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 PHOTOLELECTRIC 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 PHOTOELECTRIC SENSORS

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

- ML4.2 (PAGE 6)
- ML7 (PAGE 6)
- ML9 (PAGE 7)
- ML100 (PAGE 8)
- MLV41 (PAGE 9)
- ML6
- ML8
- ML17
- MLV12
- RL28

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

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>RL29</td>
<td>10</td>
</tr>
<tr>
<td>RLK28</td>
<td>10</td>
</tr>
<tr>
<td>RLK31</td>
<td>11</td>
</tr>
</tbody>
</table>

### Cylindrical housings

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLK18</td>
<td>12</td>
</tr>
<tr>
<td>VL18 · VT18</td>
<td>12</td>
</tr>
<tr>
<td>18GM60</td>
<td>13</td>
</tr>
<tr>
<td>GLV30</td>
<td>13</td>
</tr>
</tbody>
</table>

#### 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.
<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>ML4.2</th>
<th>ML6</th>
<th>ML7</th>
<th>ML8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thru-beam sensor</td>
<td>10 m</td>
<td>10 m, adjustable</td>
<td>4.5 m</td>
<td>4.5 m</td>
</tr>
<tr>
<td>Retroreflective sensor</td>
<td>6 m</td>
<td>6 m</td>
<td>3.5 m</td>
<td>3.5 m, 7.6 m</td>
</tr>
<tr>
<td>Background suppression sensor</td>
<td>20 mm, 40 mm, 60 mm, 80 mm</td>
<td>20 mm, 40 mm, 60 mm, 80 mm, 120 mm, 150 mm, adjustable</td>
<td>20 mm, 40 mm, 60 mm, 80 mm, 120 mm, 150 mm, adjustable</td>
<td>20 mm, 40 mm, 60 mm, 80 mm, 120 mm, 150 mm, adjustable</td>
</tr>
<tr>
<td>Thru-beam sensor</td>
<td>10 m, adjustable</td>
<td>10 m, adjustable</td>
<td>4.5 m</td>
<td>4.5 m</td>
</tr>
<tr>
<td>Retroreflective sensor</td>
<td>6 m</td>
<td>6 m</td>
<td>3.5 m</td>
<td>3.5 m, 7.6 m</td>
</tr>
<tr>
<td>Background suppression sensor</td>
<td>20 mm, 40 mm, 60 mm, 80 mm</td>
<td>20 mm, 40 mm, 60 mm, 80 mm, 120 mm, 150 mm, adjustable</td>
<td>20 mm, 40 mm, 60 mm, 80 mm, 120 mm, 150 mm, adjustable</td>
<td>20 mm, 40 mm, 60 mm, 80 mm, 120 mm, 150 mm, adjustable</td>
</tr>
</tbody>
</table>

- 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
- Plastic optical face
- Accurate switching point
- LED indicators front and rear
- Adjustable contrast settings
- Metal housings for rough environments
- “2-point scanning” method
- Adjustable contrast settings
- IP69K Resistant to steam jets and cleaning
- Version with optical face on the side
- Tamperproof, no operating controls
- Versions with broad light spot and multiple light spots for special requirements
- Diffuse mode sensor
- Convergent mode sensor
- Resistive to steam jets and cleaning
- Version with optical face on the side
- Metal housings for rough environments
- TAMPERPROOF, NO OPERATING CONTROLS
- Versions with broad light spot and multiple light spots for special requirements
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.

**MINIATURE HOUSINGS IN THE APPLICATION**

- 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
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

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

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
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

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

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

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, 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 doork and barrier systems
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.

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thru-beam sensor</td>
<td>43 m</td>
</tr>
<tr>
<td>Retroreflective sensor</td>
<td>12 m, 16.5 m</td>
</tr>
<tr>
<td>Diffuse mode sensor</td>
<td>1200 mm, 2500 mm, adjustable</td>
</tr>
</tbody>
</table>

- 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
### STANDARD SENSORS · CYLINDRICAL HOUSINGS

<table>
<thead>
<tr>
<th>ECONOMICAL LINE</th>
<th>ECONOMICAL LINE</th>
<th>BASIC LINE</th>
<th>CLASSIC LINE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GLV18</strong></td>
<td><strong>GLK18</strong></td>
<td><strong>18GM60</strong></td>
<td><strong>VL18 · VT18</strong></td>
</tr>
</tbody>
</table>

#### 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

#### Background suppression sensor
- 120 mm, adjustable

- Red light

- 10 V DC … 30 V 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

#### Background suppression sensor
- 120 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
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

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.
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](http://www.pepperl-fuchs.com) to view our range of standard fiber optic sensors or contact us about your specific requirements.
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.
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.

<table>
<thead>
<tr>
<th>Slot widths</th>
<th>50 mm, 70 mm, 100 mm, 150 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target sizes</td>
<td>0.5 mm, 1 mm, 2 mm, 3 mm</td>
</tr>
<tr>
<td>Infrared light</td>
<td>Robust aluminum housing, Open frame with wide detection area, Option of switching between static and dynamic operation, Adjustable timer functions and sensitivity</td>
</tr>
</tbody>
</table>
**CONTRAST SENSORS**

**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 µs, 750 µs
- 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
COLOR SENSORS

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.
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 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

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 SENSORS IN THE APPLICATION

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.
<table>
<thead>
<tr>
<th>Measuring ranges</th>
<th>up to 50 m, 150 m, 300 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse Ranging Technology (PRT)</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1 mm, adjustable</td>
</tr>
<tr>
<td>Repeatability</td>
<td>&lt; 0.5 mm</td>
</tr>
</tbody>
</table>

18 V DC … 30 V DC

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

<table>
<thead>
<tr>
<th>Special Sensor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RLG28</strong></td>
<td>Retroreflective area sensor for the reliable detection of the leading edges on objects.</td>
</tr>
<tr>
<td><strong>MLV41-8-HV</strong></td>
<td>Background suppression sensor for web break monitoring on printing machines.</td>
</tr>
<tr>
<td><strong>ML8-8-*/162</strong></td>
<td>Miniature background suppression sensor for printed circuit board detection.</td>
</tr>
<tr>
<td><strong>GLD3-RT</strong></td>
<td>Photoelectric slot sensor for label detection.</td>
</tr>
</tbody>
</table>

**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.
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.
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.

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.
### IO-LINK SENSORS

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retroreflective sensor</td>
<td>Sensing distances 10 m, 12 m</td>
<td>IO-Link V1.0, COM 2 interface, Red light 10 V DC … 30 V DC</td>
</tr>
<tr>
<td>Contrast sensor</td>
<td>Detection range 11 mm, Light spot size: Rectangular, 1 mm x 3 mm</td>
<td>IO-Link V1.0, COM 2 interface, Modulated light, visible red, green, blue 10 V DC … 30 V DC</td>
</tr>
<tr>
<td>Diffuse mode sensor with background suppression</td>
<td>Max. detection range 800 mm, adjustable</td>
<td>IO-Link V1.0, COM 2 interface, Red light (PowerBeam) 10 V DC … 30 V DC</td>
</tr>
<tr>
<td>Distance sensor</td>
<td>Measuring ranges up to 8 m, 15 m, 50 m, adjustable</td>
<td>IO-Link V1.0, COM 2 interface, Red laser light, laser class 1 or 2 10 V DC … 30 V DC</td>
</tr>
</tbody>
</table>

---

**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-G-2M-PUR**: Female cordset, straight, M12, 5-pin, 2 m PUR cable
- **V15-G-5M-PVC**: Female cordset, angled, M12, 5-pin, 2 m PVC cable
- **V15-G-5M-PUR**: Female cordset, angled, M12, 5-pin, 2 m PUR cable

#### STANDARD REFLECTORS
- **REF-H50**: Rectangular, 50 mm x 50 mm
- **REF-H60**: Rectangular, 60 mm x 40.5 mm
- **REF-H65-2**: Rectangular, 84.5 mm x 84.5 mm
- **REF-H60**: 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
- **OFR60-G**: Rectangular, 50 mm x 50 mm

#### REFLECTORS WITH IP69K PROTECTION AND TÜV OR ECOCAR CERTIFICATION
- **REF-H100F**: Rectangular, 100 mm x 100 mm x 9.2 mm
- **REF-S20F**: Rectangular, 20 mm x 10 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; Hi60
- **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
- **PLYScan mounting set**: Mounting set for PLYScan 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 DOVE TAIL 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

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST-03</td>
<td>Sensor tester</td>
</tr>
<tr>
<td>CL-CUT</td>
<td>Cutter for plastic fiber optics</td>
</tr>
<tr>
<td>OMH-11</td>
<td>Aperture for ML4.2 and ML6 series</td>
</tr>
</tbody>
</table>

### PARAMETERIZATION ACCESSORIES

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming set</td>
<td>CD PLVScan: Programming software and cables for PLVScan light grids</td>
</tr>
<tr>
<td>IO-Link-Master01-USB</td>
<td>Parameterization tool IO-Link-Master, incl. power supply, USB cable</td>
</tr>
<tr>
<td>IO-Link software</td>
<td>See download area <a href="http://www.pepperl-fuchs.com">www.pepperl-fuchs.com</a></td>
</tr>
<tr>
<td>PactWare 4.0</td>
<td>FDT base application, for convenient communication with field devices</td>
</tr>
<tr>
<td>IODD Interpreter</td>
<td>Translation tool for IODD devices</td>
</tr>
<tr>
<td>IODDs devices</td>
<td>Description files for the relevant IO-Link sensors</td>
</tr>
<tr>
<td>Device DTMs</td>
<td>Parameter descriptions for the relevant IO-Link sensors</td>
</tr>
<tr>
<td>Parameter description</td>
<td>Parameter descriptions for IO-Link sensors</td>
</tr>
</tbody>
</table>
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.