

PRODUCT OVERVIEW

PHOTOELECTRIC SENSORS FOR AUTOMATION TECHNOLOGY



Our broad range of photoelectric sensors is aimed at all automation solutions where noncontact object detection can be utilized. The wide variety of different operating principles, models, sizes and specifications means that the best possible sensor can always be found for the relevant application and all conditions that occur in practice can be met.

In automation, photoelectric sensors in general provide all the benefits of fast and noncontact detection. They essentially consist of an emitter and a receiver unit. If an object moves into the beam path, for example, the receiver responds to changes in the amount of light received within milliseconds and converts the optical signal emitted by the emitter into an electrical switching signal. The photoelectric sensors operate with visible red light, invisible infrared light or powerful laser light as required.

THE FUTURE OF PHOTOELECTRIC SENSORS

Market requirements and technological developments give rise to innovations in photoelectronics. Pepperl+Fuchs is the first manufacturer to use the principle of direct light propagation time measurement method with pulse ranging technology (PRT) in commercial industrial applications. Used to calculate the sensing distances to objects, PRT is far superior to other available processes. This important trend in photoelectronics can therefore be summarized by the maxim “Sensing by Ranging”, i.e., the future belongs to measuring photoelectric sensors. Another focus of attention at Pepperl+Fuchs is the efficient connection of sensors to the control hierarchy via IO-Link for the utilization of intelligent sensor functions.

Take a look at our impressive selection of noncontact photoelectric sensors. You are sure to find the right one for you. Perfectly adapted customer-specific optical solutions are also available. Talk to us!

STANDARD SENSORS

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PHOTOELECTRONICS WITH UNEQUALED BENEFITS



Pepperl+Fuchs photoelectric sensors master extreme influences such as excessive ambient light, high humidity or dirt. Therefore, most of our standard sensors bear the VISO+ quality symbol.

Highest priority is placed on functional reliability. The sensors are extremely reliable because the emitters generate between 10 and 100 times more light than required for reliable detection. As a result, they operate even in very dirty, dusty environments or with inaccurate alignment. The high degree of insensitivity to ambient light increases operational reliability which allows operation in the direct vicinity of high-frequency fluorescent lighting, while a high degree of immunity to mutual interference allows sensors to be positioned next to each other.

Miniature and compact housings

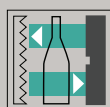


THRU-BEAM SENSOR



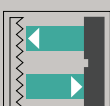
The light emitters and receivers are housed in individual, spatially separated housings that must be installed opposite one another and aligned. Extremely long sensing ranges and high signal strengths can be achieved with thru-beam sensors because the light emitted from the emitter reaches the receiver directly.

RETROREFLECTIVE SENSOR FOR CLEAR GLASS DETECTION



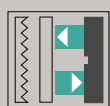
These sensors detect the smallest changes in the intensity of incident light and are able to detect glass and other transparent objects reliably. Switching threshold adjustment compensates for any dirt on the sensor lens to prevent extreme sensitivity from causing malfunctions.

RETROREFLECTIVE SENSOR



Retroreflective sensors, which have emitters and receivers in the same housing, are easy to install and align and require a reflector. The reflector reflects the light emitted by the emitter back to the sensor so that the receiver detects it. If the background and objects are reflective, polarization filters guarantee reliable operation.

RETROREFLECTIVE SENSOR WITH FOREGROUND SUPPRESSION



These photoelectric sensors do not respond to signals from reflectors and high-gloss reflective objects positioned closer to the sensor than the preset minimum sensing range and therefore ignore anything in the close range. They are suitable for recognizing objects wrapped in shrink wrap, for example.

UNIVERSAL OUTPUT ELECTRONICS LEAVE NOTHING TO BE DESIRED



Another advantage of our standard sensors is the push-pull output (4 in 1). With only one sensor type, the push-pull output offers safe, reproducible switching characteristics with outstanding EMC strength for every conceivable configuration in signal processing. With a single sensor without explicit light/dark switch can be realized light or dark switching and PNP or NPN configurations. Amazing versatility reduces inventory and ordering costs.

IN THE RIGHT LIGHT, ANY PROBLEM CAN BE SOLVED

Photoelectric sensors are predominantly used in applications where rapid, reliable object detection is a top priority. The color and material of the detected objects do not generally play a significant role and even objects with transparent or reflective surfaces can be detected reliably. Among standard sensors, a distinction is made between the three functional principles of thru-beam sensors, retroreflective sensors and diffuse mode sensors, depending on the function and the relative position. These principles form the basis for other sensor versions with additional optical or electronic characteristics such as fiber optic sensors, contrast sensors, optical data couplers and measuring systems such as distance sensors, all of which are described in detail on the following pages.

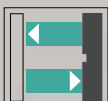
Compact housings



Cylindrical housings



DIFFUSE MODE SENSOR



Light emitter and receiver incorporated in a single housing. A reflector is not required because the detected object also functions as a reflector. The sensing range referred to here as the detection range is reduced due to the diffuse object reflection. The main strength of diffuse sensors is the detection of very small objects at close distance.

CONVERGENT MODE SENSOR



The visual fields of the emitter and receiver on these special diffuse mode sensors cross over in such a way that only light reflected from objects positioned a certain distance away from the sensor reaches the receiver to prevent interfering objects in the background from causing a malfunction.

BACKGROUND SUPPRESSION SENSOR



These sensors are also insensitive to interfering objects in the background. Additionally, they are extremely accurate, their sensing range can be varied more effectively, and they have a more efficient emitted light energy which makes them insensitive to dirty or dusty lenses. The special feature of this type of sensor is a receiver consisting of two elements. More light falls on the closer element or the further element, depending on how far away the reflecting object is positioned. The sensor indicates the presence of an object only when more than half of the emitted light falls on the closer element. As a result, the sensor detects objects in front of a close background with extreme accuracy regardless of the consistency and color of the object and the background. The same applies for dark objects in front of a light background.

If you cannot find the right sensor, give us a call! Working together, we are confident that we can find the perfect solution for your application.

STANDARD SENSORS · MINIATURE HOUSINGS



ML4.2



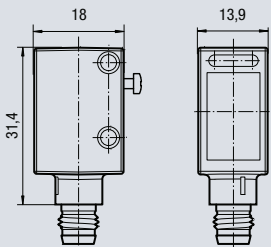
ML6



ML7



ML8



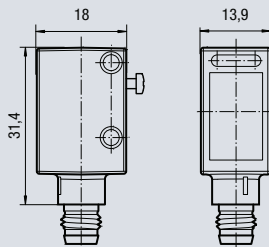
Thru-beam sensor
10 m

Retroreflective sensor
6 m

Background suppression sensor
20 mm, 40 mm, 60 mm, 80 mm

Red light,
Infrared light
10 V DC ... 30 V DC

- Glass optical face
- Resistant to dust build-up
- LED indicators front and rear
- Double sensor version with two light spots
- Metal housings for rough environments
- Tamperproof, no operating controls



Thru-beam sensor
10 m, adjustable

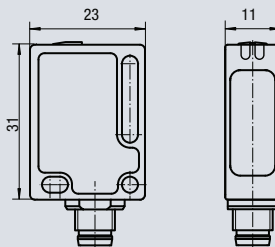
Retroreflective sensor
6 m

Retroreflective sensor for clear object detection
6 m

Background suppression sensor
20 mm, 40 mm, 60 mm, 80 mm, 120 mm, 150 mm, adjustable

Red light,
Infrared light
10 V DC ... 30 V DC

- Plastic optical face
- Accurate switching point
- LED indicators front and rear
- Adjustable contrast settings
- Metal housings for rough environments



Thru-beam sensor
4.5 m

Retroreflective sensor
3.5 m

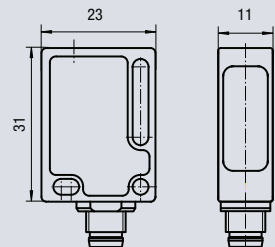
Retroreflective sensor for clear object detection
7.6 m

Diffuse mode sensor
200 mm, adjustable

Background suppression sensor
140 mm, 350 mm, adjustable

Red light,
Infrared light
10 V DC ... 30 V DC

- "2-point scanning" method
- Adjustable contrast settings
- IP69K Resistant to steam jets and cleaning
- Version with optical face on the side



Thru-beam sensor
4.5 m

Retroreflective sensor
3.5 m, 7.6 m

Diffuse mode sensor
200 mm

Background suppression sensor
30 mm, 50 mm, 100 mm, 140 mm, 350 mm, adjustable

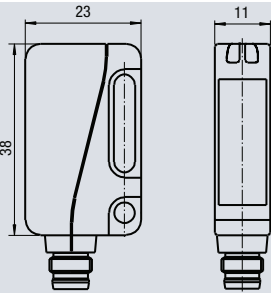
Convergent mode sensor
30 mm, 50 mm, 220 mm, adjustable

Red light,
Infrared light
10 V DC ... 30 V DC

- Tamperproof, no operating controls
- Versions with broad light spot and multiple light spots for special requirements



ML9



Retroreflective sensor

6 m

**Retroreflective sensor
for clear object detection**

7.6 m

Background suppression sensor

50 mm, adjustable

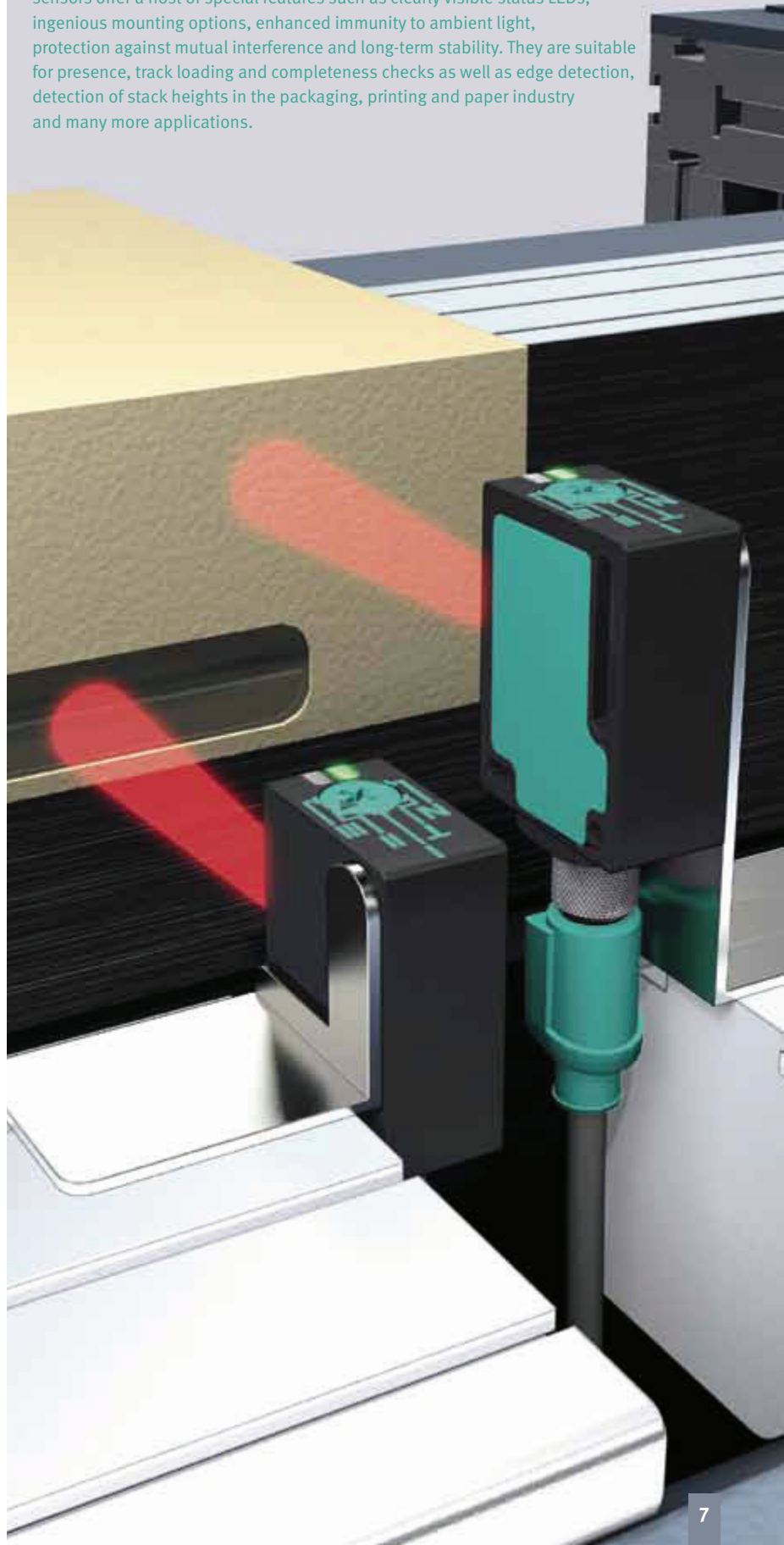
Red light,
Infrared light

10 V DC ... 30 V DC

- Teach-in
- "2-point scanning" method
- Adjustable contrast detection settings
- Metal housings for rough environments

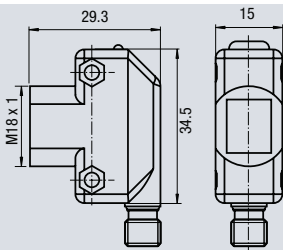
MINIATURE HOUSINGS IN THE APPLICATION

Miniature housings are ideal for use in extremely confined areas where reliable detection is required under demanding conditions. In spite of their small size, these impressive sensors offer a host of special features such as clearly visible status LEDs, ingenious mounting options, enhanced immunity to ambient light, protection against mutual interference and long-term stability. They are suitable for presence, track loading and completeness checks as well as edge detection, detection of stack heights in the packaging, printing and paper industry and many more applications.





ML17



Thru-beam sensor
20 m

Retroreflective sensor
5 m, 9 m, adjustable

Diffuse mode sensor
450 mm, adjustable

Background suppression sensor
50 mm, 100 mm

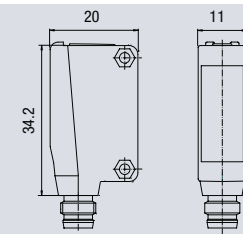
Red light,
Infrared light

10 V DC ... 30 V DC

- Special design for M18 front mounting or side mounting holes



ML100



Thru-beam sensor
15 m, 20 m, 30 m, adjustable

Retroreflective sensor
7 m, adjustable

Diffuse mode sensor
1000 mm, adjustable

Background suppression sensor
350 mm, adjustable

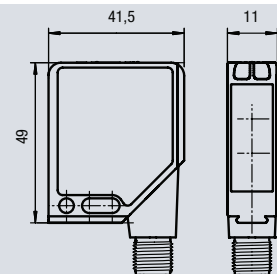
Red light (PowerBeam)
Infrared light

10 V DC ... 30 V DC

- Extremely bright and sharp light spot due to PowerBeam, no central bond spot
- Light spot size adapted to the application
- Metal housings for rough environments



MLV12



Thru-beam sensor
25 m

Retroreflective sensor
9 m, 21 m, adjustable

Retroreflective sensor for clear object detection
5.6 m

Background evaluation sensor
150 mm, adjustable

Background suppression sensor
100 mm, 250 mm, adjustable

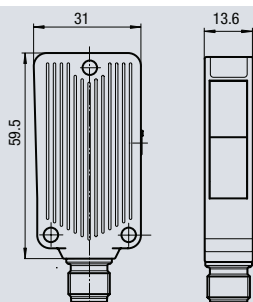
Red light,
Infrared light,
Laser light

10 V DC ... 30 V DC

- Teach-in, internal and external
- Adjustable contrast settings
- Test input
- Impermeable housing with metal frame for extra stability



MLV41



Retroreflective sensor

10 m, 12 m

Retroreflective sensor

for clear object detection

6.5 m

Background suppression sensor

60 mm, 120 mm, 350 mm,
adjustable

Red light,
Infrared light

10 V DC ... 30 V DC

- Tamperproof, no operating controls
- Versions with broad light spot and multiple light spots for printed circuit board detection

SMALL STANDARD SENSORS IN THE APPLICATION

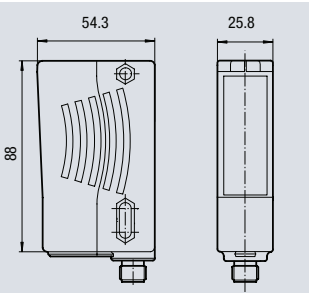
Ideal for cramped spaces, these compact sensors are characterized by a series of functions that are normally found only on larger sensors. Special features include switching frequencies up to 1 kHz, HF immunity to ambient light, protection against mutual interference and universal push-pull outputs for all kinds of switching logic. These sensors were designed for standard solutions such as presence checks, monitoring applications, stacking height/front edge detection and impulse sensors.



STANDARD SENSORS · COMPACT HOUSINGS



RL28



Thru-beam sensor

40 m, 400 m, adjustable

Retroreflective sensor

17 m, 21 m, 42 m, adjustable

Retroreflective sensor for clear object detection

7 m

Retroreflective sensor with foreground suppression

12 m, 17 m, adjustable
0 m ... 0.2 m no detection range

Background suppression sensor

400 mm, 700 mm, 1500 mm, 2000 mm, adjustable

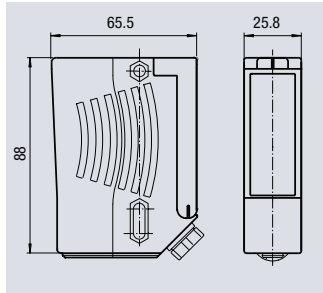
Red light,
Infrared light,
Laser light, laser class 1

10 V DC ... 30 V DC

- Test input
- Teach-in, internal and external
- Adjustable timer functions
- Adjustable contrast settings



RLK28



Thru-beam sensor

90 m, 400 m, adjustable

Retroreflective sensor

21 m, 42 m, adjustable

Retroreflective sensor for clear object detection

7 m

Retroreflective sensor with foreground suppression

17 m, adjustable
0 m ... 0.2 m no detection range

Background suppression sensor

400 mm, 700 mm, 2000 mm, adjustable

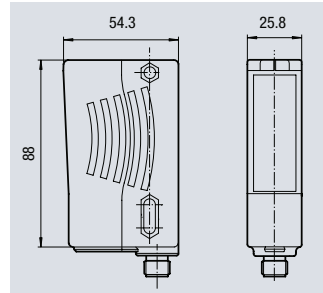
Red light,
Infrared light,
Laser light, laser class 1

12 V AC/DC ... 240 V AC/DC

- Teach-in, internal and external
- Relay output
- Adjustable timer functions
- Adjustable contrast settings
- Terminal compartment



RL29



Retroreflective sensor

10 m

Retroreflective sensor with foreground suppression

8 m
0 m ... 0.2 m no detection range

Diffuse mode sensor

2000 mm, adjustable

Background suppression sensor

1200 mm, adjustable

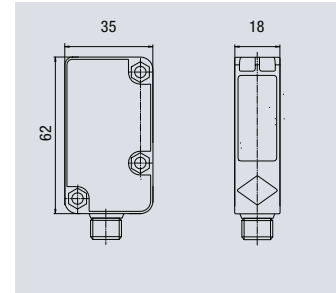
Red light

10 V DC ... 30 V DC

- Tamperproof, no operating controls
- Version with increased sensing range and universal power supply for door and barrier systems



RL31



Thru-beam sensor

43 m

Retroreflective sensor

12 m

Diffuse mode sensor

1200 mm, 2500 mm

Background suppression sensor

800 mm, adjustable

Convergent mode sensor

300 mm, adjustable

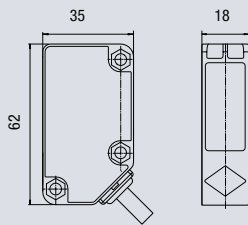
Red light,
Red light (PowerBeam),
Infrared light

10 V DC ... 30 V DC

- Test input
- Measuring version of photoelectric sensor with several operating modes and distance information via IO-Link
- Extremely bright and sharp light spot due to PowerBeam, no central bond spot



RLK31



Thru-beam sensor

43 m

Retroreflective sensor

12 m, 16.5 m

Diffuse mode sensor

1200 mm, 2500 mm, adjustable

Red light,
Infrared light

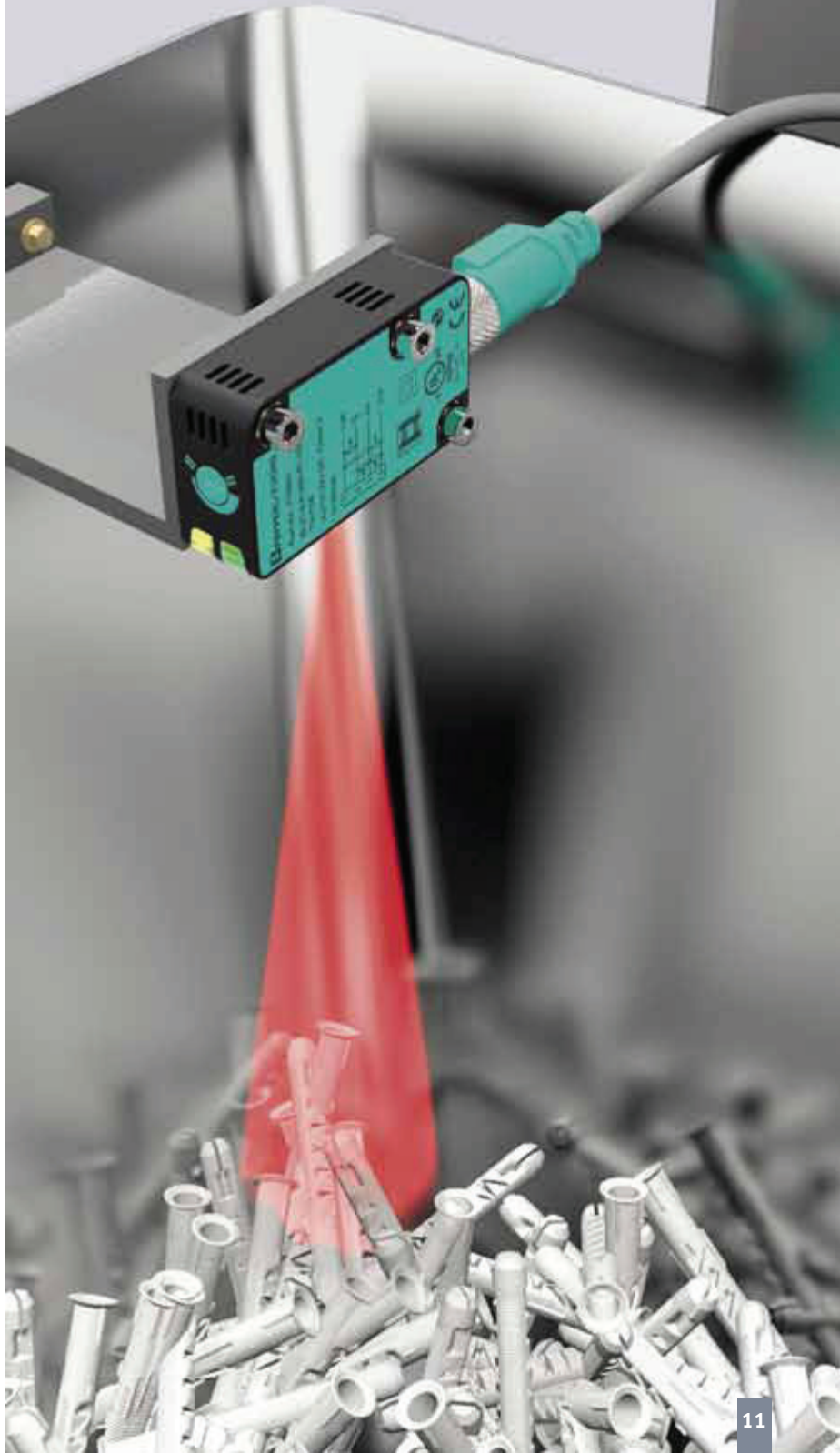
24 V AC ... 240 V AC

12 V DC ... 240 V DC

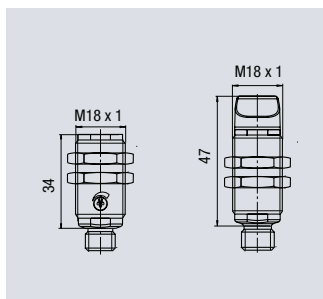
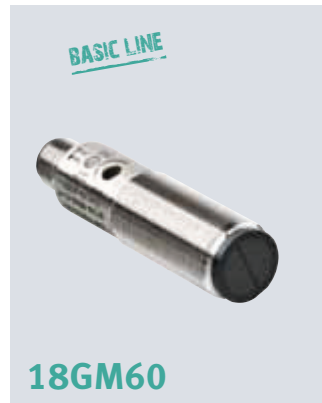
- Relay output
- Universal power supply version, also for industrial door applications

COMPACT STANDARD SENSORS IN THE APPLICATION

Enclosed in compact, robust IP67 plastic housings with scratchproof lens covers, these sensors qualify for indoor, outdoor and deep-freeze applications. Long sensing range, insensitivity to ambient light, protection from mutual interference and bright status LEDs round off the large selection of features. These sensors are suitable for positioning, conveying and object tracking as well as presence, height and locking edge monitoring in all conceivable applications in processing, monitoring and logistic processes.



STANDARD SENSORS · CYLINDRICAL HOUSINGS



Thru-beam sensor
17.5 m, 25 m

Retroreflective sensor
4.5 m, 5.5 m, 6.5 m, 8 m

**Retroreflective sensor
for clear object detection**
2.5 m, 6.5 m

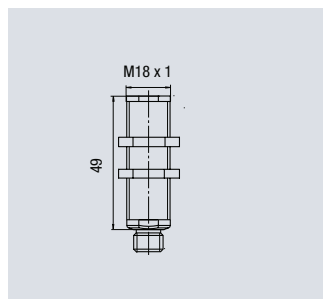
Diffuse mode sensor
200 mm, 400 mm, 450 mm,
adjustable

Background suppression sensor
120 mm, adjustable

Red light,
Red light (PowerBeam)

10 V DC ... 30 V DC

- Extremely bright and sharp light spot due to PowerBeam, no central bond spot
- Straight and right-angled optical face configurations
- Best background suppressor in its class



Thru-beam sensor
17.5 m, 25 m

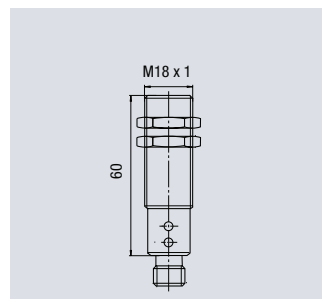
Retroreflective sensor
5.5 m, 6.5 m, 8 m

Diffuse mode sensor
200 mm, 400 mm, 450 mm,
adjustable

Red light

20 V AC/DC ... 250 V AC/DC

- Output N channel MOSFET
- Microconnector AC, 1/2"



Thru-beam sensor
10 m, adjustable

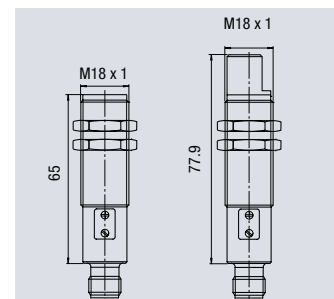
Retroreflective sensor
4 m, adjustable

Diffuse mode sensor
200 mm, 500 mm,
adjustable

Red light,
Infrared light

10 V DC ... 30 V DC

- Dual color display
- Robust M18 threaded housing, nickel-coated brass



Thru-beam sensor
85 m, adjustable

Retroreflective sensor
4 m, 6 m, 18 m, 20 m, adjustable

Diffuse mode sensor
400 mm,
adjustable

Background suppression sensor
120 mm, adjustable

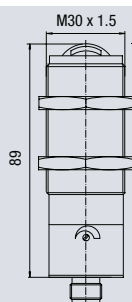
Red light,
Infrared light,
Laser light, laser class 1

10 V DC ... 30 V DC

- Straight and right-angled configurations
- Thru-beam version with adjustable focus for the detection of parts smaller than 50 µm at close range
- Robust M18 threaded housing, nickel-coated brass



GLV30



Diffuse mode sensor

2500 mm,
adjustable

Background suppression sensor

150 mm

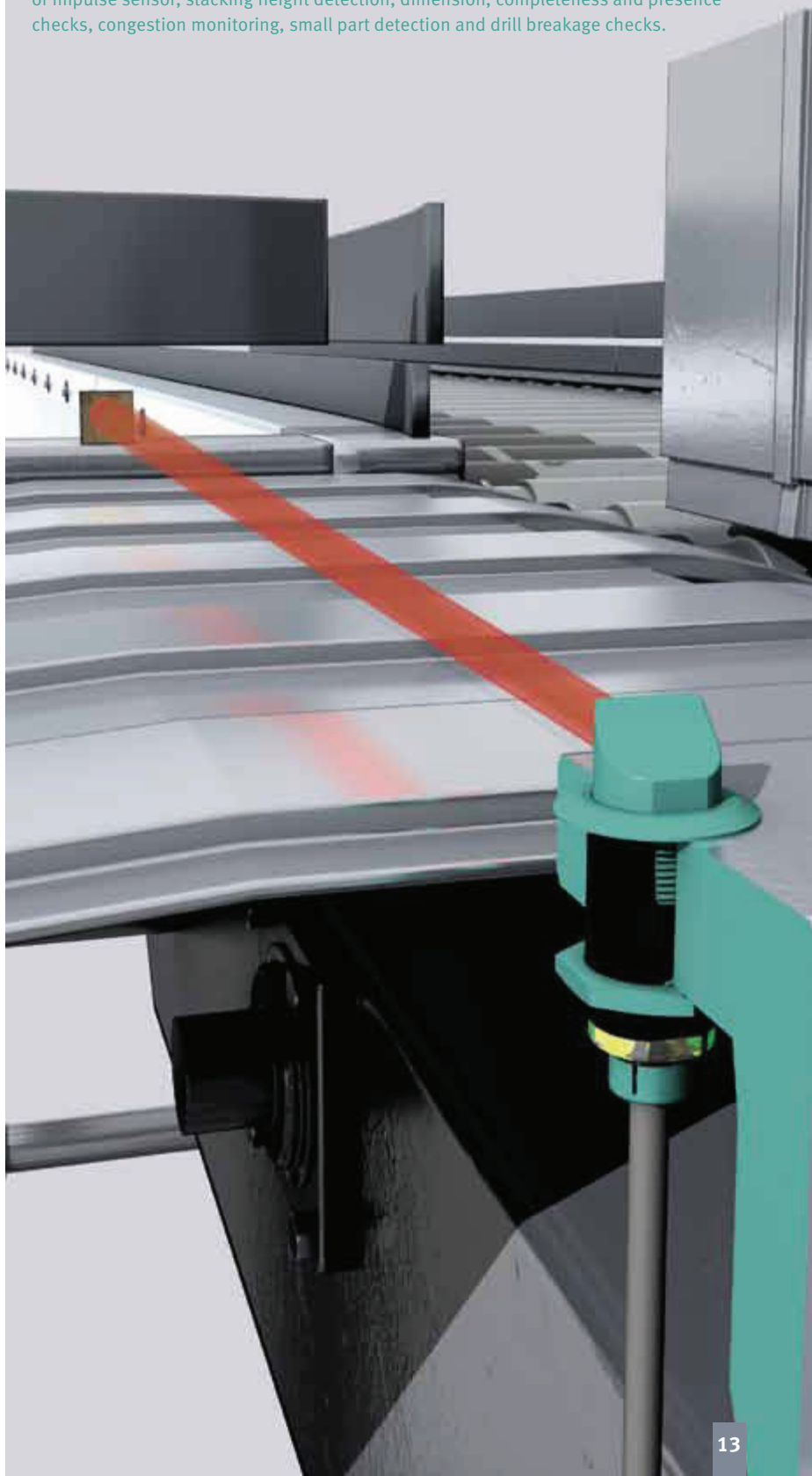
Infrared light

24 V DC

■ M30 plastic housing

CYLINDRICAL SENSORS IN THE APPLICATION

The features of threaded sensors with M18 and M30 housings range from clearly laid out operating and display indicators, laser capability, a high degree of immunity to interference, nickel-plated housing with IP67 protection and a version with integral 90° optical face to an economical plastic housing with compact housing, PowerBeam LED and adjustable background suppression. Extremely easy to install, these devices open up a wide range of universal application options in all areas of automation technology. Application examples include use as a target sensor or impulse sensor, stacking height detection, dimension, completeness and presence checks, congestion monitoring, small part detection and drill breakage checks.



FIBER OPTIC SENSORS



SU18



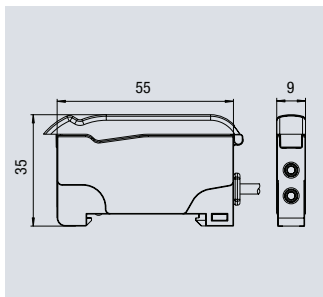
SU19



VL18-LL



ML17-LL

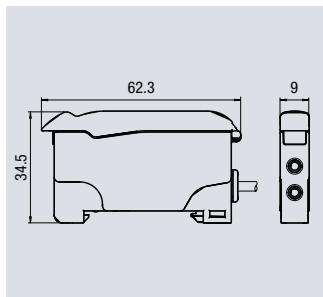


Fiber optic sensor for plastic and glass fiber optics

Red light

10 V DC ... 30 V DC

- DIN rail mounting
- Three operating modes
- Automatic switching threshold and amplification (AGC)
- High-speed object detection
- High resolution mode
- High Power version for particularly long sensing ranges

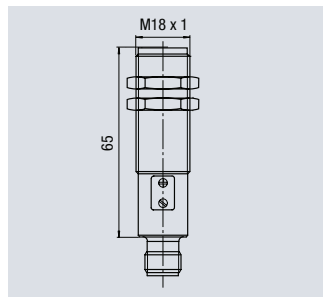


Fiber optic sensor for plastic and glass fiber optics

Red light

10 V DC ... 30 V DC

- DIN rail mounting
- Clear percentage display
- Automatic switching threshold and amplification (AGC)
- 5 operating modes
- 30 µs high-speed mode
- Master and slave modules
- Bridge contacts on the back for gang mounting

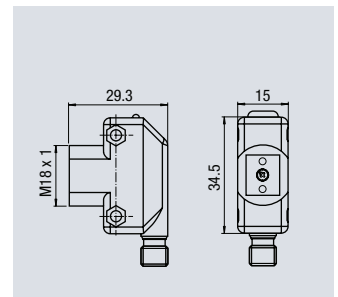


Fiber optic sensor for glass fiber optics with adapter type 18

Red light

10 V DC ... 30 V DC

- Robust M18 brass housing for harsh industrial environments
- Adjustable sensitivity
- Connection for robust fiber optics and max. ambient temperature of 200 °C



Fiber optic sensor for plastic and glass fiber optics

Red light

10 V DC ... 30 V DC

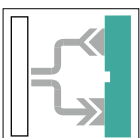
- Compact housing
- Adjustable sensitivity
- 360° visible LEDs with diagnostic functions
- Front mounting with M18 thread and side holes offer flexible attachment options

FIBER OPTIC SENSORS IN THE APPLICATION

Fiber optic sensors and cables are the perfect solution for applications where the direct mounting of sensors is not possible due to space restrictions, temperature extremes, and so on. Small fiber optic beams are ideal for detecting tiny objects. Other special features include the automatic adjustment of the amplification and switching threshold as well as back panel wiring via plug-in jumpers.

A list of fiber optic cables compatible with the individual sensor types appears on the following page.

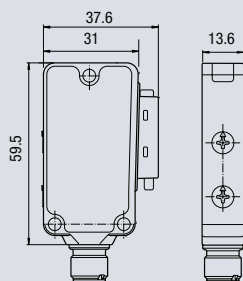
FIBER OPTIC SENSOR



Fiber optic sensors allow sensing to be done remotely and connected using flexible fiber optic cables made of glass or plastic fibers. The thru-beam principle also permits photoelectric sensors to be implemented as diffuse mode sensors when the emitter and receiver are angled at the object to be sensed. Thru-beam systems have one fiber optic cable for each emitter and receiver, while in diffuse systems the light is passed in a single fiber optic cable via separate emitting and receiving fibers.



MLV41-LL



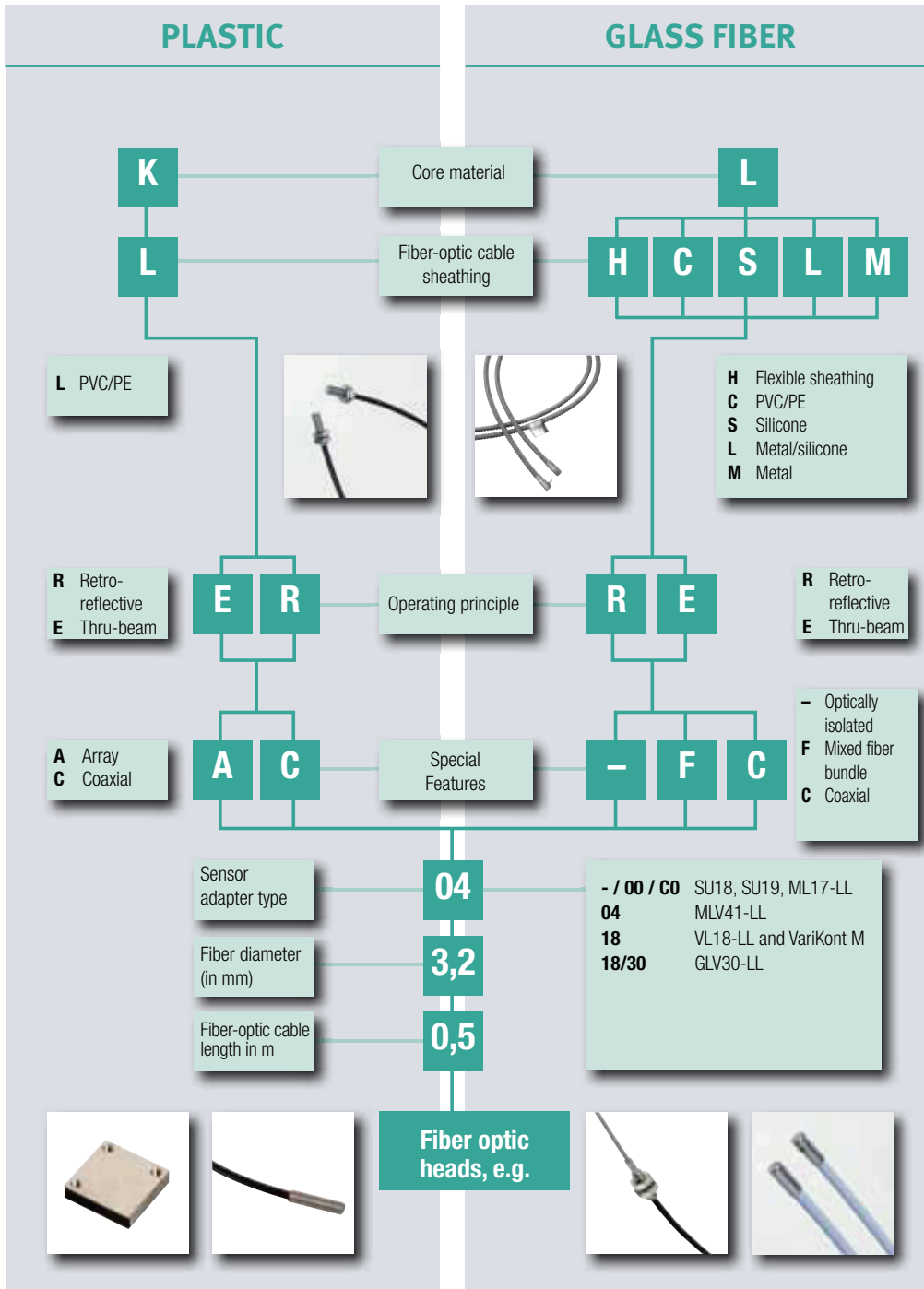
Fiber optic sensor for glass fiber optics with adapter type 04

Red light,
Infrared light

10 V DC ... 30 V DC

- Narrow, robust metal housing for harsh industrial environments, resistant to acids and alkalis
- Incremental adjustment of sensitivity
- Connection for robust fiber optics and max. ambient temperature of 200 °C
- Quick lock mounting





PLASTIC FIBER OPTICS

comprise a single PVC-sheathed fiber. They are lightweight and very flexible and can be used on machines with moving parts. One great advantage is that the fibers can be cut to length individually according to customers requirements.

GLASS FIBER OPTICS

comprise multiple individual fibers with a diameter of approx. 50 µm. Stainless steel, PVC, metal and silicone, or silicone sheathing can be selected depending on the application. Due to the low optical attenuation of glass fibers compared to plastic fibers, greater sensing ranges are possible. The robust mechanical design of the stainless steel sheathing permits use of the cables at temperatures of up to 200 °C.

Visit www.pepperl-fuchs.com to view our range of standard fiber optic sensors or contact us about your specific requirements.

GLASS FIBER

K2



K11



WC0



K12



K14



WC1-..



K10



K13



K3



G..



K9



Z0



PLASTIC

K81



K75



K78



K101



K71



K82



K106



K108



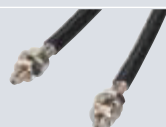
K101



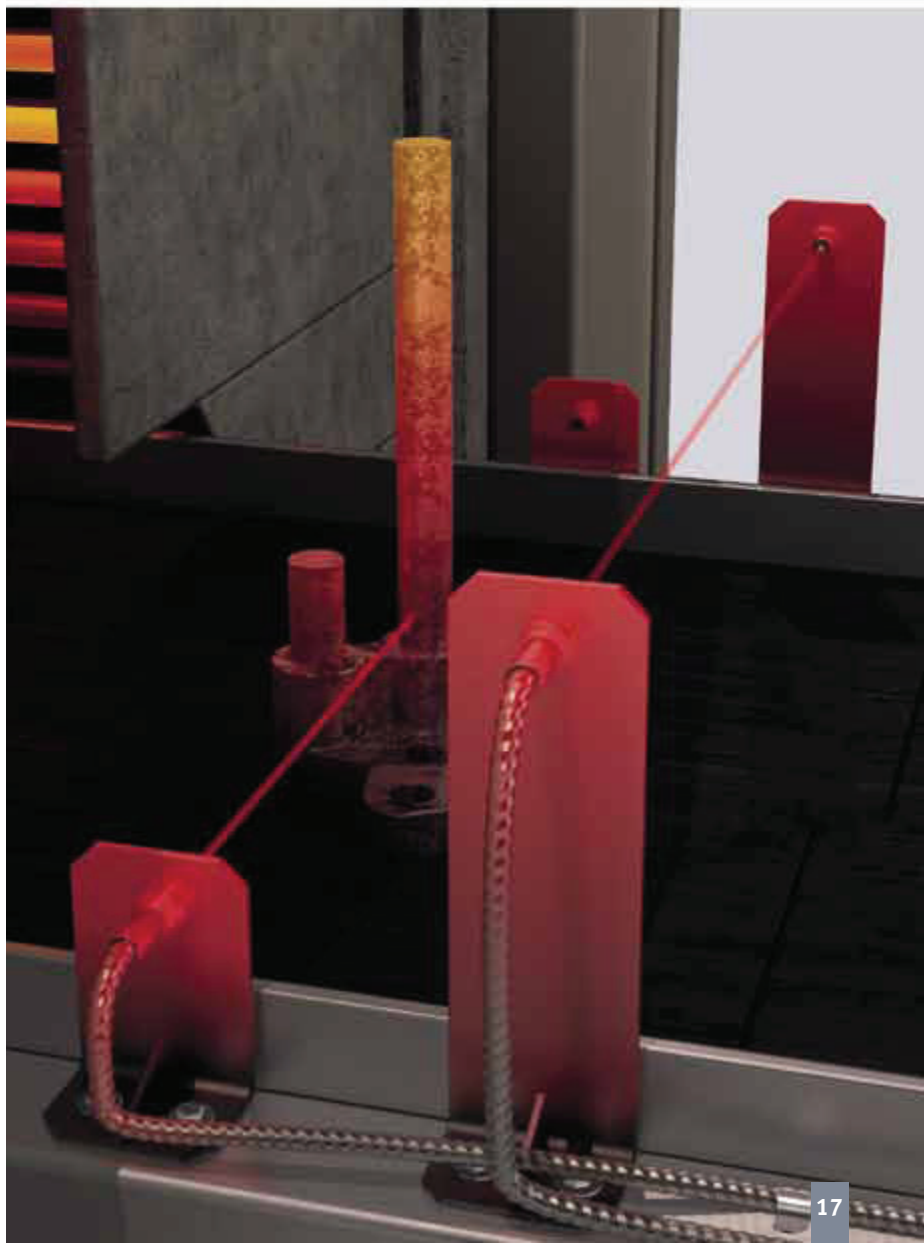
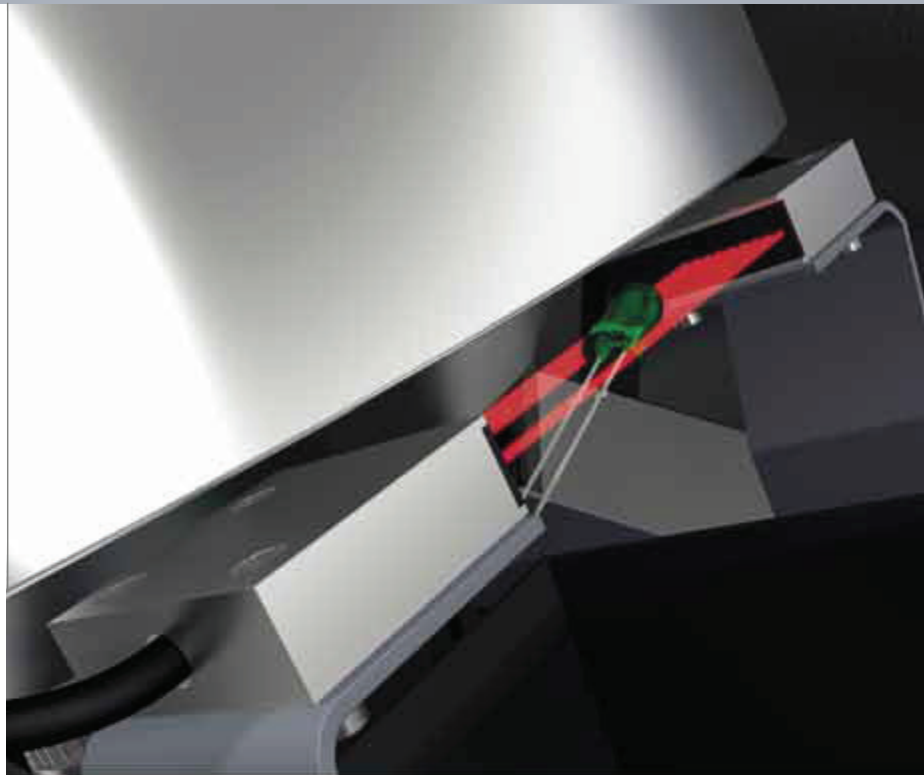
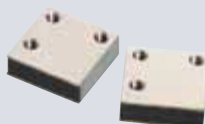
K113



K102



K111



PHOTOELECTRIC SLOT AND SLOT GRID SENSORS



GL2 · GL3 · GL5



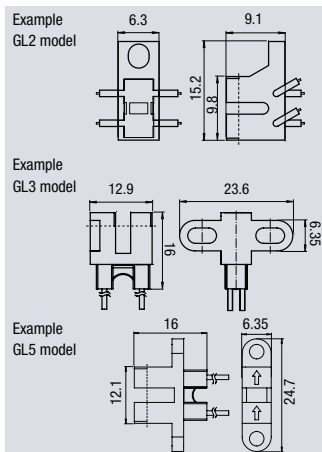
GL10 ... GL220



GL...-LAS



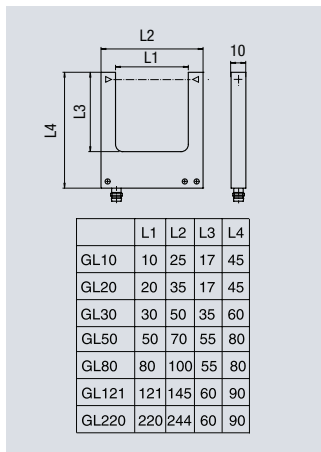
GLP



Slot widths	2 mm, 3 mm, 5 mm
Target sizes	0.2 mm x 2.6 mm 0.8 mm x 1.8 mm

Infrared light

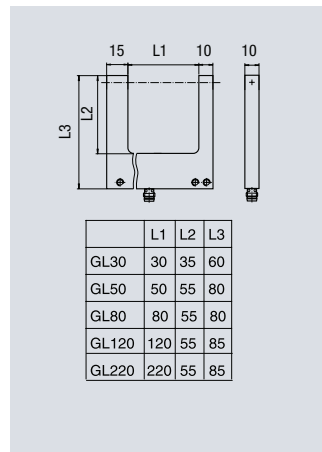
- Miniature housing
- Wide variety of housing types for different installation options
- High positioning accuracy



Slot widths	10 mm, 20 mm, 30 mm, 50 mm, 80 mm, 121 mm, 220 mm
Target sizes	0.3 mm, 0.5 mm, 2 mm

Red light,
Infrared light

- Zinc pressure diecast housing
- No mutual interference
- Versions with ATEX approval 3G
- Adjustable sensitivity

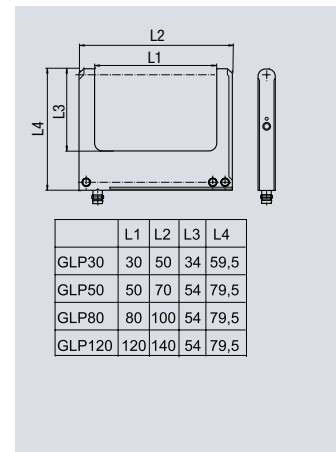


Slot widths	20 mm, 30 mm, 50 mm, 80 mm, 120 mm, 220 mm
-------------	---

Target sizes 0.05 mm

Laser light, laser class 2

- Robust aluminum housing
- Very high resolution
- High switching point accuracy
- Adjustable sensitivity
- No mutual interference



Slot widths	30 mm, 50 mm, 80 mm, 120 mm
-------------	--------------------------------------

Target sizes 0.3 mm,
0.5 mm,
0.8 mm

Red light

- Plastic housing
- External and dynamic teach-in

PHOTOELECTRIC SLOT SENSOR



Photoelectric slot sensors are thru-beam sensors with an emitter and receiver that are connected via a U-shaped housing. Installation and alignment of a second device is not required and a high degree of vibration resistance is achieved.

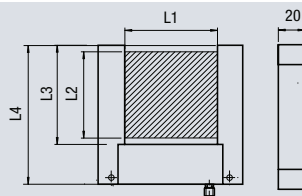
SLOT GRID SENSOR



The function and design of slot grid sensors are the same as photoelectric slot sensors, except that they have a whole sensing array for detecting objects, which makes detecting parts ejection applications much easier.



RAL



	L1	L2	L3	L4
RAL50	50	35	46	81
RAL70	70	64	70	105
RAL100	100	94	98	135
RAL150	150	144	150	185

Slot widths
50 mm,
70 mm,
100 mm,
150 mm

Target sizes
0.5 mm,
1 mm, 2 mm,
3 mm

Infrared light

- Robust aluminum housing
- Open frame with wide detection area
- Option of switching between static and dynamic operation
- Adjustable timer functions and sensitivity

PHOTOELECTRIC SLOT SENSORS IN THE APPLICATION

With a fast response time, the devices are ideal for detecting tiny objects from long distances and they are frequently used to detect objects on vibrating and oscillating conveyors.

Slot grid sensors handle challenging counting and monitoring tasks such as detecting non-guided objects in free fall. Numerous miniature housings are also available.

They are suitable for use in confined environments such as in the semiconductor or micro assembly industries.



CONTRAST SENSORS



DK10



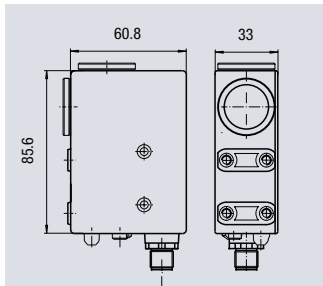
DK12



DK20 · DK21



DK31 · DK34 · DK35

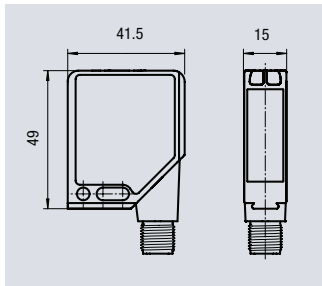


Sensing distances 9.5 mm, 25 mm, 300 mm, adjustable 12 mm (with laser)

Light spot size
Rectangular: 1 mm x 4 mm, 2 mm x 8.5 mm
Circular: 0.8 mm, 2 mm, 10 mm

Response time 30 µs

- Modulated light, green or laser light, red, laser class 2
- Analog output
- Test input
- Timer functions
- Light-ON/dark-ON switch

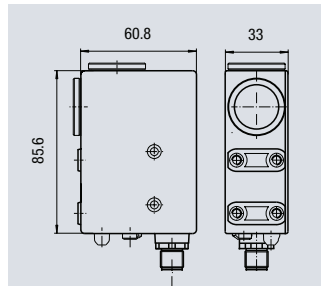


Sensing distance 11 mm

Light spot size
Rectangular: 1 mm x 3 mm
Parallel or perpendicular to housing

Response time 40 µs, 50 µs

- Modulated light, red, green, blue
- Adjustable teach-in: dynamic, static, external
- Timer functions
- IO-Link interface

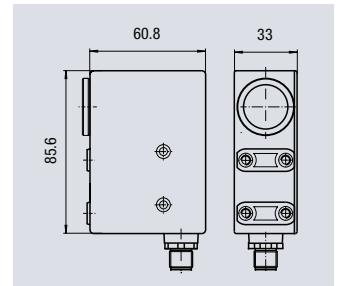


Sensing distances 9.5 mm, 25 mm, 50 mm

Light spot size
Rectangular: 1 mm x 4 mm, 2 mm x 8.5 mm, 3 mm x 16 mm
Circular: 1.5 mm, 3 mm

Response time 30 µs

- Modulated light, red, green, blue
- Interchangeable dual lens option
- Analog output
- DK20: Static teach-in
- DK21: Dynamic teach-in
- Timer functions
- Version with stainless steel housing



Sensing distances 9.5 mm, 25 mm, 50 mm

Light spot size
Rectangular: 1 mm x 4 mm, 2 mm x 8.5 mm, 3 mm x 16 mm
Circular: 1.5 mm, 3 mm

Response time 30 µs

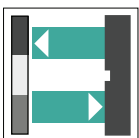
- Modulated light, red, green, blue
- Low contrast sensitivity
- DK34: Static teach-in
- DK35: Dynamic teach-in
- Timer functions
- Autom. threshold adaptation

CONTRAST SENSORS IN THE APPLICATION

When a contrast sensor passes the taught-in point between the background and print mark, it quickly recognizes it and then indicates the exact position of the mark.

These sensors are used for precise object positioning in printing machines, packaging plants and labeling machines in the food, beverage and pharmaceutical industry and are characterized by a low contrast resolution, a high degree of switching reliability when differences in contrast are minimal, short response times and insensitivity to fluctuations in height and angle on the material web.

CONTRAST SENSOR

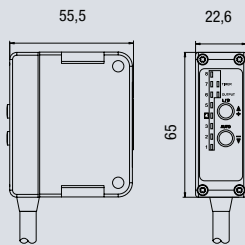


Contrast sensors operate with one or more differently colored emitter LEDs and the difference in brightness is analyzed so that the sensors are optimized to detect colored print marks against backgrounds with different colors.

The sensors automatically select the most suitable emitter color (red, green or blue) in the application to ensure that the best possible contrast is used.



DK50-UV



Sensing distances
127 mm, 190 mm,
254 mm, 330 mm,
609.6 mm,
adjustable

Light spot size
Circular:
1.7 mm,
2.2 mm,
3.25 mm,
4.1 mm,
25.4 mm

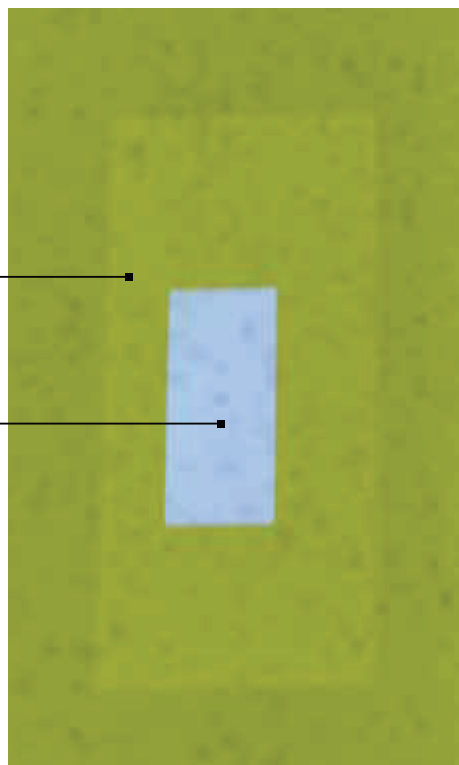
Response time 200 μ s, 750 μ s

- UV modulated light
- Detecting luminescent material
- Automatic or incremental teach-in
- Analog output
- Timer functions



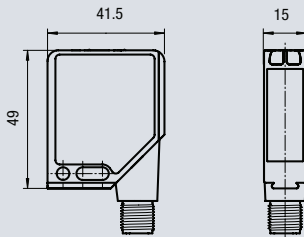
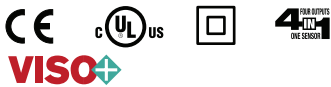
Light yellow mark on
dark yellow background

Light spot of DK12





DF12

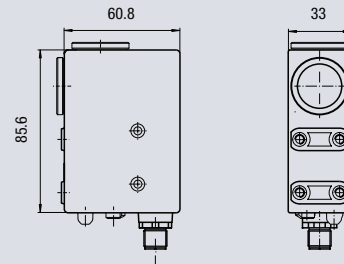


Sensor range: 11 mm
 Light spot size: Rectangular, 1 mm x 3 mm
 Response time 1 ms

- 3 independent channels, 3 tolerance settings per channel
- 3 emitter colors: red, green, blue
- Teach-in for automatic threshold adjustment, external teach-in
- Quick disconnect can be turned 90°



DF20



Sensor range: 9.5 mm, 25 mm
 Light spot size: Rectangular, 1 mm x 4 mm, 2 mm x 8.5 mm
 Circular, 1.5 mm
 Response time 300 µs

- 3 emitter colors: red, green, blue
- Teach-in for automatic threshold adjustment, external teach-in
- Quick disconnect can be turned 90°
- Interchangeable dual lens option
- Version with stainless steel housing

COLOR SENSORS IN THE APPLICATION

Unlike contrast sensors, which operate using a similar principle, color sensors operate on multicolored backgrounds with an exceptional degree of reliability.

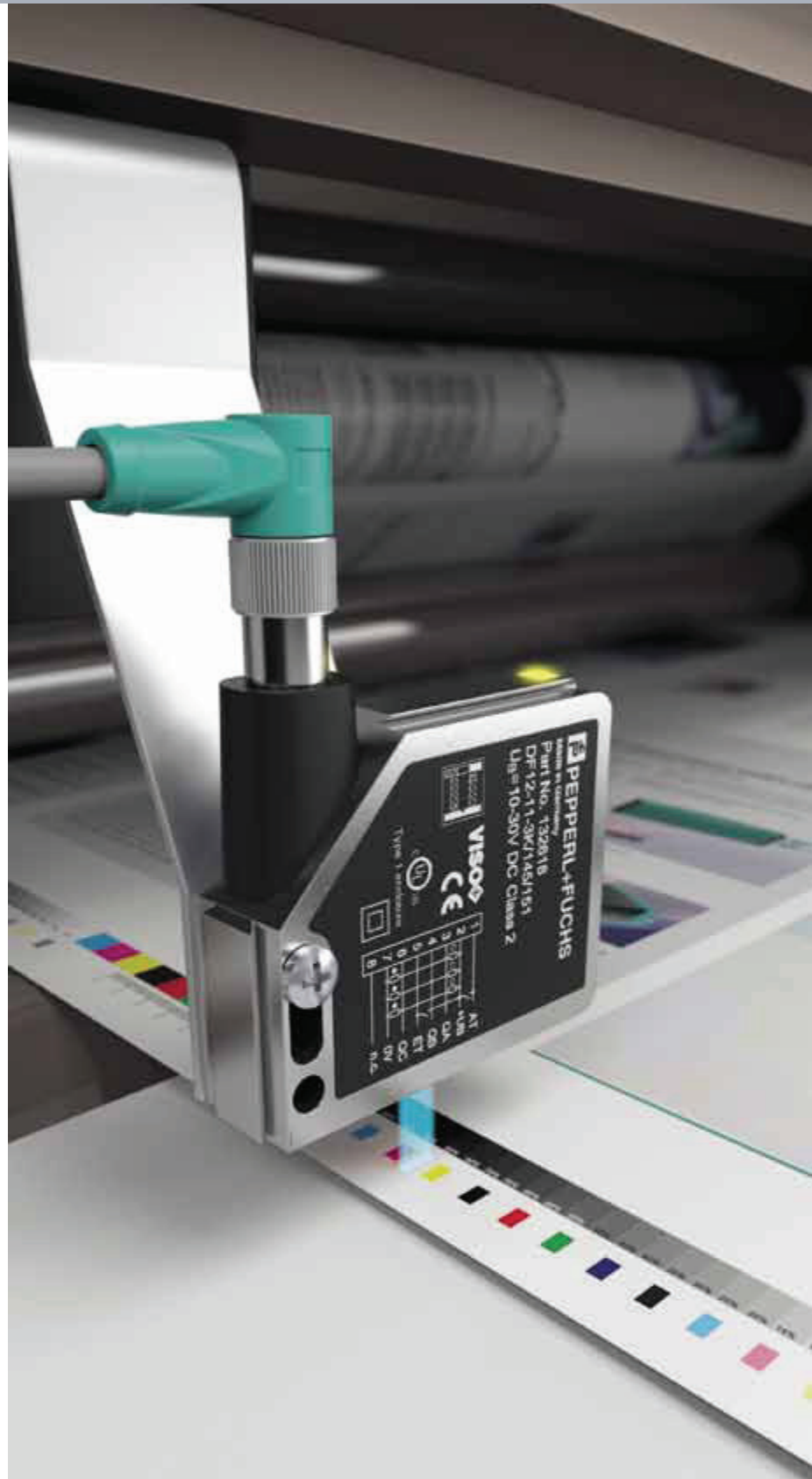
The sensor periodically scans the target material on the R, G, B color channels in order to detect the taught in color. Three different colors can be taught in and recognized in parallel.

The main applications for color sensors include a wide range of printing and converting processes in the packaging and printing industries.

COLOR SENSOR



Color sensors operate using the active three-range process, which connects the three emitter LEDs (red, green and blue) in quick succession and evaluates them individually. The light reflected by the target is divided into several subspectra and a separate intensity value is assigned to each spectrum. The distribution of the intensity values ultimately defines the exact color.



MEASURING LIGHT GRIDS



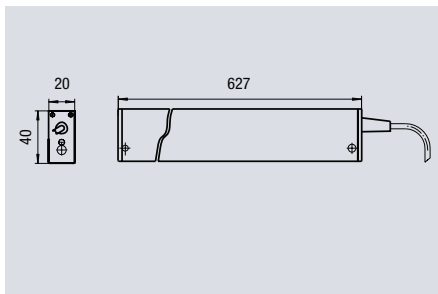
LG96



LG192



LG320



Max. sensing distances, 800 mm or 1200 mm

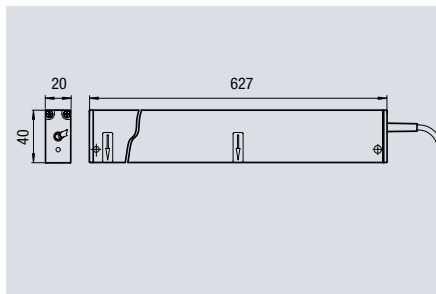
96 beams

Field height 480 mm

Beam spacing 5 mm

24 V DC

- Light grid for height control
- Gray code measuring output D0..D8:
Output of the difference between the highest
and the lowest interrupted beam.
- Detects objects of any shape
- Automatic calibration



Max. sensing distance 1200 mm

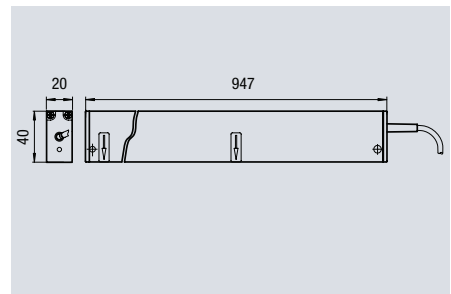
192 beams

Field height 482.5 mm

Beam spacing 2.5 mm

24 V DC

- Light grid for width or height control
- Detects objects of any shape
- Gray code measuring output D0..D8:
Output of the difference between the highest
and the lowest interrupted beam.
- Automatic calibration



Max. sensing distances 1200 mm

320 beams

Field height 802.5 mm

Beam spacing 2.5 mm

24 V DC

- Light grid for width or height control
- Detects objects of any shape
- Gray code measuring output D0..D8:
Output of the difference between the highest
and the lowest interrupted beam.
- Automatic calibration

LIGHT GRIDS IN THE APPLICATION

Light grids are ideal for applications where wider areas need to be monitored. Light grids are much easier to mount, install and align and are therefore preferred to multiple individual photoelectric sensors. Application areas range from controlling the width, height and profile of pallets in material handling facilities to detecting position-independent objects, controlling overlap on larger conveyed goods and monitoring elevator doors.

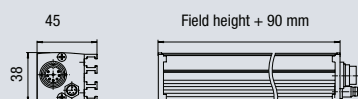
LIGHT GRID



Light grids incorporate an emitter and a receiver unit that form a two-dimensional monitoring field consisting of several parallel light beams. When an object interrupts one or more light beams, the evaluation electronics detect the interruption and generate a switching signal at the output. Light grids are available with different beam spacings and evaluation logics for a varied range of applications.



PLVScan P



Max. sensing distances, 6 m or 12 m

8, 16, 24, 32, 40, 48, 56, 64, 80, 96
or 112 beams

Field heights between 300 mm and 2668 mm

Beam spacing 20 mm, 42.5 mm, 48 mm

15 V DC to 30 V DC

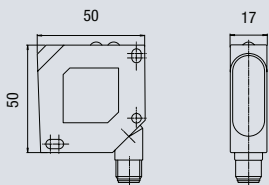
- Light grid for profile control
- Separate outputs for height control
- Adjustable beam crossover and emitted optical power
- Parameters defined using Windows® software
- Test input
- RS232 interface



DISTANCE MEASUREMENT SENSORS



VDM18



Measuring ranges
up to 100 mm or
300 mm

Laser triangulation

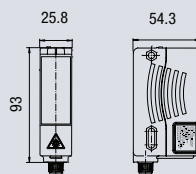
Resolution 0.1 % of measuring range

18 V DC ... 30 V DC

- Laser light, laser class 2
- Measurement to object
- Analog output
- RS485 interface



VDM28



Measuring ranges to object:
8 m, 15 m
to reflector: 50 m

Pulse Ranging Technology (PRT)

Resolution 1 mm

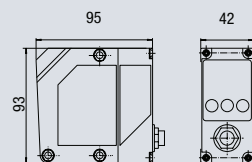
Repeatability < 5 mm

10 V DC ... 30 V DC

- Red light laser, laser class 1 or 2
- Measurement to object or reflector
- Switching and analog output
- IO-Link interface



VDM70



Measuring ranges
up to 10 m,
250 m

Pulse Ranging Technology (PRT)

Resolution 0.1 mm, 0.125 mm

Repeatability ± 2 mm,
± 4 mm

18 V DC ... 30 V DC

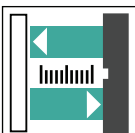
- Laser light, laser class 1 for measurement
- Measurement to object or reflector
- Analog output
- SSI, RS422 interface

DISTANCE MEASUREMENT SENSORS IN THE APPLICATION

Even the smallest model is suitable for a wide range of measuring and positioning tasks. It operates using laser triangulation and an analog output. All other sensors from the VDM series use Pulse Ranging Technology, offer long sensing ranges and achieve extremely accurate measurement results. PRT uses high-intensity light pulses to provide a high degree of operating reliability, even under difficult ambient conditions with exposure to ambient light and dust.

Equipped with analog outputs and/or a maximum of two discrete outputs, the sensors are used for presence checks, trip value monitoring, the positioning of industrial trucks as well as distance measurement on monorail conveyors, manufacturing systems, cranes and gantries and for stack height control, dip monitoring and many more.

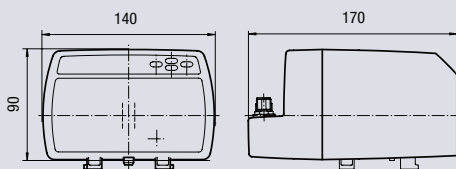
DISTANCE MEASUREMENT SENSOR



Depending on the model, these sensors are based either on the familiar triangulation process or the innovative Pulse Ranging Technology (PRT), which enables direct light propagation time measurement in general industrial applications. Sensors with PRT emit light pulses and measure the time it takes for the sensors to receive the signal reflected back from the target objects. Due to the constant nature of light speed, the light propagation time is an accurate indicator of the distance to the object or reflector.



VDM100



Measuring ranges
up to 50 m, 150 m,
300 m

Pulse Ranging Technology (PRT)

Resolution 0.1 mm, adjustable

Repeatability < 0.5 mm

18 V DC ... 30 V DC

- Laser light, laser class 1 for measurement
- Measurement to reflector
- Active dynamic control
- INTERBUS, PROFIBUS, SSI, RS422 interfaces



OPTICAL DATA COUPLERS



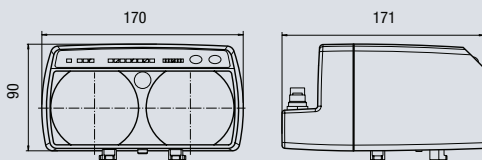
LS610 · 611-DA



LS680-DA

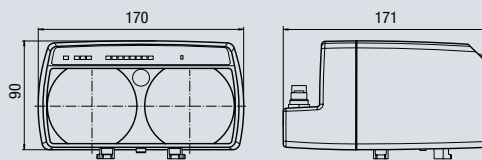


DAD15-8P



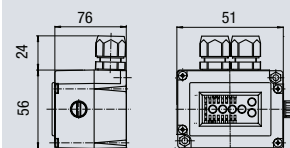
Max. sensing distances: 120 m, 140 m, 200 m, 260 m, 350 m
Data rate 0 Mbit/s ... 2 Mbit/s, adjustable
Infrared light,
Red light
18 V DC ... 30 V DC

- Lightweight plastic housing
- Standard quick-disconnect
- Telegram Verification Technology (TVT)
- RS422, PROFIBUS, INTERBUS interface
- Membrane pushbuttons



Max. sensing distances: 180 m
Data rate 100 Mbit/s, (Fast Ethernet)
Infrared laser light, laser class 1M
Red laser light, laser class 1 M
18 V DC ... 30 V DC

- Fast Ethernet
- 100 BASE-TX interface
- Protocol-independent
- Lightweight plastic housing
- Standard quick-disconnects



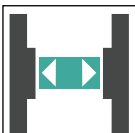
Max. sensing distances: 2.5 m, 5 m
Data rate 225 bit/s
Infrared light
10 V DC ... 30 V DC
10 V DC ... 60 V DC

- 8-bit parallel data transfer
- Units can be arranged in series
- Operating mode switch
- Test input

OPTICAL DATA COUPLERS IN THE APPLICATION

The optical data couplers were designed to establish wireless communication with stock feeders, industrial trucks, automated transportation systems, overhead conveyors and docking stations. Mechanical and problematic RF- and Wi-Fi-based transmissions are avoided as a result. Devices with a variety of operating ranges and transfer rates are available. The current flagship, the LS680-DA, is the fastest optical data coupler on the market and, for the first time, supports connections between vehicle controls and Fast Ethernet networks without reducing the Ethernet transfer speed. It also supports all Ethernet protocols.

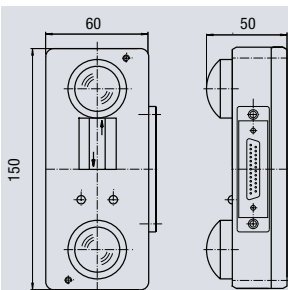
OPTICAL DATA COUPLER



Optical data couplers use light for the wireless emission of information between two points where mechanical means of transfer (like drag cables) is not economically feasible, e.g., on machine components that are mobile or difficult to access. The devices emit data available at the interface to the receiver.



DAD30



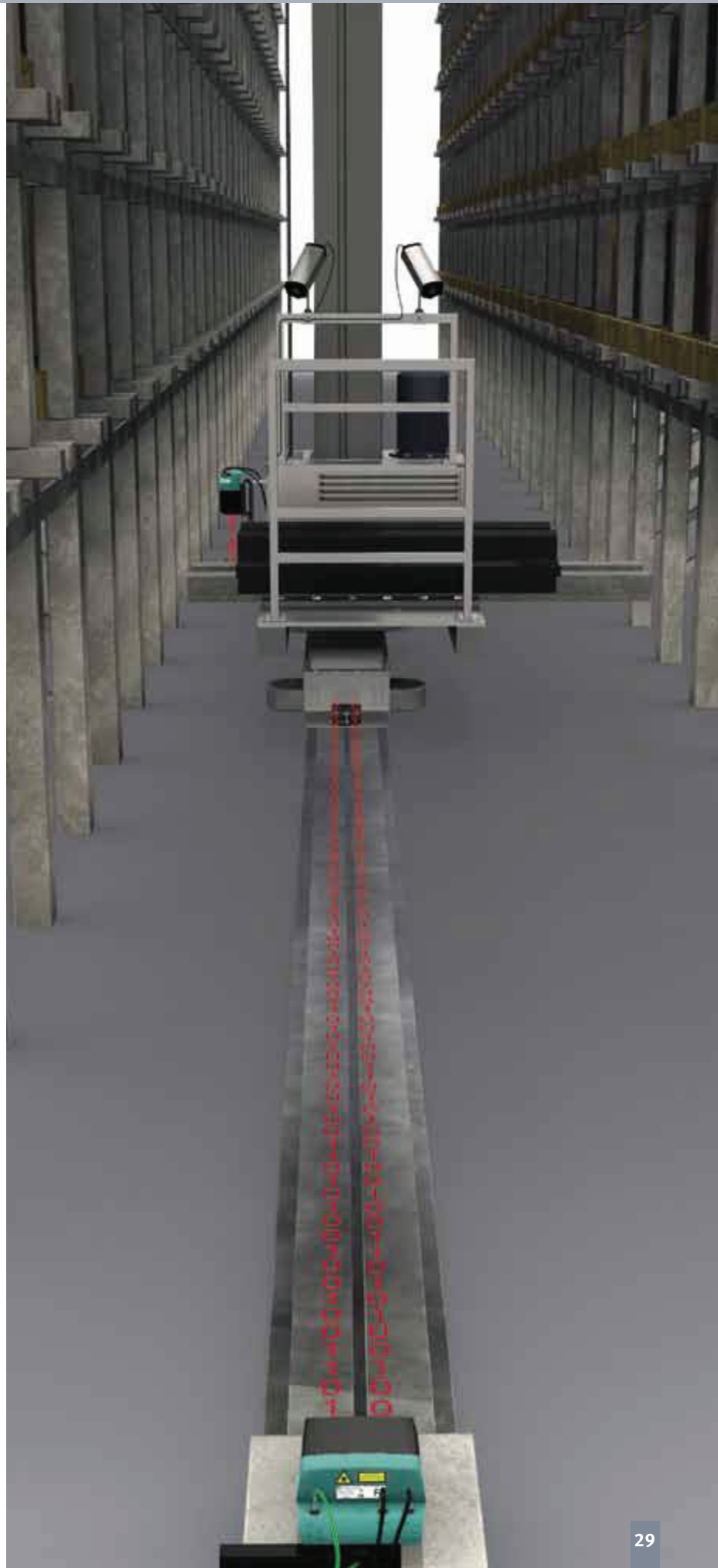
Max. sensing distances:
20 m, 45 m, 150 m

Data rate 0 kbit/s ... 19.2 kbit/s

Infrared light,
Red light

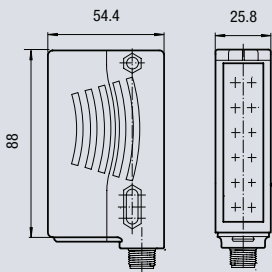
24 V DC

- Measuring output
- Wide-angle lens version
- RS232, RS422, CL20 mA interface





RLG28



**Retroreflective area sensor
for the reliable detection of
the leading edges on objects**



Sensing range
0 m ... 5.6 m
High detection field
typ. 60 mm

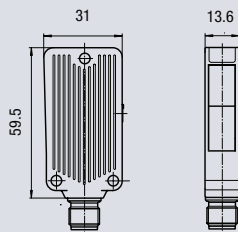
Red light

12 V DC ... 30 V DC

- 6 parallel beams
- Teach-in
- Resolution 12 mm
- Robust standard photoelectric sensor housing for series 28



MLV41-8-HV



**Background suppression sensor
for web break monitoring
on printing machines**



Detection range
20 mm ... 60 mm
Foreground
suppression:
0 mm ... 15 mm
Background
suppression:
from 70 mm

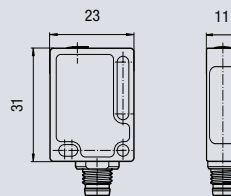
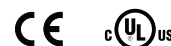
Infrared light

10 V DC ... 30 V DC

- Foreground and background suppression
- Test input
- Active dusty lens detection
- Housing resistant to acids and alkalis



ML8-8-H */162



**Miniature background
suppression sensor for printed
circuit board detection**



Max. detection range
30 mm, 50 mm,
100 mm, adjustable



Max. detection range
30 mm, 50 mm

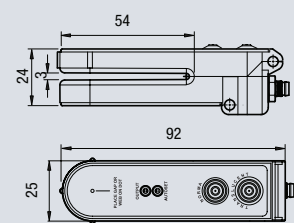
Red light

10 V DC ... 30 V DC

- Background suppression with multiple light spots
- Convergent with narrow, elongated light spot
- Reliably detects regardless of holes, indentations and other critical objects



GLD3-RT



**Photoelectric slot sensor
for label detection**



Sensing range
0 mm ... 3 mm

Red light

10 V DC ... 30 V DC

- Programmed with pushbutton
- Adjustable sensitivity
- Detection of paper and foil labels, also transparent
- External teach-in

SPECIAL SENSORS IN THE APPLICATION

A selection of photoelectric special sensors designed for specific applications rounds off the sensor program.

With six light beams, the RLG28 retroreflective area sensor generates a wide detection field and is therefore ideal for detecting objects with varying shapes, surfaces and positions.

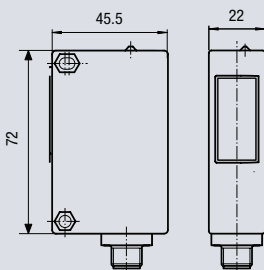
The MLV41-8-HV diffuse mode sensor was specially designed for web break monitoring on all materials unwinding from rolls in the printing, paper and packaging industry. If the object leaves the defined sensing range, the sensor detects a web break.

The ML8 series is optimized for detecting printed circuit boards while disregarding indentations, holes and components on the PCB. Different colors and textures are detected reliably due to the light spot structure and reliable background suppression.

The GLD3-RT photoelectric slot sensor is designed to detect a wide variety of labels. With a one-touch teach, this sensor can be integrated perfectly into applications such as label detection/counting, detection of unprinted labels, adhesive strip detection and web break monitoring.



MS32



**Motion sensor for the
noncontact detection
of object movements**



Detection range 20 mm

Red laser light, laser class 2

10 V DC ... 30 V DC

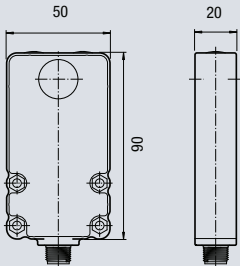
- Detection of movements between the object and sensor
- Operates on irregular surfaces
- Movements in X or Y direction detected
- 3 switching outputs

The MS32 motion sensor detects movements of objects in an X and Y direction and provides the following information: Exceeded speed limit values, direction of travel / standstill and rate of advance. The sensor operates without slipping and is ideal for detecting the rate of advance of materials or paneling unwinding from rolls.





WTS10



Diffuse mode sensor for checking the quality of welding tips

Detection range 2 mm ... 12 mm, electronically adjustable

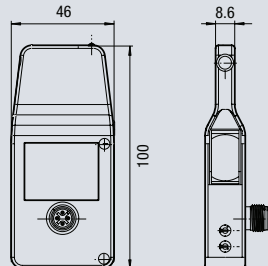
Red light

10 V DC ... 30 V DC

- Scratch-resistant glass lens cover
- Simultaneous check of two welding tips in the welding tongs
- Teach-in
- Pre-fault diagnostics



SBL-8-H



Diffuse mode sensor for accumulating roller conveyors

Max. detection range 600 mm, 900 mm, adjustable

Infrared light

24 V DC

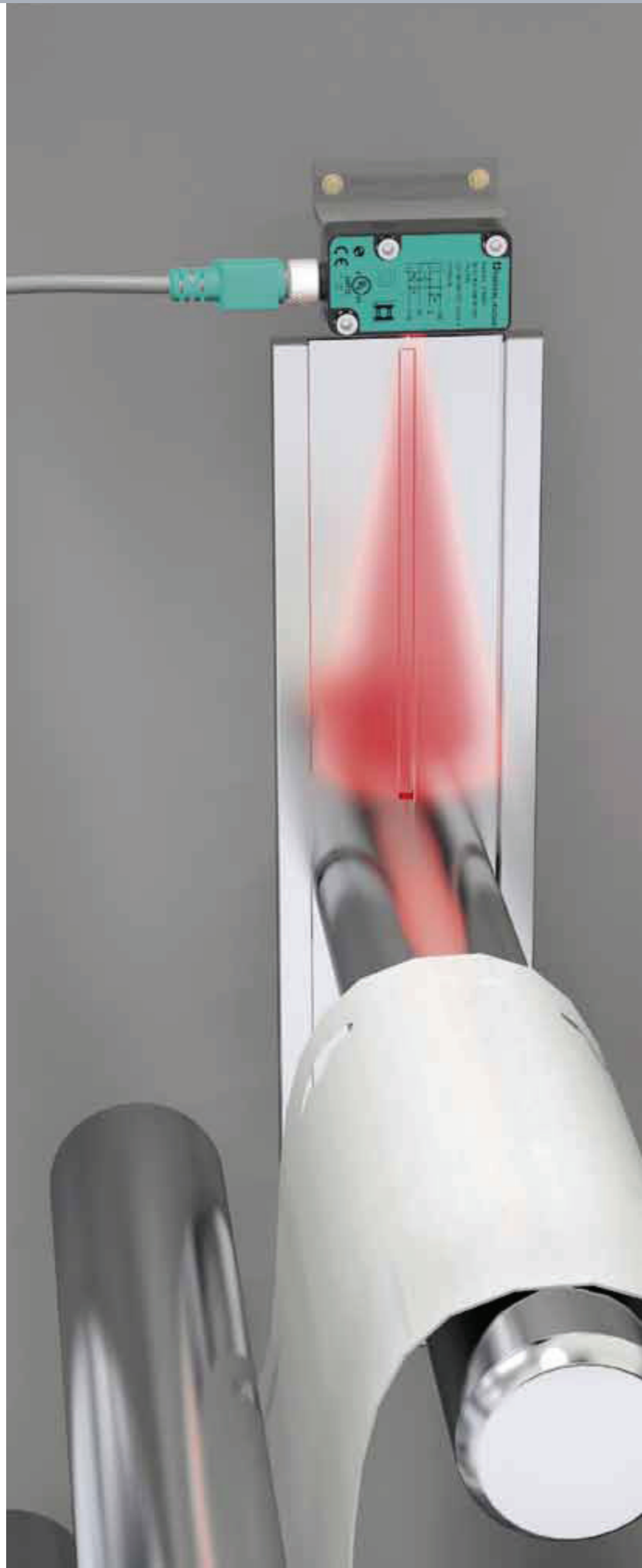
- Background suppression
- Different versions: with/without logic, with/without solenoid valve and time relay
- Integral control logic for linking several devices
- Double timing relay for congestion-minimized conveying

WELD TIP SENSOR WTS10

The WTS10 weld tip sensor performs a non-contact quality inspection on the welding tips of robot tongs to ensure that burn-out or faults on electrodes do not affect the welding quality.

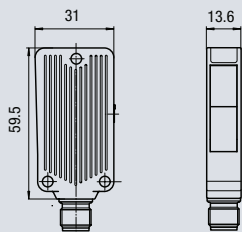
ZONE CONTROL SENSOR SBL

The SBL zone control sensor was developed to detect and control the flow of material on congested sections of a roller conveyor to enable the precision downstream and upstream transfer of conveyed goods at distribution stations and prevent collisions. The unique design allows for the protected, space-saving installation of the sensor between the rollers on a roller conveyor.





MLV41-...-IO



Retroreflective sensor

Retroreflective sensor for clear object detection

Sensing distances
10 m, 12 m

Sensing distance
up to 6.5 m,
adjustable

IO-Link V1.0, COM 2 interface

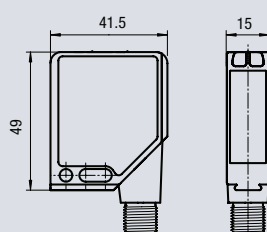
Red light

10 V DC ... 30 V DC

- Choice of operating modes:
Clear object detection or normal
- Adjustable contrast detection settings
- Enclosure resistant to acids and alkalis



DK12-IO



Contrast sensor

Detection range 11 mm,
Light spot size:
Rectangular, 1 mm x 3 mm

IO-Link V1.0, COM 2 interface

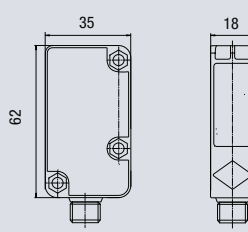
Modulated light, visible red, green, blue

10 V DC ... 30 V DC

- Response time 50 μ
- Teach-in: dynamic, static, external
- Timer functions



RL31-8-H-IO



Diffuse mode sensor with background suppression

Max. detection range 800 mm,
adjustable

IO-Link V1.0, COM 2 interface

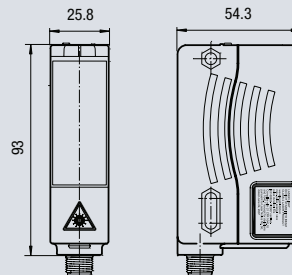
Red light (PowerBeam)

10 V DC ... 30 V DC

- Measuring photoelectric sensor with integral measuring principle enables various switching functions in one device
- Distance information



VDM28-IO



Distance sensor

Measuring ranges up to 8 m, 15 m,
50 m, adjustable

IO-Link V1.0, COM 2 interface

Red laser light, laser class 1 or 2

10 V DC ... 30 V DC

- Pulse Ranging Technology (PRT)
- Repeat accuracy < 5 mm
- Analog output

IO-LINK – THE NEW DIMENSION IN SENSOR COMMUNICATION

Sensors with IO-Link interface enable standardized, consistent communication all the way to the sensor level and enable efficient configuration in all areas of factory automation. IO-Link sensors not only enable rapid online configuration during setup and changeovers, but offer online diagnostics, continuous parameter monitoring, fast fault identification, cloning of configurations, etc. for simplified service and operation. The reduced variety of interfaces opens up enormous savings potential on material and storage costs.



ACCESSORIES FOR STANDARD SENSORS

CORDSETS WITH M8 QUICK DISCONNECT

V31-GM-2M-PVC	Female cordset, straight, M8, 4-pin, 2 m PVC cable
V31-WM-2M-PVC	Female cordset, angled, M8, 4-pin, 2 m PVC cable
V31-GM-2M-PUR	Female cordset, straight, M8, 4-pin, 2 m PUR cable
V31-WM-2M-PUR	Female cordset, angled, M8, 4-pin, 2 m PUR cable

CORDSETS WITH M12 QUICK DISCONNECT

V1-G-2M-PVC	Female cordset, straight, M12, 4-pin, 2 m PVC cable
V1-G-2M-PUR	Female cordset, straight, M12, 4-pin, 2 m PUR cable
V1-W-2M-PVC	Female cordset, angled, M12, 4-pin, 2 m PVC cable
V1-W-2M-PUR	Female cordset, angled, M12, 4-pin, 2 m PUR cable
V1-G-VL18	M12 4-pin connecting plug (Vario-Quick) for VL18/VT18 series
V15-G-2M-PVC	Female cordset, straight, M12, 5-pin, 2 m PVC cable
V15-W-2M-PVC	Female cordset, angled, M12, 5-pin, 2 m PVC cable
V15-G-5M-PVC	Female cordset, straight, M12, 5-pin, 5 m PVC cable
V15-W-5M-PVC	Female cordset, angled, M12, 5-pin, 5 m PVC cable

STANDARD REFLECTORS

REF-H50	Rectangular, 50 mm x 50 mm
REF-H60	Rectangular, 60 mm x 40.5 mm
REF-H85-2	Rectangular, 84.5 mm x 84.5 mm
REF-H160	Rectangular, 60 mm x 18 mm
REF-VR10-2	Rectangular, 60 mm x 19 mm
REF-C110-2	Round, diameter 84 mm
OFR-100/100	Reflective tape, 100 mm x 100 mm
OFR-A4	Reflective tape, 297 mm x 210 mm

REFLECTOR WITH MICROSTRUCTURE FOR LASER SENSORS

REF-MH23	Rectangular, 13 mm x 13.8 mm
REF-MH82	Rectangular, 82 mm x 60 mm
REF-MA21	Round, diameter 21 mm

REFLECTOR WITH POLARIZATION FILTER FOR TRANSPARENT FOIL AND PLASTIC

REF-H32-G	Rectangular, 25 mm x 55 mm
ORR50-G	Rectangular, 50 mm x 50 mm

REFLECTORS WITH IP69K PROTECTION AND TÜV OR ECOLAB CERTIFICATION

REF-H100F	Rectangular, 100 mm x 100 mm x 9.2 mm
REF-S20F	Round, diameter 20 mm
REF-H20x40F	Rectangular, 20 mm x 60 mm x 6 mm
REF-H60F	Rectangular, 60 mm x 41 mm x 8 mm



MOUNTING ACCESSORIES

OMH4.1	Mounting clamp for ML4.2 and ML6 series
OMH-ML6	Mounting bracket for ML4.2 and ML6 series
OMH-ML7-01	Mounting bracket for ML7 and ML8 series
OMH-ML7-03	Mounting plate for ML7 and ML8 series
OMH-ML9	Mounting bracket for ML9 series
OMH-ML17	Mounting bracket for ML17 series
OMH-ML100-01	Mounting bracket for ML100 series
OMH-10	Mounting bracket for ML100 series
OMH-MLV12-HWG	Large mounting bracket for MLV12, DK12 and DF12 series
OMH-MLV12-HWK	Small mounting bracket for MLV12, DK12 and DF12 series
OMH-40	Mounting bracket for MLV41 series
OMH-21	Mounting bracket for 28 and 29 series sensors
OMH-22	Mounting bracket for 28, 29 series sensors and reflector C110-2; H60
OMH-RL31-01	Wide mounting bracket for 31 series sensors
OMH-RL31-02	Narrow mounting bracket for 31 series sensors
OMH-VL18	Mounting bracket with swivel adjustment for VL18 series
CPZ18B03	Mounting bracket with swivel adjustment for GLV18 series
BF18	Adjustable mounting bracket for M18 threaded sensors
BF5-30	Universal mounting bracket for M18 to M30 threaded sensors
OMH-DK	Mounting bracket for DK10, DK20/21 and DK34/35 series
OMH-GL	Mounting bracket for glass fiber optics
OMH-SBL-01	Mounting bracket for SBL series
OMH-C110-01	Mounting bracket for C110-2 reflector
PLVScan mounting set	Mounting set for PLVScan light grids
OMH-VDM18-01	Mounting bracket with adjuster for VDM18
OMH-VDM35	Mounting bracket for VDM70
OMH-LS610-01	Adjustment and mounting unit with quick-release mechanism for LS610, LS611, LS680 and VDM100
OMH-LS610-03	Adjustment and mounting bracket with deflector mirror for LS610, LS611 and LS680
OMH-VDM100-01	Adjustment and mounting bracket with deflector mirror for VDM100
OMH-DAD10	Mounting bracket for DAD15

MOUNTING BRACKETS FOR ATTACHING TO CIRCULAR OR FLAT PROFILES

OMH-09	Mounting bracket for MLV41 series
OMH-05	Mounting bracket for 28 and 29 series
OMH-RL31-04	Mounting bracket for RL31 series
OMH-DAD10	Mounting bracket for DAD15

MOUNTING CLAMP FOR DOVETAIL JOINT ATTACHMENT

OMH-K01	Mounting clamp for MLV12, DK12 and DF12 series
OMH-K02	Mounting clamp for MLV12, DK12 and DF12 series
OMH-MLV11-K	Mounting clamp for 12, 28 and 29 series



OTHER ACCESSORIES

ST-03	Sensor tester
CL-CUT	Cutter for plastic fiber optics
OMH-11	Aperture for ML4.2 and ML6 series

PARAMETERIZATION ACCESSORIES

Programming set CD PLVScan	Programming software and cables for PLVScan light grids
IO-Link-Master01-USB	Parameterization tool IO-Link-Master, incl. power supply, USB cable
IO-Link software	See download area www.pepperl-fuchs.com
PactWare 4.0	FDT base application, for convenient communication with field devices
IODD Interpreter	Translation tool for IODD devices
IODDs devices	Description files for the relevant IO-Link sensors
Device DTMs	Parameter descriptions for the relevant IO-Link sensors
Parameter description	Parameter descriptions for IO-Link sensors



FACTORY AUTOMATION – SENSING YOUR NEEDS



Pepperl+Fuchs sets the standard in quality and innovative technology for the world of automation. Our expertise, dedication, and heritage of innovation have driven us to develop the largest and most versatile line of industrial sensor technologies and interface components in the world. With our global presence, reliable service, and flexible production facilities, Pepperl+Fuchs delivers complete solutions for your automation requirements – wherever you need us.

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