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# 5. Positioning Systems

## Introduction

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PMI Inductive Analog Measuring Systems

From switch to positioning measuring technology

The PMI series of position measurement sensors are inductive based measurement devices that can be used to detect the position of a metal target relative to the device sensing surface. Combining inductive sensing techniques with microcontroller technology, these sensors can be used to provide analog feedback or switching point information to automation control or error proofing systems. In addition to the analog current signal (4 mA to 20 mA) or voltage signal (0 V to 10 V), PMI sensors also offer binary switching element functions. This enables limit switch positions to be implemented in addition to the measured path information.

The PMI series of sensing products comes in two configurations, one for linear measurement and one for 360 degree angular measurement.

Special technical features:

Noncontact path and angle positioning

The inductive functional principle of these sensors enables contact-free position measurement. This measuring technique operates entirely without wear and provides reliable position and switching signals even in the most extreme ambient conditions.

Simple steel actuator

PMI sensors react to a simple steel actuator. The actuating element can be designed as a part of the machine module.

Three-in-one – combined measuring and switching element functions

The combination of analog output and switching element functions can replace up to three standard sensors. For complete valve control, the actual position, both end stop positions, and valve OPEN and valve CLOSED can be fed back to the control system.

Functional description of inductive positioning sensors

PMI position measurement sensors have multiple coils positioned in two rows on a coil carrier. When an actuator passes over the coil arrangement, it creates a path-dependent attenuation pattern over the coils. The attenuation level for adjacent coils is compared in order to determine the exact position of the actuator.

Actuators are offered as accessories, but they can be produced as part of a machine module. In order to meet the specified performance, certain mechanical dimensions and mounting conditions must be adhered to when reproducing the actuator.

Material and dimensions of the actuator

Actuators for PMI sensors are made out of mild steel. Construction steel 1.0037 (formerly ST37) is used as the reference material. When using other materials, you must take into account that the sensor will not provide the specified measurement accuracy. To provide protection against corrosion, the actuator's surface can be burnished, varnished, or galvanized.

The actuator must present a coplanar surface with two non-rounded edges to the measuring surface of the sensor. The required width of the actuator is 8 mm or 13 mm depending on the sensor type. The actuator must be long enough to completely overlap the active sensor area. The detailed dimensions are included in the specific sensor data sheet.

Mounting

The sensor and actuator together make up the positioning system. To ensure proper performance with the corresponding measurement accuracy, the actuator must not leave the detection range [a] of the sensor, nor exceed the specific distance [b]. The specific mounting conditions are included in the data sheets.

Inductive positioning systems

PMI-F90

The PMI-F90 inductive positioning system is available in three different lengths: 80 mm, 104 mm, and 120 mm. In addition to versions with analog signal output designed solely for positioning, versions are also available with combined analog and binary functions.

PMI-F110

For longer measuring ranges, the PMI-F110 series is available in five different lengths from 210 mm to 960 mm. The F110 series provides an analog output signal that is either 0 V to 10 V or 4 mA to 20 mA. They can be mounted in the machine bed using adjustable t-slides.

PMI-F112

The PMI-F112 series offers a measuring length up to 14 mm and has a compact housing. The analog voltage signal (0 V to 10 V) is adjustable between 7 mm and 14 mm on the measuring range. In addition to the standard version with analog interface, a configurable version is available with an IO-Link interface.

Inductive angular position feedback system

PMI-F130

The angle-measuring PMI-F130 sensors are similar to the linear positioning sensors. The metallic actuator is integrated into a round puck that can be mounted onto a rotating drive shaft. The air gap between the sensor and the puck enables wear-free evaluation of the rotation angle.

The PMI-F130 series includes three different function types. In its basic function, the sensor feeds back the measured rotation angle as an analog current signal (4 mA to 20 mA) or a voltage signal (0 V to 10 V). The desired rotation angle range can be scaled for the output range. Similar to the PMI-F90 positioning sensor, the F130 is also available as an angular sensor with two configurable switching window functions. An additional model is also available with three separately configurable switching window functions. This version can be used as a noncontact electronic cam position switch.

Outline of angular positioning system with central opening for the actuator

Dimensions and mounting conditions for reproducing the actuator
VDM Laser Distance Measurement Device

VDM laser sensors provide an analog output (4 to 20 mA) proportional to how close or far an object or reflector is from the sensor, which makes them an ideal solution for most types of measurement and inspection applications. VDM28 and VDM100 series sensors use Pulse Ranging Technology (PRT) and have long detection ranges, offering completely reliable measurement results. With the use of intense impulses of laser light, PRT offers a high level of reliability even in extreme ambient conditions with excessive ambient light and dust.

Equipped with analog outputs and/or a maximum of two discrete outputs, the sensors are used for presence checking, threshold monitoring, the positioning of industrial trucks, measuring distances on monorail conveyors, manufacturing systems, cranes and gantries, for stack height control, dip monitoring, and much more.

VDM18, Laser triangulation for short distances

The VDM18 is based on the principle of the triangulation of laser light and has measuring ranges of 30 mm to 100 mm and 80 mm to 300 mm. The VDM18 not only offers a space-saving housing but also optimal measurement accuracy. Its analog output can be scaled to any distance in the measuring range. Furthermore, it is fully equipped with two configurable discrete outputs and is available with an RS485 interface option.

Distance Measurement using PRT (Pulse Ranging Technology)

PRT sensors are either diffuse, meaning they emit light that is reflected from the object to be sensed back to the sensor's receiver, or retroreflective, meaning they emit light that is reflected from a corner-cube reflector back to the sensor's receiver. But unlike background suppression and multipixel array technologies, PRT technology uses only one receiver element. A timer in the sensor determines how long it takes—after it emits a short burst of light—for the light to make it from the sensor to the object and then be reflected back to the sensor again.

Calculating this time duration and using the speed of light in air as a constant then determines the distance from the sensor to the object.

\[
S = \frac{c \cdot t_L}{2}
\]

\[c = 299.792.458 \text{ m/s}\]

PRT is true "time of flight" (TOF) distance measurement. It is critical to note that the term "time of flight" is often misused in industry, as some manufacturers improperly use it to describe a different method of distance measurement that is more accurately called phase correlation or is chip-based technology. In phase correlation distance measurement, the reflected light is evaluated at the receiver, not based on the time it took to get from the sensor's emitter to the object and be reflected back, but rather by how much the phase angle of the light shifted as it traveled to and from the object. In other words, phase correlation geometrically calculates the distance rather than directly measuring it, as is the case with PRT.

Phase correlation distance measurement has significant disadvantages compared to PRT distance measurement. Phase correlation sensors have a weaker LED intensity since they are continuously on, resulting in shorter sensing distances and difficulty detecting dark objects. They are also limited to short sensing ranges because they detect shifts to the reflected light's phase angle, but anything greater than 360° can be misinterpreted by the sensor. This also means they are prone to detecting background objects, especially those that reflect light at the same phase angle as light in the sensing range. For example, whether reflected light is shifted in phase by 90° or by 450°, there is no way for a phase correlation sensor to differentiate the two. This results in the detection of “phantom objects” in the background. Other strengths of PRT include its ability to ignore environmental conditions such as ambient light, temperature, and target color, and measured values don't drift as they do in phase correlation, even after prolonged use.

VDM28, Sensing by ranging

The VDM28 is a universal measuring and monitoring device. It can be used in a wide range of industries and applications. With its PRT-based measurement principle, it is used where sensors with background suppression have reached their limitations. The VDM28 has a small, extremely visible red light spot and always provides accurate, reliable, clear, and reproducible results, regardless of ambient conditions such as surface texture, dark color, or ambient light. Thanks to the Teach-in option or the IO-Link interface for service and process data, the VDM28 is flexible for your application.

VDM100, Long distance, high accuracy measurement

The VDM100 works with outstanding precision up to 300 m. It achieves a measuring frequency of 1000 measurements per second using light pulses in the range of nanoseconds.

Using noncontact technology that is completely eye-safe, this modern and robust device is used for fast and accurate positioning on stock feeders, moving carriages, and gantry cranes. The Pulse Ranging Technology (PRT) measuring method certainly demonstrates its strengths in this area, even at travel speeds of up to 15 m/s.

The VDM100 is the perfect enhancement to the LS680 optical data coupler that is already popular. Together these form a strong duo to fulfill your requirements for a flexible automation solution.
PosiTrack™ WCS and PCV Position Feedback Systems

The PosiTrack WCS system from Pepperl+Fuchs brings fraction-of-a-millimeter position feedback to a wide range of industrial and commercial applications. Overhead monorails, gantry cranes, automated warehouses, even elevators and theater stage lighting systems can raise their performance to new levels with PosiTrack.

WCS position feedback system

Automating material handling systems requires information about the moving vehicle or forklift truck that is accurate to the millimeter. The WCS position feedback system provides the operator with a reliable and proven positioning system. It combines two important characteristics: noncontact technology and absolute positioning. You need just two components for positioning within your application—the read head and the code rail.

The read head

The U-shaped read head optically scans a uniquely coded rail that enables the position encoding system to detect a new position value every 0.8 mm. Position values are determined regardless of temperature fluctuations and in real time, even at high travel speeds. The read head’s sophisticated intelligence provides rock-solid data in some of the toughest conditions. If the high-powered optics lose strength, the read head provides a maintenance control signal well before the system’s output is influenced.

All read heads come with a snap-on mounting bracket and field-attachable connector.

The data is transferred directly from the read head to the control unit via a serial RS485, SSI, or CANopen interface. A wide range of interface modules are available for connecting to bus systems, such as PROFIBUS DP, PROFINET RT, MODBUS/RTU, DeviceNet, or EtherNet/IP.

The code rail

Available in stainless steel or fiber-laminate, the code rail is positioned parallel to the travel path and assigns a clear and exactly reproducible position at each point of the travel path. All rail types can be hirozontally curved with no affect on the read head’s accuracy. Fiber-laminate rails can also be flexed for vertical bends. Brackets are available for quickly mounting the code rail.

Precise, flexible, noncontact, absolute position feedback!

Outstanding benefits ...

- Emulates a 512 turn, 1024 ppr absolute rotary encoder
- Non-contact, wear-free operation
- +/- 0.4 mm resolution
- Control interface options include SSI, DeviceNet, and EtherNet/IP
- Follows straight or curved travel paths
- High burn-through power for dirty environments
- 1ms response time
- Up to 27 mph travel speed

... proven in many applications

- Automated warehousing
- Floor conveyors
- Vehicle ID
- Elevators and lifts
- Overhead monorails
- Stage lighting
- Rotating stages and turntables
- Gantry cranes

PCV Data Matrix position feedback system

The PosiTrack PCV Data Matrix position feedback system scans a custom data matrix-marked tape using 2-D camera technology. Continuous feedback to distances of six miles is possible with accuracy to ±0.1 mm.

The data bits of the Data Matrix code are divided into two dimensions and provide a high degree of data density over a small surface area. The PCV read head and the Data Matrix code tape are suitable for a wide range of positioning tasks. The code tape is available in lengths up to 10 km. Several Data Matrix code sections can also be used to evaluate vertical position.

Always in focus: the read head unit with power illumination and two-row Data Matrix code reel

Benefits

- Vertical and horizontal position feedback
- 80 and 100 mm read distances
- Follows straight or curved travel paths
- 12.5 m/s (41 ft/s) maximum speed
- +/- 0.1 mm resolution
- RS-485, SSI and PROFIBUS models
  - Interface modules for DeviceNet and EtherNet/IP
- Durable, self-adhesive polyester laminate code tape
  - Chemically resistant to fuels and oils
  - Vertical movement tolerances to +/- 45 mm

Application examples

Monorail conveyor

The Data Matrix code tape is affixed directly above the power rails and the PCV read head attached to the hanger. Each hanger is optimally positioned.

Skid conveyor

The simple attachment of the self-adhesive code tape together with its chemically resistant coating mean the PCV system is ideal for positioning skids.

High-bay warehouse

The PosiTrack PCV positioning system is always the best choice for moving and positioning in an X or Y-direction.
Inductive positioning system

F112 series

Technical Data

Model Number: PMI14V-F112-U-V3

- Measurement range: 0 ... 14 mm
- Object distance: max. 2.5 mm
- Switching element function: Analog voltage output
- Operating voltage: 18 ... 30 V DC
- No-load supply current: ≤ 20 mA
- Linearity error: ± 0.3 mm
- Resolution: 33 µm
- Reverse polarity protected: ✔

Switching element function:
- Analog output
- 1 voltage output: 0 ... 10 V

Ambient temperature: -25 ... 70 °C (-13 ... 158 °F)

Material:
- Housing: PA 6
- Target: mild steel, e.g. 1.0037, SR235JR (formerly St37-2)

Protection degree: IP67

Connection type: M8 x 1 connector, 3-pin

Approvals and Certificates:
- UL approval: cULus Listed, General Purpose, Class 2 Power Source
- CCC approval: CCC approval / marking not required for sensors rated ≤ 36 V

Dimensions:
- Length L [mm]: 30.5
- Width W [mm]: 35
- Height H [mm]: 35
- Connector length lc [mm]: 10.5

Accessories:
- These and more accessories can be found in chapter 5.5 from page 851
- See pages from 970 ... for cordsets
- See pages 1066 ... for mounting accessories

- BT-F90-W: Damping element; lateral screw holes
- V3-GM-2M-PUR: Female cordset, M8, 3-pin, 2 m PUR cable, straight
- V3-WM-2M-PUR: Female cordset, M8, 3-pin, 2 m PUR cable, angled
- V3-GM-5M-PUR-ABG: Female cordset, M8, 3-pin, 5 m PUR cable, straight, shielded

Electrical Connection

Core colors in accordance with EN 60947-5-2
1  BN (brown)
3  BU (blue)
4  BK (black)

Properties

- F112 housing style
- 14 mm measuring length
- 33 µm resolution
- Analog output
- Pushbutton configurable

Benefits

- Non-contact position measurement
- Output proportional to linear position
- Up to 2.5 mm target distance
- No specialized targets or magnets needed
## Technical Data

### General Data
- **Object distance**: 0.5 ... 3 mm, recommended: 2 mm
- **Switching element function**: analog, current or voltage output
- **Operating voltage**: 18 ... 30 V DC
- **No-load supply current**: ≤ 40 mA
- **Reverse polarity protected**: ✔
- **Linearity error**: within measuring range: ± 0.8 mm, within linearity range: ± 0.4 mm
- **Resolution**: 125 µm
- **Analog output**: 1 current output: 4 ... 20 mA, 1 voltage output: 0 ... 10 V
- **Ambient temperature**: -25 ... 70 °C (-13 ... 158 °F)
- **Material**: Housing ABS, Target: mild steel, e.g. 1.0037, SR235JR (formerly St37-2)
- **Protection degree**: IP67
- **Connection type**: connector M12 x 1, 4-pin

### Model Number
- PMI80-F90-IU-V1
- PMI104-F90-IU-V1
- PMI120-F90-IU-V1

### Measurement range
- 0 ... 80 mm
- 0 ... 104 mm
- 0 ... 120 mm

### Approvals and Certificates
- **UL approval**: cULus Listed, General Purpose, Class 2
- **CCC approval**: CCC approval / marking not required for sensors rated ≤ 36 V

### Dimensions
- **Length L [mm]**: 102, 126, 142
- **Width W [mm]**: 23
- **Height H [mm]**: 22
- **Connector length lc [mm]**: 19

### Accessories
- These and more accessories can be found in chapter 5.5 from page 851
- See pages from 970 ... for cordsets
- See pages 1066 ... for mounting accessories

## Electrical Connection

### Wire colors in accordance with EN 60947-5-2
- 1: BN (brown)
- 2: WH (white)
- 3: BU (blue)
- 4: BK (black)

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**Properties**
- F90 housing style
- Up to 120 mm measuring length
- 125 µm resolution
- Current or voltage analog output
- Fixed setting

**Benefits**
- Non-contact position measurement
- Output proportional to linear position
- Up to 3 mm target distance
- No specialized targets or magnets needed
Inductive positioning system

F90 series

Technical Data

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

General Data

Object distance 0.5 ... 3 mm, recommended: 2 mm
Switching element function Analog current output with 2 PNP NO switching outputs
Operating voltage 18 ... 30 V DC
No-load supply current ≤ 40 mA
Reverse polarity protected ✓
Linearity error within measuring range: ± 0.6 mm
within linearity range: ± 0.4 mm
Resolution 125 µm
Switching outputs 2 switch outputs PNP, NO, reverse polarity protected, short-circuit protected
Operating current ≤ 100 mA
Short-circuit protection pulsing
Analog output Output type 1 current output: 4 ... 20 mA
Ambient temperature -25 ... 70 °C (-13 ... 158 °F)
Material Housing ABS
Target mild steel, e.g. 1.0037, SR235JR (formerly St37-2)
Protection degree IP67
Connection type M12 x 1 connector, 5-pin

Model Number

<table>
<thead>
<tr>
<th>Model Number</th>
<th>PMI80-F90-IE8-V15</th>
<th>PMI104-F90-IE8-V15</th>
<th>PMI120-F90-IE8-V15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range</td>
<td>0 ... 80 mm</td>
<td>0 ... 104 mm</td>
<td>0 ... 120 mm</td>
</tr>
</tbody>
</table>

Approvals and Certificates

UL approval cULus Listed, General Purpose, Class 2
CCC approval CCC approval / marking not required for sensors rated ≤ 36 V

Dimensions

Length L [mm] 102 126 142
Width W [mm] 23
Height H [mm] 22
Connector length lc [mm] 19

Accessories

These and more accessories can be found in chapter 5.5 from page 811
See pages from 970 ... for cordsets
See pages 1066 ... for mounting accessories

Accessories:

BT-F90-W Damping element for F90 sensors; lateral screw holes
MH-F90 Mounting bracket for mounting of F90 sensors
V15-G-2M-PVC Female cordset, M12, 5-pin, 2 m PVC cable, straight
V15-W-2M-PVC Female cordset, M12, 5-pin, 2 m PVC cable, angled
V15-G-5M-PUR-ABG Female cordset, M12, 5-pin, 5 m PUR cable, straight, shielded

Electrical Connection

Wire colors in accordance with EN 60947-5-2

1 BN (brown) 2 WH (white) 3 BU (blue) 4 BK (black) 5 GY (gray)
Inductive positioning system

F110 series

Technical Data

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

General Data

Object distance max. 6 mm
Switching element function analog, current or voltage output
Operating voltage 18 ... 30 V DC
Reverse polarity protected ✔

Analog outputs

Output type 1 current output: 4 ... 20 mA
1 voltage output: 0 ... 10 V (only one output can be used at a time)

Ambient temperature -25 ... 70 °C (-13 ... 158 °F)

Material

Housing PA 6 / AL
Target mild steel, e. g. 1.0037, SR235JR (formerly St37-2)

Protection degree IP65

Connection type connector M12 x 1, 4-pin

Model Number

PMI210-F110-IU-V1
PMI360-F110-IU-V1
PMI510-F110-IU-V1
PMI810-F110-IU-V1

Measurement range 0 ... 210 mm
0 ... 360 mm
0 ... 510 mm
0 ... 810 mm

No-load supply current ≤ 40 mA
≤ 65 mA
≤ 70 mA

Linearity error ± 0.4 mm
± 0.6 mm
± 0.8 mm

Resolution 210 μm
360 μm
550 μm
950 μm

Approvals and Certificates

UL approval cULus Listed, General Purpose, Class 2
Power Source
CCC approval CCC approval / marking not required for sensors rated ≤ 36 V

Dimensions

Length L [mm] 250 400 550 850
Width W [mm] 41
Height H [mm] 30.5
Connector length lc [mm] 17

Accessories

These and more accessories can be found in chapter 5.5 from page 851
See pages from 970 ... for cordsets
See pages 1066 ... for mounting accessories

BT-F110-G
Damping element for F110 housing sensors; front screw holes

BT-F110-W
Damping element for F110 housing sensors; lateral screw holes

MH-F110
Mounting bracket for mounting F110 series sensors

V1-G-2M-PVC
Female cordset, M12, 2-pin, PVC cable, straight

V1-W-2M-PVC
Female cordset, M12, 2-pin, PVC cable, angled

V1-G-5M-PUR-ABG
Female cordset, M12, 4-pin, 5 m PUR cable, straight, shielded

Electrical Connection

Wire colors in accordance with EN 60947-5-2

1 BN (brown)
2 WH (white)
3 BU (blue)
4 BK (black)
### Technical Data

**Model Number**: PMI360D-F130-IE8-V15

**Measurement range**: 360°

**Operating voltage**: 18 ... 30 V

**Operating current**: ≤ 45 mA

**Reverse polarity protection**: reverse polarity protected

**Repeat accuracy**: ± 0.25°

**Resolution**: 0.4°

**Switching outputs**: 2 switch outputs PNP, NO, reverse polarity protected, short-circuit protected

**Output type**: 1 analog output: 4 ... 20 mA

**Linearity error**: ± 0.6° (with original actuator)

**Ambient temperature**: -25 ... 70 °C (-13 ... 158 °F)

**Protection degree**: IP67

**Connection type**: M12 x 1 connector, 5-pin

### Properties

- F130 housing style
- 360° measuring range
- 1 analog output and 2 switching outputs
- Pushbutton configurable

### Benefits

- 3 functions in a single sensor
- Non-contact position measurement
- Angle proportional analog value
- 2 teachable set points

### Approvals and Certificates

- UL approval: cULus Listed, General Purpose, Class 2 Power Source
- CCC approval: CCC approval / marking not required for sensors rated ≤ 36 V

### Dimensions

- Length L [mm]: 110
- Width W [mm]: 76.5
- Height H [mm]: 26
- Connector length lc [mm]: 20

### Accessories

- BT-F130-A: Actuator for F130 series
- V15-G-2M-PVC: Female cordset, M12, 5-pin, 2 m PVC cable, straight
- V15-W-5M-PUR-ABG: Female cordset, M12, 5-pin, 5 m PUR cable, angled, shielded

### Electrical Connection

**PMI360D-F130-IE8-V15**

1. **BN** (brown)
2. **WH** (white)
3. **BU** (blue)
4. **BK** (black)
5. **GY** (gray)

Wire colors in accordance with EN 60947-5-2.

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For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us
**Technical Data**

For detailed data and product description refer to the data sheets at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

- **Model Number**: PMI360DV-F130-IU-V15
- **Measurement range**: max. 360°
  - min. 45°
- **Adjustment range**: 45° ... 360° analog range
- **Operating voltage**: 18 ... 30 V DC
- **No-load supply current**: ≤ 45 mA
- **Resolution**: 0.2°
- **Repeat accuracy**: ≤ 0.25°
- **Linearity**: ≤ 0.6° (with BT-F130-A)
- **Analog output**: current output or voltage output (depends on connected load resistance at power-up)
  - 4 ... 20 mA (R_L < 400 Ω)
  - 0 ... 10 V (R_L > 3.3 kΩ)
- **Ambient temperature**: -25 ... 70 °C (-13 ... 158 °F)
- **Material - Housing**: PBT
- **Target**: mild steel, e.g. 1.0037, SR235JR (formerly St37-2)
- **Protection degree**: IP67
- **Connection type**: M12 x 1 connector, 5-pin

**Approvals and Certificates**

- **UL approval**: cULus Listed, General Purpose, Class 2 Power Source
- **CCC approval**: CCC approval / marking not required for sensors rated ≤36 V

**Dimensions**

- **Length L [mm]**: 110
- **Width W [mm]**: 76.5
- **Height H [mm]**: 26
- **Connector length l_c [mm]**: 20

**Electrical Connection**

- **Wire colors in accordance with EN 60947-5-2**
  - 1: BN (brown)
  - 2: WH (white)
  - 3: BU (blue)
  - 4: BK (black)
  - 5: GY (gray)

**Properties**

- F130 housing style
- Adjustable active range
- Analog output
- Pushbutton configurable

**Benefits**

- Non-contact position measurement
- Output proportional to angle position
- Teachable active rotation range
- Teachable output signal - rotation direction (CW/CCW)
- Zero position settable

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See pages from 970 ... for cordsets
See pages 1066 ... for mounting accessories

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT-F130-A</td>
<td>Actuator for F130 series</td>
</tr>
<tr>
<td>V15-G-2M-PVC</td>
<td>Female cordset, M12, 5-pin, 2 m PVC cable, straight</td>
</tr>
<tr>
<td>V15-W-2M-PVC</td>
<td>Female cordset, M12, 5-pin, 2 m PVC cable, angled</td>
</tr>
<tr>
<td>V15-W-5M-PUR-ABG</td>
<td>Female cordset, M12, 5-pin, 5 m PUR cable, angled, shielded</td>
</tr>
</tbody>
</table>
Technical Data

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.com

Model Number: PMI360DV-F130-3E2-V15

- Adjustment range: 3 configurable switchpoint windows, min. 5°, max. 360°
- Operating voltage: 18 ... 30 V DC
- No-load supply current: ≤ 45 mA
- Reverse polarity protected: ✔
- Resolution: 0.2°
- Repeat accuracy: ±0.25°
- Output type: 3 switch outputs PNP, NO, reverse polarity protected, short-circuit protected, programmable
- Operating current: ≤ 100 mA
- Short-circuit protection: pulsing
- Ambient temperature: −25 ... 70 °C (−13 ... 158 °F)
- Material:
  - Housing: PBT
  - Target: mild steel, e.g. 1.0037, SR235JR (formerly Si37-2)
- Protection degree: IP67
- Connection type: M12 x 1 connector, 5-pin

**Properties**

- F130 housing style
- 360° rotation range
- 3 switch point outputs
- Pushbutton configurable

**Benefits**

- Non-contact cam switch
- 3 teachable output points and pulse window widths

**Approvals and Certificates**

- UL approval: cULus Listed, General Purpose, Class 2 Power Source
- CCC approval: CCC approval / marking not required for sensors rated ≤36 V

**Dimensions**

- Length L [mm]: 110
- Width W [mm]: 76.5
- Height H [mm]: 26
- Connector length lc [mm]: 20

**Accessories**

These and more accessories can be found in chapter 5.5 from page 851.

- BT-F130-A: Actuator for F130 series
- V15-G-2M-PVC: Female cordset, M12, 5-pin, 2 m PVC cable, straight
- V15-W-2M-PVC: Female cordset, M12, 5-pin, 2 m PVC cable, angled
- V15-W-5M-PUR-ABG: Female cordset, M12, 5-pin, 5 m PUR cable, angled, shielded

**Electrical Connection**

Wire colors in accordance with EN 60947-5-2

1. BN (brown)
2. WH (white)
3. BU (blue)
4. BK (black)
5. GY (gray)
Technical Data

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

General Data

Measurement range
- max. 360°
- min. 45°

Adjustment range
- 45° .. 360° analog range, programmable
- 2 configurable switchpoint windows, min. 5°, max. 360°

Operating voltage
18 ... 30 V DC

No-load supply current
≤ 45 mA

Reverse polarity protected ✔

Resolution
0.2°

Repeat accuracy
± 0.25°

Linearity
± 0.6° (with BT-F130-A)

Switching outputs
- Operating current ≤ 100 mA
- Short-circuit protection pulsing

Analog output
- Output type: current output or voltage output
- (depends on connected load resistance at power-up)
- 4 ... 20 mA (R< sub >L< sub > < 400 Ω< sub >)
- 0 ... 10 V (R< sub >L< sub > > 3.3 kΩ< sub >)

Ambient temperature
-25 ... 70 °C (-13 ... 158 °F)

Material
- Housing: PBT
- Target: mild steel, e.g. 1.0037, SR235JR (formerly St37-2)

Protection degree
- IP67

Connection type
- M12 x 1 connector, 5-pin

Model Number

PMI360DV-F130-IU2E0-V15
PMI360DV-F130-IU2E2-V15

Output type
- 2 switch outputs NPN, NO, reverse polarity protected, short-circuit protected, programmable
- 2 switch outputs PNP, NO, reverse polarity protected, short-circuit protected, programmable

Approvals and Certificates

UL approval
- cULus Listed, General Purpose, Class 2 Power Source

CCC approval
- CCC approval / marking not required for sensors rated ≤36 V

Dimensions

Length L [mm]
110
Width W [mm]
76.5
Height H [mm]
26
Connector length l< sub >c< sub > [mm]
20

Accessories

These and more accessories can be found in chapter 5.5 from page 851
See pages from 1066 ... for mounting accessories

Wire colors in accordance with EN 60947-5-2

1. GN (brown)
2. WH (white)
3. BU (blue)
4. BK (black)
5. GY (gray)
### Technical Data

**General Data**
- **Light source**: Laser diode
- **Typ. service life**: 50,000 h at Ta = +40 °C
- **Light type**: Modulated visible red light
- **Wave length**: 650 nm
- **Measuring method**: Laser triangulation
- **Linearity error**: 0.25 % of the measuring range
- **Resolution**: < 0.1 % of the maximum sensing range

**Operating voltage**: 18 ... 30 V DC
**No-load supply current**: \( \leq 40 \) mA at 24 V DC
**Switching current max.**: 100 mA
**Switching frequency**: \( \leq 1 \) kHz
**Measurement output**: 1 analog output 4 ... 20 mA, short-circuit/overload protected, \( R_{\text{max}} = 500 \) Ohm

**Ambient temperature**: -10 ... 60 °C (14 ... 140 °F)

**Housing**: ABS, impact resistant
**Optical face**: PMMA
**Protection degree**: IP67

### Model Number

- **VDM18-100/20/122/151**
- **VDM18-100/20/88/122/151**
- **VDM18-100/32/105/122**
- **VDM18-300/20/122/151**
- **VDM18-300/20/88/122/151**
- **VDM18-300/32/105/122**

### Measurement range

- 30 ... 100 mm
- 80 ... 300 mm

**Light spot representation**
- approx. 1.5 mm \( \times \) 3 mm at 100 mm
- approx. 1.5 mm \( \times \) 3.25 mm at 100 mm
- approx. 2 mm \( \times \) 4.5 mm at 300 mm

**Interface type**: RS 485
**Control input**: Laser off (HIGH +UB), Keypad lock (LOW 0 V)
**Signal output**: 1 PNP output, short-circuit protected, reverse polarity protected, open collector
- 2 PNP outputs, independent, short-circuit protected, reverse polarity protected

**Connection**: 5-pin, M12 \( \times \) 1 plastic connector
- M12 connector, 8-pin

### Approvals and Certificates

- UL approval: cULus Listed

### Dimensions

- **Length L [mm]**: 50
- **Width W [mm]**: 17
- **Height H [mm]**: 50
- **Connector length lc [mm]**: 13.5

### Accessories

- These and more accessories can be found in chapter 10
  - See pages from 570 ... for cordsets
  - See pages 1066 ... for mounting accessories

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us
## Technical Data

### General Data
- **Measurement range:** 0.2 ... 8 m
- **Light source:** laser diode
- **Wavelength:** 660 nm
- **Measuring method:** Pulse Ranging Technology (PRT)
- **Diaphragm diameter:** < 10 mm at a distance of 8 m at 20 °C
- **Repeatability:** < 5 mm
- **Operating voltage:** 10 ... 30 V DC / when operating in IO-Link mode: 18 ... 30 V
- **No-load supply current:** ≤ 70 mA / 24 V DC

### Interface
- **Interface type:** IO-Link
- **Switching current:** max. 100 mA
- **Switching frequency:** 50 Hz
- **Ambient temperature:** -30 ... 50 °C (-22 ... 122 °F)

### Material
- **Housing:** Plastic ABS
- **Optical face:** Plastic pane

### Protection degree
- **IP65**

### Model Number
- **VDM28-8-L-IO/110/115b/122**
- **VDM28-8-L-IO/115b/136**
- **VDM28-8-L-IO/73c/110/122**
- **VDM28-8-L-IO/73c/136**

### Laser class
- 2

### Signal output
- Push-pull output, short-circuit protected, reverse polarity protected
- 2 Push-pull outputs, short-circuit protected, reverse polarity protection

### Measurement output
- 1 analog output 4 ... 20 mA, short-circuit / overload protected

### Connection
- 300 mm fixed cable with M12 x 1, 4-pin

### Approvals and Certificates
- Protection class: II
- **UL approval:** cULus Listed, Class 2 Power Source, Type 1 enclosure

### Dimensions
- **Length L [mm]:** 54.3
- **Width W [mm]:** 25.8
- **Height H [mm]:** 88
- **Connector length lc [mm]:** 5

### Accessories
- **These and more accessories can be found in chapter 10**
  - See pages from 970 ... for cordsets
  - See pages 1066 ... for mounting accessories

### Electrical Connection

#### Option:
- 1: +UB
- 2: Q2
- 3: 0 V
- 4: C/O1

#### Option:
- 1: +UB
- 2: Q2
- 3: 3 V
- 4: C/O1

Wire colors in accordance with EN 60947-5-2:
- 1: BN (brown)
- 2: WH (white)
- 3: BU (blue)
- 4: BK (black)

---

**Properties**
- Rectangular full-size housing
- Diffuse distance measurement
- Pulse Ranging Technology (PRT)
- Medium range
- Discrete and analog outputs with IO-Link
- Laser red light

**Benefits**
- Parallel measuring paths without crosstalk.
- Secure measurement in difficult conditions, e.g. mist or dust
- High resistance to ambient light
- Measures distances consistently, regardless of surface color

---

**Positioning Systems, Distance Measurement Devices**

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Refer to General Notes Relating to Product Information

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Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
Technical Data

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.com

Model Number: VDM28-15-L-IO/73c/110/122
Measurement range: 0.2 ... 15 m
Reference target: Kodak white (90%)
Light source: Laser diode
Wave length: 660 nm
Measuring method: Pulse Ranging Technology (PRT)
Diameter of the light spot: < 15 mm at a distance of 15 m at 20 °C
Repeat accuracy: < 5 mm
Operating voltage: 10 ... 30 V DC when operating in IO-Link mode: 18 ... 30 V
No-load supply current: ≤ 70 mA / 24 V DC
Interface type: IO-Link
Signal output: Push-pull output, short-circuit protected, reverse polarity protected
Switching current: max. 100 mA
Switching frequency: 50 Hz
Measurement output: 1 analog output 4 ... 20 mA, short-circuit/overload protected
Ambient temperature: -30 ... 50 °C (-22 ... 122 °F)
Material: Plastic ABS

Properties
- Rectangular full-size housing
- Diffuse distance measurement
- Pulse Ranging Technology (PRT)
- Medium range
- Discrete and analog outputs with IO-Link
- Laser red light

Benefits
- Parallel measuring paths without crosstalk.
- Secure measurement in difficult conditions, e.g. mist or dust
- High resistance to ambient light
- Measures distances consistently, regardless of surface color

Electrical Connection

Wire colors in accordance with EN 60947-5-2
1  BN (brown)  Q1
2  WH (white)  Q2
3  BU (blue)  0 V
4  BK (black)  +UB

- = light on, ● = dark on

Accessories
These and more accessories can be found in chapter 10
See pages from 970 ... for cordsets
See pages 1066 ... for mounting accessories

PACTware 4.3 Software
VDM28-IO-Link DTM Device DTM for communication with VDM28-IO-Link sensors
IODD Interpreter Software for the integration of IODDs in a frame application (e.g. PACTware)
IO-Link-Master01-USB IO-Link Master
IO-Link-Master-USB DTM Communication DTM for use of IO-Link-Master
OMH-05 Mounting bracket for round steel ø 12 mm or sheet 1.5 mm ... 3 mm
OMH-07 Mounting bracket for round steel ø 12 mm or sheet 1.5 mm ... 3 mm
OMH-21 Mounting bracket
OMH-22 Mounting bracket
OMH-MLV11-K dove tail mounting clamp
OMH-RLK29 Mounting bracket
OMH-RLK29-HW Mounting bracket for rear wall mounting
OMH-RL28-C Protective cover
OMH-K01 dove tail mounting clamp
OMH-K03 dove tail mounting clamp
OMH-VDVM28-01 Metal enclosure for inserting protective panes or apertures

PACTware 4.X
VDM28-IO-Link DTM
IO-Link-Master01-USB
IO-Link-Master-USB DTM
OMH-05
OMH-07
OMH-21
OMH-22
OMH-MLV11-K
OMH-RLK29
OMH-RLK29-HW
OMH-RL28-C
OMH-K01
OMH-K03
OMH-VDVM28-01

Option:

- UB
- Q2
- 0 V
- C/Q1

1, 2, 3, 4 = light on, ● = dark on

Wire colors in accordance with EN 60947-5-2
1  BN (brown)
2  WH (white)
3  BU (blue)
4  BK (black)
### Technical Data

**General Data**
- **Measurement range**: 0.2 ... 50 m
- **Reference target**: OFR-100/100
- **Light source**: laser diode, typ. service life 85,000 h at Ta = +25 °C
- **Light type**: modulated visible red light
- **Wave length**: 660 nm
- **Measuring method**: Pulse Ranging Technology (PRT)
- **Diameter of the light spot**: < 50 mm at a distance of 50 m at 20 °C
- **Repeatability**: < 5 mm
- **Operating voltage**: 10 ... 30 V DC / when operating in IO-Link mode: 18 ... 30 V
- **No-load supply current**: ≤ 70 mA / 24 V DC
- **Interface**: IO-Link
- **Switching current**: max. 100 mA
- **Switching frequency**: 50 Hz
- **Ambient temperature**: -30 ... 50 °C (-22 ... 122 °F)
- **Material**
  - **Housing**: Plastic ABS
  - **Optical face**: Plastic pane
- **Protection degree**: IP65
- **Protection class**: II
- **UL approval**: cULus Listed, Class 2 Power Source, Type 1 enclosure

**Electrical Connection**

**Model Number**

<table>
<thead>
<tr>
<th>Model Name</th>
<th>VDM28-50-R-IO/73c/136</th>
</tr>
</thead>
</table>

| Laser class | 2 |
| Signal output | Push-pull output, short-circuit protected, reverse polarity protected
| 2 Push-pull outputs, short-circuit protected, reverse polarity protection |
| Measurement output | 1 analog output 4 ... 20 mA, short-circuit/overload protected |

**Accessories**

These and more accessories can be found in chapter 10

**Properties**

- Rectangular full-size housing
- Retroreflective distance measurement
- Pulse Ranging Technology (PRT)
- Long range
- Discrete and analog outputs with IO-Link
- Laser red light

**Benefits**

- Parallel measuring paths without crosstalk.
- Secure measurement in difficult conditions, e.g. mist or dust
- High resistance to ambient light

**Materials**

- Housing: Plastic ABS
- Optical face: Plastic pane
- Protection degree: IP65

**Dimensions**

| Length L [mm] | 54.3 |
| Width W [mm] | 25.8 |
| Height H [mm] | 88 |
| Connector length $l_c$ [mm] | 14 |

**Approvals and Certificates**

UL approval: cULus Listed, Class 2 Power Source, Type 1 enclosure
## Technical Data

For detailed data and product description refer to the data sheets at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us).

### General Data

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light source</td>
<td>Laser diode</td>
</tr>
<tr>
<td>Alignment aid</td>
<td>Laserpointer</td>
</tr>
<tr>
<td>Laser class</td>
<td>Measurement laser: 1</td>
</tr>
<tr>
<td></td>
<td>Alignment laser: 2</td>
</tr>
<tr>
<td>Wave length</td>
<td>Measurement laser: 905 nm</td>
</tr>
<tr>
<td></td>
<td>Alignment laser: 660 nm</td>
</tr>
<tr>
<td>Measuring method</td>
<td>Pulse Ranging Technology (PRT)</td>
</tr>
<tr>
<td>Max. Motion velocity</td>
<td>15 m/s</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1 mm; adjustable</td>
</tr>
<tr>
<td>Absolute accuracy</td>
<td>± 2.5 mm (&gt; 3 m); ± 3.5 mm (0.3 m to 3 m)</td>
</tr>
<tr>
<td>Repeat accuracy</td>
<td>&lt; 0.5 mm</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>18 … 30 V DC</td>
</tr>
<tr>
<td>No-load supply current</td>
<td>250 mA (18 V) ... 150 mA (30 V)</td>
</tr>
<tr>
<td>Interface type</td>
<td>SSI</td>
</tr>
<tr>
<td>Input/output type</td>
<td>2 PNP inputs/outputs, independent configuration, short-circuit protected, reverse polarity protection</td>
</tr>
<tr>
<td>Switching current</td>
<td>200 mA per output</td>
</tr>
<tr>
<td>Material</td>
<td>ABS / PC</td>
</tr>
<tr>
<td>Housing</td>
<td>PMMA, hard coated</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP65</td>
</tr>
<tr>
<td>Connection</td>
<td>4-pin, M12x1 connector, standard (supply), 5-pin, M12 x 1 connector, B-coded (SSI), 8-pin M12x1 connector, service</td>
</tr>
<tr>
<td>Wave length</td>
<td>905 nm</td>
</tr>
<tr>
<td>Alignment laser</td>
<td>660 nm</td>
</tr>
<tr>
<td>Measuring method</td>
<td>Pulse Ranging Technology (PRT)</td>
</tr>
<tr>
<td>Max. Motion velocity</td>
<td>15 m/s</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1 mm; adjustable</td>
</tr>
<tr>
<td>Absolute accuracy</td>
<td>± 2.5 mm (&gt; 3 m); ± 3.5 mm (0.3 m to 3 m)</td>
</tr>
<tr>
<td>Repeat accuracy</td>
<td>&lt; 0.5 mm</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>18 … 30 V DC</td>
</tr>
<tr>
<td>No-load supply current</td>
<td>250 mA (18 V) ... 150 mA (30 V)</td>
</tr>
<tr>
<td>Interface type</td>
<td>SSI</td>
</tr>
<tr>
<td>Input/output type</td>
<td>2 PNP inputs/outputs, independent configuration, short-circuit protected, reverse polarity protection</td>
</tr>
<tr>
<td>Switching current</td>
<td>200 mA per output</td>
</tr>
<tr>
<td>Material</td>
<td>ABS / PC</td>
</tr>
<tr>
<td>Housing</td>
<td>PMMA, hard coated</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP65</td>
</tr>
<tr>
<td>Connection</td>
<td>4-pin, M12x1 connector, standard (supply), 5-pin, M12 x 1 connector, B-coded (SSI), 8-pin M12x1 connector, service</td>
</tr>
</tbody>
</table>

### Model Number

<table>
<thead>
<tr>
<th>Model Number</th>
<th>VDM100-50-SSI</th>
<th>VDM100-150-SSI</th>
<th>VDM100-300-SSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement range</td>
<td>0.3 ... 50 m</td>
<td>0.3 ... 150 m</td>
<td>0.3 ... 300 m</td>
</tr>
<tr>
<td>Reference target</td>
<td>Foil reflector 500 mm x 500 mm</td>
<td>Reflector VDM01</td>
<td></td>
</tr>
<tr>
<td>Diameter of the light spot</td>
<td>&lt; 15 cm at 50 m</td>
<td>&lt; 35 cm at 150 m</td>
<td>&lt; 70 cm at 300 m</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-10 ... 50 °C (14 ... 122 °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approvals and Certificates</td>
<td>cULus Listed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length L [mm]</td>
<td>170</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Width W [mm]</td>
<td>140</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height H [mm]</td>
<td>90</td>
<td></td>
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</tbody>
</table>

### Accessories

- OMH-LS10-05: Mounting bracket for optical data coupler and distance measurement devices
- V15-G-15M-LIHCH-TP: SSI bus cable, B-coded M12, 5-pin cable, straight
- OMH-VD100-01: Mounting bracket with deviation mirror for distance measurement devices
- OMH-LS10-01: Mounting bracket for optical data coupler
- OMH-LS10-02: Direct mounting set consisting of 4 x M4 threaded inserts
- OMH-LS10-05: Mounting bracket

These and more accessories can be found in chapter 10. See pages from 970 ... for cordsets. See pages 1066 ... for mounting accessories.

### Electrical Connection

![Electrical Connection Diagram](image)
Positioning Systems, Distance Measurement Devices

**Distance measurement device**

**VDM100 series**

### Technical Data

**General Data**
- **Light source**: Laser diode
- **Alignment aid**: Laserpointer
- **Laser class**: Measurement laser: 1; Alignment laser: 2
- **Wave length**: Measurement laser: 905 nm; Alignment laser: 660 nm
- **Measuring method**: Pulse Ranging Technology (PRT)
- **Max. Motion velocity**: 15 m/s
- **Absolute accuracy**: ± 2.5 mm (> 3 m); ± 3.5 mm (0.3 m to 3 m)
- **Repeatability**: < 0.5 mm
- **Operating voltage**: 18 ... 30 V DC
- **No-load supply current**: 250 mA (18 V) ... 150 mA (30 V)
- **Interface type**: PROFIBUS DP acc. to EN 50170
- **Transfer rate**: 9.6 kbit/s ... 12 Mbit/s, adjustable
- **Input/output type**: 2 PNP inputs/outputs, independent configuration, short-circuit protected, reverse polarity protection
- **Switching current**: 200 mA per output
- **Material**: Housing ABS / PC; Optical face: PMMA, hard coated
- **Protection degree**: IP65
- **Connection**: 4-pin, M12x1 connector, standard (supply); 5-pin, M12x1 connector, B-coded (Bus In); M12x1 socket, 5-pin, B-coded (Bus Out); 8-pin M12x1 connector, service

### Model Number

- **VDM100-50-P**
- **VDM100-150-P**
- **VDM100-300-P**

### Measurement Range

- 0.3 ... 50 m
- 0.3 ... 150 m
- 0.3 ... 300 m

### Reference Target

- Foil reflector 500 mm x 500 mm
- Reflector VDM01

### Diameter of the light spot

- < 15 cm at 50 m
- < 35 cm at 150 m
- < 70 cm at 300 m

### Ambient Temperature

- -10 ... 50 °C (14 ... 122 °F)

### Approvals and Certificates

- UL approval: cULus Listed

### Dimensions

- **Length L [mm]**: 170
- **Width W [mm]**: 140
- **Height H [mm]**: 90

### Accessories

- **OMH-LS610-05**: Mounting bracket for optical data coupler and distance measurement devices
- **ICZ-TR-V15B**: Terminal resistor for PROFIBUS
- **OMH-VDM100-01**: Mounting bracket with deviation mirror for distance measurement devices
- **OMH-LS610-01**: Mounting bracket for optical data coupler
- **OMH-LS610-02**: Direct mounting set consisting of 4 x M4 threaded inserts
- **OMH-LS610-05**: Mounting bracket

### Electrical Connection

Refer to General Notes Relating to Product Information

### Benefits

- Integral alignment aid LEDs simplify setup
- Eyesafe, due to laser class 1 in measurement operation
- Easy installation due to quick clamp tool-less mounting
- Ideal for highly dynamic control loops
- LED bar display indicates signal strength
Distance measurement device

### Technical Data

#### General Data
- **Light source**: Laser diode
- **Laser class**: Measurement laser: 1; Alignment laser: 2
- **Wave length**: Measurement laser: 905 nm; Alignment laser: 660 nm
- **Measuring method**: Pulse Ranging Technology (PRT)
- **Max. Motion velocity**: 15 m/s
- **Alignment aid**: Laserpointer Laserclass 2
- **Resolution**: 0.1 mm, adjustable
- **Absolute accuracy**: ± 2.5 mm (3 m); ± 3.5 mm (0.3 m to 3 m)
- **Repeatability**: < 0.5 mm
- **Operating voltage**: 18 ... 30 V DC
- **No-load supply current**: 250 mA (18 V) ... 150 mA (30 V)
- **Interface type**: INTERBUS
- **Transfer rate**: 500 kBit/s
- **Input/output type**: 2 PNP inputs/outputs, independent configuration, short-circuit protected, reverse polarity protected
- **Switching current**: 200 mA per output
- **Ambient temperature**: -10 °C ... 50 °C (14 °F ... 122 °F)
- **Housing**: ABS / PC
- **Optical face**: PMMA, hard coated
- **Protection degree**: IP65
- **Connection**: 4-pin, M12x1 connector, standard (supply), 5-pin, M12x1 connector, B-coded (Bus In), M12x1 socket, 5-pin, B-coded (Bus Out), 8-pin M12x1 connector, service

#### Model Number

<table>
<thead>
<tr>
<th></th>
<th>VDM100-50-IBS</th>
<th>VDM100-300-IBS</th>
<th>VDM100-150-IBS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measurement range</strong></td>
<td>0.3 ... 150 m</td>
<td>0.3 ... 300 m</td>
<td>0.3 ... 50 m</td>
</tr>
<tr>
<td><strong>Reference target</strong></td>
<td>Foil reflector 500 mm x 500 mm</td>
<td>Reflecter VDM01</td>
<td></td>
</tr>
<tr>
<td><strong>Diameter of the light spot</strong></td>
<td>&lt; 15 cm at 50 m</td>
<td>&lt; 35 cm at 150 m</td>
<td>&lt; 70 cm at 300 m</td>
</tr>
</tbody>
</table>

#### UL approval
- **cULus Listed**

#### Dimensions
- **Length L [mm]**: 170
- **Width W [mm]**: 140
- **Height H [mm]**: 90

#### Accessories
- **These and more accessories can be found in chapter 10**
- **See pages from 970 ... for cordsets**
- **See pages 1066 ... for mounting accessories**

#### Electrical Connection

- **Remote Bus In**: DO1, DI1
- **Remote Bus Out**: DO2, DI2
- **Service**: DO1, DI1
- **Power**: DC 24 V

### Properties
- Rectangular full-size housing
- Retroreflective distance measurement
- Pulse Ranging Technology (PRT)
- Extended range
- INTERBUS interface
- Laser infrared light

### Benefits
- Integral alignment aid LEDs simplify setup
- Eyesafe, due to laser class 1 in measurement operation
- Easy installation due to quick clamp tool-less mounting
- Ideal for highly dynamic control loops
- LED bar display indicates signal strength

---

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us
## Technical Data

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Number</td>
<td>VDM100-150-EIP/G2</td>
</tr>
<tr>
<td>Measurement range</td>
<td>0.3 ... 150 m</td>
</tr>
<tr>
<td>Reference target</td>
<td>Foil reflector 500 mm x 500 mm</td>
</tr>
<tr>
<td>Light source</td>
<td>Laser diode</td>
</tr>
<tr>
<td>Laser class</td>
<td>Measurement laser: 1, Alignment laser: 2</td>
</tr>
<tr>
<td>Wave length</td>
<td>Measurement laser: 905 nm, Alignment laser: 660 nm</td>
</tr>
<tr>
<td>Measuring method</td>
<td>Pulse Ranging Technology (PRT)</td>
</tr>
<tr>
<td>Max. Motion velocity</td>
<td>15 m/s</td>
</tr>
<tr>
<td>Alignment aid</td>
<td>Laserpointer</td>
</tr>
<tr>
<td>Diameter of the light spot</td>
<td>&lt; 35 cm at 150 m</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1 mm, adjustable</td>
</tr>
<tr>
<td>Absolute accuracy</td>
<td>± 2.5 mm (&lt; 3 m); ± 3.5 mm (0.3 m to 3 m)</td>
</tr>
<tr>
<td>Repeat accuracy</td>
<td>&lt; 0.5 mm</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>18 ... 30 V DC</td>
</tr>
<tr>
<td>No-load supply current</td>
<td>250 mA (16 V) ... 150 mA (30 V)</td>
</tr>
<tr>
<td>Input/output type</td>
<td>2 PNP inputs/outputs, independent configuration, short-circuit protected, reverse polarity protected</td>
</tr>
<tr>
<td>Switching current</td>
<td>200 mA per output</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-10 ... 50 °C (14 ... 122 °F)</td>
</tr>
<tr>
<td>Housing</td>
<td>ABS / PC</td>
</tr>
<tr>
<td>Optical face</td>
<td>PMMA, hard coated</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP65</td>
</tr>
<tr>
<td>Connection</td>
<td>4-pin, M12x1 connector, standard (supply), M12x1 socket, 4-pin, D-coded (LAN), 8-pin M12x1 connector, service</td>
</tr>
<tr>
<td>UL approval</td>
<td>cULus Listed</td>
</tr>
</tbody>
</table>

### Properties

- Rectangular full-size housing
- Retroreflective distance measurement
- Pulse Ranging Technology (PRT)
- Extended range
- Ethernet/IP interface
- Laser infrared light

### Benefits

- Integral alignment aid LEDs simplify setup
- Eyesafe, due to laser class 1 in measurement operation
- Easy installation due to quick clamp tool-less mounting
- Ideal for highly dynamic control loops
- LED bar display indicates signal strength

### Dimensions

- Length L [mm]: 170
- Width W [mm]: 140
- Height H [mm]: 90

### Accessories

- V15-G-PG9: 5-pin, M12 female field-attachable connector, straight
- V15D-G-2M-PUR-ABG-V45-G: Connection cable, M12 to RJ-45, PUR cable 4-pin, CAT5e, straight
- V15D-G-5M-PUR-ABG-V45-G: Connection cable, M12 to RJ-45, PUR cable 4-pin, CAT5e, straight
- V15D-G-ABG-PG9: 4-pin, M12 female field-attachable connector, D-coded, shielded, straight
- V15D-G-2M-PUR-ABG-V15D-G: Ethernet bus cable, M12 to M12, PUR cable 4-pin, CAT5e, straight
- OMH-LS610-01: Mounting bracket for optical data coupler
- OMH-VD100-01: Mounting bracket with deviation mirror for distance measurement devices
- OMH-LS610-05: Mounting bracket

## Electrical Connection

### Ethernet

<table>
<thead>
<tr>
<th>Port</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power</td>
</tr>
<tr>
<td>2</td>
<td>I/O 1</td>
</tr>
<tr>
<td>3</td>
<td>I/O 2</td>
</tr>
<tr>
<td>4</td>
<td>I/O 3</td>
</tr>
<tr>
<td>5</td>
<td>Shield</td>
</tr>
</tbody>
</table>

### State

<table>
<thead>
<tr>
<th>Port</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power</td>
</tr>
<tr>
<td>2</td>
<td>I/O 1</td>
</tr>
<tr>
<td>3</td>
<td>I/O 2</td>
</tr>
<tr>
<td>4</td>
<td>I/O 3</td>
</tr>
</tbody>
</table>

### Power

<table>
<thead>
<tr>
<th>Port</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power</td>
</tr>
<tr>
<td>2</td>
<td>I/O 1</td>
</tr>
<tr>
<td>3</td>
<td>I/O 2</td>
</tr>
<tr>
<td>4</td>
<td>I/O 3</td>
</tr>
</tbody>
</table>

---

**Distance measurement device**

**VDM100 series**

Refer to General Notes Relating to Product Information

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Reading head

Technical Data

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

General Data

- Measuring range: max. 314.5 m
- Resolution: ± 0.4 mm (1,250 positions/m)
- Passage speed: ≤ 12.5 m/s
- Free tolerances to code rail:
  - horizontal: ± 15.5 mm
  - vertical: ± 14 mm
- Operating voltage: 10 ... 30 V DC
- Power consumption: 2 VA
  - with Option H, heating: 11 VA at 24 V DC
- Operating display:
  - LED green: power on
  - LED yellow: data communication active
- Data flow display:
  - LED yellow (only with Option S, speed output)
  - LED red: flashing: read head outside of code rail
  - solid on: internal diagnostic test failed
- Velocity indication:
  - LED yellow (only with Option S, speed output)
  - off, if speed limit is exceeded (instead of data flow display)
- Error display:
  - LED red: flashing: read head outside of code rail
  - solid on: internal diagnostic test failed
- Display:
  - LED green: power on
  - LED yellow: data communication active
- Interface type: RS 485 interface
- Data output code:
  - binary code
- Transfer rate:
  - Baud rate: 19.2 kBit/s ... 187.5 kBit/s (to be specified with order)
- Output velocity:
  - switch output, short-circuit protected
  - (only with Option S, speed output)
- Operating temperature:
  - 0 ... 60 °C (32 ... 140 °F)
  - (only with Option S, speed output)
  - -40 ... 60 °C (-40 ... 140 °F)
- Housing:
  - ABS , PC (Polycarbonate)
- Protection degree: IP54
- Connection type:
  - M12 x 1 connector, 5-pin

Model Number

- termination with RS 485 termination
- without RS 485 termination

Termination

- termination with RS 485 termination
- without RS 485 termination

Approvals and Certificates

- CSA approval:
  - cCSAus Certified, General Purpose
  - Class 2 power source
- CCC approval:
  - CCC approval / marking not required for sensors rated ≤36 V

Dimensions

- Length L [mm]: 115
- Width W [mm]: 90
- Height H [mm]: 99
- Slot width G [mm]: 31

Accessories

These and more accessories can be found in chapter 5.5 from page 8551

WCS-MP1: Mounting plate for reading heads WCS2 and WCS3

Electrical Connection

Wire colors in accordance with EN 60947-5-2

1. BN (brown)
2. WH (white)
3. BU (blue)
4. BK (black)
5. GY (gray)

Only with option S, velocity output
Positioning Systems, PosiTrack WCS

Technical Data

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

General Data
- Measuring range: max. 314.5 m
- Resolution: ± 0.4 mm (1,250 positions/m)
- Passage speed: ≤ 12.5 m/s
- Free tolerances to code rail: horizontal: 31 mm (± 15.5 mm) vertical: 28 mm (± 14 mm)
- Operating voltage: 10 ... 30 V DC
- Power consumption: 2 VA
- Operating display: LED green: power on
- Data flow display: LED yellow: data communication active
- Error display: LED red: flashing: read head outside of code rail solid on: internal diagnostic test failed
- Interface type: SSI interface
- Clock frequency: 100 ... 1000 kHz
- Operating temperature: 0 ... 60 °C (32 ... 140 °F)
- Housing: ABS, PC (Polycarbonate)
- Protection degree: IP54
- Connection type: 8-pin, M12 x 1 connector

Model Number

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCSB-L310</td>
<td></td>
</tr>
<tr>
<td>WCSB-L310D</td>
<td></td>
</tr>
<tr>
<td>WCSB-L311</td>
<td></td>
</tr>
<tr>
<td>WCSB-L311D</td>
<td></td>
</tr>
</tbody>
</table>

Display
- Display module, 6-digit, adaptable to installation position
- Velocity indication: LED yellow (only with Option S, speed output)
- Data output code: binary code, 25 bit

Approvals and Certificates
- CSA approval: cCSAus Certified, General Purpose Class 2 power source
- CCC approval: CCC approval / marking not required for sensors rated ≤36 V

Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length L [mm]</td>
<td>115</td>
</tr>
<tr>
<td>Width W [mm]</td>
<td>90</td>
</tr>
<tr>
<td>Height H [mm]</td>
<td>99</td>
</tr>
<tr>
<td>Slot width G [mm]</td>
<td>31</td>
</tr>
</tbody>
</table>

Accessories

These and more accessories can be found in chapter 5.5 from page 851
See pages from 970 ... for cordsets
See pages 1066 ... for mounting accessories

WCS-MP1
Mounting plate for reading heads WCS2 and WCS3

Properties

- Infrared LED technology
- Positioning feedback to 314.5 m
- SSI interface
- 1 ms response time
- ± 0.4 mm resolution

Benefits

- Emulates a 512-turn, 1024 ppr absolute rotary encoder
- Non-contact, wear-free operation
- Alignment aids and health checks
- Scans straight or curved paths
- Plug-n-play drive communication

Electrical Connection

Wire colors

- WH (white)
- BN (brown)
- GN (green)
- YE (yellow)
- GR (gray)
- PK (pink)
- BU (blue)
- RD (red)

Velocity output (*)
- Only with option S, velocity output

(*) only with option S, velocity output

Refer to General Notes Relating to Product Information

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
### Technical Data

**Model Number**

WCS3B-LS410

**Measuring range**

max. 314.5 m

**Resolution**

± 0.4 mm (1,250 positions/m)

**Passage speed**

≤ 12.5 m/s

**Free tolerances to code rail**

horizontal: 31 mm (± 15.5 mm)  
vertical: 28 mm (± 14 mm)

**Operating voltage**

10 ... 30 V DC

**Power consumption**

2 VA

**Operating display**

LED green: power on

**Data flow display**

LED yellow: data communication active

**Error display**

LED red: flashing: read head outside of code rail  
solid on: internal diagnostic test failed

**Interface type**

CANopen, galvanically isolated

**Data output code**

binary code

**Transfer rate**

max. 1 MBits/s

**Termination**

switchable

**Operating temperature**

0 ... 60 °C (32 ... 140 °F)

**Housing**

ABS, PC (Polycarbonate)

**Protection degree**

IP54

**Connection type**

M12 x 1 connector, 5-pin

**Approvals and Certificates**

CSA approval: cCSAus Certified, General Purpose  
Class 2 power source

CCC approval: CCC approval / marking not required for sensors rated ≤36 V

### Properties

- Infrared LED technology
- Positioning feedback to 314.5 m
- CANopen interface
- ± 0.4 mm resolution

### Benefits

- Emulates a 512-turn, 1024 ppr absolute rotary encoder
- Non-contact, wear-free operation
- Alignment aids and health checks
- Scans straight or curved paths

### Dimensions

Length L [mm] 115  
Width W [mm]  90  
Height H [mm] 99  
Slot width G [mm] 31

### Accessories

These and more accessories can be found in chapter 5.5 from page 851  
See pages from 970 ... for cordsets  
See pages 1066 ... for mounting accessories

WCS-MP1

Mounting plate for reading heads WCS2 and WCS3

### Electrical Connection

Wire colors in accordance with EN 60947-6-2

1. SN (brown)  
2. WH (white)  
3. BU (blue)  
4. BK (black)  
5. GY (gray)
Technical Data

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

General Data

- Measuring range: max. 327 m
- Resolution: ± 0.42 mm (1,200 positions/m)
- Passage speed: < 12.5 m/s
- Free tolerances to code rail: horizontal: 10 mm (± 5 mm)
  vertical: 10 mm (± 5 mm)
- Operating voltage: 10 ... 30 V DC
- Power consumption: 2 VA
- Interface type: RS 485 interface
- Data output code: binary code
- Transfer rate: Baud rate 19.2 kBit/s ... 187.5 kBit/s (to be specified with order)
- Operating temperature: 0 ... 60 °C (32 ... 140 °F)
  with Option H, heating: -40 ... 60 °C (-40 ... 140 °F)
- Housing: ABS, Polycarbonate, Polyamide (PA)
- Protection degree: IP54
- Connection type: M12 x 1 connector, 5-pin

Model Number

- WCS2B-LS1
- WCS2B-LS2

Termination

- with RS 485 termination
- without RS 485 termination

Approvals and Certificates

- CSA approval: cCSAus Certified, General Purpose
- CCC approval: CCC approval / marking not required for sensors rated ≤36 V

Accessories

These and more accessories can be found in chapter 5.5 from page 8 51
See pages from 970 ... for cordsets
See pages 1066 ... for mounting accessories

- WCS-MP1: Mounting plate for reading heads WCS2 and WCS3
- WCS2-GT09-P1: WCS2 guiding trolley
- WCS2-PS1-SFT: WCS2 profile rail
- WCS2-MC1: Joint
- WCS-MH: WCS2 profile rail bracket
- WCS-MH1: WCS2 screw-on holder
- WCS-MH2: WCS2 holder for C profile
- WCS2-LB1: WCS2 locking bracket

Properties

- Infrared LED technology
- Positioning feedback to 327 m
- RS 485 interface
- ± 0.42 mm resolution

Benefits

- Maximum optical burn-thru power
- Used with trolley + track systems
- Emulates a 512-turn, 1024 ppr absolute rotary encoder
- Excellent for overhead cranes

Electrical Connection

Wire colors in accordance with EN 60947-5-2

1. BN (brown)
2. WH (white)
3. BU (blue)
4. BK (black)
5. GY (gray)

Dimensions

- Length L [mm]: 115
- Width W [mm]: 75
- Height H [mm]: 75
- Slot width G [mm]: 10

Wire colors in accordance with EN 60947-5-2
### Technical Data

**General Data**
- Measuring range: max. 327 m
- Resolution: ± 0.42 mm (1,200 positions/m)
- Passage speed: ≤ 12.5 m/s
- Free tolerances to code rail horizontal: 10 mm (± 5 mm)
- Vertical: 10 mm (± 5 mm)
- Operating voltage: 10 ... 30 V DC
- Power consumption: 2 VA with Option H, heating: 9 VA at 24 V DC
- Interface type: SSI interface
- Clock frequency: 100 ... 1000 kHz
- Operating temperature: 0 ... 60 °C (32 ... 140 °F) with Option H, heating: -40 ... 60 °C (-40 ... 140 °F)

**Housing**
- ABS, Polycarbonate, Polyamide (PA)

**Protection degree**
- IP54

**Connection type**
- 8-pin, M12 x 1 connector

**Data output code**
- Binary code, 25 bit
- Gray code, 25 bit

**Approvals and Certificates**
- CSA approval: cCSAus Certified, General Purpose
- CCC approval: CCC approval / marking not required for sensors rated ≤ 36 V

**Model Number**
- WCS2B-LS310
- WCS2B-LS311

**Dimensions**
- Length L [mm]: 115
- Width W [mm]: 75
- Height H [mm]: 75
- Slot width G [mm]: 10

**Accessories**
- WCS-MP1: Mounting plate for reading heads WCS2 and WCS3
- WCS2-GT09-P1: WCS2 guiding trolley
- WCS2-PS1-8FT: WCS2 profile rail
- WCS2-MC1: Joint
- WCS-MH: WCS2 profile rail bracket
- WCS-MH1: WCS2 screw-on holder
- WCS-MH2: WCS2 holder for C profile
- WCS2-LB1: WCS2 locking bracket

### Properties
- Infrared LED technology
- Positioning feedback to 327 m
- SSI interface
- 1 ms response time
- ± 0.42 mm resolution

### Benefits
- Maximum optical burn-thru power
- Used with trolley + track systems
- Emulates a 512-turn, 1024 ppr absolute rotary encoder
- Excellent for overhead cranes

### Further Products

In this series, we offer the following additional products:

**WCS2B-LS311H**

Technical data like WCS2B-LS311 but:
- with Option H, heating, see General Data.

---

Refer to General Notes Relating to Product Information

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Positioning Systems, PosiTrack WCS

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Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com

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831
WCS interface module

Technical Data

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

General Data
Operating voltage 24 V DC ± 10 %
Power consumption ≤ 3.6 W (without read heads)
Connection of control system
Protocol PROFINET
Data output format binary code
Interface 2
Connection of Connectable read heads WCS...B-LS221, WCS...B-LS121
Transmission method half duplex
Transfer rate 62.5 kBit/s
RS485 termination switchable
Refresh cycle of read head 1 ms
Operating temperature 0 ... 45 °C (32 ... 113 °F), no moisture condensation
Protection degree IP20
Connection type Interface 1: RJ-45 socket, 8-pin
Interface 2: terminal connection ≤ 2.5 mm², 5-pin

Model Number

<table>
<thead>
<tr>
<th>Number of channels</th>
<th>WCS-PNG110</th>
<th>WCS-PNG210</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>2</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

Interface 1

<table>
<thead>
<tr>
<th>Interface type</th>
<th>Ethernet; 100 BASE-TX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer rate</td>
<td>10 MBit/s or 100 MBit/s</td>
</tr>
<tr>
<td></td>
<td>100 MBit/s</td>
</tr>
</tbody>
</table>

Approvals and Certificates
CCC approval CCC approval / marking not required for sensors rated ≤ 36 V

Dimensions
Length L [mm] 117
Width W [mm] 23
Height H [mm] 100

Electrical Connection

Refer to General Notes Relating to Product Information

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Positioning Systems, PosiTrack WCS

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WCS-PNG*10

Properties
- RS 485 to PROFINET interface
- Connection of up to 2 WCS...B-LS221 read heads
- DIN rail mounting
### Technical Data

For detailed data and product description refer to the data sheets at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us).

<table>
<thead>
<tr>
<th>General Data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>10 ... 30 V DC</td>
</tr>
<tr>
<td>Power consumption</td>
<td>≤ 3.6 W (without read heads)</td>
</tr>
<tr>
<td><strong>Interface 1</strong></td>
<td></td>
</tr>
<tr>
<td>Connection of</td>
<td>control system</td>
</tr>
<tr>
<td>Interface type</td>
<td>Ethernet</td>
</tr>
<tr>
<td>Protocol</td>
<td>Ethernet/IP</td>
</tr>
<tr>
<td>Transfer rate</td>
<td>10 MB/s or 100 MB/s</td>
</tr>
<tr>
<td>Data output format</td>
<td>Ethernet 10/100 BASE-TX</td>
</tr>
<tr>
<td><strong>Interface 2</strong></td>
<td></td>
</tr>
<tr>
<td>Connection of</td>
<td>Reading head</td>
</tr>
<tr>
<td>Connectable read heads</td>
<td>WCS...B-LS221, WCS...B-LS121</td>
</tr>
<tr>
<td>Interface type</td>
<td>RS 485</td>
</tr>
<tr>
<td>Transmission method</td>
<td>half duplex</td>
</tr>
<tr>
<td>Transfer rate</td>
<td>62.5 kBit/s</td>
</tr>
<tr>
<td>RS485 termination resistor</td>
<td>switchable</td>
</tr>
<tr>
<td>Refresh cycle of read head</td>
<td>1 ms</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 ... 55 °C (32 ... 131 °F), no moisture condensation</td>
</tr>
</tbody>
</table>

**Protection degree**
- IP20
- Interface 1: RJ-45 socket, 8-pin
- Interface 2: terminal connection ≤ 2.5 mm², 5-pin

**Model Number**
- WCS-EIG210
- WCS-EIG310

<table>
<thead>
<tr>
<th>Number of channels</th>
<th>WCS-EIG210</th>
<th>WCS-EIG310</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Approvals and Certificates**
- CCC approval / marking not required for sensors rated ≤36 V

### Properties
- RS 485 to Ethernet/IP interface
- Connection of up to 2 WCS...B-LS221 read heads
- DIN rail mounting

**Dimensions**
- Length L [mm]: 117
- Width W [mm]: 23
- Height H [mm]: 100

### Electrical Connection

**WCS-EIG210**

**WCS-EIG310**
**Technical Data**

For detailed data and product description refer to the data sheets at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

<table>
<thead>
<tr>
<th>Model Number</th>
<th>WCS-MBG110</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>24 V DC ± 20 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>≤ 3.6 W (without read heads)</td>
</tr>
</tbody>
</table>

**Interface 1**

- **Connection of**: control system
- **Protocol**: MODBUS RTU (Remote Terminal Unit)
- **Transfer rate**: 19.2 kBit/s or 38.4 kBit/s
- **Data output format**: binary code
- **Bus termination resistor**: switchable

**Interface 2**

- **Connection of**: Reading head
- **Connectable read heads**: WCS..B-LS221, WCS..B-LS121
- **Interface type**: RS 485
- **Transmission method**: half duplex
- **Transfer rate**: 62.5 kBit/s
- **RS485 termination resistor**: switchable
- **Refresh cycle of read head**: 2 ms

**Operating temperature**: 20 ... 55 °C (-4 ... 131 °F), no moisture condensation

**Protection degree**: IP20

**Connection type**

- Interface 1: terminal connection | ≤ 2.5 mm²
- Interface 2: terminal connection | ≤ 2.5 mm²

**Approvals and Certificates**

- CCC approval: CCC approval / marking not required for sensors rated ≤ 36 V

**Dimensions**

- Length L [mm]: 117
- Width W [mm]: 23
- Height H [mm]: 100

---

**Electrical Connection**

![WCS-MBG110 electrical connection diagram](image-url)
# Technical Data

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

<table>
<thead>
<tr>
<th>Model Number</th>
<th>WCS-DG210</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>24 V DC ± 20 %</td>
</tr>
<tr>
<td>Power consumption</td>
<td>≤ 3.6 W (without read heads)</td>
</tr>
</tbody>
</table>

## Interface 1
- **Connection of**: control system
- **Interface type**: DeviceNet
- **Transfer rate**: max. 500 kBit/s
- **Data output format**: binary code
- **Bus termination resistor**: switchable

## Interface 2
- **Connection of**: Reading head
- **Connectable read heads**: WCS...B-LS221, WCS...B-LS121
- **Interface type**: RS 485
- **Transmission method**: half duplex
- **Transfer rate**: 62.5 kBit/s
- **RS485 termination resistor**: switchable
- **Refresh cycle of read head**: 1 ms

## Operating temperature
- 0 ... 45 °C (32 ... 113 °F), no moisture condensation

## Protection degree
- IP24

## Connection type
- Interface 1: terminal connection ≤ 2.5 mm², 5-pin
- Interface 2: terminal connection ≤ 2.5 mm², 5-pin

## Approvals and Certificates
- CCC approval / marking not required for sensors rated ≤ 36 V

## Dimensions
- **Length L [mm]**: 127
- **Width W [mm]**: 90
- **Height H [mm]**: 63.5

## Electrical Connection

![Electrical Connection Diagram](image)

---

**Properties**

- RS 485 to DeviceNet interface
- Connection of up to 4 WCS...B-LS221 read heads
- DIN rail mounting
WCS interface module

**Technical Data**

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

**Model Number**
WCS-PG210E

**Operating voltage**
24 V DC ± 20 %

**Power consumption**
≤ 3.6 W (without read heads)

**Interface 1**
- **Connection of**: control system
- **Interface type**: PROFIBUS DP V1
- **Transfer rate**: max. 12 MBit/s, Automatic baud rate detection
- **Data output format**: binary code
- **Bus termination resistor**: switchable

**Interface 2**
- **Connection of**: Reading head
- **Connectable read heads**: WCS...B-LS121, WCS...B-LS221
- **Interface type**: RS 485
- **Transmission method**: half duplex
- **Transfer rate**: 62.5 kBit/s
- **RS485 termination resistor**: switchable
- **Refresh cycle of read head**: 1 ms

**Operating temperature**
0 ... 45 °C (32 ... 113 °F), no moisture condensation

**Protection degree**
IP24

**Connection type**
Interface 1: 9-pin Sub-D connector
Interface 2: terminal connection ≤ 2.5 mm², 5-pin

**Approvals and Certificates**
- **CCC approval**: CCC approval / marking not required for sensors rated ≤ 36 V

**Dimensions**
- **Length L [mm]**: 127
- **Width W [mm]**: 90
- **Height H [mm]**: 64.5

**Electrical Connection**

```
+-----------+     +-----------+     +-----------+
| 24 V (Pwr)|     | 24 V (Pwr)|     | 24 V (Pwr) |
|----------|     |----------|     |----------|
| GND      |     | GND      |     | GND      |
| PE       |     | PE       |     | PE       |
```

- **Model Number**: WCS-PG210E
- **Pei-Max**: PE
- **Bus-Pin**: DP

**Properties**
- **RS 485 to PROFIBUS DP interface**
- **Connection of up to 4 WCS...B-LS221 read heads**
- **DIN rail mounting**
**Technical Data**
For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

<table>
<thead>
<tr>
<th>General Data</th>
<th>WCS-IS31</th>
<th>WCS-IS32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>24 V DC ± 20 %</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>≤ 2 W (without read heads)</td>
<td></td>
</tr>
<tr>
<td>Interface 1</td>
<td>Connection of</td>
<td>control system</td>
</tr>
<tr>
<td></td>
<td>Interface type</td>
<td>SSI</td>
</tr>
<tr>
<td></td>
<td>Bus termination resistor</td>
<td>integrated</td>
</tr>
<tr>
<td>Interface 2</td>
<td>Connection of</td>
<td>Reading head</td>
</tr>
<tr>
<td></td>
<td>Interface type</td>
<td>RS 485</td>
</tr>
<tr>
<td></td>
<td>Transmission method</td>
<td>half duplex</td>
</tr>
<tr>
<td></td>
<td>RS485 termination resistor</td>
<td>integrated</td>
</tr>
<tr>
<td></td>
<td>Refresh cycle of read head</td>
<td>1 ms</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 ... 55 °C (32 ... 131 °F)</td>
<td></td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP20</td>
<td></td>
</tr>
<tr>
<td>Transfer rate</td>
<td>max. 500 kHz</td>
<td></td>
</tr>
<tr>
<td>Connection type</td>
<td>removable terminal block</td>
<td></td>
</tr>
</tbody>
</table>

**Model Number**

| Data output format | WCS-IS310 : binary code | |
| WCS-IS311 : Gray code | |
| WCS-IS321 : Gray code | |

| Connectable read heads | WCS...B...LS211 | |
| WCS...B...LS221 | |

| Transfer rate | max. 187.5 kBit/s | |
| max. 62.5 kBit/s | |

**Approvals and Certificates**

| CCC approval | CCC approval / marking not required for sensors rated ≤36 V | |

**Dimensions**

| Length L [mm] | 121 | |
| Width W [mm] | 100 | |
| Height H [mm] | 74 | |

**Electrical Connection**

Refer to General Notes Relating to Product Information
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### Technical Data

**General Data**
- Operating voltage: 24 V DC ± 20 %
- Power consumption: ≤ 2 W (without read heads)

**Interface 1**
- Connection of: control system
- Interface type: Push-pull, parallel
- Transfer rate: max. 500 Updates/s
- Output stage: Push-pull output

**Interface 2**
- Connection of: Reading head
- Connectable read heads: WCS...B-LS211, WCS...B-LS111
- Interface type: RS 485
- Transmission method: half duplex
- Transfer rate: max. 187.5 kBit/s
- Refresh cycle of read head: 1 ms
- Control input: store input
- 2 inputs for reading head address
- Output type: PNP
- Signal output: error condition
- Rated operational current: ≤ 15 mA
- Operating temperature: 0 ... 55 °C (32 ... 131 °F)
- Protection degree: IP20
- Load current: max. 5 mA
- Connection type: removable terminal block

**Model Number**

<table>
<thead>
<tr>
<th>Data output format</th>
<th>WCS-IP110</th>
<th>WCS-IP111</th>
<th>WCS-IP120</th>
<th>WCS-IP121</th>
</tr>
</thead>
<tbody>
<tr>
<td>binary code</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gray code</td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

**Approvals and Certificates**
- CCC approval / marking not required for sensors rated ≤ 36 V

**Dimensions**
- Length L [mm]: 121
- Width W [mm]: 100
- Height H [mm]: 74

### Electrical Connection

Refer to General Notes Relating to Product Information

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Positioning Systems, PosiTrack WCS

WCS-IP1**
- RS 485 to parallel interface
- Connection of up to 4 LS211 read heads
- Digital display shows position and diagnostics
WCS3 Code rail

**Technical Data**

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

<table>
<thead>
<tr>
<th>General Data</th>
<th>Model Number</th>
<th>Operating temperature</th>
<th>Storage temperature</th>
<th>Installation temperature</th>
<th>Material thickness</th>
<th>Tension loading</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length: 0.1 ... 314.5 m</td>
<td>WCS3-CS70-L0</td>
<td>-40 ... 100 °C (-40 ... 212 °F)</td>
<td>-40 ... 60 °C (-40 ... 140 °F)</td>
<td>10 ... 60 °C (50 ... 140 °F)</td>
<td>0.5 mm</td>
<td>≤ 260 N</td>
<td>stainless steel 1.4310 / AISI 301</td>
</tr>
<tr>
<td>Bend radius: ≥ 300 mm</td>
<td>WCS3-CS70-L1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>polyester laminate</td>
</tr>
<tr>
<td></td>
<td>WCS3-CS70-L2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WCS3-CS70-L3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WCS3-CS70-M1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Properties**

- Code rail for WCS3 system
- Customized lengths to 314.5 m
- Polyester laminate and stainless steel versions

**Accessories**

These and more accessories can be found in chapter 5.5 from page 851

See pages from 970 ... for cordsets

See pages 1066 ... for mounting accessories

- **WCS-MT1**: Tensioning device for stainless steel code rail
- **WCS-MB**: Mounting bracket, straight
- **WCS-MB-B**: Mounting bracket, curved
- **WCS-MB1**: Mounting bracket for bolt connection, straight
- **WCS-MB1-B**: Mounting bracket for bolt connection, curved
- **WCS-MB2**: Mounting bracket for C profile, straight
- **WCS-MB2-B**: Mounting bracket for C profile, curved
- **WCS-MB2-UNI**: Mounting bracket for UNISTRUT™ profile, straight
- **WCS-MB2-B-UNI**: Mounting bracket for UNISTRUT™ profile, curved
- **WCS-SP2**: Stabilization profile

**Dimensions**

Refer to General Notes Relating to Product Information

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839
WCS2 Code rail

Technical Data

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

General Data

<table>
<thead>
<tr>
<th>Code rail height</th>
<th>a = 55 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>0.1 ... 327 m</td>
</tr>
<tr>
<td>Bend radius</td>
<td>≥ 500 mm</td>
</tr>
</tbody>
</table>

Model Number

| Operating temperature | -40 ... 100 °C (-40 ... 212 °F) |
| Storage temperature   | -40 ... 60 °C (-40 ... 140 °F) |
| Installation temperature | 10 ... 60 °C (50 ... 140 °F) |
| Material thickness    | 0.5 mm |
| Tension loading       | ≤ 230 N |
| Material              | stainless steel 1.4310 / AISI 301 |
| Thermal expansion coefficient | approx. 2.8 x 10^-5 / K |
| Mass                  | 175 g / m |

<table>
<thead>
<tr>
<th>WCS2-CS55-L1</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCS2-CS55-M1</td>
</tr>
</tbody>
</table>

Accessories

These and more accessories can be found in chapter 5.5 from page 851

<table>
<thead>
<tr>
<th>WCS-MT1</th>
<th>Tensioning device for stainless steel code rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCS2-P51-8FT</td>
<td>WCS2 profile rail</td>
</tr>
<tr>
<td>WCS2-FT1</td>
<td>Mounting tool to install the 55 mm code strip in the aluminum profile</td>
</tr>
<tr>
<td>WCS2-MF1</td>
<td>Wrist strap</td>
</tr>
<tr>
<td>WCS2-MC1</td>
<td>Joint</td>
</tr>
<tr>
<td>WCS2-LB1</td>
<td>WCS2 locking bracket</td>
</tr>
<tr>
<td>WCS2-MH2-UNI</td>
<td>WCS2 holder for UNISTRUT™ profile</td>
</tr>
<tr>
<td>WCS-GT09-P1</td>
<td>WCS2 guiding trolley</td>
</tr>
</tbody>
</table>

Properties

- Code rail for WCS2 system
- Customized lengths to 327 m
- Polyester laminate and stainless steel versions

Dimensions

Refer to General Notes Relating to Product Information
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## Technical Data

### General Data
- Code rail height: \( a = 70 \text{ mm} \)
- Length: \( 0.1 \ldots 327 \text{ m} \)
- Bend radius: \( \geq 500 \text{ mm} \)

### Model Number
<table>
<thead>
<tr>
<th>Code rail height</th>
<th>WCS2-CS70-L1</th>
<th>WCS2-CS70-M1</th>
</tr>
</thead>
</table>

### Operating temperature
- \(-40 \ldots 100 \degree C (-40 \ldots 212 \degree F)\)
- \(-40 \ldots 60 \degree C (-40 \ldots 140 \degree F)\)

### Storage temperature
- \(-40 \ldots 60 \degree C (-40 \ldots 140 \degree F)\)

### Installation temperature
- \(-40 \ldots 60 \degree C (-40 \ldots 140 \degree F)\)

### Material thickness
- \(0.5 \text{ mm} \)
- \(0.7 \text{ mm} \)

### Tension loading
- \(\leq 340 \text{ N} \)
- \(\leq 6500 \text{ N} \)

### Material
- stainless steel 1.4310 / AISI 301
- polyester laminate

### Thermal expansion coefficient
- approx. \(2.8 \times 10^{-5} / K\)
- \(1.6 \times 10^{-5} / K\)

### Mass
- \(240 \text{ g / m} \)
- \(40 \text{ g / m} \)

### Accessories
These and more accessories can be found in chapter 5.5 from page 851. See pages from 970 ... for cordsets See pages 1066 ... for mounting accessories

- WCS-MT1: Tensioning device for stainless steel code rail
- WCS-MB: Mounting bracket, straight
- WCS-MB-B: Mounting bracket, curve
- WCS-MB1: Mounting bracket for bolt connection, straight
- WCS-MB1-B: Mounting bracket for bolt connection, curve
- WCS-MB2: Mounting bracket for C profile, straight
- WCS-MB2-B: Mounting bracket for C profile, curve
- WCS-MB2-UNI: Mounting bracket for UNISTRUT™ profile, straight
- WCS-MB2-B-UNI: Mounting bracket for UNISTRUT™ profile, curve
- WCS-SP2: Stabilization profile

### Properties
- Code rail for WCS2 system
- Customized lengths to 327 m
- Polyester laminate and stainless steel versions

### Dimensions

---

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Positioning Systems, PosiTrack WCS

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WCS2 Code rail

WCS2 series

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

WCS2 Code rail WCS2 series
- Code rail for WCS2 system
- Customized lengths to 327 m
- Polyester laminate and stainless steel versions
Optical reading head with SSI-Interface

Technical Data
For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

General Data
- Measuring range: max. 10000 m
- Resolution: ± 0.1 mm
- Operating voltage: 15 ... 30 V DC, PELV
- No-load supply current: max. 200 mA

Interface 1
- Interface type: SSI interface
- Data output code: Gray code, binary code, programmable
- Clock frequency: 100 ... 1000 kHz

Interface 2
- Interface type: USB (serial comport)
- Protocol: 8E1
- Transfer rate: 38.4 ... 460.8 kBit/s

Input
- Input type: 1 to 2 functional inputs, programmable

Output
- Output type: 1 to 2 switch outputs, PNP, programmable, short-circuit protected
- Switching current: 150 mA each output

Operating temperature
- 0 ... 60 °C (32 ... 140 °F)
- -20 ... 60 °C (-4 ... 140 °F) (noncondensing; prevent icing on the lens)

Housing
- PC/ABS
- Protection degree: IP67
- Connection type: 8-pin, M12 x 1 connector

Model Number
- PCV80-F200-SSI-V19
- PCV80S-F200-SSI-V19
- PCV100-F200-SSI-V19

Read distance
- 80 mm
- 100 mm

Depth of focus
- ± 15 mm
- ± 20 mm
- ± 20 mm

Passage speed
- ≤ 12.5 m/s
- ≤ 8 m/s

Approvals and Certificates
- UL approval: cULus Listed, General Purpose, Class 2
- CCC approval: CCC approval / marking not required for sensors rated ≤36 V

Dimensions
- Length L [mm]: 51
- Width W [mm]: 70
- Height H [mm]: 70
- Connector area lc [mm]: 14.5

Accessories
- These and more accessories can be found in chapter 5.5 from page 8
- See pages from 970 ... for cordsets
- See pages 1066 ... for mounting accessories
- V19-ABG-PGS: Cable socket, M12, 8-pin, shielded, non-prewired, with ground
- V19-ABG-PGS-FE: Cable socket, M12, 8-pin, shielded, non-prewired, with ground
- PCV-KBL-V19-STR-USB: USB cable unit with power supply
- PCV-SC12: Grounding clip for PCV system
- PCV-AB: Mounting bracket
- PCV-FB: Mounting bracket

Properties
- 2-D data matrix read head
- Up to 10 km travel length
- SSI interface
- ± 0.1 mm resolution
- 80 mm and 100 mm read distance
- High speed scanning - to 12.5 m/s

Benefits
- Absolute positional information
- Vertical and horizontal feedback
- Wear-free, contactless operation
- Follows straight or curved paths
- Secure, robust code technology

Electrical Connection

Refer to General Notes Relating to Product Information

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## Technical Data

### General Data
- **Measuring range**: max. 10,000 m
- **Resolution**: ± 0.1 mm
- **Operating voltage**: 15 ... 30 V DC; PELV
- **No-load supply current**: max. 200 mA
- **Interface**: RS 485 interface
- **Data output code**: binary code
- **Transfer rate**: 38400 ... 230400 Bit/s
- **Termination**: Switchable terminal resistor
- **Input**: Input type 1 to 3 functional inputs, programmable
- **Output**: Output type 1 to 3 switch outputs, PNP, programmable, short-circuit protected
- **Switching current**: 150 mA each output
- **Operating temperature**: 0 ... 60 °C (32 ... 140 °F), -20 ... 60 °C (-4 ... 140 °F) (noncondensing; prevent icing on the lens!)
- **Housing**: PC/ABS
- **Protection degree**: IP67
- **Connection type**: 8-pin, M12 x 1 connector

### Model Number
- **PCV80-F200-R4-V19**
- **PCV100-F200-R4-V19**

### Read distance
- **80 mm**
- **100 mm**

### Depth of focus
- ± 15 mm
- ± 20 mm

### Passage speed
- â‰¤ 12.5 m/s
- â‰¤ 8 m/s

### Approvals and Certificates
- **UL approval**: cULus Listed, General Purpose, Class 2 Power Source
- **CCC approval**: CCC approval / marking not required for sensors rated ≤ 36 V

### Dimensions
- **Length L [mm]**: 51
- **Width W [mm]**: 70
- **Height H [mm]**: 70
- **Connector area lc [mm]**: 14.5

### Accessories
- **PCV-USB-RS485-Converter Set**: USB to RS 485 interface converter
- **PCV-KBL-V19-STR-RS485**: Cable unit with power supply for USB / RS 485 interface converter
- **V19-G-ABG-PS8-FE**: Cable socket, M12, 8-pin, shielded, non pre-wired
- **PCV-SC12**: Grounding clip for PCV system
- **PCV-AB**: Mounting bracket
- **PCV-FB**: Mounting bracket

### Electrical Connection

### Properties
- 2-D data matrix read head
- Up to 10 km travel length
- RS 485 interface
- ± 0.1 mm resolution
- 80 mm and 100 mm read distance
- High speed scanning - to 12.5 m/s

### Benefits
- Absolute positional information
- Vertical and horizontal feedback
- Wear-free, contactless operation
- Follows straight or curved paths
- Secure, robust code technology
Technical Data

Model Number: PCV80-F200-R4-V15-LS221
Read distance: 80 mm
Measuring range: max. 524 m
Resolution: ± 1 mm
Depth of focus: ± 15 mm
Passage speed: ≤ 12.5 m/s
Operating voltage: 15 ... 30 V DC, PELV
No-load supply current: max. 200 mA
Interface
  - Interface type: RS 485 interface
  - Data output code: binary code
  - Protocol: WCS-BL221
  - Transfer rate: 62500 Bit/s
  - Termination: Switchable terminal resistor
Input
  - Input type: 1 function input
    - 0-level: -UB or unwired
    - 1-level: +8 V ... +UB, programmable
Output
  - Output type: 1 switch output PNP, programmable, short-circuit protected
  - Switching current: 150 mA each output
Operating temperature: 0 ... 60 °C (32 ... 140 °F), -20 ... 60 °C (-4 ... 140 °F)
  (noncondensing; prevent icing on the lens!)
Housing: PC/ABS
Protection degree: IP67
Connection type: M12 x 1 connector, 5-pin

Approvals and Certificates
UL approval: cULus Listed, General Purpose, Class 2 Power Source
CCC approval: CCC approval / marking not required for sensors rated ≤36 V

Dimensions
Length L [mm]: 51
Width W [mm]: 70
Height H [mm]: 70
Connector area lc [mm]: 14.5

Accessories
These and more accessories can be found in chapter 5.5 from page 851
See pages from 970 ... for cordsets See pages 1066 ... for mounting accessories
V15-G-ABG-PG9: Cable socket, M12, 5-pin, shielded, non pre-wired
V15-G-ABG-PG9-1: Cable socket, M12, 5-pin, shielded, non pre-wired, with ground connection
PCV-SC12: Grounding clip for PCV system
WCS-DG210: WCS DeviceNet interface module
WCS-EIG210: WCS EtherNet/IP interface module
PCV-AB: Mounting bracket
PCV-FB: Mounting bracket

Properties
- 2-D data matrix read head
- Up to 524 m travel length
- RS 485 interface
- For use with network interfaces
- 80 mm read distance
- High speed scanning - to 12.5 m/s

Benefits
- WCS-DG210 and WCS-EIG210 interfaces convert RS 485 to DeviceNet or EtherNet/IP
- Follows straight or curved paths
- Wear-free, contactless operation

Electrical Connection
Technical Data

Model Number: PCV80-F200-B6-V15B

Read distance: 80 mm
Measuring range: max. 10000 m
Resolution: ± 0.1 mm
Depth of focus: ± 15 mm
Passage speed: < 12.5 m/s
Operating voltage: 15 ... 30 V DC, PELV
No-load supply current: max. 400 mA

Interface 1
- Interface type: PROFIBUS DP V0
- Protocol: PROFIBUS DP acc. to EN 50170
- Transfer rate: 9.6; 19.2; 93.75; 187.5; 500; 1500 kBit/s
  3; 6; 12 MBit/s self-synchronizing

Interface 2
- Interface type: USB (serial comport)
- Protocol: 8E1
- Transfer rate: 38.4 ... 460.8 kBit/s

Input
- Input type: 1 to 3 functional inputs, programmable

Output
- Output type: 1 to 3 switch outputs, PNP, programmable, short-circuit protected
- Switching current: 150 mA each output
- Operating temperature: 0 ... 60 °C (32 ... 140 °F), -20 ... 60 °C (-4 ... 140 °F)
  (noncondensing; prevent icing on the lens!)

Housing
- PC/ABS
- Protection degree: IP67
- Connection type: 8-pin, M12x1 connector, standard (supply+IO)
  M12x1 socket, 5-pin, B-coded (Bus Out)
  5-pin, M12x1 connector, B-coded (Bus In)

Approvals and Certificates
- UL approval: cULus Listed, General Purpose, Class 2 Power Source
- CCC approval: CCC approval / marking not required for sensors rated ≤ 36 V

Dimensions
- Length L [mm]: 51
- Width W [mm]: 70
- Height H [mm]: 70
- Connector area lc [mm]: 14.5

Accessories
These and more accessories can be found in chapter 5.5 from page 851
See pages from 830 ... for cordsets
See pages 676 ... for mounting accessories:
- PCV-KBL-V19-STR-USB: USB cable unit with power supply
- ICZ-TR-V15B: Terminal resistor for PROFIBUS
- V15B-G-2M-PUR ABG-V15B-G: Bus cable PROFIBUS, M12 to M12, PUR cable, 2 m length
- V15B-G-5M-PUR ABG-V15B-G: Bus cable PROFIBUS, M12 to M12, PUR cable, 5 m length
- PCV-SC12: Grounding clip for PCV system
- PCV-AB: Mounting bracket
- PCVFB: Mounting bracket

Properties
- 2-D data matrix read head
- Up to 10 km travel length
- Integral PROFIBUS protocol
- 80 mm read distance
- PLC configurable via fieldbus
- High speed scanning - to 12.5 m/s
- Compact housing

Benefits
- No extra control interface needed
- Absolute positional information
- Vertical and horizontal feedback
- Wear-free, contactless operation
- Follows straight or curved paths
- Secure, robust code technology

Electrical Connection

Refer to General Notes Relating to Product Information

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fa-info@us.pepperl-fuchs.com
fa-info@sg.pepperl-fuchs.com

Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
**Technical Data**

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

<table>
<thead>
<tr>
<th>Properties</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ Data Matrix code band</td>
<td>■ Thinnest possible width (15 mm)</td>
</tr>
<tr>
<td>■ Single-square, 1-row version</td>
<td>■ +/- 10 mm vertical scan tolerance</td>
</tr>
<tr>
<td>■ 10 m, 20 m, 50 m and 100 m lengths</td>
<td>■ Excellent chemical resistance</td>
</tr>
<tr>
<td>■ Self adhesive</td>
<td>■ Fast and simple installation</td>
</tr>
<tr>
<td>■ Temporary replacement sections</td>
<td>■ Temporary replacement sections easily generated via web tool</td>
</tr>
</tbody>
</table>

**Order Information**

| PCV*-CA10-* |
|---|---|---|---|---|
| Length | 6 ... 100 m |
| (see Order Information) |
| Start position | 0 ... 9900 m |
| (see Order Information) |
| Operating temperature | -40 ... 150 °C (-40 ... 302 °F) |
| Installation temperature | 10 ... 40 °C (50 ... 104 °F) |
| Environmental resistance | UV radiation |
| Humidity | Salt spray (150 h / 5%) |
| Chemical resistance | Oils |
| Grease |
| Fuels |
| Aliphatic solvents |
| Weak acids |
| Material thickness | 150 µm |
| Material | polyester laminate |
| Surface | polyester, matte |
| Tensile strength | ≥ 60 N |
| Adhesive strength | Acrylate-based adhesive; curing 72 h |
| Adhesive | Average values (FTM2)
| aluminum : 24 N / 25 mm |
| High grade stainless steel : 25 N / 25 mm |
| ABS : 22 N / 25 mm |
| PP : 18 N / 25 mm |
| HD-PE : 12 N / 25 mm |
| LD-PE : 12 N / 25 mm |

**Order Information**

| PCV*-CA10-* |
|---|---|---|---|---|
| Starting position | xxxxxxx 0 ... 990000 cm |
| Absolute band width | 10 15 mm (1 row version) |
| Absolute band length | xxx 6 ... 100 meter |
| Code: Data Matrix ECC200; matrix size 12x12 |

**Position Coding System, Vision Technology**

**Dimensions**
Positioning Systems, PosiTack PCV

**Technical Data**

For detailed data and product description refer to the data sheets at www.pepperl-fuchs.us

<table>
<thead>
<tr>
<th>Model Number</th>
<th>PCV*-CA20-*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>6 ... 100 m</td>
</tr>
<tr>
<td>(see Order Information)</td>
<td></td>
</tr>
<tr>
<td>Start position</td>
<td>0 ... 9900 m</td>
</tr>
<tr>
<td>(see Order Information)</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 ... 150 °C (-40 ... 302 °F)</td>
</tr>
<tr>
<td>Installation temperature</td>
<td>10 ... 40 °C (50 ... 104 °F)</td>
</tr>
<tr>
<td>Environmental resistance</td>
<td>UV radiation</td>
</tr>
</tbody>
</table>

| Material thickness | 150 µm |
| Material          | polyester laminate |
| Surface           | polyester, matte |
| Tensile strength  | ≥ 150 N |
| Adhesive          | Acrylate-based adhesive; curing 72 h |
| Adhesive strength | Average values (FTM2) |
|                   | aluminum: 24 N / 25 mm |
|                   | High grade stainless steel: 25 N / 25 mm |
|                   | ABS: 22 N / 25 mm |
|                   | PP: 18 N / 25 mm |
|                   | HD-PE: 12 N / 25 mm |
|                   | LD-PE: 12 N / 25 mm |

**Order Information**

PCV M - CA20 -

Starting position
xxxxxx 0 ... 990000 cm

Absolute band width
20 mm (2 rows version)

Absolute band length
xxx 6 ... 100 meter

Code: Data Matrix ECC200; matrix size 12x12

**Properties**

- Data Matrix code band
- Dual square, 2-row version
- 10 m, 20 m, 50 m and 100 m lengths
- Self-adhesive
- Stocked standard model

**Benefits**

- +/- 15 mm vertical scan tolerance
- Fast delivery time
- High chemical resistance
- Temporary replacement sections easily generated via web tool

**Dimensions**

Refer to General Notes Relating to Product Information

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www.pepperl-fuchs.com
**Technical Data**

For detailed data and product description refer to the data sheets at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

<table>
<thead>
<tr>
<th>Model Number</th>
<th>PCV*-CA40-*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>6 ... 100 m</td>
</tr>
<tr>
<td>(see Order Information)</td>
<td></td>
</tr>
<tr>
<td>Start position</td>
<td>0 ... 9900 m</td>
</tr>
<tr>
<td>(see Order Information)</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 ... 150 °C (-40 ... 302 °F)</td>
</tr>
<tr>
<td>Installation temperature</td>
<td>10 ... 40 °C (50 ... 104 °F)</td>
</tr>
<tr>
<td>Environmental resistance</td>
<td>UV radiation, Humidity, Salt spray (150 h / 5%)</td>
</tr>
<tr>
<td>Chemical resistance</td>
<td>Oils, Grease, Fuels, Aliphatic solvents, Weak acids</td>
</tr>
<tr>
<td>Material thickness</td>
<td>150 µm</td>
</tr>
<tr>
<td>Material</td>
<td>polyester laminate</td>
</tr>
<tr>
<td>Surface</td>
<td>polyester, matte</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>≥ 270 N</td>
</tr>
<tr>
<td>Adhesive</td>
<td>Acrylate-based adhesive; curing 72 h</td>
</tr>
<tr>
<td>Adhesive strength</td>
<td>Average values (FTM2): aluminum : 24 N / 25 mm, High grade stainless steel : 25 N / 25 mm, ABS : 22 N / 25 mm, PP : 18 N / 25 mm, HD-PE : 12 N / 25 mm, LD-PE : 12 N / 25 mm</td>
</tr>
</tbody>
</table>

**Order Information**

```
P C V
M - C A 4 0 -
```

Starting position
xxxxx 0 ... 990000 cm

Absolute band width
40 45 mm (4 rows version)

Absolute band length
xxx 6 ... 100 meter

Code: Data Matrix ECC200; matrix size 12x12

**Properties**

- Data Matrix code band
- Quad-square, 4-row version
- Non-stock, custom model
- Self adhesive

**Benefits**

- ± 25 mm vertical scan tolerance
- Excellent chemical resistance
- Fast and simple installation
- Temporary replacement sections easily generated via web tool

**Dimensions**

Refer to General Notes Relating to Product Information

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Courtesy of Steven Engineering, Inc. - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com
### Event Marker tape

**Technical Data**

For detailed data and product description refer to the data sheets at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Number</td>
<td>PCV-CM20-***</td>
</tr>
<tr>
<td>Number interval</td>
<td>1 ... 998 – marker number (see Order Information)</td>
</tr>
<tr>
<td>Length</td>
<td>1000 mm</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 ... 150 °C (-40 ... 302 °F)</td>
</tr>
<tr>
<td>Installation temperature</td>
<td>10 ... 40 °C (50 ... 104 °F)</td>
</tr>
<tr>
<td>Environmental resistance</td>
<td>UV radiation</td>
</tr>
<tr>
<td></td>
<td>Humidity</td>
</tr>
<tr>
<td></td>
<td>Salt spray (150 h / 5%)</td>
</tr>
<tr>
<td>Chemical resistance</td>
<td>Oils</td>
</tr>
<tr>
<td></td>
<td>Grease</td>
</tr>
<tr>
<td></td>
<td>Fuels</td>
</tr>
<tr>
<td></td>
<td>Aliphatic solvents</td>
</tr>
<tr>
<td></td>
<td>Weak acids</td>
</tr>
<tr>
<td>Material thickness</td>
<td>150 µm</td>
</tr>
<tr>
<td>Material</td>
<td>polyester laminate</td>
</tr>
<tr>
<td>Surface</td>
<td>polyester, matte</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>&gt; 150 N</td>
</tr>
<tr>
<td>Adhesive</td>
<td>Acrylate-based adhesive; curing 72 h</td>
</tr>
<tr>
<td>Adhesive strength</td>
<td>Average values (FTM2)</td>
</tr>
<tr>
<td></td>
<td>aluminum: 24 N / 25 mm</td>
</tr>
<tr>
<td></td>
<td>High grade stainless steel: 25 N / 25 mm</td>
</tr>
<tr>
<td></td>
<td>ABS: 22 N / 25 mm</td>
</tr>
<tr>
<td></td>
<td>PP: 18 N / 25 mm</td>
</tr>
<tr>
<td></td>
<td>HD-PE: 12 N / 25 mm</td>
</tr>
<tr>
<td></td>
<td>LD-PE: 12 N / 25 mm</td>
</tr>
<tr>
<td>Marker number</td>
<td>xxx</td>
</tr>
<tr>
<td>Marker band width</td>
<td>001 ... 998</td>
</tr>
<tr>
<td>Marker band</td>
<td>10 16 mm (single row version)</td>
</tr>
<tr>
<td></td>
<td>20 25 mm (2 rows version)</td>
</tr>
<tr>
<td>Code</td>
<td>Position Coding System, Vision Technology</td>
</tr>
</tbody>
</table>

**Order Information**

- **P**: 05
- **C**: 05
- **V**: 05
- **M**: 05
- **-**

**Marker number**

- 001 ... 998

**Marker band width**

- 10 16 mm (single row version)
- 20 25 mm (2 rows version)

**Dimensions**

![Dimensions Diagram](image-url)
### Technical Data

<table>
<thead>
<tr>
<th>Model Number</th>
<th>PCV-CR20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>1000 mm</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 ... 150 °C (-40 ... 302 °F)</td>
</tr>
<tr>
<td>Installation temperature</td>
<td>10 ... 40 °C (50 ... 104 °F)</td>
</tr>
<tr>
<td>Environmental resistance</td>
<td>UV radiation, Humidity, Salt spray (150 h / 5%)</td>
</tr>
<tr>
<td>Chemical resistance</td>
<td>Oils, Grease, Fuels, Aliphatic solvents, Weak acids</td>
</tr>
<tr>
<td>Material thickness</td>
<td>150 μm</td>
</tr>
<tr>
<td>Material</td>
<td>polyester laminate</td>
</tr>
<tr>
<td>Surface</td>
<td>polyester, matte</td>
</tr>
<tr>
<td>Tensile strength</td>
<td>≥ 150 N</td>
</tr>
<tr>
<td>Adhesive</td>
<td>Acrylate-based adhesive, curing 72 h</td>
</tr>
<tr>
<td>Adhesive strength</td>
<td>Average values (FTM2): aluminum: 24 N / 25 mm, high grade stainless steel: 25 N / 25 mm, ABS: 22 N / 25 mm, PP: 18 N / 25 mm, HD-PE: 12 N / 25 mm, LD-PE: 12 N / 25 mm</td>
</tr>
</tbody>
</table>

### Properties

- Data Matrix repair tape (2-row)
- Self adhesive, installs over existing positional code
- Incremental, 1 meter length

### Benefits

- Easy repair of damaged sections
- Provides a high level of system availability

### Dimensions

![Dimension Diagram]
## Technical Data

For detailed data and product description, see the data sheet at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

### Common data

**Function**: Actuator for inductive positioning system, front screw holes  
**Material**: Steel ST37/1.0037

### Model number

<table>
<thead>
<tr>
<th>Inductive positioning system</th>
<th>BT-F90-G</th>
<th>BT-F10-G</th>
</tr>
</thead>
<tbody>
<tr>
<td>F90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F110</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Technical Data

For detailed data and product description, see the data sheet at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

### Common data

**Function**: Actuator for inductive positioning system, lateral screw holes  
**Material**: Steel ST37/1.0037

### Model number

<table>
<thead>
<tr>
<th>Inductive positioning system</th>
<th>BT-F90-W</th>
<th>BT-F110-W</th>
</tr>
</thead>
<tbody>
<tr>
<td>F90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F110</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Technical Data

For detailed data and product description, see the data sheet at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

### Common data

**Function**: Mounting bracket for the inductive positioning system  
**Material**: Zinc-coated sheet steel  
**Pieces per package**: 2

### Model number

<table>
<thead>
<tr>
<th>Inductive positioning system</th>
<th>MH-F90</th>
<th>MH-F110</th>
</tr>
</thead>
<tbody>
<tr>
<td>F90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F110</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Technical Data

For detailed data and product description, see the data sheet at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

### Model number

<table>
<thead>
<tr>
<th>Material</th>
<th>BT-F130-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing: PBT</td>
<td></td>
</tr>
<tr>
<td>Cap plugs: PBT</td>
<td></td>
</tr>
<tr>
<td>Mounting screw: V2A</td>
<td></td>
</tr>
</tbody>
</table>

**Description**: Actuator for F130 inductive positioning system  
**Shaft diameter**: < 27.5 mm  
**Shaft height**: 20 mm

### Technical Data

For detailed data and product description, see the data sheet at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

### Model number

<table>
<thead>
<tr>
<th>Material</th>
<th>OMH-LS610-01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black anodized aluminum</td>
<td></td>
</tr>
<tr>
<td>Black zinc-coated steel</td>
<td></td>
</tr>
</tbody>
</table>

**Description**: Mounting bracket for VDM100 laser distance measurement devices
Positioning Systems

Technical Data
For detailed data and product description, see the data sheet at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

**Model number** OMH-LS610-02
**Material** Brass
**Description** Direct mounting set comprising 4 M4 threaded inserts for VDM100 laser distance measurement devices

---

Technical Data
For detailed data and product description, see the data sheet at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

**Model number** OFR-100/100
**Material** PMMA
**Description** 100 mm x 100 mm reflector for laser distance measurement devices
**Ambient temperature** -20 °C ... 85 °C

---

Self-adhesive

Technical Data
For detailed data and product description, see the data sheet at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

**Model number** REF-H100-2R
**Material** PMMA
**Description** 100 mm x 100 mm reflector for laser distance measurement devices
**Ambient temperature** -20 °C ... 85 °C

---

Technical Data
For detailed data and product description, see the data sheet at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

**Model number** REF-500MMx500MM
**Material** PMMA
**Description** 500 mm x 500 mm reflective tape for VDM100 laser distance measurement devices
**Ambient temperature** -20 °C ... 85 °C

---

Technical Data
For detailed data and product description, see the data sheet at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

**Model number** Protective cap LS610
**Material** PMMA
**Description** For VDM100 laser distance measurement devices
**Included with** VDM 100 series

---

Technical Data
For detailed data and product description, see the data sheet at [www.pepperl-fuchs.us](http://www.pepperl-fuchs.us)

**Model number** Functional grounding LS610/VDM100
**Material** PMMA
**Description** For VDM100 laser distance measurement devices
**Included with** VDM 100 series
Positioning Systems

Inductive Positioning Systems

Distance Measurement Devices

PosiTrack WCS

PosiTrack PCV

Electronic CAM-Switch Controller PAX

Accessories