MANUAL

Device Type Manager

2D Laser Scanner
OBD10M-R2000-4EP-V1V17

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SENSING YOUR NEEDS

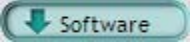PEPPERL+FUCHS

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1 Software Installation

1.1 Downloading required software/software components from the Internet

To parameterize the 2D laser scanner conveniently via a software interface, you need the corresponding Device Type Manager (DTM) in addition to the FDT framework program (PACTware 4.x). Both PACTware and the DTM are available at www.pepperl-fuchs.com.

Downloading the FDT framework program PACTware^{TM} 4.X from the Internet

1. In the Internet browser, enter **www.pepperl-fuchs.de**.

2. In the search field, enter the product name of the software component: **PACTware 4.X**.

   ↪ The results list is displayed.

3. In the results list, find the **PACTware 4.x** entry and click the ⬇ Software button.

   ↪ The zip file containing the **PACTware 4.x** software is saved.

4. Unzip the zip file.

5. Save the data to a temporary folder of your choice on your PC.

Downloading the DTM for the 2D laser scanner from the Internet

1. In the Internet browser, enter **www.pepperl-fuchs.de**.

2. In the search box, enter the product name of the 2D laser scanner, e.g.: **OBD10M-R2000-4EP-V1V17**.

   ↪ The results list is displayed.

3. In the **Product** section, click the **OBD10M-R2000-4EP-V1V17** link.

   ↪ The Internet browser displays the product page.

4. In the **Software** section, click the **Device Type Manager (DTM) for R2000 laser scanner** link.

5. The zip file with the DTM is saved.

6. Unzip the zip file.

7. Save the data to a temporary folder of your choice on your PC.

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1.2 Installing required software/software components

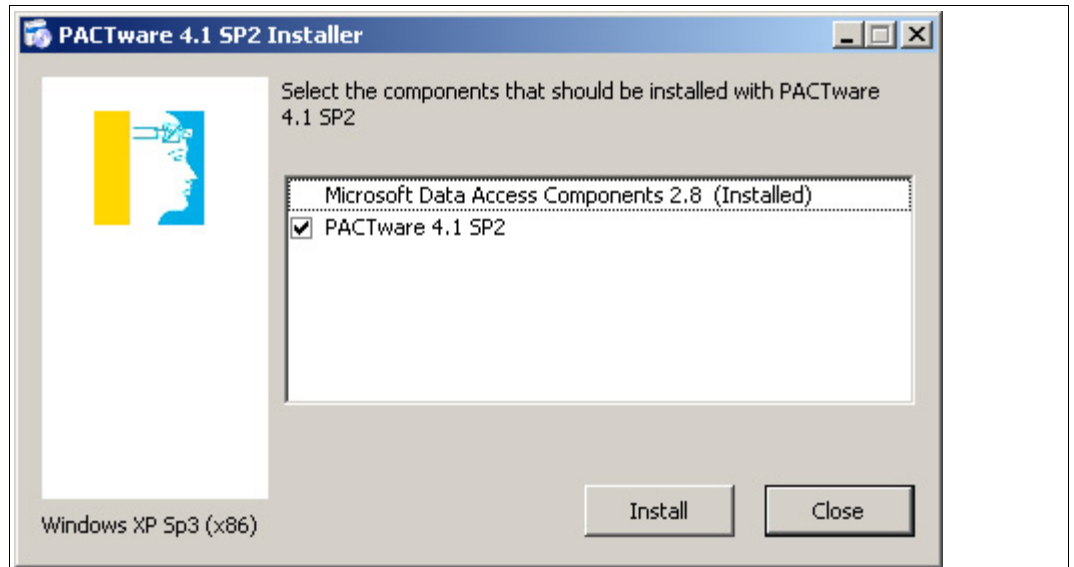### ▶ Installing the FDT framework program PACTware^TM

1. Load the FDT framework program PACTware^TM to your PC. See "Downloading the FDT framework program PACTwareTM 4.X from the Internet" on page 4

2. Unzip the zip file.

3. Save the data to a temporary folder of your choice on your PC.

4. Start the installation by double-clicking the **Setup.exe** file.

   ↳ The Select Language window is displayed.

5. In the drop-down list, select the installation language and confirm your selection with **OK**.

   ↳ The list of available software is displayed.
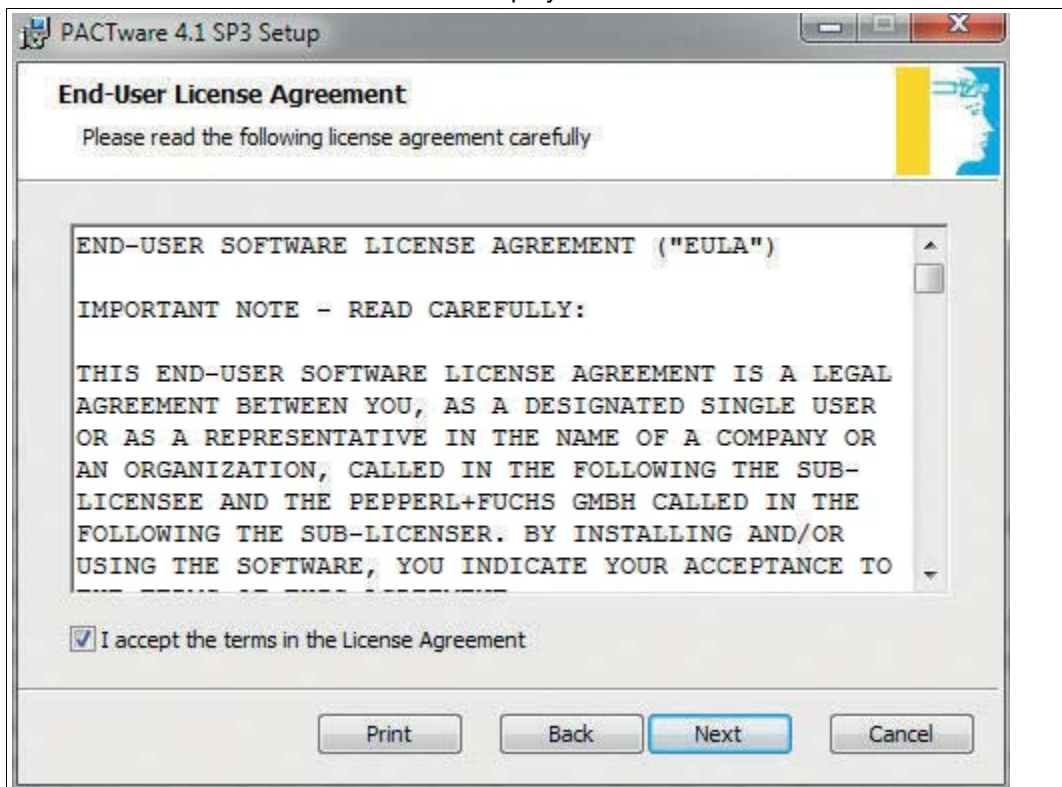
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6. Select PACTware 4.X and confirm your selection with **Install**.

   ↳ The Installation Wizard is displayed.

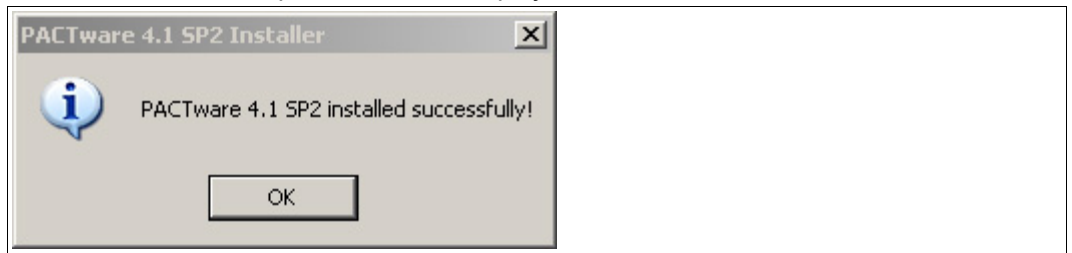7. Follow the installation instructions and confirm the installation steps.

   ↳ The window with the license terms is displayed.

8. Agree to the End User License Agreement and confirm your entry with **Next**.

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9. Follow the installation instructions and confirm the installation steps.

↳ The installation complete window is displayed.

10. Confirm the end of the installation with **OK**.

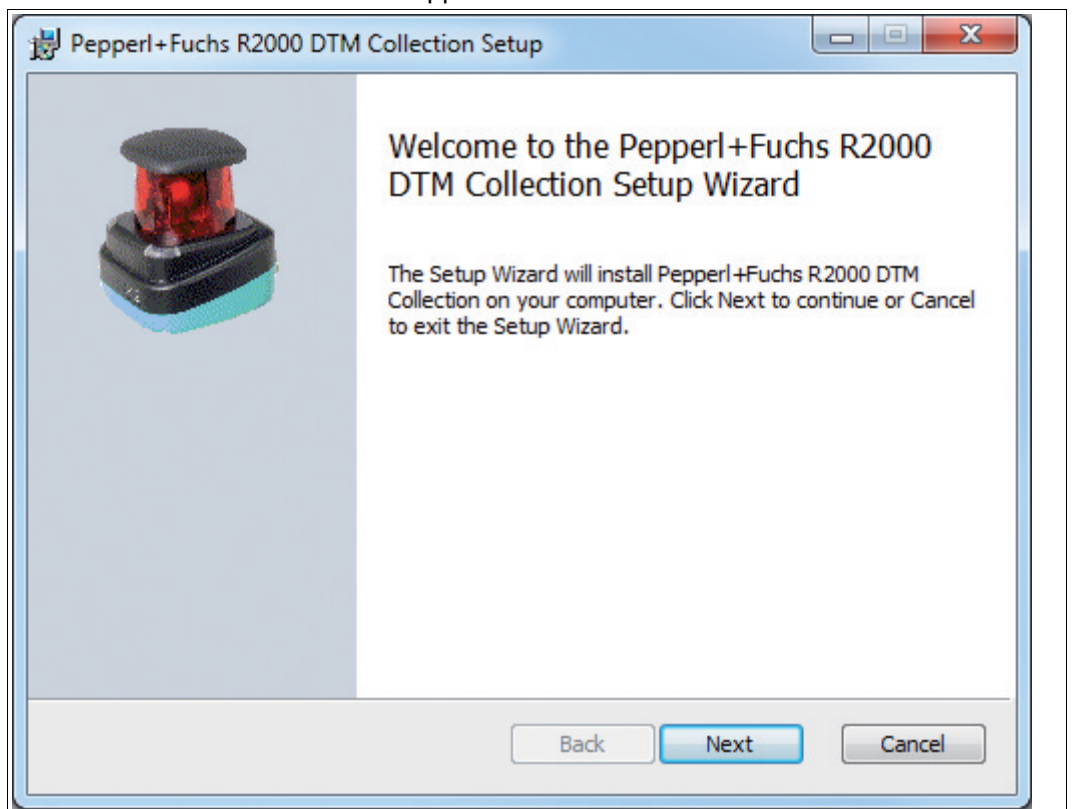↳ The FDT framework program PACTware^{TM} software is installed.

▶ Installing DTM for 2D laser scanner

1. Load the DTM for the 2D laser scanner onto your PC. See chapter 1.1

2. Unzip the zip file.

3. Save the data to a temporary folder of your choice on your PC.

4. Start the installation by double-clicking the **Setup.exe** file.

↳ The Installation Wizard window appears.

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5. Click **Next**.

↳ The window with the license terms is displayed.
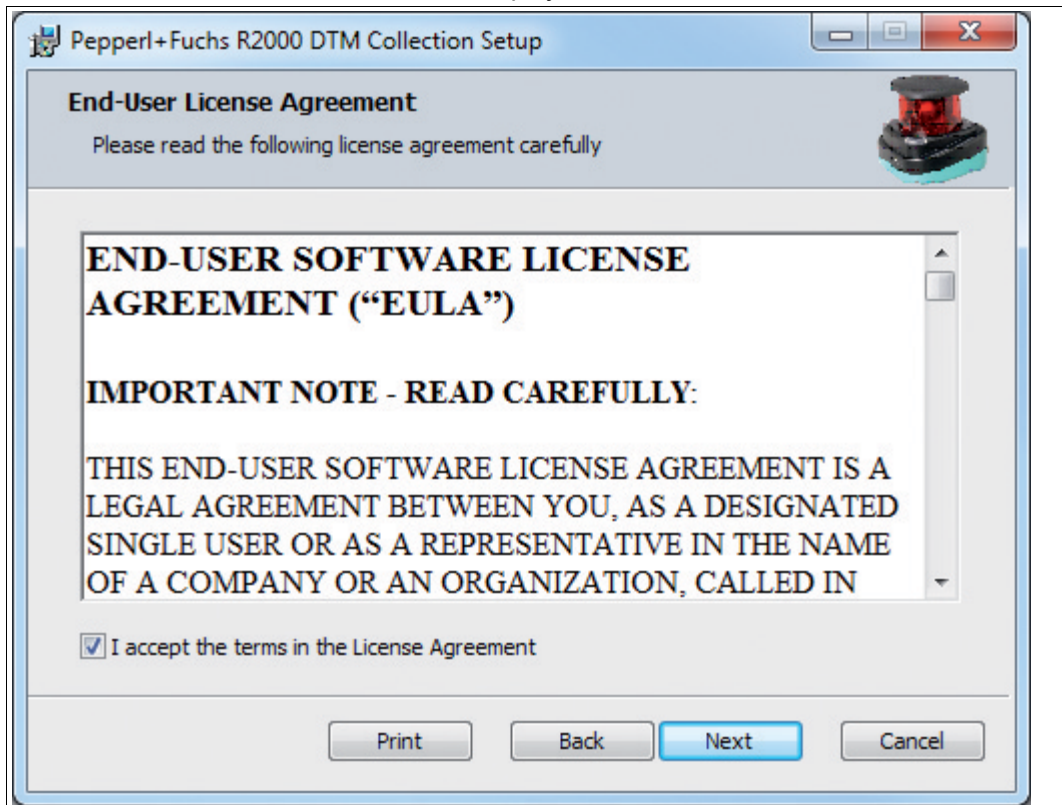
6. Agree to the license terms and conditions and confirm your entry with **Next**.

↳ The window for selecting the installation path is displayed.

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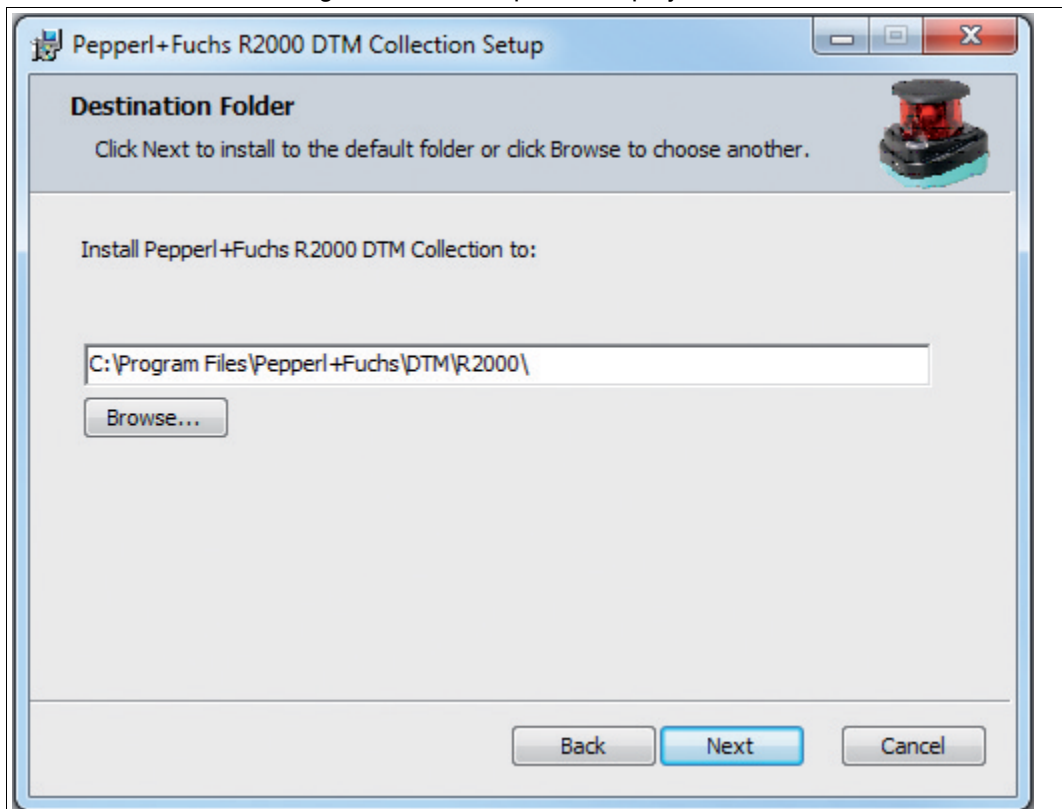
7. Select the installation path for the DTM by clicking **Browse...** and selecting a directory.
8. Confirm with **Next**.

↳ The Installation Wizard is ready for installation.

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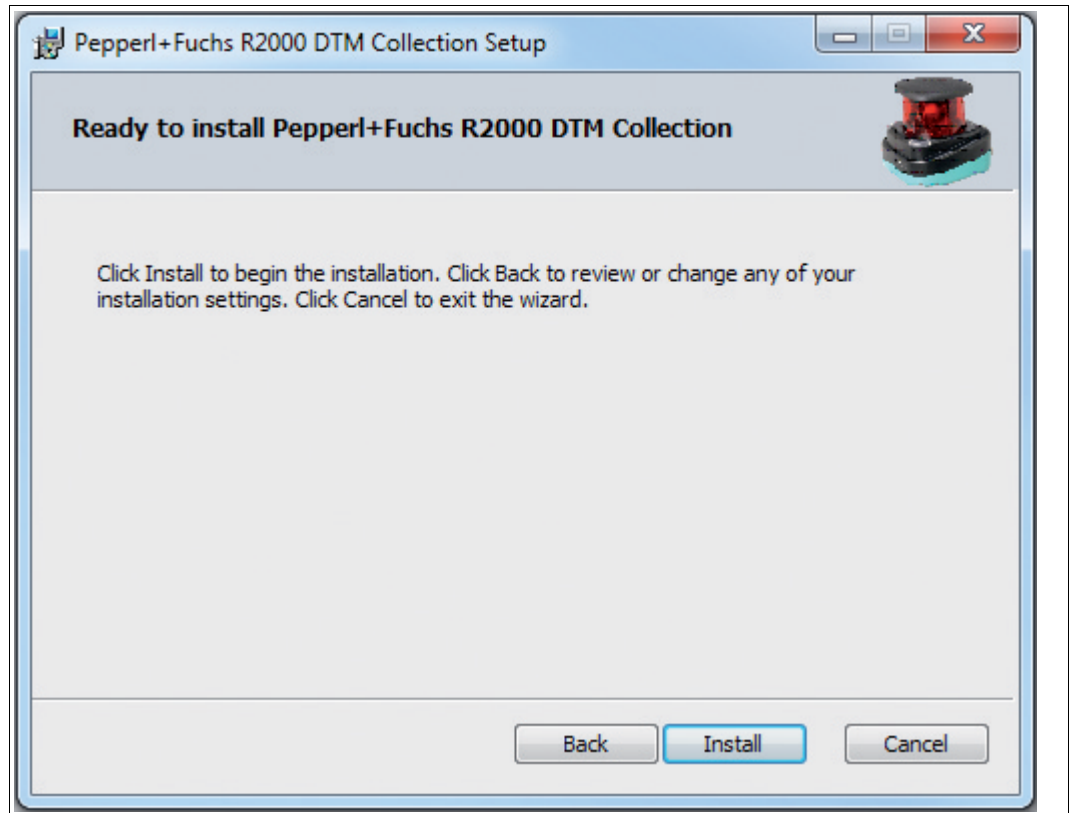
9. To begin the installation, click **Install**.

↳ A window indicating the installation progress is displayed.

10. To close the Installation Wizard after successfully installing the DTM, click **Finish**.

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2   Commissioning

▶

1. Connect the device to the power supply.

   ↳ The initialization phase lasts approx. 15 seconds. This phase is shown by circles moving down the display.

2. After the initialization phase, the Pepperl+Fuchs logo will appear.
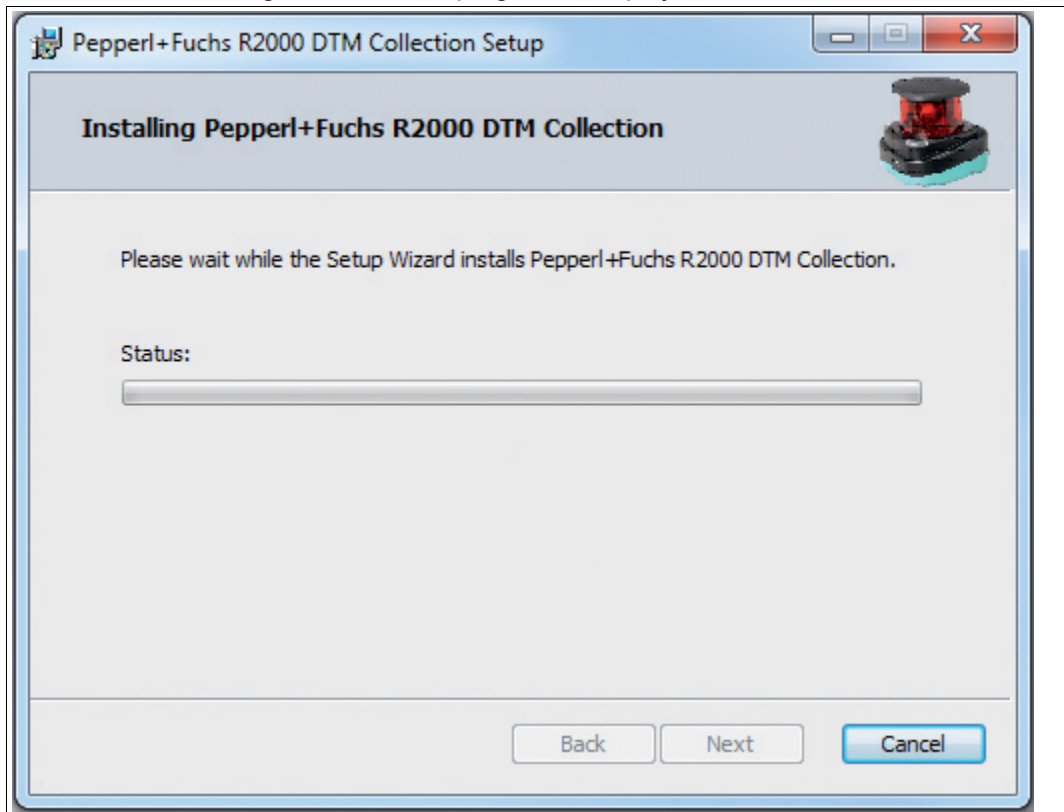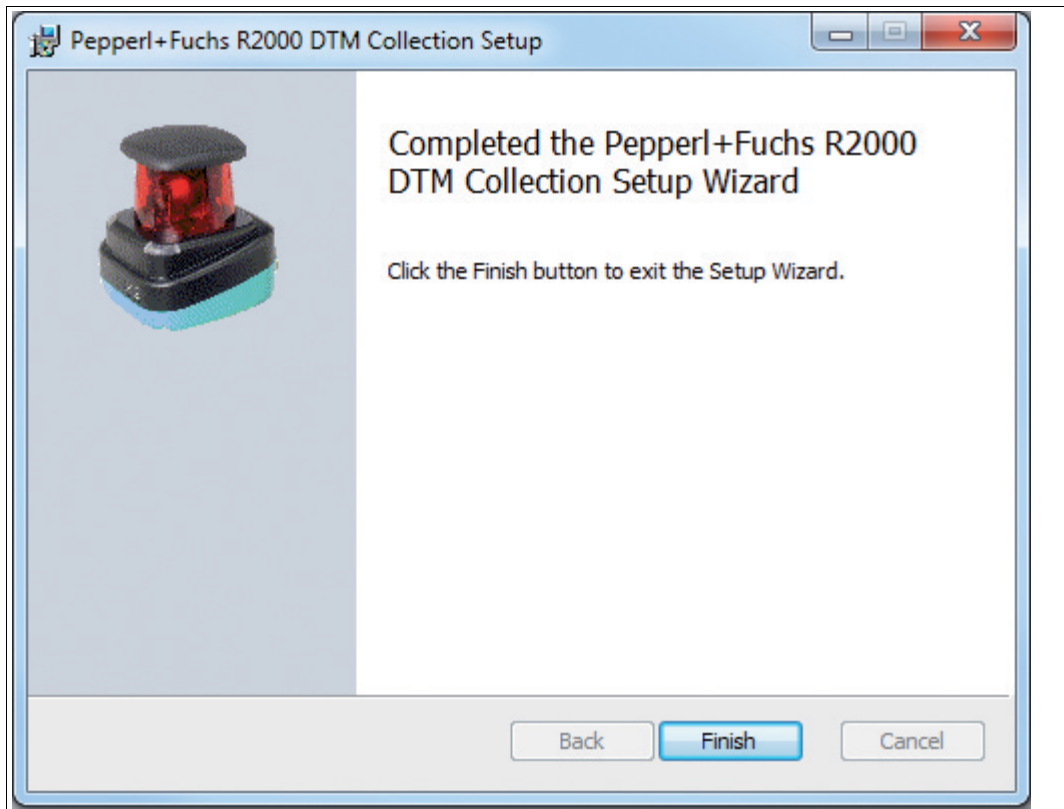
   ↳ The device is now ready for operation.

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.

In general, it is recommended to use a dedicated network card for the connection to the device.

2.1   Ethernet Configuration

The device has three different address modes. Select your preferred mode from the modes described below. The setting is configured directly on the device using the menu interface.

Auto IP

In this mode, the device independently selects a "Link-Local" IP address in the 169.254.0.0/16 range. It is ensured that the selected address is not already being used by another device.

The device is configured to Auto IP by default. The Auto IP setting is the ideal way to establish a direct connection to a PC. Set the DHCP mode (Dynamic Host Configuration Protocol) on the PC. To do this, select the TCP/IP protocol in the network card properties and select the "Obtain an IP address automatically" setting there. After approx. 30 seconds, Windows assigns an Auto IP for the PC.

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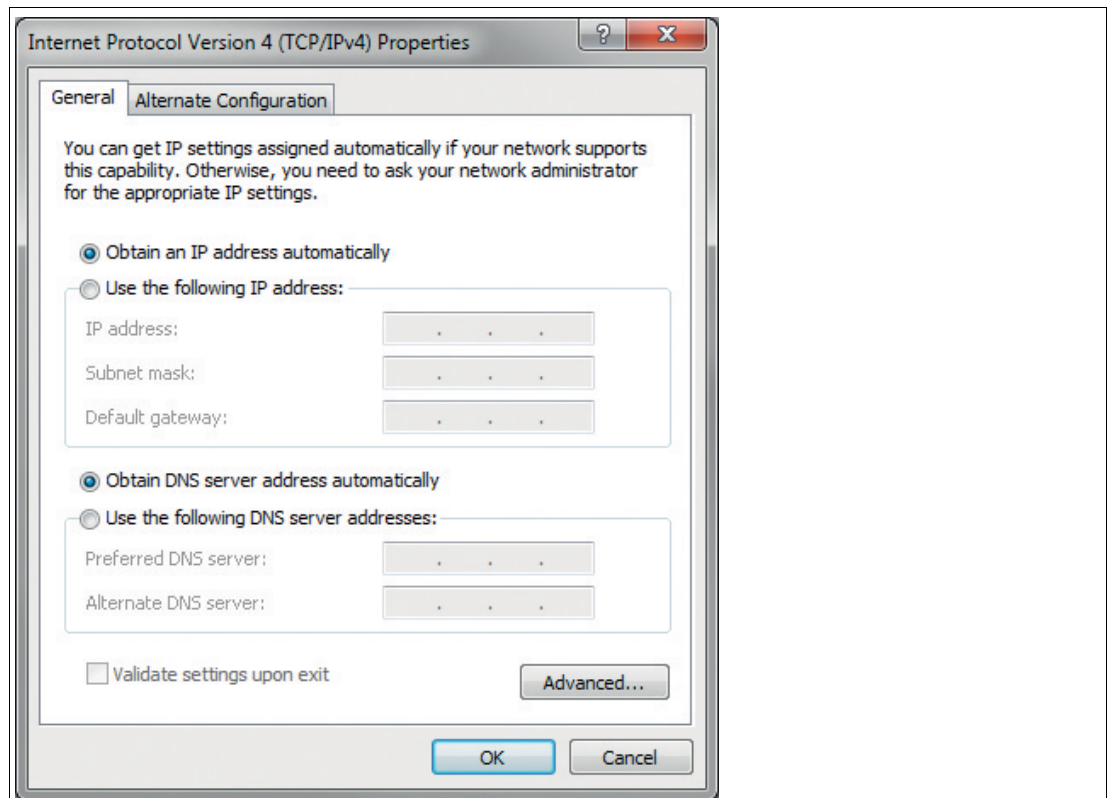
DHCP

Set the device to DHCP under the "Address mode" menu item. The DHCP configuration requires a DHCP server in the local network, e.g., a router. See the "Auto IP" item for information on this.

Manual IP

Set the device to manual under the "Address mode" menu item. The IP address is set to 10.0.10.9 and the subnet mask to 255.0.0.0 by default. To connect the device to the PC, the network card must be configured as follows. Set the required IP address in the network card menu. Select the TCP/IP protocol in the network card properties and select the "Use the following IP address" setting there. Enter the required IP address and subnet mask in these fields. Make sure that the "Disable NetBIOS over TCP/IP" menu item has been selected in the network menu under Advanced -> WINS ->.
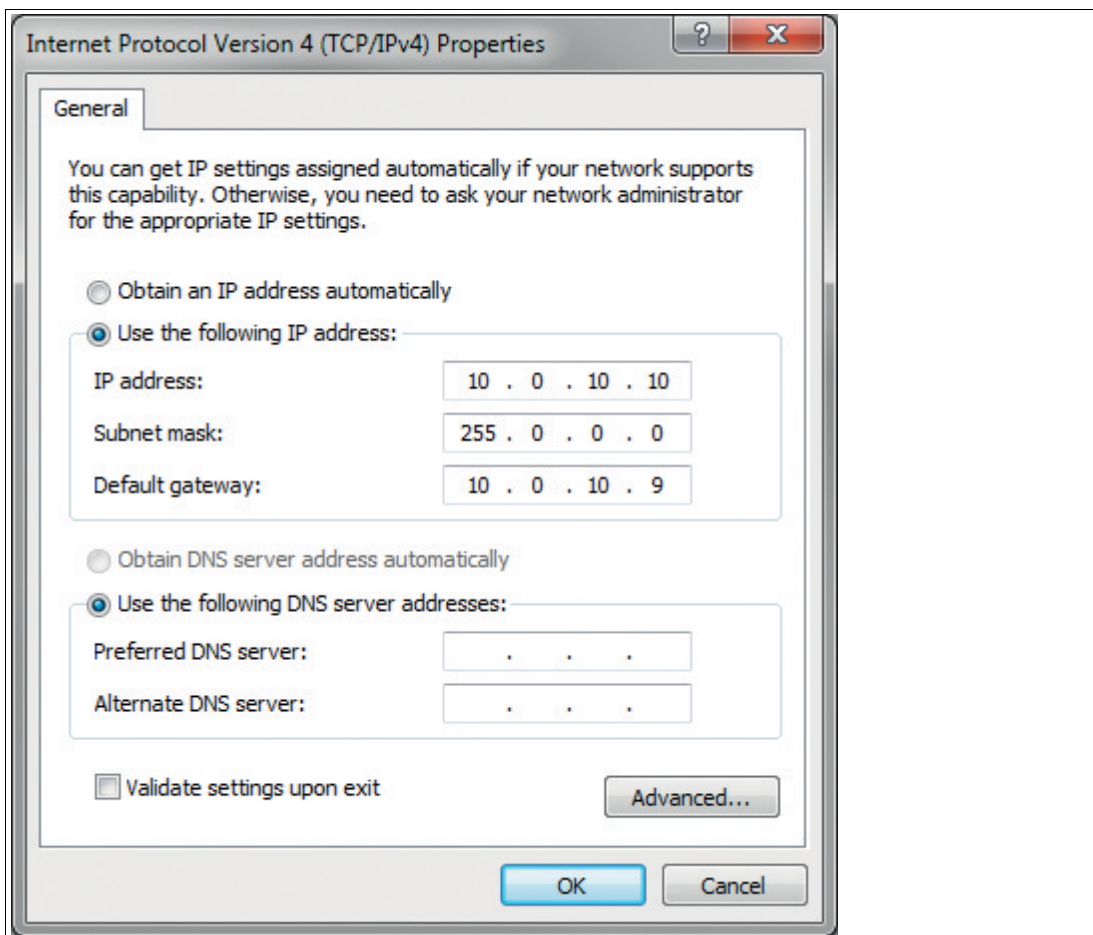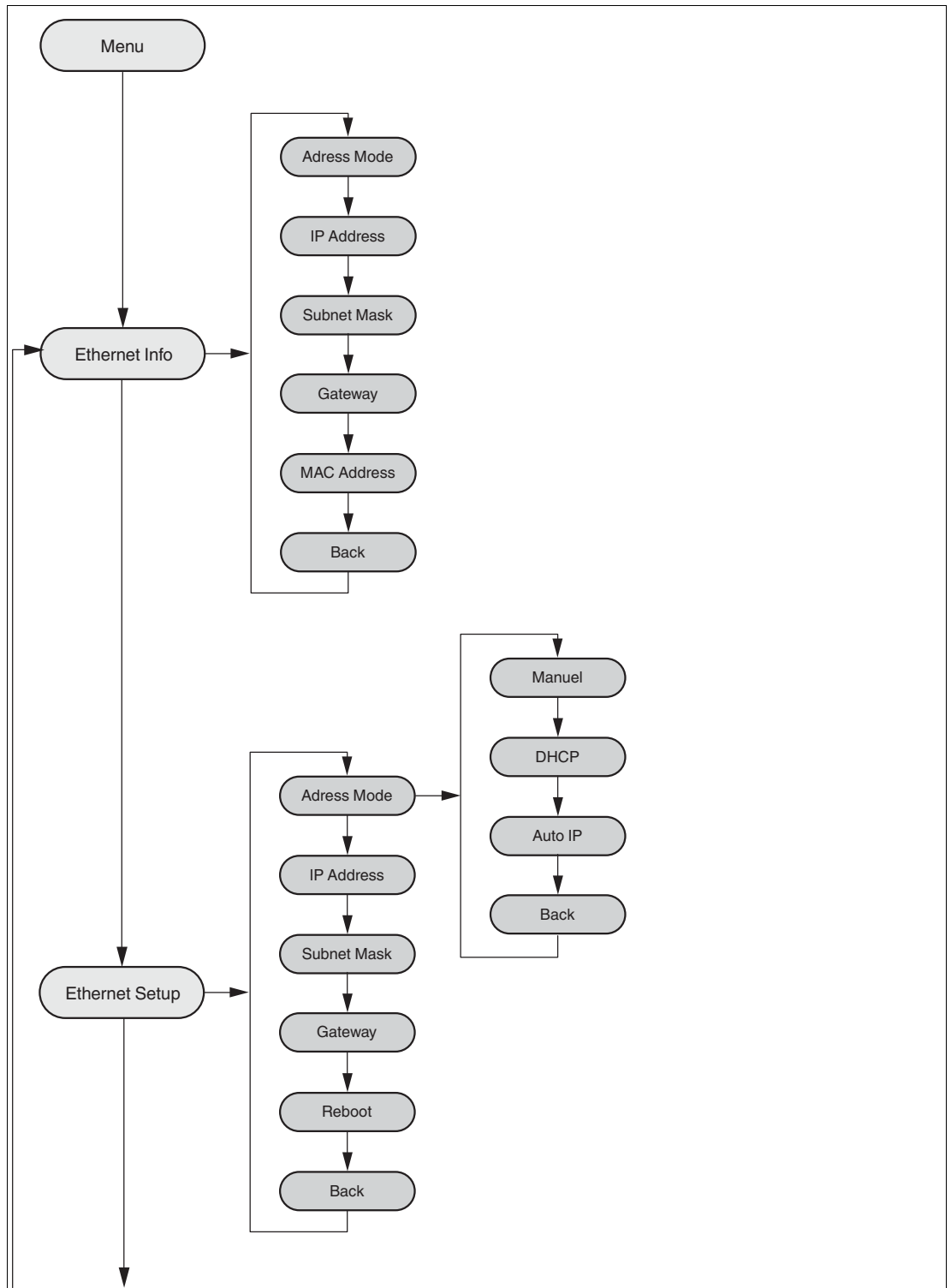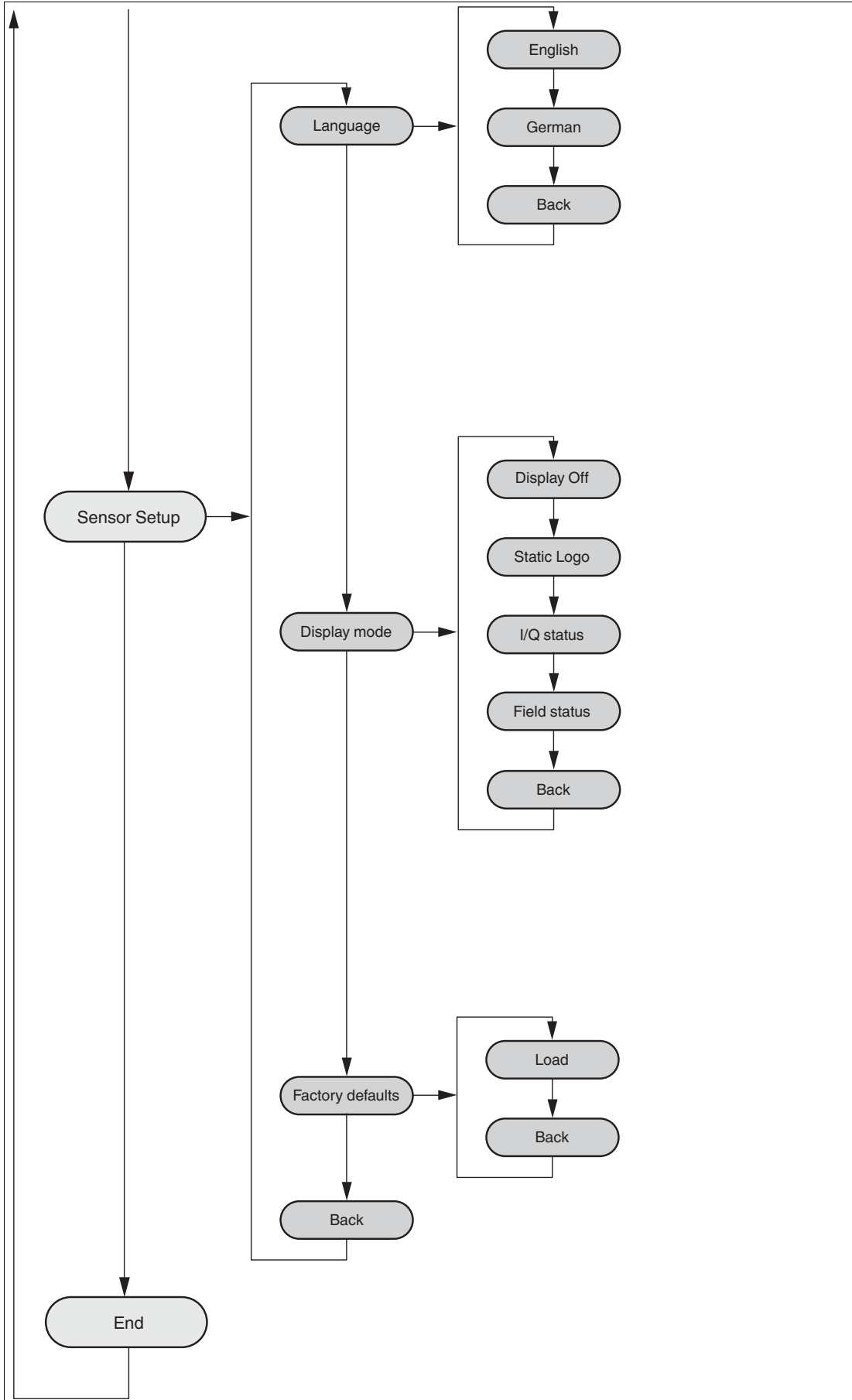

Note!

Device Restart

You must restart the device after changing the Ethernet configuration.

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3 Operation

3.1 Menu Structure

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3.2 Operation

The sensor is operated using two buttons, located on the front of the sensor, with which you can navigate in the menu structure. You can change the parameters or enter values using these buttons.

Meaning of Buttons

▶	This button is used as the "Next" button. Pressing this button takes you to the next menu item. You can change a value with this button. This button has a similar function to the ARROW button on the computer keyboard.
↵	Pressing this button selects the displayed menu item. This button has a similar function to the ENTER button on the computer keyboard.

In each menu item, the values already set are displayed with an underscore. These values can be changed. However, please note that these values should only be changed by personnel with the necessary expertise on the impact of the change.

If no other button is pressed within 60 seconds in the menu levels, the menu is ended automatically.

Navigation in the Menu

Menu display	
Top row	The current menu level is shown in the top row.
Bottom row	The currently selected element is shown in the bottom row.
Dash	One dash means that you are in the main menu.
	Two dashes mean that you are in the submenu.
Operation	
Pressing the ENTER button takes you into the menu structure.	
▶	You change to the next menu element.
	If you hold down (> 1 second) the "Next" button or "ENTER" button, you will change to the next higher menu element.
↵	You change to the selected menu element
	If you hold down (> 1 second) the "Next" button or "ENTER" button, you will change to the next higher menu element.

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Menu entry	
End	This menu entry ends the main menu.
Back	This menu entry changes to the next higher menu element

Change count parameters

Menu display	
Top row	This shows the current parameter.
Bottom row	This shows the currently selected parameter value.
Underlined parameter value	This is the currently activated value.
Operation	
▶	You change to the next available parameter value.
	If you hold down the button (> 1 second), you will change to the next higher menu element without changing the parameter.
↵	You activate the parameter value currently displayed.
	If you hold down the button (> 1 second), the displayed parameter is activated and the display returns to the higher-level menu element.

Changing Numerical Parameters

Menu display	
Top row	This shows the name of the displayed parameter.
Bottom row	This shows the current value of the parameter.
Underlined parameter value	This is the parameter value currently being edited.
Operation	
▶	You increase the currently selected digit.
	If you hold down the button (> 1 second), you increase the selected digit at a faster rate
↵	You change to the next editable digit.
	If you hold down the button (> 1 second), you change to the confirm menu.
Confirm menu	
Top row	This shows the changed number.
Bottom row	This shows the actions that can be carried out (Save, Edit, Cancel).
"Save" action	The changed value is accepted and saved.
"Edit" action	You change back to the edit display.
"Cancel" action	The changes are rejected and you change to the higher-level menu.

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IP Configuration Display

Menu display	
Top row	Name of the displayed parameter.
Bottom row	This shows the current value of the parameter.
Operation	
▶	You change to the next menu element.
	If you hold down (> 1 second) the "Next" button or "ENTER" button, you will change to the next higher menu element.
↵	no function
	If you hold down (> 1 second) the "Next" button or "ENTER" button, you will change to the next higher menu element.

Back Menu Item

You return to the higher-level menu via the "Back" menu item

3.3 Description of Menu Items

3.3.1 Ethernet Info Menu Item

This menu item provides fast access to the IP configuration currently in use. The data can be read only in this menu item.

Address Mode

The address mode currently being used is displayed in this subitem.

IP Address

The IP address currently being used is displayed in this subitem.

Subnet Mask

The subnet mask currently being used is displayed in this subitem.

Gateway

The gateway currently being used is displayed in this subitem.

MAC Address

The MAC address currently being used is displayed in this subitem.

Note!

Changing the IP Configuration

Changes to the IP configuration take effect only after a restart! The IP configuration currently used by the device is displayed in the "Ethernet Info" menu item. If these settings differ from the settings made under the "Ethernet Setup" menu item, the device must be restarted.

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3.3.2 Ethernet Setup Menu Item

Change the IP configuration data in this menu item.

Address Mode

- ■ "Manuel": Here an IP address, the subnet mask, and the gateway can be assigned manually to the device
- ■ "DHCP": The device is assigned an IP address by a DHCP server (e.g., Windows PC)
- ■ "AutoIP": The device can be detected automatically by the PC

IP Address

The IP address to be used in the address mode: "Manual" can be set in this menu item.

Subnet Mask

The subnet mask to be used in the address mode: "Manual" can be set in this menu item.

Gateway

The Gateway can be set in this menu item.

Reboot

The device can be restarted in this menu item.

Note!

Changing the IP Configuration

Changes to the IP configuration take effect only after a restart! The IP configuration currently used by the device is displayed in the "Ethernet Info" menu item. If these settings differ from the settings made under the "Ethernet Setup" menu item, the device must be restarted.

3.3.3 Sensor Setup Menu Item

Language

The language can be set to German or English using this menu item.

Display Mode

The display mode defines the display in normal mode when the menu is not active. The display mode is set on a permanent basis. It is active following a restart.

- ■ **Display off**: The display goes dark as soon as the menu is exited.
- ■ **Static logo**: The Pepperl+Fuchs logo is displayed.

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■ **I/Q Status**: The four inputs/outputs are displayed at the same time in rings. The respective input/output is indicated every 90° via points (1 – 4). The respective input/output is displayed even when it is not active.

■ **Field Status**: The four fields are displayed at the same time in rings. The respective field is indicated every 90° via points (1 – 4). The respective field is displayed even when it is not active.

Default Settings

The default settings for the sensor can be loaded in this menu item. To do this, you must select "Load" in the submenu and confirm by pressing the "Enter" button. You must restart the device to accept all the changes.

3.3.4   End Menu Item

End

Pressing the "Enter" button to confirm ends the menu and the display mode set is displayed.
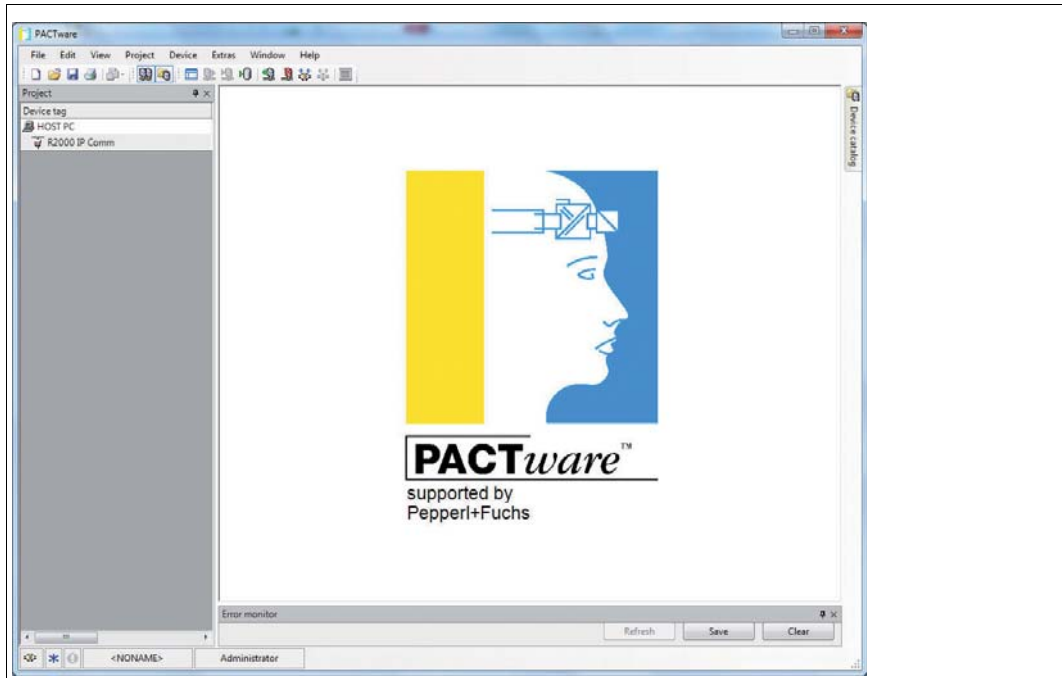
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# 4 Overview of the DTM menus

4.1 Establishing a connection

Once you have successfully installed the software (PACTware[TM]/DTM for R2000 laser scanner) and have commissioned the 2D laser scanner hardware, set up the connection between the device and the DTM.
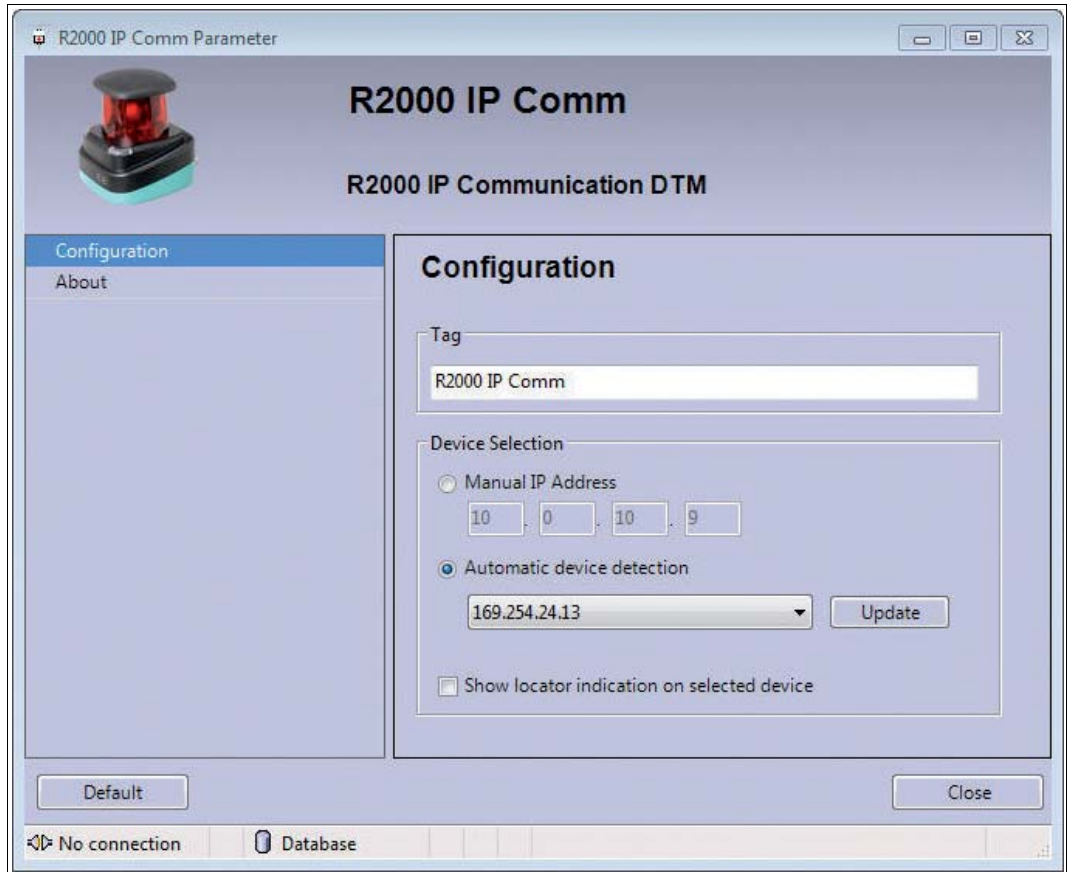
Connecting the 2D laser scanner to the DTM

1. Start PACTware[TM].

2. Open the device catalog by pressing F3.

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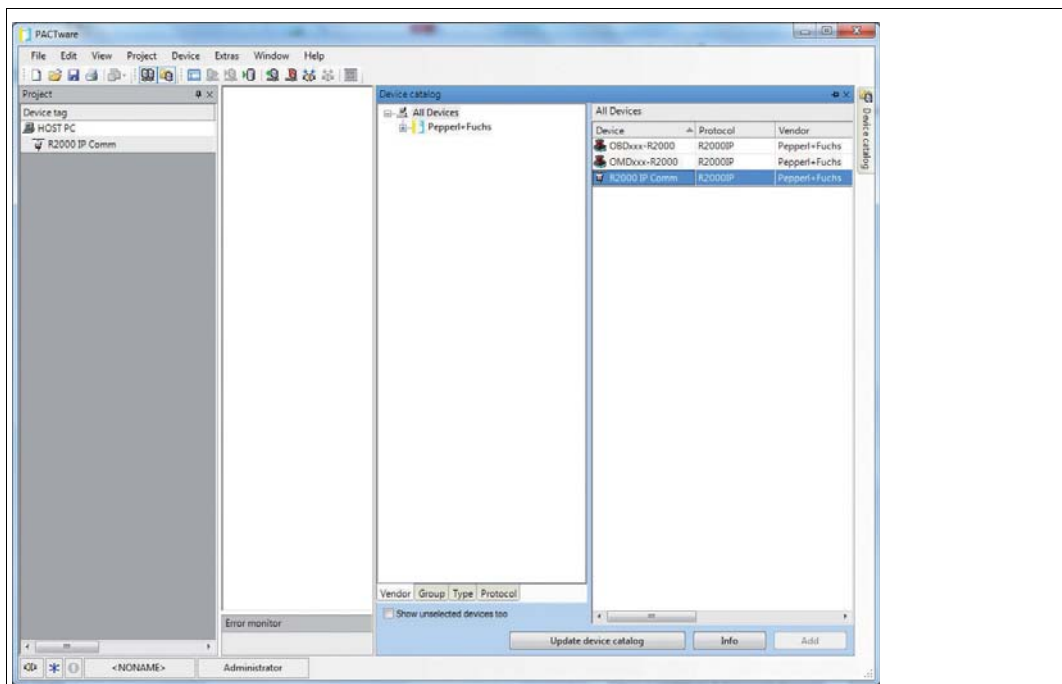
3. In the device catalog, double-click the entry **R2000 IP Comm**.

   ↳ The entry is included in the device tag tree structure.

4. Double-click the entry **R2000 IP Comm** in the device tag tree structure.

   ↳ The R2000 IP Comm parameters window opens.

5. To find a connected 2D laser scanner, click **Update**.

   ↳ As soon as the IP address of the 2D laser scanner is identified, click **Close**. If no IP address is displayed, check your network.

6. Highlight the entry **R2000 IP Comm** in the device tag tree structure. Click ⚙.

   ↳**R2000 IP Comm** is connected.

7. Double-click the entry **OBD-xxx-R2000** in the device catalog.

   ↳ The entry is included in the device tag tree structure.

8. Highlight the entry **OBD-xxx-R2000** in the device tag tree structure. Click ⚙.

   ↳**OBD-xxx-R2000** is connected.

9. Double-click the entry **OBD-xxx-R2000** in the device tag tree structure.

   ↳ The DTM for 2D laser scanner opens with the **Sensor Information** window.

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Data management

Changes made in the DTM interface do not become active in the 2D laser scanner until they have been transferred to the device.

Note!

We recommend first configuring all settings in all DTM interface windows. Then transfer all data to the 2D laser scanner. It is not necessary to transfer the data before switching between the individual DTM windows.

► Reading data from the 2D laser scanner

Click 👥.

↳ The data saved on the 2D laser scanner is read. The data in the DTM interface is overwritten by the data from the 2D laser scanner.
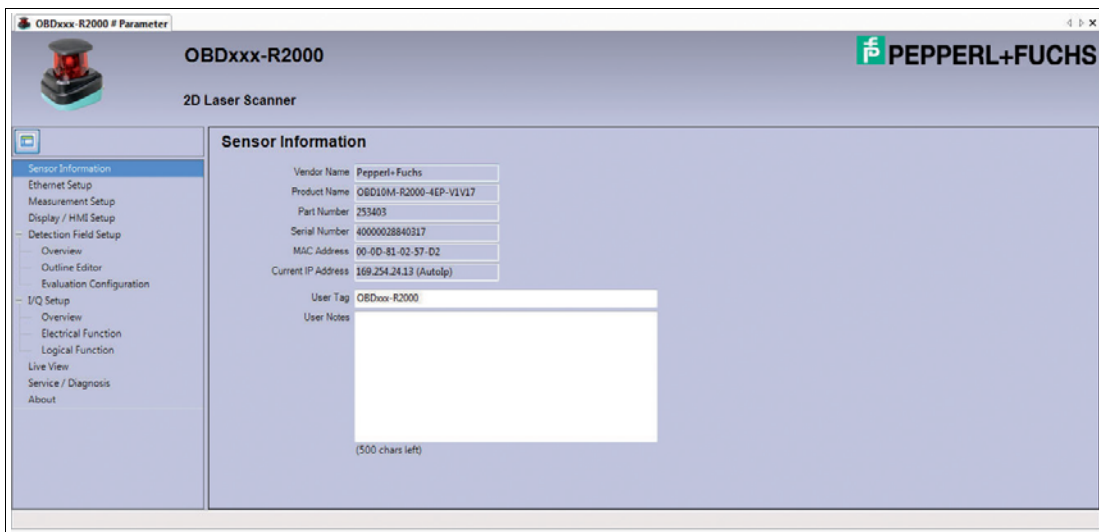
► Transferring data to the 2D laser scanner

Click 👥.

↳ The data from the DTM interface is transferred to the 2D laser scanner. The data on the 2D laser scanner is overwritten with the data from the DTM interface.

4.2 Sensor Information

In the **Sensor Information** window, various information on the 2D laser scanner is displayed.

Once a connection has been established, only the sensor information is automatically updated and displayed. All other data must first be read from the 2D laser scanner. To read additional data from the 2D laser scanner, see "Reading data from the 2D laser scanner" on page 22.

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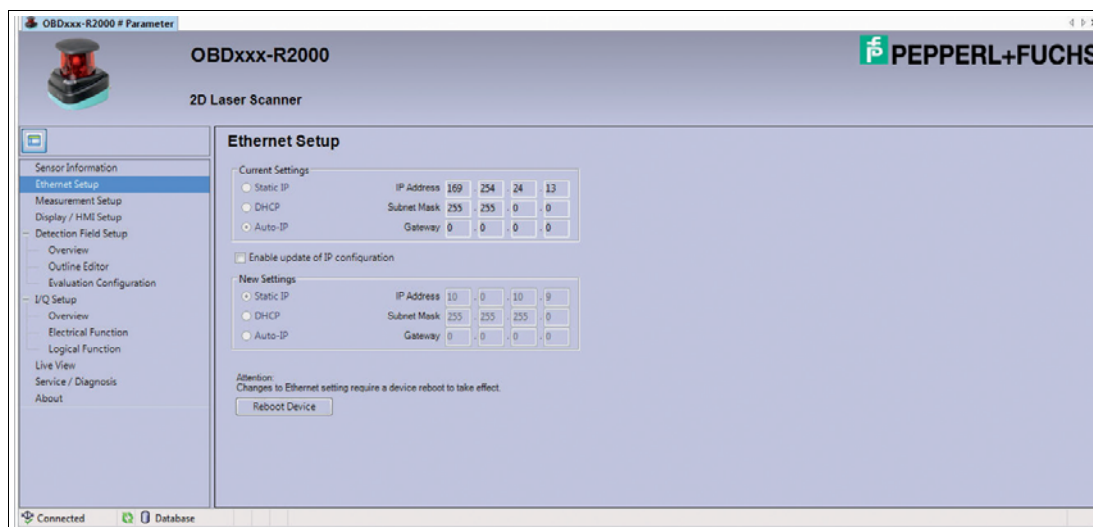
4.3 Ethernet Setup

In the **Ethernet Setup** window, information on the current network settings of the 2D laser scanner is displayed in the **Current Settings** section.

In the **New Settings** section, you can change the network settings.

Changing network settings

1. Activate the **Enable update of IP configuration** check box.

   ↪ The **New Settings** section is activated.

2. In the **New Settings** section, activate the desired option and, if necessary, enter a static IP address and/or the subnet mask.

3. Click 📶.

   ↪ The data is transferred to the 2D laser scanner.

4. Click **Reboot Device**.

   ↪ The 2D laser scanner is restarted. The new network settings are then enabled.

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4.4 Measurement Setup
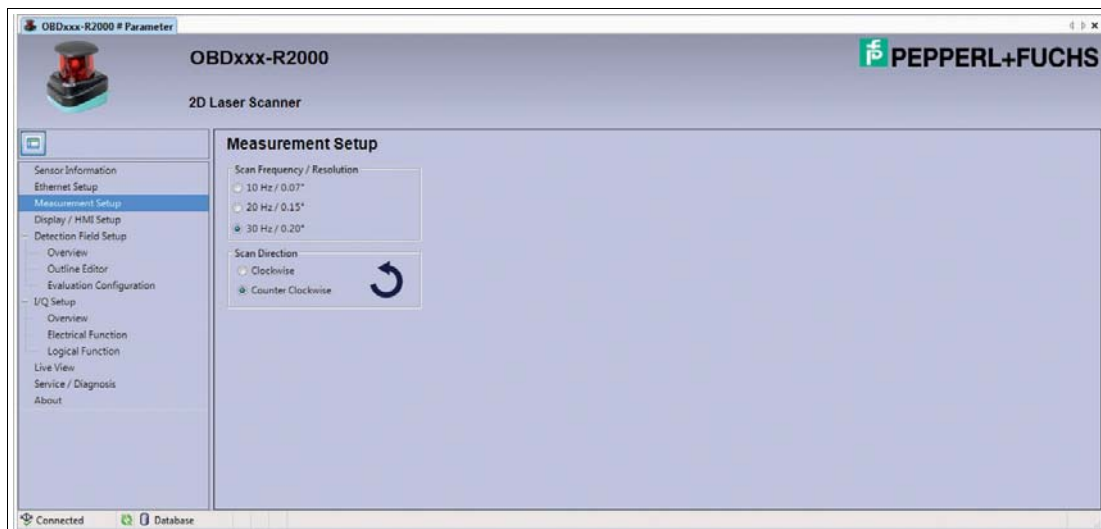
In the **Measurement Setup** window, define the rotational speed, angular resolution, and physical direction of rotation of the 2D laser scanner.

The maximum response time is derived from the rotational speed setting and the **Multiple Evaluation** (see chapter 4.6.2) setting according to the following table:

Rotational speed	Reaction time
10 Hz	30 ms + 100 ms * scans
20 Hz	30 ms + 50 ms * scans
30 Hz	30 ms + 33 ms * scans

4.5 Display/HMI Setup

In the **Display/HMI Setup** window, you can define the visual feedback for the laser scanner display and manage the release/locking functions of control buttons and functions.

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HMI Display Mode

In the **HMI Display Mode** section, you can define the visual feedback for the laser scanner display.

The following options are available:

Option	Description
Display off	The display is switched off
Static logo	The Pepperl+Fuchs logo appears
Rings I/Q Status	Each active input/output is shown by a red ring
Rings Field Status	Each active field is shown by a red ring

Display Language

In the **Display Language** section, you can select the language of the 2D laser scanner display.

German and English can be selected.

HMI Button Lock

This function locks the control buttons on the 2D laser scanner. Operation is no longer possible.

Function	Description	DTM icon
Disabled	The control buttons are not locked.	
Enabled	The control buttons are locked.	

HMI Parameter Lock

This function locks the setup menus of the 2D laser scanner (Ethernet Setup, Sensor Setup). It is no longer possible to make parameter changes on the device via the display. The information menus (Ethernet Info) remain available.

| Function	Description	DTM icon
Disabled	The menus are not locked.	
Enabled	The **Ethernet Setup** and **Sensor Setup** setup menus are locked. The **Ethernet Info** info menu is not locked.	

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4.6 Detection Field Setup
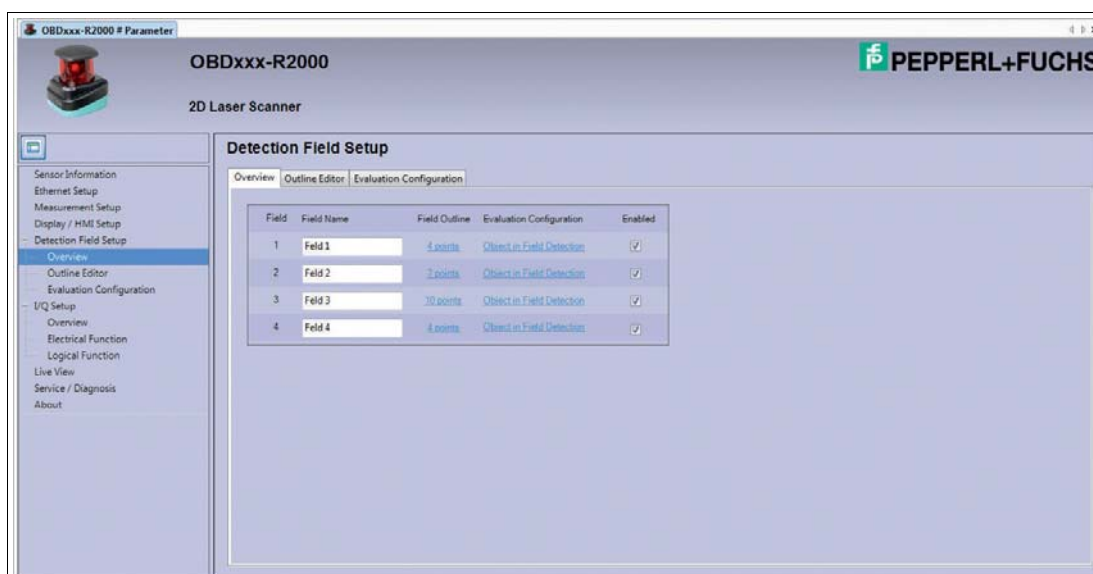
The **Detection Field Setup** window contains three tab pages:

- Overview
- Outline Editor
- Evaluation Configuration

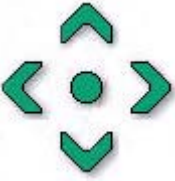The **Overview** tab page appears by default.

Function	Description
Field Name	Name of the respective field. To define a name for the field, click in the appropriate box.
Field Outline	Indicates how many corner points the respective field consists of. Clicking on the link takes you to the **Outline Editor** tab.
Evaluation Configuration	Displays the currently defined detection algorithm. Clicking on the link takes you to the **Evaluation Configuration** tab.
Enabled	Enables/disables the respective field.

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4.6.1 Outline Editor
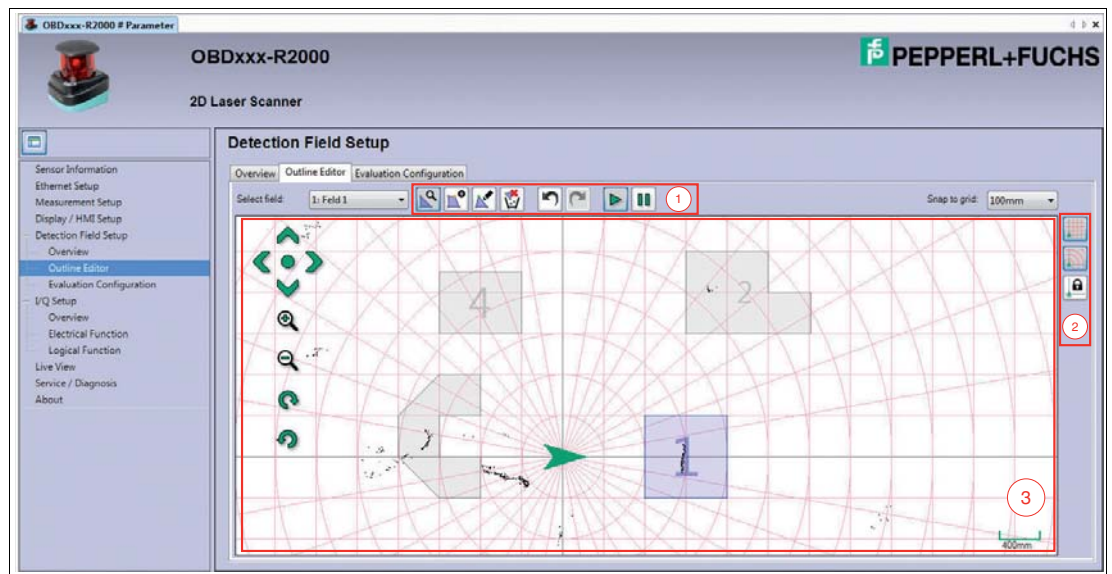
On the **Outline Editor** tab page, you can create up to four fields for the detection of objects. The tools required to do so are provided in a horizontal toolbar (1), and the vertical bar (2) allows you to switch between different visualization options. There is also a character editor (3).

Button	Description	Keyboard shortcuts
	Zoom in and zoom out functions, move view, rotate	Q
	Add points tool	W
	Move points tool	E
	Tool to clear the active field. Use the "Undo" function to reverse unintentional deletion.	
	Undo function. Undo the last operation.	
	Redo function. Redo the previously undone operation.	
	Start LiveView	
	Pause LiveView	
	Show/hide rectangular coordinate system	
	Show/hide circular coordinate system	
	Fixes the respective coordinate system	

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| Button	Description	Keyboard shortcuts
	Arrows: Move view Circle: Center view	Arrow keys Pos1
	Zoom in	Mouse wheel +
	Zoom out	Mouse wheel -
	Turn view to the right	/
	Turn view to the left	*

Create fields

1. In the **Select Field** section, select the field to be created. You have four fields to choose from.

2. Select the Add points tool .

3. A field is defined by corner points to which lines are added to automatically create a defined area. To set corner points, click in the character editor.

   ↳ The field area is automatically created.
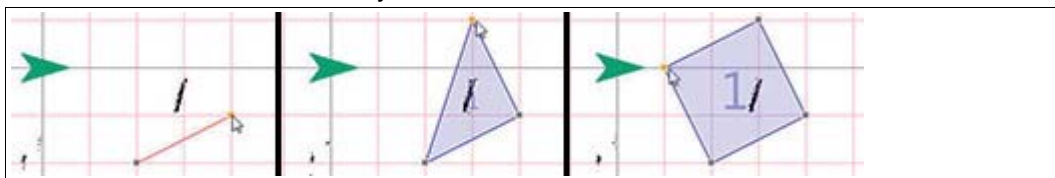
4. To move points, select the Move points tool .

5. Select the corner point that you wish to move or, with the left mouse button held down, drag a box over several corner points.

   ↳ The highlighted corner points are selected and turn green.

6. Move corner points by clicking on the highlighted corner point and moving it with the left mouse button held down. If you have selected several corner points, click on one of the highlighted corner points and move the group of selected corner points with the left mouse button held down.
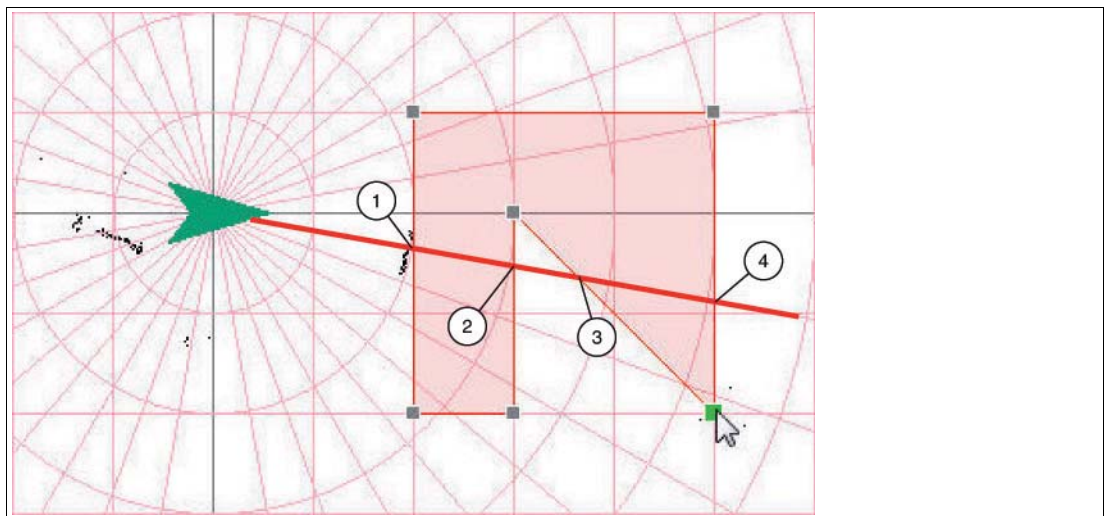
7. Exit field creation by pressing the Esc key or by clicking .

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Information on Creating Fields

■ Each laser beam may enter and exit a field only once.
The Add points tool helps you create valid fields. Valid fields are displayed in blue, while
invalid fields are in red.
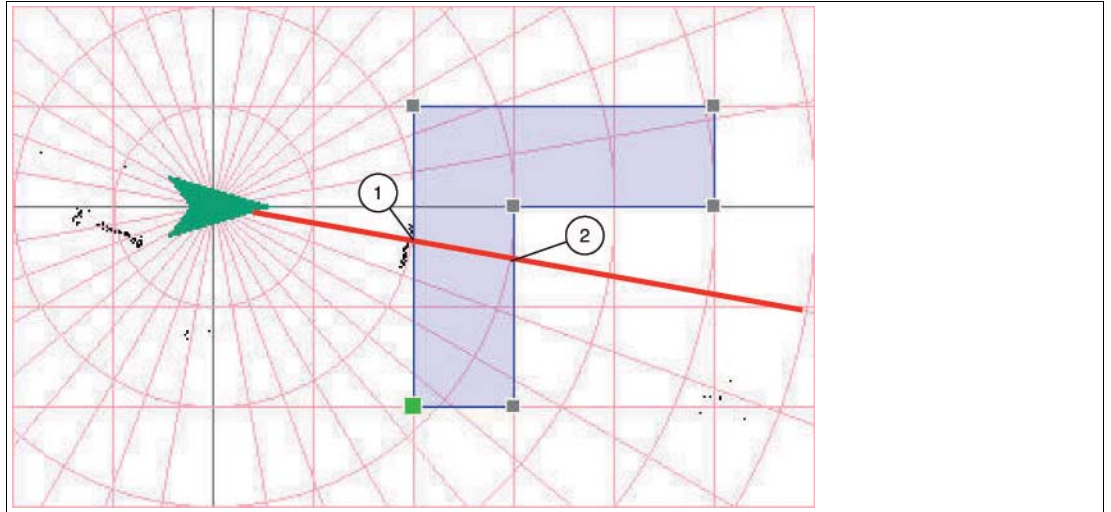
1. Entry 1—OK

2. Exit 1—OK

1. Entry 1—OK

2. Exit 1—OK

3. Entry 2—not OK

4. Exit 2—not OK

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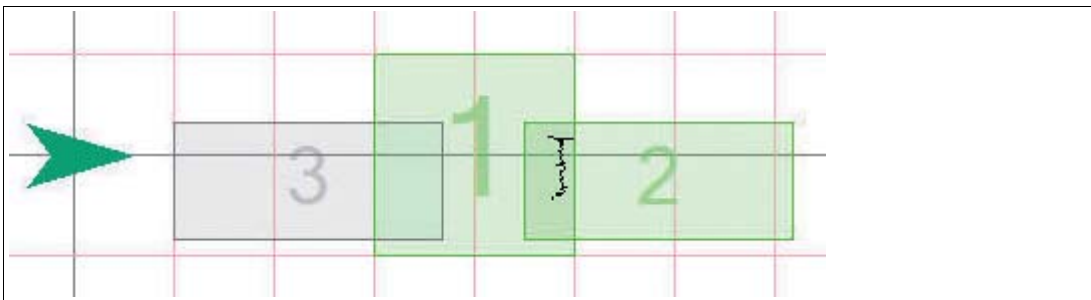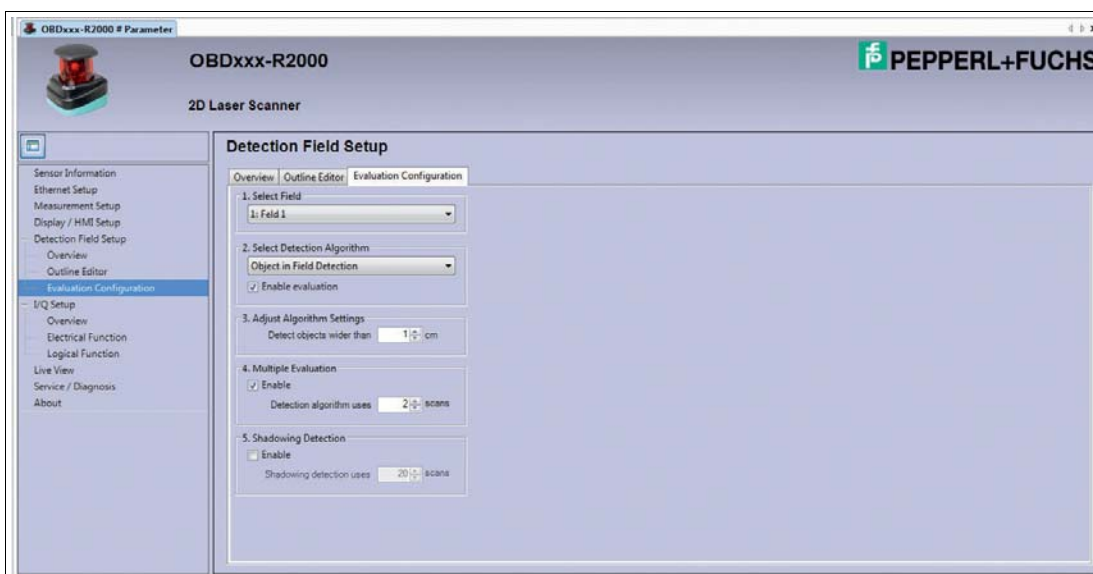
■ Fields may overlap.

Figure 4.1   The fields 1, 2, and 3 overlap. 1 and 2 are active, as the object is detected in the overlap of field 1 and 2.

4.6.2   Evaluation Configuration

On the **Evaluation Configuration** tab page, define the detection algorithm. Further settings can be adjusted in each field.
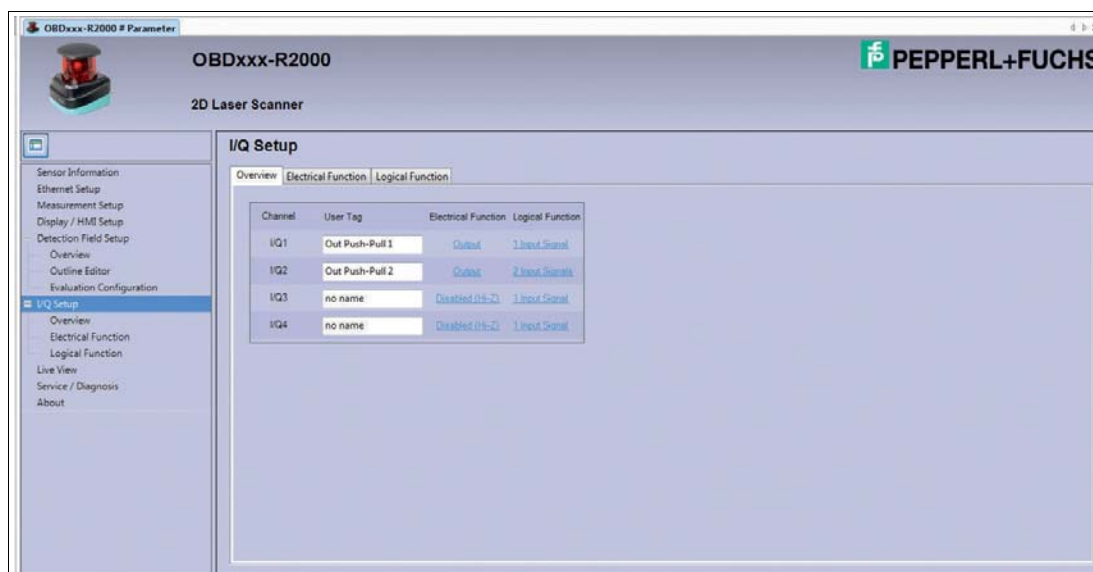
Area	Description
1. Select Field	Selection of the field for which you wish to define parameters
2. Select Detection Algorithm	Selection of the detection algorithm: ■ None: Detection disabled ■ Object in Field Detection: as soon as an object is detected within the field, the field becomes active. ■ Reference Region Monitoring: as soon as a gap is detected in a defined reference region, the field becomes active.
3. Adjust Algorithm Settings	
Detect objects wider than (on selecting "Object in Field Detection")	Minimum object size that is necessary to detect an object. Objects that are smaller than the set value are not detected. If the set value is 0 cm, measurement on a single measurement beam is sufficient for object detection. The actual resolution is dependent on the set angular resolution and object distance.

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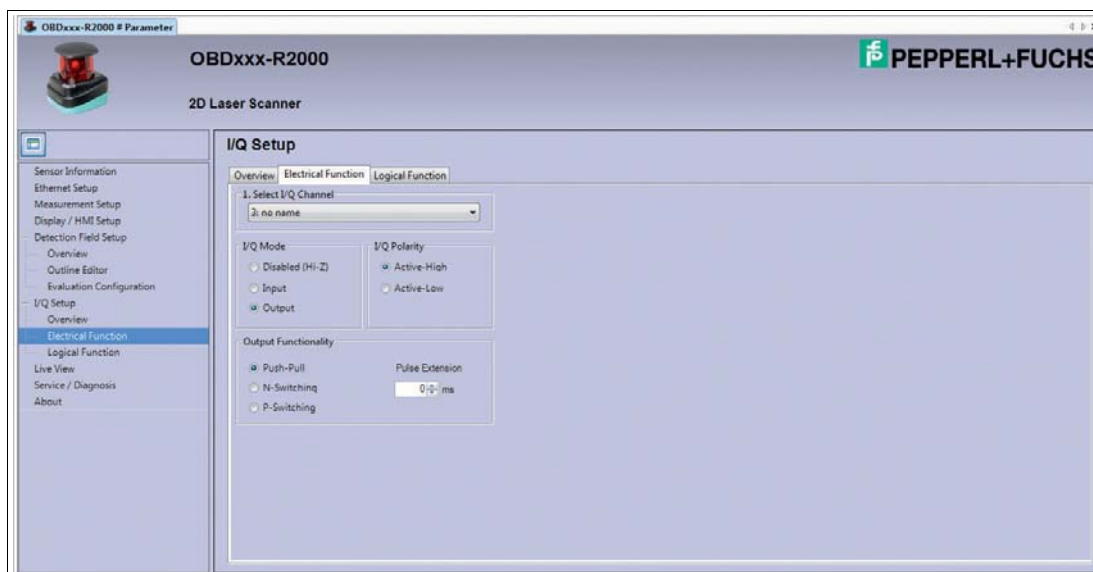| Area	Description
Detect gaps larger than (on selecting "Reference Region Monitoring")	Minimum size of the gap that is necessary to enable a field whose detection algorithm is "Reference Region Monitoring".
4. Multiple Evaluation	Minimum number of consecutive scans required for field activation, during which the object must be in the field. Use this setting to prevent accidental activation by objects that remain in the field only briefly (e.g., insects flying through).
5. Shadowing Detection	Number of consecutive scans required to enable a field that is (partly) shadowed by another object outside of the field.

4.7 I/Q Setup

The **I/Q Setup** window contains three tab pages:

- Overview
- Electrical Function
- Logical Function

The **Overview** tab page appears by default.

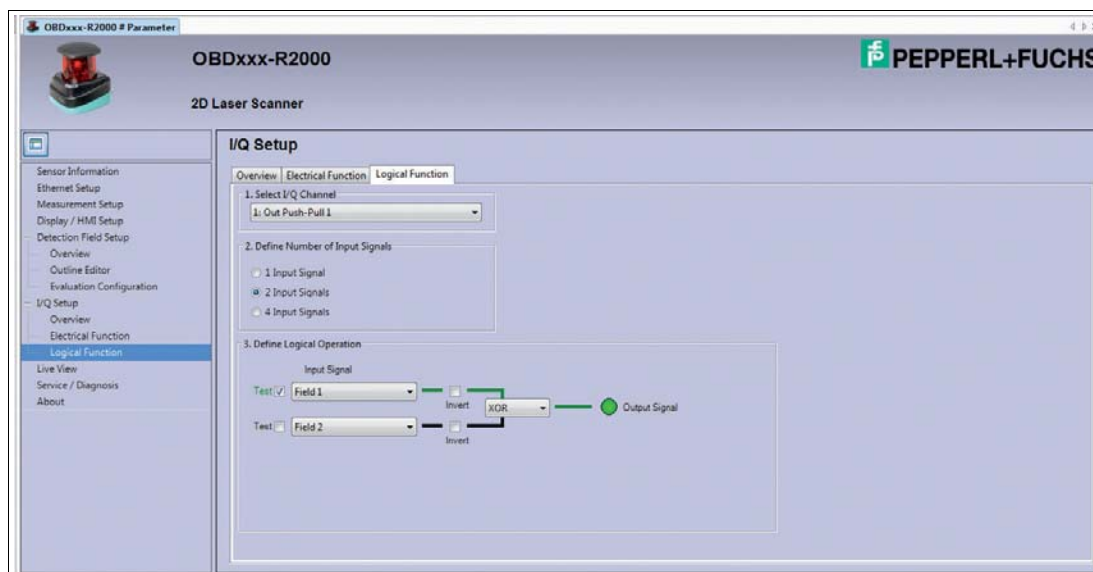| Function	Description
User Tag	Name of the corresponding input/output. To create a name for the input/output, click in the appropriate box.
Electrical Function	Indicates the electrical function. Clicking on the link takes you to the **Electrical Function** tab.
Logical Function	Indicates the logical condition that activates a trigger. Clicking on the link takes you to the **Logical Function** tab.

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4.7.1 Electrical Function

On the **Electrical Function** tab page, you can define input and output signals. Further settings can be adjusted for each input/output signal.

Area	Description
Select I/Q Channel	Selection of the I/Q channel for which you wish to define parameters
I/Q Mode	Determines whether the electrical connection is operated as input, output, or high resistance (disabled).
I/Q Polarity	■ Active-High: positive logic ■ Active-Low: negative logic
Output Functionality (on selecting "Output" in the "I/Q Mode" section)	Defines the type of electrical circuit of an output and the pulse extension: ■ Push-Pull: push-pull circuit ■ N-Switching: negative switching (NPN) ■ P-Switching: positive switching (PNP) Pulse Extension: sets the time by which the corresponding output signal is extended. Shorter output pulses are extended accordingly. An output remains active for longer in line with this setting.

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4.7.2 Logical Function

On the **Logical Function** tab page, you can create logical operations for one, two, or four input signals for each I/Q channel defined as an output.

Area	Description
1. Select I/Q Channel	Selection of the I/Q channel for which a logical link is to be defined
2. Define Number of Input Signals	Selection of how many input signals are processed in the logical link
3. Define Logical Operation	Definition of the actual logical link. ■ The **Test** check box is used for simulation purposes to test the set logical link without activating the input signal. ■ Under **Input Signal**, select a field, an input, or the "System Error Flag" ■ The **Invert** check box inverts the logical state of the **input signal**. If two or four input signals are processed for one output signal, the following three logical operators are available: ■ AND: logical "and" ■ OR: logical "or" ■ XOR: exclusive "or"

Note!

Once all the settings in the DTM interface have been configured, transfer the data to the 2D laser scanner.

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
▶ **Transferring data to the 2D laser scanner**

Click 🖳.

↳ The data from the DTM interface is transferred to the 2D laser scanner. The data on the 2D laser scanner is overwritten with the data from the DTM interface.

4.8   Live View

In the **Live View** window, the live image of the 2D laser scanner is shown in real time.

Different buttons in the vertical toolbar on the right-hand side (1) allow you to adjust the Live View display.

Button	Description
	Shows the individual scan points
	Connects scan points that are close to one another with lines
	Connects all scan points with lines
	Indicates invalid scan points
	Indicates the size of the echo amplitude using color coding
	Indicates measurements on reflectors or highly reflective objects using red color coding.

The statuses of the inputs/outputs and of the active fields are displayed at the bottom of the screen (2):

- ■ Gray: inactive
- ■ Green: active

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4.9 Service/Diagnosis
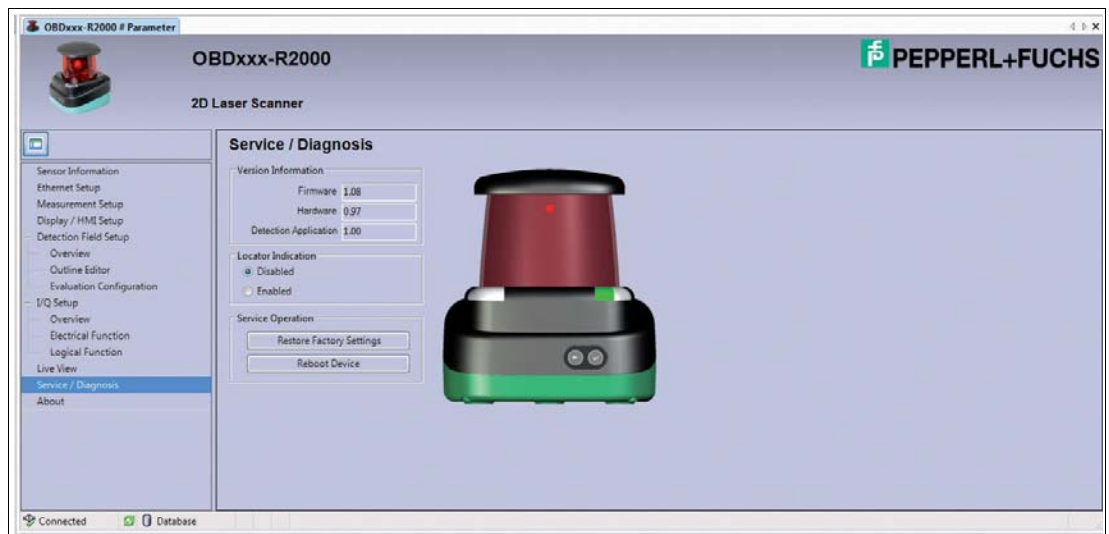
The **Service/Diagnosis** window contains information about the firmware and hardware version.

▶ Enabling/disabling the locator indication on the laser scanner

To make it easier to locate the laser scanner in the system, you can choose to activate the locator indication.

1. In the **Locator Indication** section, activate the **Enabled** option.
   ↳ The two LEDs **PWR** and **Q2** on the laser scanner will flash.

2. In the **Locator Indication** section, activate the **Disabled** option.
   ↳ The locator indication is disabled.

▶ Resetting the 2D laser scanner to factory settings

1. In the **Service Operation** section, click the **Restore Factory Settings** button.
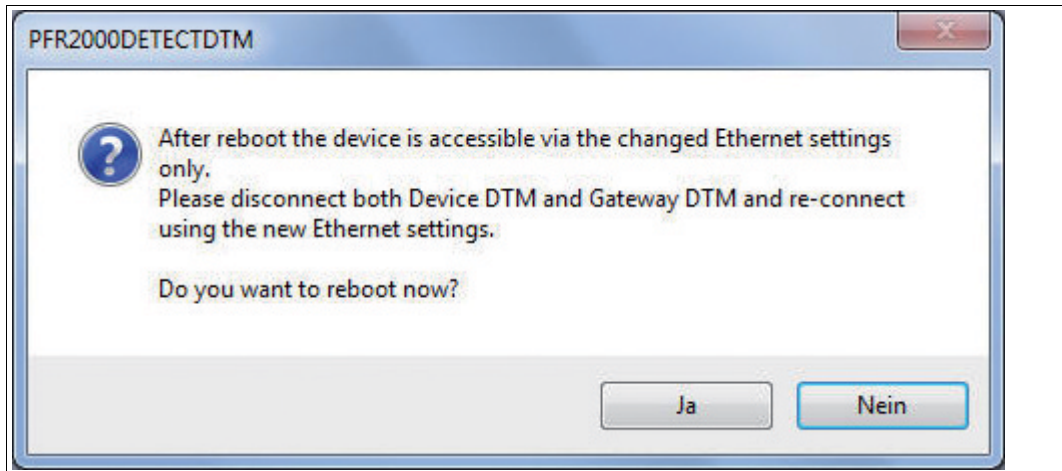   ↳ A dialog box opens.
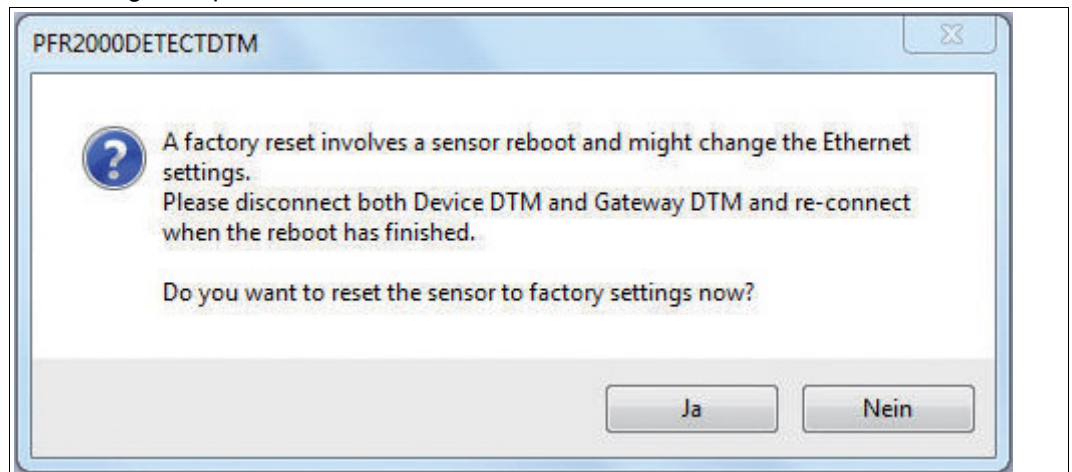
2. Confirm with **Yes** to continue.
   ↳ The 2D laser scanner reverts to its factory settings.

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Restarting 2D laser scanner

1. In the **Service Operation** section, click on the **Reboot Device** button.

   ↳ A dialog box opens.

2. Confirm with **Yes** to continue.

   ↳ The 2D laser scanner is restarted.

4.10 About

The **About** window displays information about the DTM version.

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