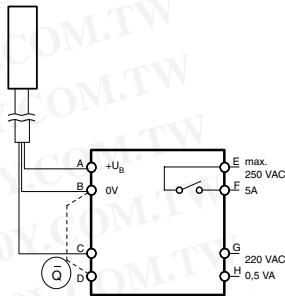
AMPLIFIERS FOR 3-WIRE SENSORS

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:

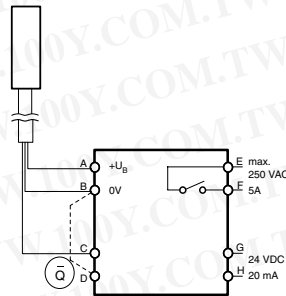


DW-AZ-100-D3

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

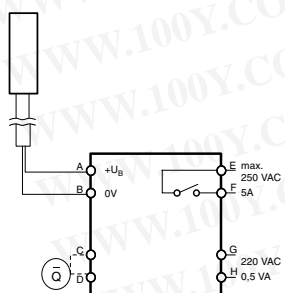
DW-AZ-100-AN

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:



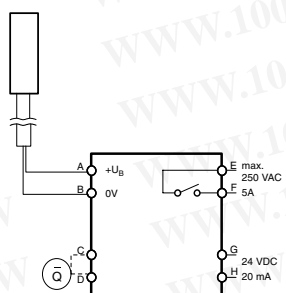
DW-AZ-100-DN

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:





GLOSSARY

HIGHLIGHTS:

- ✓ Clearance
- ✓ Connectors
- ✓ Correction factors
- ✓ Degrees of protection
- ✓ EMC
- ✓ Excess gain
- ✓ Hysteresis
- ✓ Mounting
- ✓ Oil resistance
- ✓ Operating distance
- ✓ Parallel connection
- ✓ Switching frequency
- ✓ Tightening torque
- ✓ Turn-on/turn-off time

 **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.

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 position. Fit the reflex sensor with the optical axis aligned on the reflector so that it switches reliably. Test with target. Reduce sensitivity if necessary.

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). 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. 15). 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.

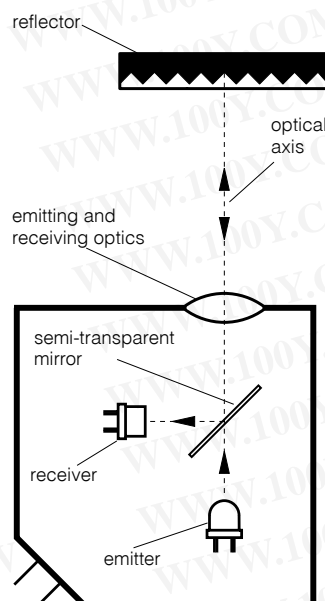


Fig. 15

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. 16).

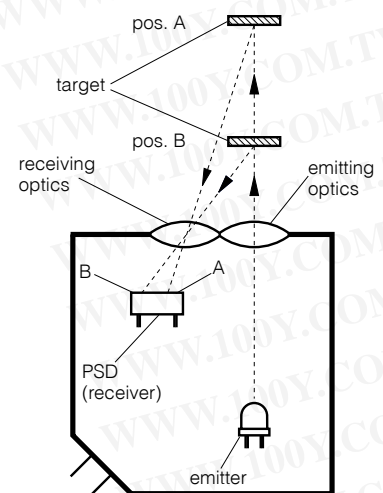


Fig. 16

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.

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-voltage directive 2006/95/EC. Consequently, they are labeled with the CE mark.

CE

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 additional security monitoring.

CLASSICS FAMILY



The **Classics** family (600 series) is one of three inductive sensing technologies offered by Contrinex. **Classics** family sensors rely on conventional inductive oscillator and coil technology (see page 18).

Sensors are sized from $\varnothing 3$ to M30, with cuboid variants up to 40 mm x 120 mm. PNP, NPN and 2-wire AC/DC output configurations are available, combined with sensing distances between 0.6 mm and 40 mm.

The **Classics** technology family includes devices from the following ranges: **Basic**, **Miniature**, **Extra pressure**, **Extra temperature**, **High temperature**, **Weld-immune** and **Special**.

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. 17).

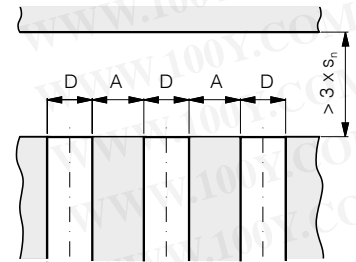


Fig. 17

EXTRA DISTANCE (SERIES 500, 520*)

Size D	(quasi)-embed. A (mm)	non-emb. A (mm)
$\varnothing 4$	6 (embeddable)	---
M5	5 (embeddable)	---
$\varnothing 6.5$	9.5	---
M8	8 / *16	20
C8	8	---
M12	18 / *34	30
M18	26	60
M30	50	120

CLASSICS (SERIES 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

DIFFUSE SENSORS (FIG. 18)

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

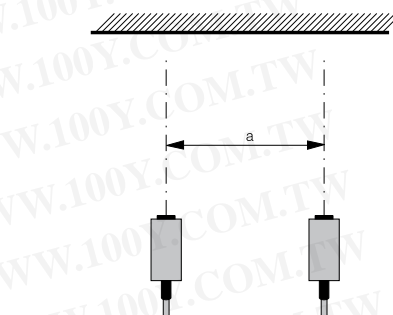


Fig. 18

FULL INOX (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.

REFLEX SENSORS (FIG. 19)

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

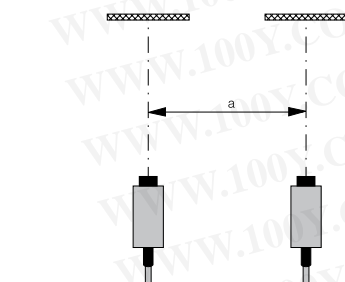


Fig. 19

THROUGH-BEAM SENSORS (FIG. 20)

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

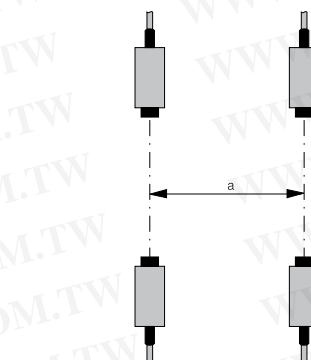


Fig. 20

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

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 Full Inox family (700 series) (see also page 19). 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

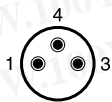


Developed and patented by Contrinex, this innovative technology makes use of a high-performance oscillator for inductive sensors. Operating distances from **2.2 to 4 times** the standard values are possible thanks to excellent temperature and voltage stability. Devices of the Extra distance family (500 and 520 series) work with such an oscillator (see also page 19).

CONNECTORS



PIN ASSIGNMENT SIZE S8:



N.O. and N.C.

+U _B	pin 1	brown
0V	pin 3	blue
output	pin 4	black

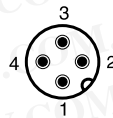
NAMUR

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":

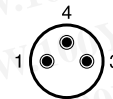


2-wire AC/DC / N.O. and N.C.

L1	pin 3	blue
L2	pin 2	brown
GND	pin 1	yellow/green



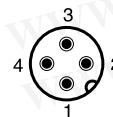
PIN ASSIGNMENT SIZE S8 3 POLE:



N.O. and N.C.

+U _B	pin 1	brown
0V	pin 3	blue
output	pin 4	black

PIN ASSIGNMENT SIZE S12 3 POLE:



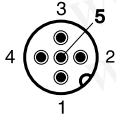
N.O.

+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

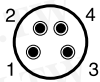
PIN ASSIGNMENT SIZE S12 5 POLE:



N.O. and N.C.

+U _B	pin 1	brown
output 2	pin 2	white
OV	pin 3	blue
output 1	pin 4	black
test	pin 5	gray

PIN ASSIGNMENT SIZE S8 4 POLE:



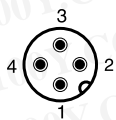
N.O. and N.C.

+U _B	pin 1	brown
output 2	pin 2	white
OV	pin 3	blue
output 1	pin 4	black

Teach

+U _B	pin 1	brown
output 2	pin 2	white
OV	pin 3	blue
output 1	pin 4	black

PIN ASSIGNMENT SIZE S12 4 POLE:



N.O. and N.C.

+U _B	pin 1	brown
output 2	pin 2	white
OV	pin 3	blue
output 1	pin 4	black

CORRECTION FACTORS



The specified operating distance **s** of inductive sensors refers to exactly defined measuring conditions (see **OPERATING DISTANCE**).

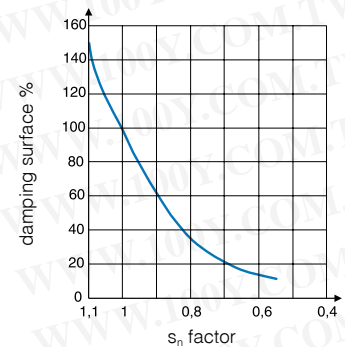
Other arrangements generally result in a reduction of the operating distance. The following data are to be considered as **guidelines** only; according to size and version, there can be wide variations. Exact values are given in the individual data sheets. These can be found on the Contrinex website (www.contrinex.com), or ordered directly from our sales offices.

CLASSICS (SERIES 600 / 620)

Material influence (indicative values):

Target material	Operating distance
Steel type FE 360	$s_n \times 1.00$
Aluminum	$s_n \times 0.55$
Brass	$s_n \times 0.64$
Copper	$s_n \times 0.51$
Stainless steel (V2A)	$s_n \times 0.85$

Geometrical influence:



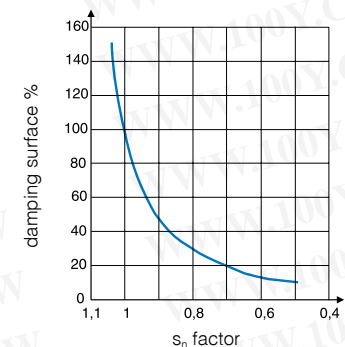
When using foils, an increase in the usable operating distance can be expected.

EXTRA DISTANCE (SERIES 500 / 520*)

Material influence (indicative values):

Target material	Operating distance
Steel type FE 360	$s_n \times 1.00$
Aluminum	$s_n \times 0.36 / *0.28$
Brass	$s_n \times 0.44 / *0.37$
Copper	$s_n \times 0.32 / *0.24$
Stainless steel (V2A)	$s_n \times 0.69$

Geometrical influence:



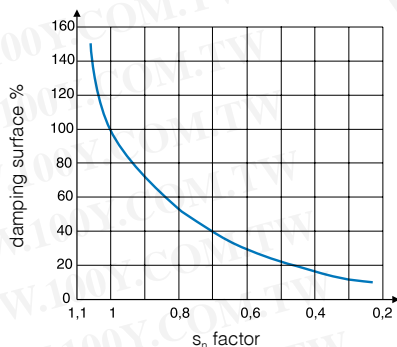
When using foils, an increase in the usable operating distance can be expected.

FULL INOX (SERIES 700)

Material influence (indicative values):

Target material	Operating distance
Steel type FE 360	$s_n \times 1.0$
Aluminum	$s_n \times 1.0$
Brass	$s_n \times 1.3$
Copper	$s_n \times 0.8$
Stainless steel (1 mm thick)	$s_n \times 0.5$
Stainless steel (2 mm thick)	$s_n \times 0.9$

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 listed here 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 \pm 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 \pm 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 \geq 1 month.

9K Protection against water which, if 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 $80 \pm 5^\circ\text{C}$ ($176 \pm 41^\circ\text{F}$); pressure 8,000 - 10,000 kPa (80 - 100 bar / 1160.8 - 1451 psi); 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**lectromagnetic **C**ompatibility) resistance of the devices satisfies the highest demands. For exact values, please refer to the data sheets.

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

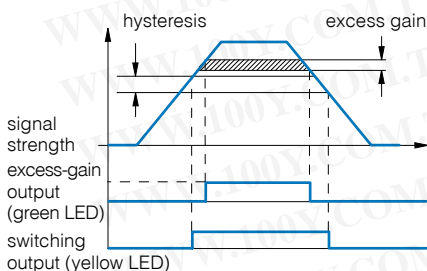


Fig. 21

with a second LED (green), which lights up when less than approximately 80% of the available operating distance is used. 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.

EXTRA DISTANCE FAMILY



The **Extra Distance** family (series 500/520) is one of three inductive sensing technologies offered by Contrinex. **Extra Distance** family sensors rely on conventional inductive oscillator and coil technology, but with a completely different signal evaluation circuit for better stability and therefore **long operating distances**. The most important contribution to this comes from the Contrinex patented Condist® oscillator (see pages 18-19).

Sensors are sized from Ø 4 to M30, with long operating distances up to 40 mm.

The Extra Distance technology family includes devices from the **Basic, Miniature, Extra pressure, High pressure** and **Analog output** ranges.

F

FULL INOX FAMILY



The **Full Inox** family (series 700) is one of three inductive sensing technologies offered by Contrinex. **Full Inox** family sensors rely on Contrinex's patented Condet® technology (see page 19).

Full Inox sensors have a one-piece, stainless steel housing and are exceptionally robust and chemically resistant. They are not only the most durable inductive sensors on the market, but also offer long operating distances on any conductive metal.

Sensors are sized from M8 to M30, with long operating distances up to 40 mm and protection class IP 67 and IP 69K

The **Full Inox** technology family includes devices from the **Miniature, Extreme, High pressure, Washdown, Weld-immune** and **Special** ranges.

H

HYSTERESIS



Hysteresis (differential travel) causes a defined switching behavior of the device (Fig. 22). 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.

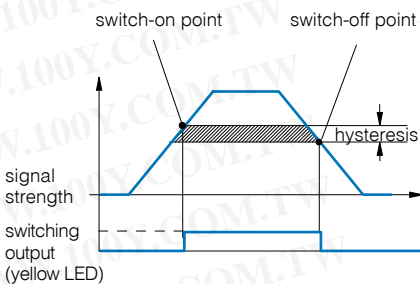


Fig. 22



Hysteresis (differential travel) causes a defined switching behavior of the device (Fig. 23). 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.

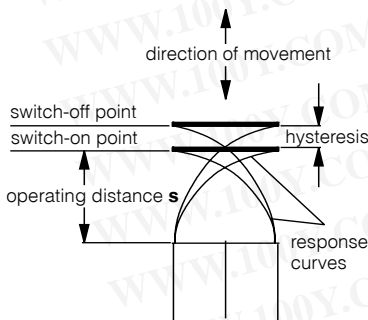


Fig. 23

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 **free-wheeling 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 75 VDC / 50 VAC (for supply voltages up to 75 VDC / 50 VAC) or 300 VDC / 250 VAC (for supply voltages between 75 VDC / 50 VAC and 300 VDC / 250 VAC).

IP 64 / IP 65 / IP 67 / IP 68 / IP 69K



Refer to [DEGREES OF PROTECTION](#).

IR LIGHT



IR is the abbreviation of “**Infra-Red**”. 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.



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 pages 288-295) 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**.



All photoelectric sensors have one or two **Light Emitting Diodes (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).

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



Strong fields can saturate the ferrite core of inductive sensors, thereby increasing the operating distance, or even provoking false switching. 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.

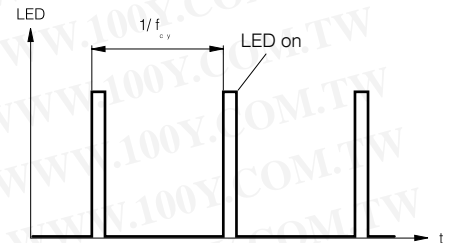


Fig. 24

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. 25 should be observed.

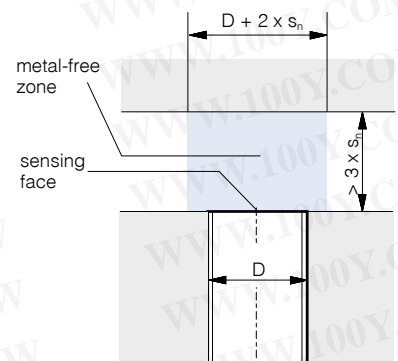


Fig. 25

QUASI-EMBEDDABLE SENSORS

When installing quasi-embeddable Extra Distance sensors (500 and 520 series) in conductive materials (metals), the devices must **protrude** by a distance **X**, according to Fig. 26. Further, a free zone of $3 \times s_n$ must be observed. Flush mounting in non-conducting materials is permitted.

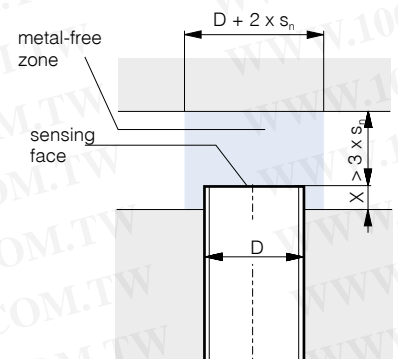


Fig. 26

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

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.

NON-EMBEDDABLE SENSORS

When mounting non-embeddable sensors in conducting materials (metals), minimum distances to the conducting material must be maintained according to Fig. 27. Flush mounting in non-conducting materials is permitted.

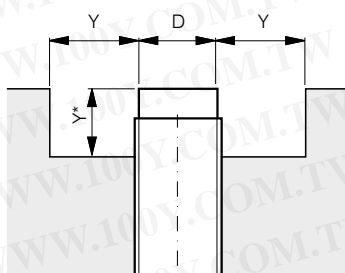


Fig. 27

Housing size D	Y (mm)
M8	8
M12	12
M18	22
M30	40
C44	60 / *40
C40	70 / *40

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. 28).

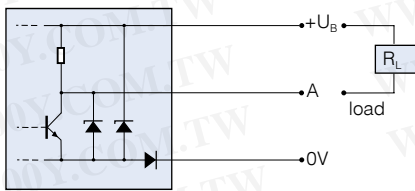


Fig. 28

O

OIL RESISTANCE



Long-term contact with any oils may affect plastics and weaken their resistance. However, inductive Full Inox sensors (series 700), 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 4150 and 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. 29). 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. 30). 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.

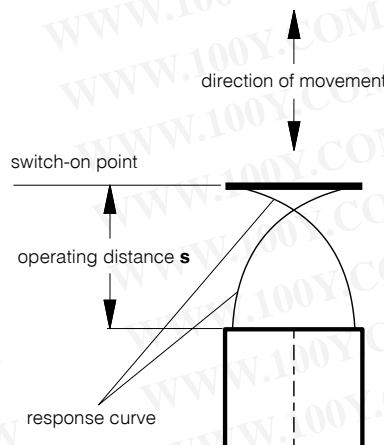


Fig. 29

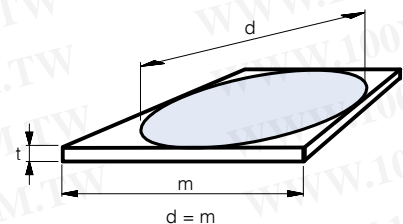


Fig. 30

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 $\pm 10\%$.

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.

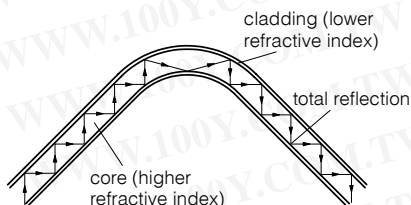


Fig. 31

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 capacitive 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 or pull-down 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. 32 and 33).

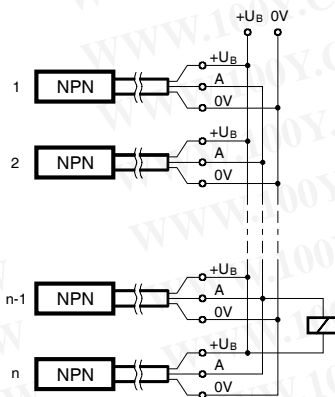


Fig. 32

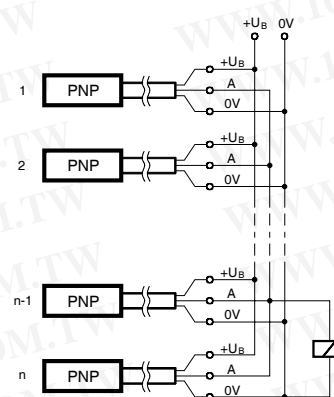


Fig. 33

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. 34).

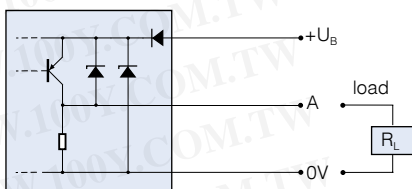


Fig. 34

POLARITY REVERSAL PROTECTION



Virtually all sensors in this catalog are protected against **any polarity reversal** at all terminals.

POLARIZATION FILTER

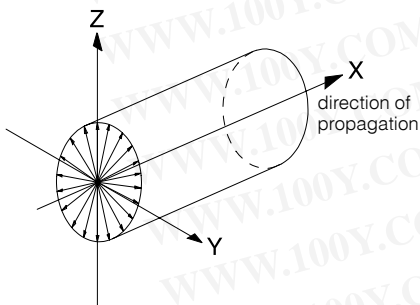


Fig. 35

Natural light (including the light from the emitter diodes) is not polarized (Fig. 35). 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. 36). 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.

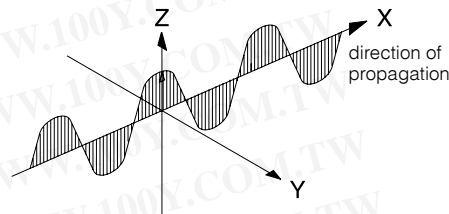


Fig. 36

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. 37 and 38.

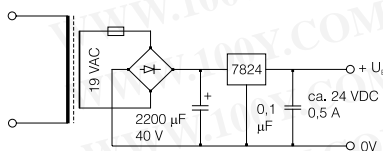


Fig. 37

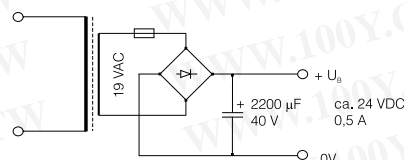


Fig. 38

The Contrinex accessory program also includes a suitable power supply unit (see page 302).

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. 39). 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 $\pm 15^\circ$).

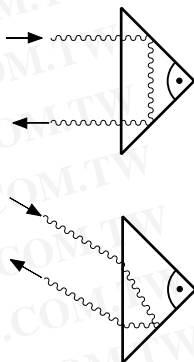


Fig. 39

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 , over an 8-hour period at an ambient temperature of $23 \pm 5^\circ\text{C}$ ($73.4 \pm 41^\circ\text{F}$) 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. 40 and Fig. 41):

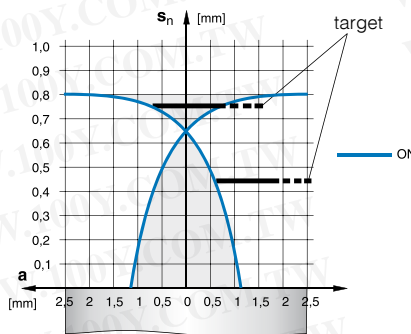


Fig. 40 DW-AD-403-M5

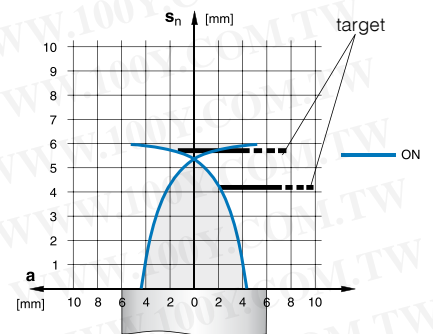


Fig. 41 DW-AD-503-M12

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.

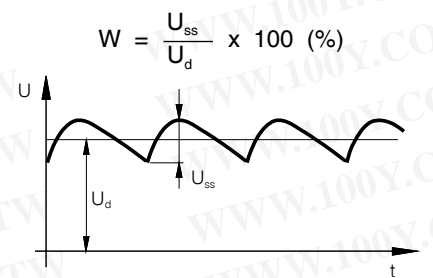


Fig. 42

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 photo-electric 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 versions of double convex lenses. They feature a short focal length and a good light incidence area. Fig. 43 shows such a design in sensor type LT#-1040/1050-30#-50# (see pages 141-146).

For diffuse sensors, the sphere is cut in two to separate the reception from the emission channel.

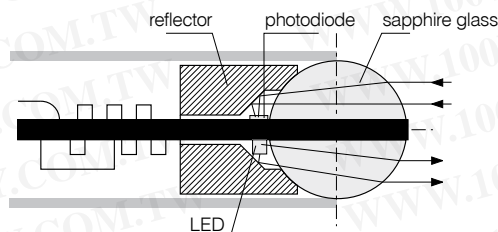


Fig. 43

The emitter and receiver chips are mounted as closely as possible to the surface of the sphere and slightly off the optical axis (see Fig. 43). This causes the emitted beam to intersect the receiver's sensing range at a specific distance from the device, resulting in a relatively short sensing range, but a virtually cylindrical detection zone. A cylindrical detection zone is particularly useful in some applications, such as 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. 44).

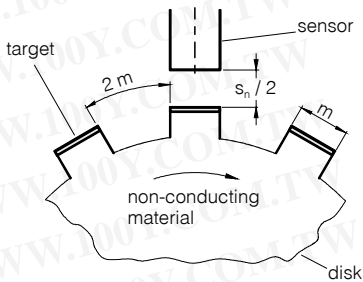


Fig. 44



In the case of photoelectric sensors, the frequency of operating cycles (f) is determined from the formula:

$$f = \frac{1}{t_{on} + t_{off}}$$

where:

t_{on} is the turn on time

t_{off} is the turn off time

t_{on} and t_{off} are measured in accordance with IEC60947-5-2 2007 paragraph 8.5.3. (see also **Turn-on/turn-off time**, in this glossary).

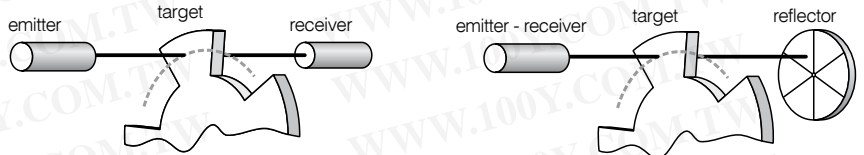


Fig. 45: Through-beam and reflex modes: the light beam must be fully broken by the target.

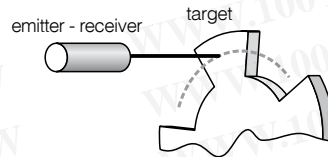


Fig. 46: Diffuse mode: the target must be of the same material as the standard target.



TEACH-IN



Some devices have a teach-in capability instead of a potentiometer to adjust their sensing range, etc. Teach-in is achieved either directly by pressing a button or remotely 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.

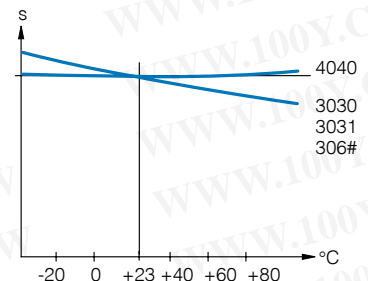


Fig. 47



The specified operating distances refer to a nominal ambient temperature of 23°C (73.4°F). The operating distance, as a function of ambient temperature, follows approximately the curve shown in Fig. 48.

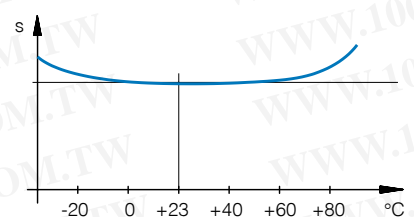


Fig. 48

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 $+70^{\circ}\text{C}$ (-13°F to $+158^{\circ}\text{F}$), the operating distance varies by a maximum of $\pm 10\%$ compared to its value at 23°C (73.4°F).

TURN-ON / TURN-OFF TIME



The output **turn-on** time t_{on} is the minimum period of time required for a sensor to detect the **presence** of a light beam and output an ON signal.

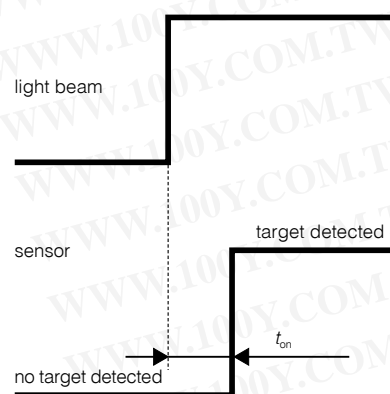


Fig. 49: Output turn-on time

The output **turn-off** time t_{off} is the minimum period of time required for a sensor to detect the **absence** of a light beam and output an OFF signal.

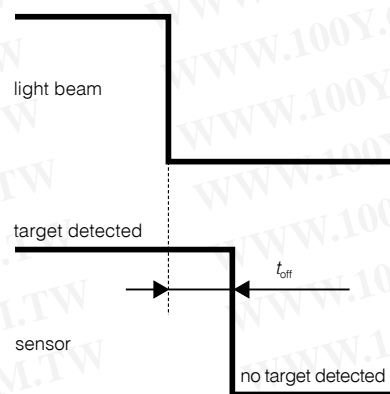


Fig. 50: Output turn-off time

t_{on} and t_{off} are measured in accordance with IEC60947-5-2 2007 paragraph 8.5.3.

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.



FULL INOX (SERIES 700)

Housing size D	M (Nm)
M8	8
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



CLASSICS / EXTRA DISTANCE (SERIES 500*, 520*, 600, 620)

Housing size D	M (Nm)
M4	0.8
M5	1.5
C5	0.2
M8	8 / *4
C8	1
M12	10
M18	25
M30	70

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



PART REFERENCE KEY

HIGHLIGHTS:

- ✓ **Inductive:** sensor type, connection, series, output, housing
- ✓ **Photoelectric:** sensor type, series, dimensions, execution
- ✓ **Ultrasonic:** sensor type, connection, housing, operating distance, output, polarity
- ✓ **Capacitive:** sensor type, connection, dimensions, operating distance, housing, mounting, output
- ✓ **Connectivity:** distribution boxes, cables and connectors

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

500 / 520 (Extra Distance)	5
600 / 620 (Classics)	6
700 (Full Inox)	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

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

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###

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

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
--------------------	----------

HOUSING SIZE

Cylindrical devices	
M12	12
M18	18
M30	30

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

CAPACITIVE SENSORS

CSK-1120-103

CAPACITIVE SENSOR	C		OUTPUT	
SENSOR TYPE			PNP, changeover	3
Basic / High performance	S		AC/DC N.O.	7
CONNECTION			PNP, N.O.	8
Cable	K		MOUNTING	
Connector	S		Embeddable	0
DIMENSIONS			Non-embeddable	1
Cylindrical devices			HOUSING TYPE	
M12		112	Metal housing	1
M18		118	Synthetic housing	2
M30		130	PTFE housing	3
Ø 26 / G1		226	OPERATING DISTANCE	
Cubic devices			Increased operating distance	0
48.5 x 32 mm		332	Standard operating distance	1
120 x 80 mm		380		

CABLE DISTRIBUTION BOXES

V12-58PD-050-UYN (-###)

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
2 connections	T
4 connections	4
6 connections	6
8 connections	8
10 connections	1

MATERIAL

Plastic	P
Metal	M

SPECIAL EXECUTIONS

TECHNOLOGY

Standard (passive distribution box)	N
Wiring according diagram no.	#

LED

Yes	Y
No	N

CABLE MATERIAL

No cable	N
PVC	V
PUR	U

CONNECTION

No cable	000
Cable 0.3 m	003
Cable 2 m	020
Cable 5 m	050
Cable 10 m	100
Connector M12	012
Connector M23	023

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 CABLES

S12-4FAG-020[-NNLN-12MG]-(XXX)

CONNECTION CABLE

S

CONNECTOR SIZE FEMALE

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 (FEMALE)

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.	015
100 pieces	921

CABLE EXIT (MALE)

Straight	G
Right-angle	W

CONNECTOR TYPE

Male (plug)	M
Female (socket)	F

CONNECTOR SIZE MALE

M8	08
M12	12
M23	23

CONNECTION TYPE

Standard	N
Quick-lock	Q
Cable Ø 3.0 - 5.0 mm / wire 0.08 - 0.38 mm ²	1
Cable Ø 4.0 - 8.0 mm / wire 0.14 - 0.50 mm ²	2

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

PART REFERENCE CHANGE

OLD PART REFERENCE	NEW PART REFERENCE
DW-AD-301-03	DW-AD-601-03
DW-AD-301-M4	DW-AD-601-M4
DW-AD-303-03	DW-AD-603-03
DW-AD-303-M4	DW-AD-603-M4
DW-AD-304-03	DW-AD-604-03
DW-AD-304-M4	DW-AD-604-M4
DW-AD-401-04	DW-AD-601-04
DW-AD-401-C5	DW-AD-601-C5
DW-AD-401-M5	DW-AD-601-M5
DW-AD-403-04	DW-AD-603-04
DW-AD-403-C5	DW-AD-603-C5
DW-AD-403-M5	DW-AD-603-M5
DW-AD-403-M5-735	DW-AD-603-M5-735
DW-AD-403-M5E	DW-AD-603-M5E
DW-AD-404-04	DW-AD-604-04
DW-AD-404-C5	DW-AD-604-C5
DW-AD-404-M5	DW-AD-604-M5
DW-AD-405-04	DW-AD-605-04
DW-AD-405-04K	DW-AD-605-04K
DW-AD-405-M5	DW-AD-605-M5
DW-AD-405-C5	DW-AD-605-C5
DW-AD-401-C5	DW-AD-601-C5
DW-AD-421-M8	DW-AD-601-M8-120
DW-AD-423-065	DW-AD-603-065-120
DW-AD-423-065-400	DW-AD-603-065-400
DW-AD-423-M8	DW-AD-603-M8-120
DW-AD-425-065	DW-AD-605-065-120
DW-AS-403-M5	DW-AS-603-M5
DW-AS-404-M5	DW-AS-604-M5
DW-AS-421-065-001	DW-AS-601-065-129
DW-AS-423-065-001	DW-AS-603-065-129
DW-AS-424-065-001	DW-AS-604-065-129
DW-AV-303-03-276	DW-AV-603-03-276



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