

# OBD10M-R2000-4EP- V1V17

## 2D Laser Scanner

Brief Instructions



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With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"

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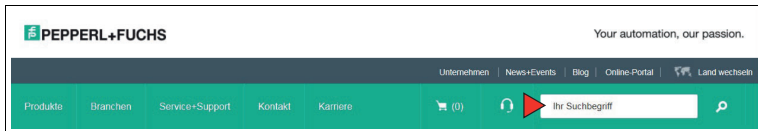
# 1 Introduction

## 1.1 Purpose of These Brief Instructions

These brief instructions contains basic instructions for operating the device. However, the manual takes priority over the brief instructions.

## 1.2 Product documentation on the internet

You can view all the relevant documentation and additional information on your product at <http://www.pepperl-fuchs.com>. Simply enter the product name or model number in the **Product/Key word search** box and click **Search**.



Select your product from the list of search results. Click on the information you require in the product information list, e.g., **Technical documents**.



A list of all available documents is displayed.

## 1.3 Intended Use

The R2000 laser scanners are measuring devices that are used on automated transport systems or other movable machinery in intralogistics. They are also used on stationary equipment in the area of factory and building automation.

Make sure that the devices are used only for their intended purpose.

## 2 Safety

### 2.1 Laser Class 1

#### Class 1 Laser Product

This sensor is certified according to laser protection class 1.

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#### Warning!

Class 1 laser light

The laser light can be an irritant, especially in a dark environment. Do not point lasers at people!

Maintenance and repairs should only be carried out by authorized service personnel!

Install the device so that the warning is clearly visible and readable.

Caution: Use of controls, adjustments, or performance of procedures other than those specified herein may result in harmful laser beam exposure.

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### 3 Product Description

#### 3.1 Indicators and Operating Controls

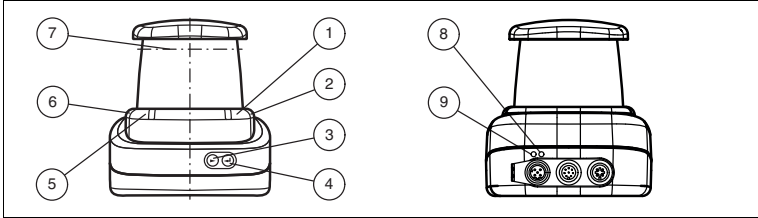


Figure 3.1 Indicators and Controls

No.	Designation	Color
1	Operating status indicator	Green
2	Error indicator	Red
3	"Next" menu button	
4	"Return" menu button	
5	Q2—input/output 2	Yellow
6	Q1—input/output 1	Yellow
7	Laser face	
8	Ethernet link indicator	Green
9	Ethernet activity indicator	Yellow

Table 3.1 Indicators and Operating Controls

#### 3.2 Interfaces and Connections

The following connections are found on all devices:

##### Power Supply

There is a 4-pin M12 connector on the rear of the housing to connect the power supply. The following diagram shows the pinning:

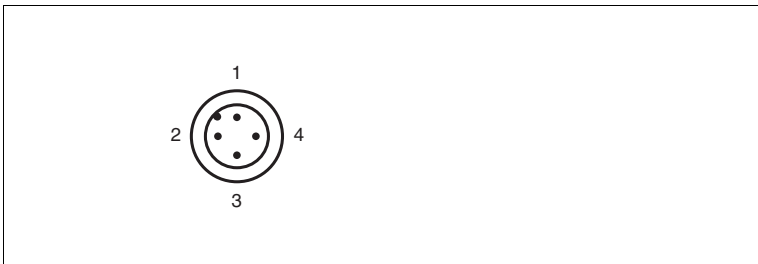
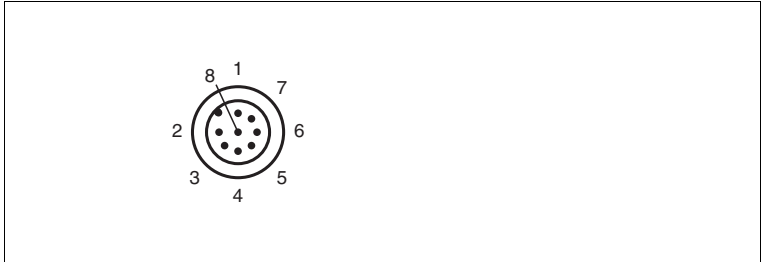


Figure 3.2 Power supply connection layout

- 1 24 V power supply
- 2 I/Q2
- 3 Ground (GND)
- 4 I/Q1

### MultiPort

An 8-pin M12 connector is located on the rear of the housing. Inputs/outputs 3 and 4 are located here



- 1 DNC (Do not connect)
- 2 DNC (Do not connect)
- 3 DNC (Do not connect)
- 4 I/Q3
- 5 I/Q4
- 6 I/Q2
- 7 I/Q1
- 8 DNC (Do not connect)

All pins with "DNC (Do not connect)" must not be connected!

### Interface:

There is a 4-pin M12 socket on the back of the housing to connect the Ethernet interface. The following diagram shows the pinning:

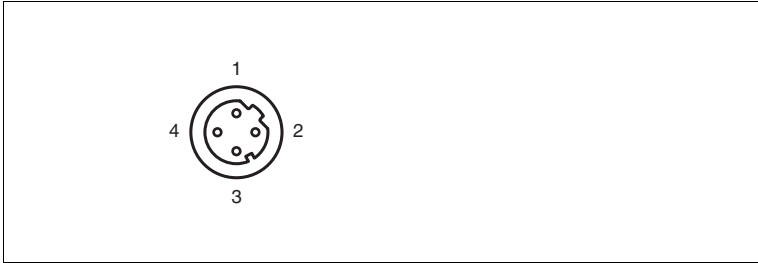


Figure 3.3 Ethernet connection layout

- 1 TD+
- 2 RD+
- 3 TD-
- 4 RD-

The connector housing is located on the shield.

### 3.3 Included in Delivery

The delivery package contains:

- R2000 2D laser scanner
- Quick start guide
- Protective cover for MultiPort and Ethernet
- 3 x socket cap screws, M5 x 10
- 3 x washers, size 5



## 4 Installation

### 4.1 Mounting



#### Caution!

##### Safety information

Do not point the sensor into the sun.

Protect the sensor against direct and prolonged sunlight.

Prevent condensation from forming by ensuring that the sensor is not subjected to any major temperature fluctuations.

Do not subject the sensor to aggressive chemicals.

Keep the glass on the device clean.

For cleaning, use only water (if necessary with a little detergent) and a soft micro-fiber cloth! The use of other detergents is not permitted! The glass must never be cleaned when dry!

The device can be fitted with the supplied socket head screws with washers on the underside of the device.



#### Caution!

##### Screw-in depth

The maximum screw-in depth in the base must not exceed 8 mm, otherwise the device will be mechanically destroyed! The minimum screw-in depth is 5 mm.

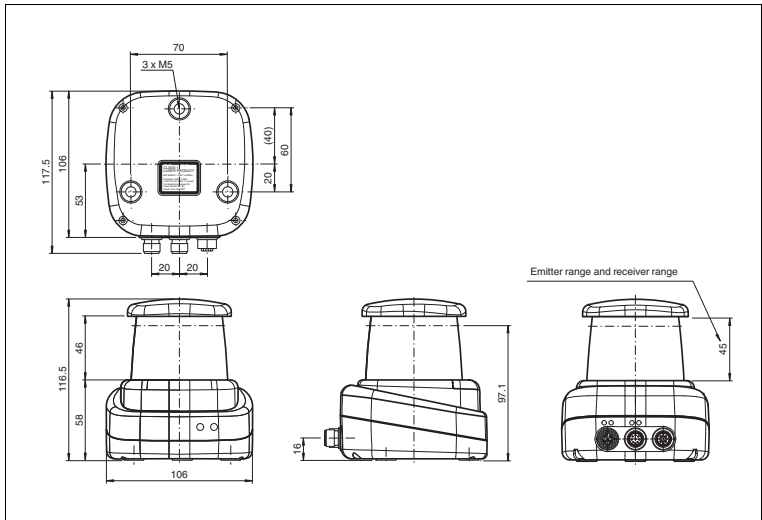


Figure 4.1 Dimensional drawing R2000



**Note**

**Keep the emitting/receiving area clear**

During assembly, make sure that the emitting/receiving area is kept clear. If the emitting/receiving area is covered, this reduces the performance of the 2D laser scanner.

**4.2 Device Connection**



**Electrical connection in line with IP65**

- Put protective covers on unused M12 connectors.

↳ The IP65 protection class is achieved. The protective covers can be ordered as accessories .

The device conforms to protection class III. This means that the power has to be supplied as a low protective voltage (PELV).

The power supply of the device is 10 VDC ... 30 VDC. On account of the integrated motor, an increased level of startup current is required compared with normal operation. It is recommended that power supplies with 1 A (at 24 V) or with 2 A (at 12 V) are used.

The maximum cable length is 30 m.

The pin assignment is as follows:

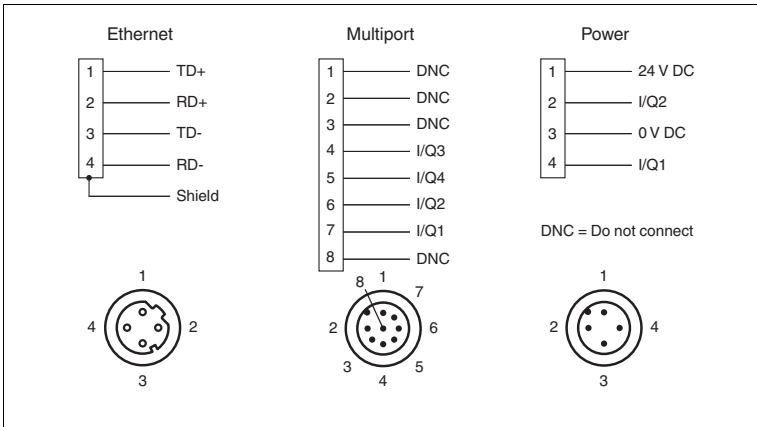


Figure 4.2 R2000 pin assignment

## 5 Commissioning



1. Connect the device to the power supply.
  - ↳ The initialization phase lasts approx. 10 seconds. This phase is indicated by an illuminated Power LED. The display is still disabled in this phase.
2. There is another initialization phase that lasts approx. 10 seconds.
  - ↳ The display turns on and shows circles moving downward.
3. After the initialization phase, the Pepperl+Fuchs logo will appear.
  - ↳ The device is ready for operation.

To achieve the best measurement accuracy, allow the device to warm up for 30 minutes.

The sensor has been tested and calibrated before delivery. It can be put into operation immediately.

It is generally recommended to use a dedicated network card for the connection to the device.

For parameterization, connect the device to an Ethernet interface on a computer. Install the PACTware software and the appropriate DTM.

### 5.1 Ethernet Configuration

The sensor has three different addressing options that can be used as required. The setting is configured using the menu interface on the sensor itself.

#### Auto IP

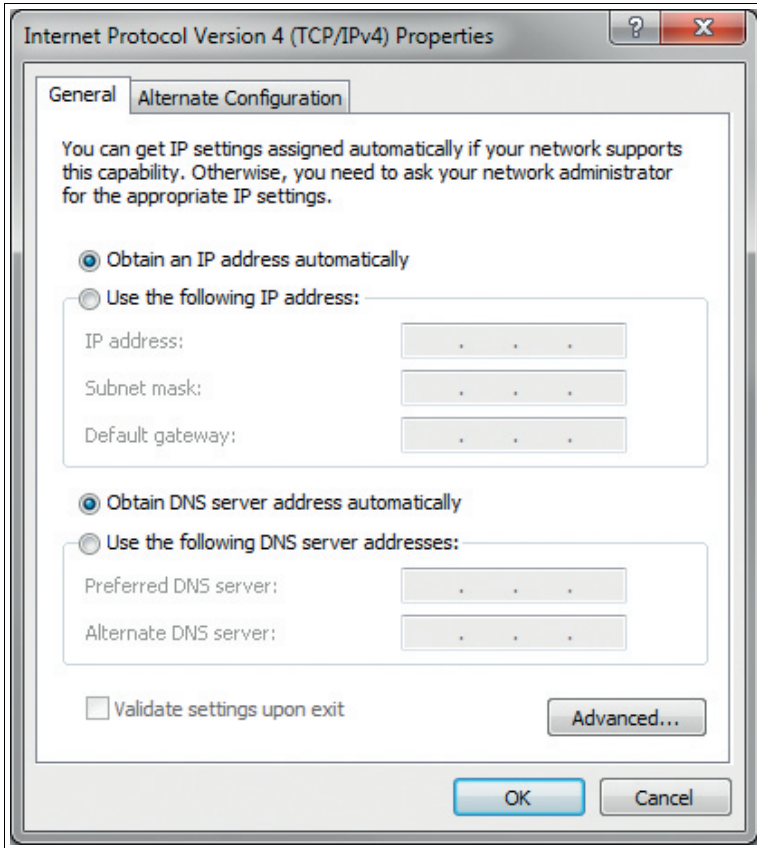
In the Auto IP setting, the sensor independently assigns a "link-local" IP address in the 169.254.0.0/16 range. During this process, the system ensures that the selected address is not already being used by another device.



#### Configuring a Connection via Auto IP

The sensor is set to Auto IP by default. The Auto IP setting is the best way to connect directly to a PC.

1. If the network configuration of the sensor no longer matches the factory setting:
  1. Under **Ethernet Setup > Address Mode**, set the sensor to "Auto IP."
  2. Restart the sensor to apply the configuration.
3. To connect the sensor to the PC, set the PC to Dynamic Host Configuration Protocol (DHCP).
4. Adjust the properties of the PC network card accordingly. To do this, select the TCP/IP protocol in the network card properties.
5. In the Internet protocol properties, select **Obtain an IP address automatically**.



- Click **OK** to confirm.

↳ After approx. 30 seconds, Microsoft® Windows® assigns an auto IP for the PC.

## DHCP

Connecting via DHCP requires the availability of a DHCP server, such as a router, on the local network; see Auto IP, PC network card settings.

If this requirement is fulfilled, you can set the sensor to DHCP.



## Configuring a Connection via DHCP

- Under **Ethernet Setup > Address Mode**, set the sensor to "DHCP."
- Restart the sensor to apply the configuration.

## Manual IP

You can also address the sensor via an IP address set manually. You can set the PC network card and the sensor to an IP address of your choice.



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### Note

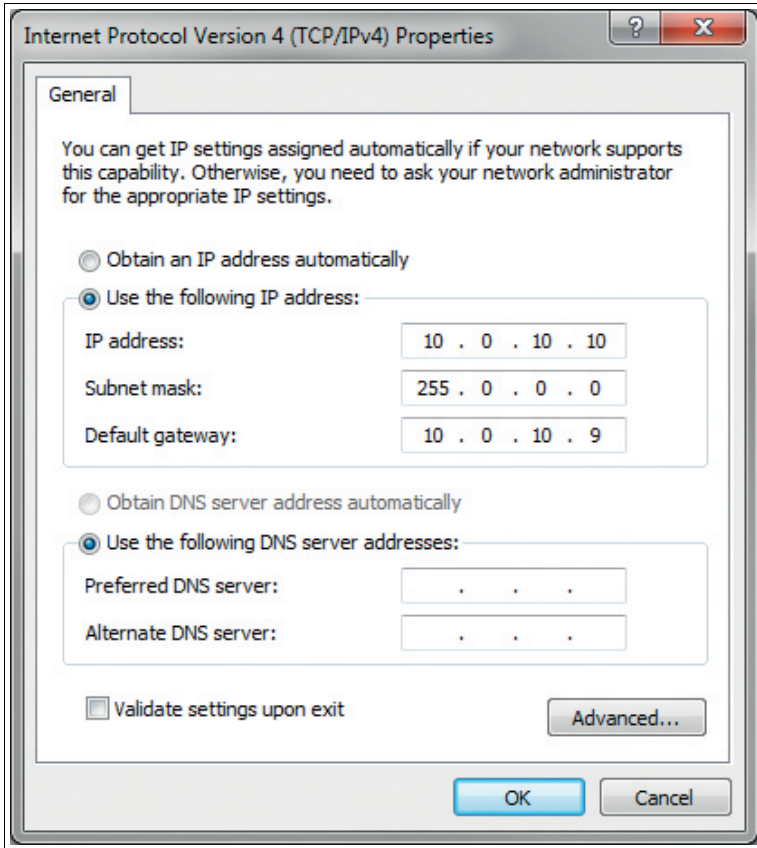
The IP address of the sensor is set to 10.0.10.9 and the subnet mask to 255.0.0.0 by default.

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## Configuring a Connection via a Manual IP Address

1. Configure the sensor:
  1. Under **Ethernet Setup > Address Mode**, set the sensor to "Manual."
  2. Enter the required address under **Ethernet Setup > IP Address**.
3. Restart the sensor to apply the configuration.
4. To connect the sensor to the PC, enter the required IP address in the menu for the PC network card. Select the TCP/IP protocol in the PC network card properties.
5. Select "Use the following IP address" and enter the required IP address and subnet mask.



- Click **OK** to confirm.



### Note

#### Device restart

You must restart the sensor after changing the Ethernet configuration.

## 6 Appendix

### 6.1 Technical Data

#### General specifications

Measurement range	0.2 ... 3 m (bw 10%) 0.2 to 10 m (wb 90%) 0.2 to 30 m (reflector)
Light source	laser diode
Light type	modulated visible red light
Laser nominal ratings	
Note	LASER LIGHT , DO NOT STARE INTO BEAM
Laser class	1
Wave length	660 nm
Beam divergence	1 mrad
Pulse length	5 ns
Repetition rate	54 kHz
max. pulse energy	< 4 nJ
Measuring method	Pulse Ranging Technology (PRT)
Scan rate	10 Hz, 20 Hz, 30 Hz
Scanning angle	360°
Diameter of the light spot	< 15 mm at 10 m
Ambient light limit	> 80000 Lux

#### Functional safety related parameters

MTTF <sub>d</sub>	75 a
Mission Time (T <sub>M</sub> )	20 a
Diagnostic Coverage (DC)	0 %

#### Indicators/operating means

Operation indicator	LED green
Data flow indicator	LED yellow: active ethernet LED green: Ethernet link
Function indicator	LED red: fault Yellow LED: I/Q1 + I/Q2

Control elements	2 Button
Parameterization indicator	24 x 252 pixels , red

### Electrical specifications

Operating voltage	10 ... 30 V
Ripple	10 % within the supply tolerance
No-load supply current	≤ 400 mA / 24 V DC
Power consumption	< 10 W
Time delay before availability	< 40 s

### Integrated application

Application	Field monitoring
Number of fields	4
Response time	30 ms + 1 Scan duration
Detectable object shape	Almost any
Object size	> 1 mm
Linking fields	Up to 4 x 3 levels

### Interface

Interface type	4 x switching inputs/outputs (selectable)
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### Input/Output

Input/output type	4 PNP Inputs/Outputs , Independently configurable , short circuit/reverse polarity protected
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#### Input

Switching threshold	low: $U_e < 5\text{V}$ ; high: $U_e > 10\text{V}$
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#### Output

Switching threshold	low: $U_a < 1\text{V}$ ; high: $U_a > U_b - 1\text{V}$
Switching current	100 mA per output

### Measurement accuracy<sup>1</sup>

Measuring speed	54000 measurements per second
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1. Values are typical values. The individual values depend on the measurement and environmental conditions.



Angle accuracy	0,071°; 0,15°; 0,2°
Repeat accuracy	< 12 mm

**Ambient conditions**

Ambient temperature	-10 ... 50 °C (14 ... 122 °F)
Storage temperature	-20 ... 70 °C (-4 ... 158 °F)
Relative humidity	95 % , no moisture condensation

**Mechanical specifications**

Degree of protection	IP65
Connection	4-pin, M12x1 connector, A-coded (supply) , 8-pin, M12x1 connector, A-coded (MultiPort) , 4-pin, M12x1 socket, D-coded (LAN)
Material	
Housing	ABS + PC + aluminum
Optical face	PMMA
Mass	approx. 0.8 kg

**Compliance with standards and directives**

Directive conformity	
EMC Directive 2004/108/EC	EN 60947-5-2:2007
Standard conformity	
Product standard	EN 60947-5-2:2007 , IEC 60947-5-2:2007
Laser class	IEC 60825-1:2007 EN 60825-1:2007

**Approvals and certificates**

CCC approval	CCC approval / marking not required for products rated ≤36 V
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