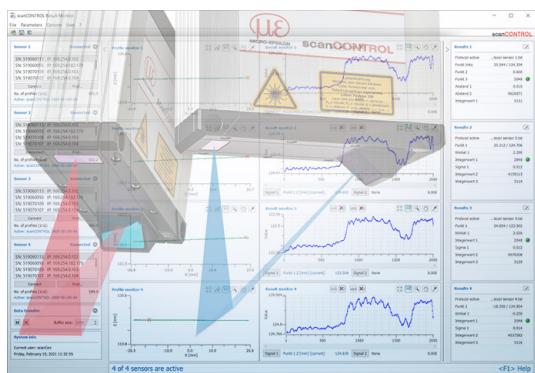




## Operating Instructions



scanCONTROL Result Monitor 1.1

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## Contents

<b>1.</b>	<b>Introduction .....</b>	<b>4</b>
1.1	Using this Manual .....	4
1.2	Overview of the Complete System .....	4
1.3	Definition of Basic Terms .....	5
<b>2.</b>	<b>Installation and Preparation for Measuring Operation .....</b>	<b>6</b>
2.1	Installation Requirements .....	6
2.2	Software Installation.....	6
2.3	Connecting scanCONTROL to the PC.....	6
<b>3.</b>	<b>Working with Result Monitor .....</b>	<b>8</b>
3.1	Starting the Software .....	8
3.2	Log into the System .....	8
3.3	The Control and Display Elements .....	8
3.4	Selecting the scanCONTROL Measuring System .....	9
3.5	Adjusting Basic Settings .....	11
3.6	Menu Bar.....	13
3.7	"General" Toolbar .....	14
3.8	"Display" Toolbar .....	15
3.9	"Measurement" Toolbar.....	15
3.10	Saving and Loading Parameters .....	15
3.10.1	Saving Parameters.....	16
3.10.2	Loading Parameters.....	16
3.11	Saving and Loading of Layout Settings.....	16
3.11.1	Saving Layout Settings .....	16
3.11.2	Loading Layout Settings .....	16
3.12	Resetting Parameters to Default Settings.....	17
3.13	Activating Parameters on scanCONTROL.....	18
3.14	Logging Results .....	19
3.15	Saving Ring Buffer .....	19
3.16	Settings for Analysis of Measured Values .....	20
3.17	Control of Analysis of Measured Values .....	20
3.18	Adjusting scanCONTROL Network Settings (Ethernet Configurator) .....	21
3.19	Exiting the Software .....	22
<b>4.</b>	<b>Working with the scanCONTROL Measuring System.....</b>	<b>23</b>
4.1	Operating Modes .....	23
4.1.1	Continuous Measurement .....	23
4.1.2	Triggered Measurement .....	23
4.2	Outputting Measured Values .....	23
4.2.1	Pin Assignment of the Analog Outputs.....	23
4.2.2	Pin Assignment of the Digital Outputs .....	24
4.2.3	Pin Assignment of Serial Port .....	24
4.2.4	Converting the Measured Values to Real Coordinates .....	24
4.3	Activating "User Modes" .....	25
4.3.1	Activating User Modes Using the Serial Port (ASCII) .....	25
4.3.2	Activating User Modes Using Modbus .....	25
4.3.3	Activating User Modes via Ethernet (TCP) .....	26
4.3.4	Loading of User Modes using 2D/3D Gateway .....	27
<b>5.</b>	<b>Appendix.....</b>	<b>28</b>
5.1	Status and Error Messages .....	28
5.2	Notes and Tips on Using scanCONTROL .....	29
5.3	Key Shortcuts.....	30

## 1. Introduction

This user manual provides an overview of the functions of the "scanCONTROL Result Monitor" software, referred to in short as "Result Monitor". Result Monitor offers you the opportunity to perform typical measuring tasks using the scanCONTROL measuring system, monitor measuring and the measuring progress and record the measured values. A parallel transfer of the measured values to the control is possible and recommended. The scanCONTROL measuring system is a laser line sensor which is designed for applications in the industrial environment.

This product is distinguished by varied options for use and high measuring accuracy. Result Monitor provides you with ways to solve different applications combined with maximum precision.

### 1.1 Using this Manual

This user manual contains general information on the installation and use of Result Monitor and on the use of the scanCONTROL measuring system. As a user of the software, it is important that you read Chapter 2 "[Installation and Preparation for Measuring Operation](#)". Chapter 3 "[Working with Result Monitor](#)" explains how to use the functions offered by the software. Chapter 4 "[Working with the scanCONTROL Measuring System](#)" describes how to work with the scanCONTROL measuring system.

---

**Note:** Please refer to the contact address printed on the inside cover for any issues relating to queries and support or any other technical information.

---

### 1.2 Overview of the Complete System

Result Monitor receives profile data and measurements in a simple way from up to four scanCONTROL measuring systems and displays these graphically. All data are transferred via Ethernet, and can be stored with the software if needed.

The scanCONTROL measuring system records two-dimensional profile data, sequentially processes the data in function modules and analyzes these, and determines user-defined measured values and evaluates these. The measured values are output at various ports (see Fig. 1.1), e.g. to a connected controller. Result Monitor is used to visualize and log the preconfigured measurements parallel, but does not access these interfaces.

	scanCONTROL 25XX/26XX/29XX/30XX
RS422 (ASCII format, binary)	half-duplex
RS422 (Modbus RTU protocol)	half-duplex
Ethernet (UDP, ASCII format, binary)	yes
Ethernet (Modbus TCP protocol)	yes
Analog out	x4 *
Digital out	x8 *
ProfiNET	yes **
Ethernet/IP	yes **
EtherCAT	yes **

\* optional, 2D/3D Output Unit is required

\*\* optional, 2D/3D Gateway is required

Fig. 1.1: Measured values output ports

---

**Note:** The transfer and display of measured values is only possible with scanCONTROL measuring systems of the SMART product type.

---

**Note:** The following software packages can be used to parameterize the scanCONTROL measuring system and configure the measurement tasks:

- scanCONTROL Application Tools
  - scanCONTROL Configuration Tools (version 6.3 and above)
-

Function
Visualization of profiles and measurement results
Logging measurement results
Statistical analysis of measurement results
Saving profile sequences
Activating stored parameters (user modes)
Saving and restoring parameters and layout settings
Select language

Fig. 1.2: Functional scope of scanCONTROL Result Monitor

### 1.3 Definition of Basic Terms

- **Profile/Profile data:** A profile consists of individual measuring points. Each of these points is defined by its X and Z coordinate.
- **X coordinate:** The horizontal coordinate of a point.
- **Z coordinate:** The vertical coordinate of a point.
- **Profile sequence:** A chronologically consecutive series of profiles.
- **Scan rate:** Refers to the number of measuring operations performed per second.
- **Measuring operation:** Refers to the operation in which a profile is recorded by scanCONTROL and all measured values are determined.

## 2. Installation and Preparation for Measuring Operation

### 2.1 Installation Requirements

The following minimum system specifications are necessary for the operation of Result Monitor:

- Windows 8 or 8.1 (64 bit), Windows 10 (64 bit), Windows 11 (64 bit)
- 1 GHz processor (64 bit) or higher
- 1 GB RAM

---

**Note:** Due to a high data rate, we recommend using a Gigabit Ethernet connection and a high-quality Ethernet PC plug-in card, for example IntelPro/1000 PT.

---

To be able to use Result Monitor, the following steps must be followed:

- ➡ 1. Install the Ethernet port hardware, if not already installed.
- ➡ 2. Install Result Monitor (see Chapter [2.2](#)).
- ➡ 3. Connect the scanCONTROL measuring system to the PC via Ethernet.

[Installation package]:\Documentation	Contains the manual and installation instructions
[Installation package]:\License	Contains licensing information for Result Monitor
[Installation package]:\Program\scanCONTROL Result Monitor 1.1\x64	Contains scanCONTROL Result Monitor 1.1
[Installation package]:\Support\Ethernet	Contains a software tool for configuration of the IP addresses of scanCONTROL measuring systems with an Ethernet interface
[Installation package]:\Support\FlImageFilter\x64	Contains filter files for integrating DirectX
[Installation package]:\Support\VCRedist2008	Contains the "Microsoft Visual C++ 2008" Redistributable Package
[Installation package]:\Support\VCRedist2017	Contains the "Microsoft Visual C++ 2017" Redistributable Package

*Fig. 2.1: Contents of the installation package*

### 2.2 Software Installation

After extracting the installation files to a temporary folder, an installation window appears which offers you a number of options. Alternatively you can start the window with the [Temporary folder]:\setup.exe file.

- ➡ Click on the "Install" button to start installing the software.

Now the installation wizard installs the software and necessary components.

---

**Note:** Activate the "Configure Windows firewall" option to enable data transfer between measuring system and the Software if there is an active firewall.

---

**Note:** If a third-party firewall is installed on your operating system, you must include Result Monitor in the firewall exception list to enable communication between the measuring system and the software.

---

### 2.3 Connecting scanCONTROL to the PC

In order to connect scanCONTROL via Ethernet to the PC, proceed as follows:

- ➡ Complete the entire installation of scanCONTROL Result Monitor. This process is described in Chapter [2.2](#).
- ➡ Connect scanCONTROL via the Ethernet interface to the PC and switch on the power supply.
- ➡ Please wait until the scanCONTROL measuring system is recognized by the PC. This may take a few seconds.

The system is now ready to operate the scanCONTROL measuring system with scanCONTROL Result Monitor.

---

**Note:** scanCONTROL must be connected directly to the PC. Do not use hubs and only suitable switches.

---

**Note:** If your network adapter supports the "VLAN" option, this option must be deactivated in order to operate the scanCONTROL measuring system.

---

**Note:** To be able to operate the scanCONTROL measuring system, the PC and the measuring system must be located in the same subnet. If necessary, use the "Ethernet Configurator" dialog (see Chapter [3.16](#)) to adjust the measuring system's network settings.

---

### 3. Working with Result Monitor

#### 3.1 Starting the Software

Once software installation has been completed, start Result Monitor. To do this, use the program shortcut on your desktop or select "scanCONTROL Result Monitor" in the Start menu.

After you start the program, the software automatically connects to scanCONTROL and visualizes current profile data and related measurement results. An extensive description of the control and display elements is provided in Chapter 3.3.

**Note:** The transfer of measured values is only possible if this has been configured in advance and the appending to profile data has been activated (see Chapter 1.2).

#### 3.2 Log into the System

The system is protected against unauthorized changes with a password (see below). After starting the program, no user is logged into the system. Use the "User → Log on" or "User → Log off" menu item to log into or out of the software.

Name	Password	Rights
---	---	Reduced functionality
scanCon	scancon	Access to the entire system

#### 3.3 The Control and Display Elements

After you start the program, the software automatically connects to scanCONTROL and visualizes current profile data and associated measurement results (see Fig. 3.1).

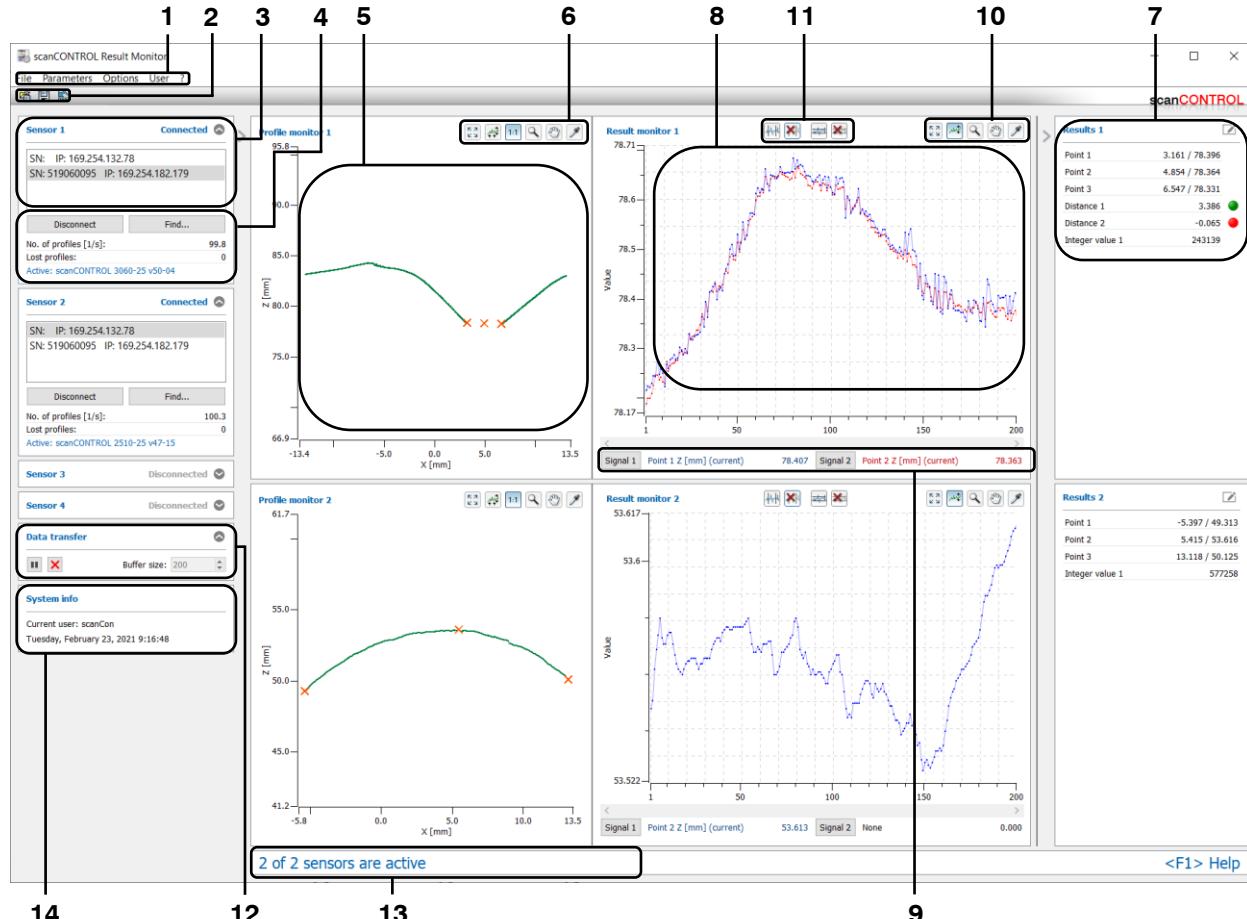


Fig. 3.1: The Control and Display Elements

The structure of the user interface is divided into the following sections:

- 1 Menu bar:** Calls up various settings and functions (see Chapter 3.6).
- 2 "General" toolbar:** Using this toolbar, you can load parameters (see Chapter 3.10.2), save parameters (see Chapter 3.10.1) and reset parameters to default settings (see Chapter 3.12).
- 3 Sensor selection:** Select a scanCONTROL measuring system to display its profiles and results (see Chapter 3.4).
- 4 Sensor status:** This section displays current information from the scanCONTROL measuring system (see Chapter 3.4 and 5.1).
- 5 Profile display:** This display visualizes the currently measured profile and, if applicable, associated measuring points. You can scale the profile display by using the "Display" toolbar (see Chapter 3.8).
- 6 "Display" toolbar:** Use this toolbar to scale the profile display and activate various options for mouse interaction (see Chapter 3.8).
- 7 Results display:** This display lists all available measured values. The measured values are continuously updated. The names of the measured values can be edited.
- 8 Measured values progression:** This display visualizes the measured values selected for analysis over time.
- 9 Analysis of measured values:** This section lets you select the measured values for measured values progression and statistical analysis (see Chapter 3.16).
- 10 "Display" toolbar:** Use this toolbar to scale the display of the measured values progression and activate various options for mouse interaction (see Chapter 3.8).
- 11 "Measurement" toolbar:** Use this toolbar to set the various limits for analysis (see Chapter 3.9).
- 12 Data transfer:** Set the buffer size and control the measured values progression (see Chapter 3.17).
- 13 Status bar:** Status and error messages are displayed in the status bar (see Chapter 5.1).
- 14 System info:** This section displays the user who is currently logged in and the system time.

You can change the size of individual sections or hide the sections.

### 3.4 Selecting the scanCONTROL Measuring System

When the software is started, Result Monitor automatically reestablishes the connection with the scanCONTROL measuring system that was connected last. You can manage the sensor connections in the "Sensor selection" input field (see Fig. 3.2).

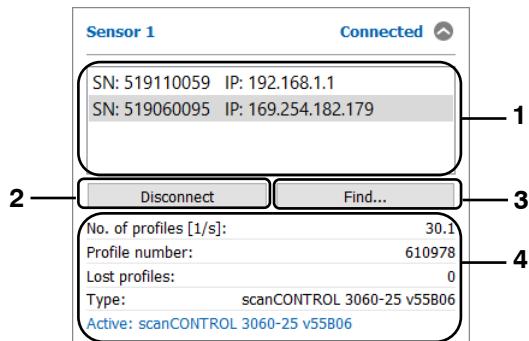


Fig. 3.2: "Sensor selection" input field

Parameters in the "Sensor selection" input field:

- 1 - **List of sensors:** This list contains all scanCONTROL measuring systems connected to the PC.
- 2 - **Connect/Disconnect:** Depending on the selection in the sensor list, this button provides the following functions:
  - **Disconnect:** If the currently active measuring system has been selected in the selection list, you can use the "Disconnect" button to terminate the connection to the measuring system.
  - **Connect:** If a measuring system that is currently not connected to Result Monitor has been selected in the selection list, you can use the "Connect" button to establish a connection to the selected measuring system. The connection to the previously connected measuring system is terminated in the process.
- 3 - **Find...:** Click this button to identify all measuring systems that are connected via Ethernet to the PC. This function is performed automatically when you start the software. After the process has been completed, the list of sensors is updated and you can switch between the measuring systems found.
- 4 - If the sensor is connected, current information of the scanCONTROL measuring system is displayed below the "Sensor selection" input field. You may configure the display in the basic settings (see Chapter 3.5).
  - **No. of profiles [1/s]:** This value shows the effective scan rate that is used to analyze sensor data. There may be a discrepancy between the setpoint value and the actual value for the scan rate if the number of scans is set too high for the processing power of the PC.
  - **Profile number:** The current profile number.
  - **Lost profiles:** The number of lost profiles since resetting the counter (connecting to the measuring system or using the "Reset lost profiles" button in the "Settings" dialog, see Chapter 3.5).
  - **Type:** The currently used type of measurement system and the associated firmware version are displayed.
  - **Status line:** Status and error messages are displayed on the status line (see Chapter 5.1).

### 3.5 Adjusting Basic Settings

Select the "Options → Settings" menu item to specify basic settings for the software. The "Settings" dialog is displayed (see Fig. 3.3).

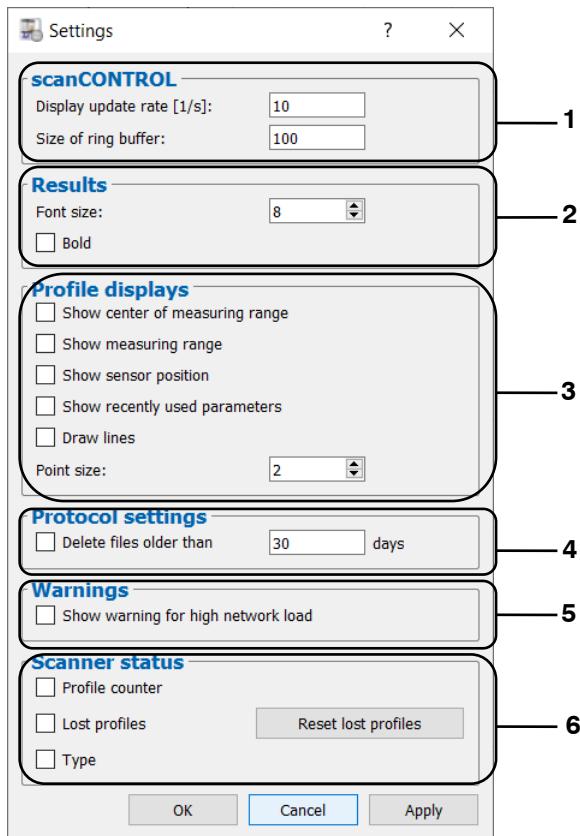


Fig. 3.3: "Settings" dialog

Parameters in the "Settings" dialog:

- 1 - **Display update rate [1/s]:** Specify the speed at which the display is updated.  
- **Size of ring buffer:** Specify the size of the ring buffer that can be saved to a file by using the "Save Ring Buffer" menu (see Chapter 3.15).
- 2 - **Font size:** Enter the font size for the numerical display of the result values here.  
- **Bold:** Enter the font format for the numerical display of the result values here.
- 3 - **Show center of measuring range:** Shows the center of measuring range in the profile display.  
- **Show measuring range:** Shows the measuring range in the profile display.  
- **Show sensor position:** Shows the sensor position in the profile display.  
- **Show recently used parameters:** Shows the recently used parameters in the profile display.  
- **Draw lines:** Draws a straight line between adjacent points in the profile display.  
- **Point size:** Defines the point size in the profile display.
- 4 - **Delete files older than [days]:** If this option is active, log files that are older than the value set are automatically deleted.
- 5 - **Show warning for high network load:** Displays a warning when high network load occurs.
- 6 - **Profile counter:** Shows the current profile number (0 - 16777215).  
- **Lost profiles:** Shows the number of lost profiles since connecting to the measuring system.  
- **Reset lost profiles:** Press this button in order to reset the lost profiles counter.  
- **Type:** Shows the currently used type of measurement system and the associated firmware version.



### 3.6 Menu Bar

A summary of the menu bar functions is provided below.

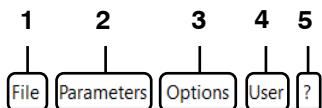


Fig. 3.4: Menu bar

**1 - File:**

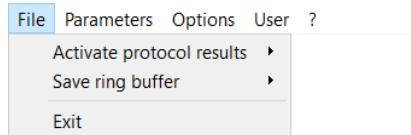


Fig. 3.5: "File" menu

- **Activate protocol results:** Activates saving of measured values of the respective sensor to an ASCII file for analytical purposes (see Chapter 3.14).
- **Save ring buffer:** Saves profiles from the ring buffer of the respective sensor to a file (see Chapter 3.15).
- **Exit:** Ends Result Monitor.

**2 - Parameters:**

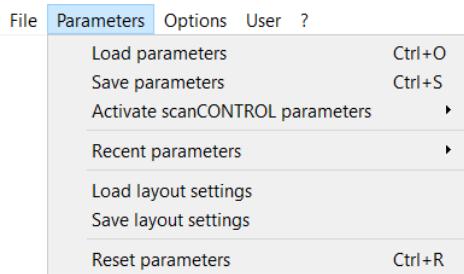


Fig. 3.6: "Parameters" menu

- **Load parameters:** Loads parameters of Result Monitor from a file (see Chapter 3.10.2).
- **Save parameters:** Saves the parameters of Result Monitor to a file (see Chapter 3.10.1).
- **Activate scanCONTROL parameters:** Activates parameters that have been saved on the respective sensor scanCONTROL measuring system (see Chapter 3.13).
- **Recent parameters:** Loads previously saved or loaded parameters.
- **Load layout settings:** Loads layout settings of Result Monitor from a file (see Chapter 3.11.2).
- **Save layout settings:** Saves the layout settings of Result Monitor to a file (see Chapter 3.11.1).
- **Reset parameters:** Resets parameters and layout settings to default settings (see Chapter 3.12).

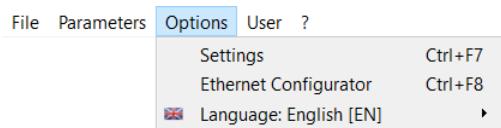
**3 - Options:**

Fig. 3.7: "Options" menu

- **Settings:** Activates a dialog where you can specify basic settings (see Chapter 3.5).
- **Ethernet Configurator:** Opens a dialog where you can modify the network settings (IP address, etc.) of scanCONTROL measuring systems (see Chapter 3.18).
- **Language:** Select the display language of Result Monitor:
  - **English [EN]:** English.
  - **Deutsch [DE]:** German.

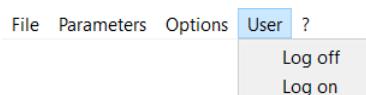
**4 - User:**

Fig. 3.8: "User" menu

- **Log off:** Logs out the current user (see Chapter 3.2).
- **Log on:** Opens a dialog where you can log in with name and password (see Chapter 3.2).

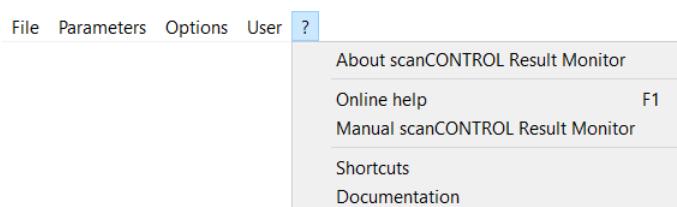
**5 - ?:**

Fig. 3.9: "?" menu

- **About Result Monitor:** Opens an information window about Result Monitor.
- **Online help:** Opens the documentation for the current view.
- **Manual scanCONTROL Result Monitor:** Opens the Result Monitor operating instructions.
- **Shortcuts:** Opens an overview of the available shortcut keys (see Chapter 5.3).
- **Documentation:** Opens an overview where you can call up various help screens and documentation (installation guide, user manual, data sheet, operating instructions, ...).

**3.7 "General" Toolbar**

A summary of the functions of the "General" toolbar is provided below.



Fig. 3.10: "General" Toolbar

- Loads measuring program parameters from a file (see Chapter 3.10.2).
- Saves the parameters of all active measuring programs to a file (see Chapter 3.10.1).
- Resets parameters to default settings (see Chapter 3.12).

### 3.8 "Display" Toolbar

A summary of the functions of the "Display" toolbar is provided below.



*Fig. 3.11: "Display" toolbar*

- Click this button to reset the profile/result monitor display. This causes the settings of the profile display to be reset in such a way that the entire measuring/results range is displayed.
- You activate or deactivate automatic scaling of the profile display by clicking this button. If automatic scaling is activated, the profile display automatically adjusts to the smallest and largest profile point measured by scanCONTROL.
- Click this button to activate or deactivate the "Keep aspect ratio" option. If this option is activated, the profile display is scaled in such a way that the real aspect ratio of the displayed profile is retained. If this option is deactivated, the scaling is adapted separately to the actual values for the X and Y axes.
- You activate or deactivate the "Zoom" mode by clicking this button. In this mode, you can zoom into the profile/result monitor display and thereby directly set the scaling of the profile/result monitor display with your mouse.
- You activate or deactivate the "Move" mode by pressing this button. You can move the profile/result monitor display if the "Move" mode is activated.
- Click this button to activate or deactivate the "Point information" mode.
- Activates or deactivates automatic scaling of the vertical display area. If automatic scaling is activated, the vertical display area automatically adjusts to the smallest and largest values of the result values that you chose for analysis.

### 3.9 "Measurement" Toolbar

Use this toolbar to set the various limits for evaluation (see Fig. 3.12).



*Fig. 3.12: "Measurement" toolbar*

- Activates or deactivates "Set evaluation lines" mode. Use this setting to define the range for the statistical evaluation of measured values. By default, all measured values are evaluated.
- Removes the evaluation range. All the recorded values are used for statistical evaluation.
- Activates or deactivates "Set marker lines" mode. Using this setting, you define two marker lines that are used to acquire undershoots or overshoots (peaks).
- Removes the marker lines.

### 3.10 Saving and Loading Parameters

Result Monitor allows you to save and load parameter sets. For example, you can save parameters for different measuring settings and therefore configure the measuring system for different measuring tasks.

Once you have saved all the parameters for measurement settings you can load them again later on. You can save the parameters for as many measuring tasks as you like.

### 3.10.1 Saving Parameters

To save parameters, either select the "Parameters → Save parameters" menu item or click the corresponding button (see Fig. 3.13) on the "General" toolbar.



Fig. 3.13: "Save parameters" button

A standard Windows dialog is displayed for selection of the path and file name for saving the parameters. The file name has the extension ".sr1". The parameters are saved in the selected file after confirmation of the dialog.

### 3.10.2 Loading Parameters

To load previously saved parameters, either select the "Parameters → Load parameters" menu item or click the corresponding button (see Fig. 3.14) on the "General" toolbar.



Fig. 3.14: "Load parameters" button

A standard Windows dialog is displayed for selection of the path and file name from which the parameters should be loaded. The file name has the extension ".sr1". The parameters are loaded after confirmation of the dialog.

---

**Note:** Use the "Parameters → Recent parameters" menu item to load previously saved or loaded parameters.

---

## 3.11 Saving and Loading of Layout Settings

Result Monitor allows you to save and load layout settings sets. In this way you can configure the layout of the system according to your own needs.

Once you have saved the layout settings you can load them again later on. You can save the layout settings for as many measuring tasks as you like.

### 3.11.1 Saving Layout Settings

To save layout settings, select the "Parameters → Save layout settings" menu item.

A standard Windows dialog is displayed for selection of the path and file name for saving the layout settings. The file name has the extension ".xml". The layout settings are saved in the selected file after confirmation of the dialog.

### 3.11.2 Loading Layout Settings

To load previously saved layout settings, select the "Parameters → Load layout settings" menu item.

A standard Windows dialog is displayed for selection of the path and file name from which the layout settings should be loaded. The file name has the extension ".xml". The layout settings are loaded after confirmation of the dialog.

### 3.12 Resetting Parameters to Default Settings

To reset parameters to their default settings, either select the "Parameters → Reset parameters" menu item or click the corresponding button (see Fig. 3.15) on the "General" toolbar.



Fig. 3.15: "Reset parameters" button

A dialog is displayed (see Fig. 3.16) where you can select which parameters should be reset.

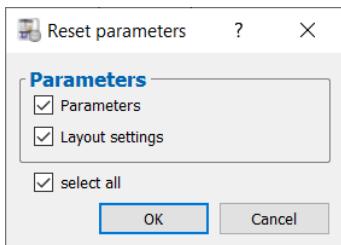


Fig. 3.16: "Reset parameters" dialog

The following parameters can be reset:

- **Parameters:** Parameters of Result Monitor (see Chapters 3.5, 3.16 and 3.17).
- **Layout settings:** Layout settings (see Chapter 3.5).

### 3.13 Activating Parameters on scanCONTROL

Result Monitor allows you to activate various predefined parameter sets (user modes) on the currently connected sensors.

To activate a specific parameter set on the connected scanCONTROL measuring system, select the "Parameters → Activate scanCONTROL parameters → Activate scanCONTROL parameters sensor X" menu item.

The dialog "Activate user mode sensor X" is displayed. In this dialog, select the parameter set (user mode) to be activated. After you have confirmed the dialog with OK, the selected parameters are activated on the scanCONTROL measuring system.

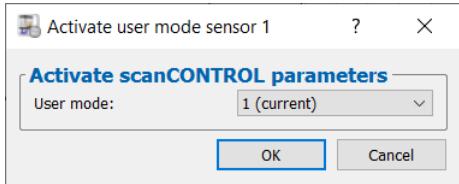


Fig. 3.17: "Activate user mode sensor X" dialog

### 3.14 Logging Results

Result Monitor allows you to log measured values to an ASCII file. To activate a logging of measured values, select the "File → Activate protocol results → Activate protocol results sensor X" menu item (see Fig. 3.18):

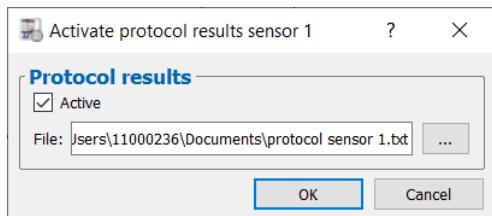


Fig. 3.18: "Activate protocol results sensor X" dialog

- **Active:** Activate or deactivate logging of results.
- **File:** Specify the path and file name of the log file.

---

**Note:** A time stamp in "YYYY-MM-DD" format is appended to the file name. Where YYYY is year, MM month, DD day, HH hour, MM minute, SS second.

---

### 3.15 Saving Ring Buffer

The ring buffer is continuously filled with profile data from the measuring system.

To save a profile sequence from the ring buffer, select the "File → Save ring buffer → Save ring buffer sensor X" menu item.

A standard Windows dialog is displayed for selection of the path and file name for saving the profile sequence. The ring buffer is not filled during the file selection process. Once the selection has been confirmed, the profiles from the ring buffer are saved in the selected file, and the filling of the ring buffer is continued.

---

**Note:** A "%" character in the file name is replaced by a time stamp in "YYY-MM-DD\_ HH-MM-SS" format. Where YYYY is year, MM month, DD day, HH hour, MM minute, SS second.

---

### 3.16 Settings for Analysis of Measured Values

Proceed as follows to analyze the development of a measured value over time:

- ➡ Click on the "Signal X" button.

The following dialog is displayed:

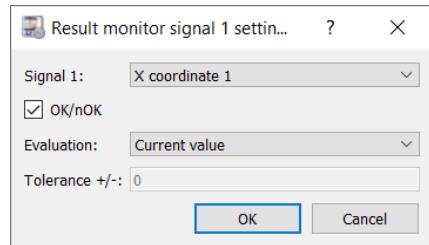


Fig. 3.19: "Result Monitor signal X settings" dialog

The following settings are available:

- **Signal X:** Select the measured value to be analyzed.
- **OK/nOK:** If the OK/nOK evaluation is activated for the measured value, it can be selected for analysis.
- **Evaluation:** Select the statistical characteristic that is to be determined:
  - **Current value:** The currently measured value.
  - **Minimum value:** The smallest measured value.
  - **Maximum value:** The largest measured value.
  - **Mean value:** The mean value.
  - **No. of min. peaks:** Number of times measurements fell below the bottom marker line.
  - **No. of max. peaks:** Number of times measurements exceeded the top marker line.
  - **No. of peaks:** Number of times measurements fell below the bottom or exceeded the top marker line.
  - **Standard deviation:** The standard deviation of the measured values.
  - **Capability gauge measurement (CGM):** Capability index, calculated as follows:  
 $0.2 * \text{abs}(2 * \text{tolerance}) / (6 * \text{standard deviation})$ .

---

**Note:** For 50 measured values, the above specifications are sufficient for checking measuring equipment capability ("Statistical Procedures for Machine and Process Qualification"; 3rd edition; Edgar Dietrich, Alfred Schulze; Carl Hanser Verlag Munich, Vienna) if the following condition is fulfilled: CGM  $\geq 1.33$  (process 1).

---

- **Tolerance +/-:** The tolerance value for calculating the capability index.

### 3.17 Control of Analysis of Measured Values

Set the buffer size and control the measured values progression (see Fig. 3.20).

- ➡ In the "Buffer size" section, enter the buffer size. The buffer size determines the maximum number of measured values that are used for statistical evaluation. If the maximum number of measured values has been reached, the system deletes the oldest values from the buffer and inserts the current values into the buffer.
- ➡ Click the "Start data transfer" button to start or resume the measured values progression.
- ➡ Click the "Stop data transfer" button to interrupt the measured values progression.
- ➡ Click the "Clear buffer" button to delete the contents of the buffer.

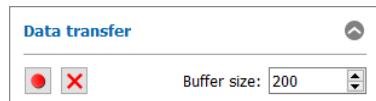


Fig. 3.20: "Data transfer" dialog

### 3.18 Adjusting scanCONTROL Network Settings (Ethernet Configurator)

Applications Tools lets you adjust the network settings (IP address, etc.) of the measuring system. Use the "Options → Ethernet Configurator" menu item for this purpose. The "Ethernet Configurator" dialog will open.

**Note:** To be able to operate a scanCONTROL measuring system via Ethernet with Result Monitor, the measuring system and PC must be located in the same subnet. Adjust any relevant network settings for the measuring system in the "Ethernet Configurator" dialog.

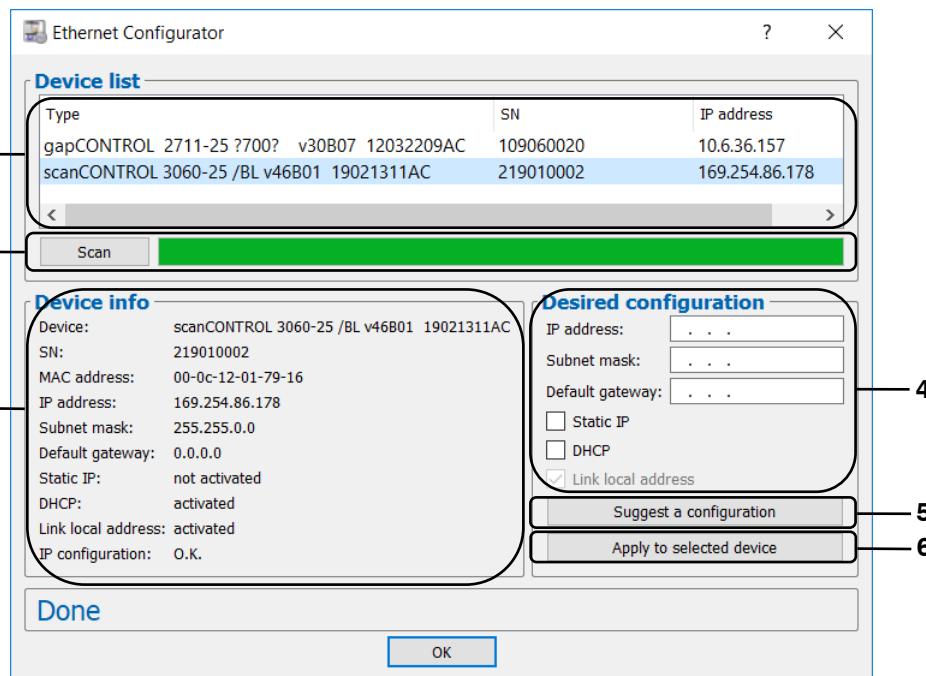


Fig. 3.21: "Ethernet Configurator" dialog

Display elements and parameters in the "Ethernet Configurator" dialog:

- 1 **Device list:** This display lists all available measuring systems. Use the "Scan" button to update this list. Select the desired measuring system.
- 2 **Scan:** Click this button to scan for scanCONTROL measuring systems in all subnets connected to the PC. The scan progress is displayed. When the scanning is complete, any found measuring systems are displayed in the list.
- 3 **Device info:** The current settings of the selected scanCONTROL measuring system are displayed:
  - **Device:** Device name.
  - **SN:** Serial number.
  - **MAC address:** Physical address.
  - **IP address:** IP address.
  - **Subnet mask:** Subnet mask.
  - **Default gateway:** Default gateway.
  - **Static IP:** "Static IP address" option active.
  - **DHCP:** "DHCP" option active.
  - **Link local address:** "Link local address" option active.
  - **IP configuration:** Indicates whether the network configuration is valid. If the network configuration is not valid, the measuring system cannot be operated using Result Monitor.

- 4 **Desired configuration:** Use these input fields to enter the desired network configuration for the selected scanCONTROL measuring system:
  - **IP address:** IP address.
  - **Subnet mask:** Subnet mask.
  - **Default gateway:** Default gateway.
  - **Static IP address:** "Static IP address" option. If this option is active, dynamic address assignment is inactive. The IP address entered is used as IP address. This parameter takes priority over the "DHCP" and "Link local address" options.
  - **DHCP:** "DHCP" option. If this option is active, an IP address is assigned dynamically through a DHCP server. This parameter takes priority over the "Link local address" option.
  - **Link local address:** "Link local address" option. If this option is active, the IP address is assigned dynamically in the local subnet 169.254.x.x. This option is always enabled.
- 5 **Suggest a configuration:** Click this button to have a suitable configuration for the selected scanCONTROL measuring system determined automatically. After the process has been completed, the system automatically enters the corresponding values in the input fields of the "Desired configuration" section.
- 6 **Apply to selected device:** Use this button to apply the network configuration specified in the "Desired configuration" section to the selected scanCONTROL measuring system.

Proceed as follows to manually enter the network configuration parameters for a scanCONTROL measuring system:

- ➡ When the "Ethernet Configurator" dialog is opened, the system automatically searches for available measuring systems. If the measuring system is not yet connected to your subnet, establish a connection, and click the "Scan" button.

When scanning is complete, the measuring system is displayed in the device list.

- ➡ Select the required measuring system from the device list.
- ➡ Specify the desired network settings in the input fields of the "Desired configuration" section.
- ➡ Click the "Apply to selected device" button to apply the settings to the selected measuring system.
- ➡ Confirm the "Ethernet Configurator" dialog with OK.

Proceed as follows to automatically specify network configuration parameters for a scanCONTROL measuring system:

- ➡ When the "Ethernet Configurator" dialog is opened, the system automatically searches for available measuring systems. If the measuring system is not yet connected to your subnet, establish a connection, and click the "Scan" button.

When scanning is complete, the measuring system is displayed in the device list.

- ➡ Select the required measuring system from the device list.
- ➡ Click the "Suggest a configuration" button to have a suitable network configuration for the selected scanCONTROL measuring system determined automatically.

After the process has been completed, the system automatically enters the corresponding values in the input fields of the "Desired configuration" section.

- ➡ Click the "Apply to selected device" button to apply the settings to the selected measuring system.
- ➡ Confirm the "Ethernet Configurator" dialog with OK.

### 3.19 Exiting the Software

Select the menu item "File → Exit" or press the standard Windows button  in the title bar of the program window in order to exit scanCONTROL Result Monitor.

## 4. Working with the scanCONTROL Measuring System

The scanCONTROL measuring system records two-dimensional profile data, analyzes the profile data, determines measured values and evaluates these. The measured values are output at various ports. Result Monitor visualizes the measurement results of the measuring system, but is not definitively required to operate the measuring system. The scanCONTROL measuring system operates as an independent unit and performs measurements. Handling the measuring system and the interfaces is described in the following.

**Note:** Always exit the software first and **then** disconnect the connection between the measuring system and the PC.

### 4.1 Operating Modes

Depending on how the scanCONTROL measuring system was set up, two different operating modes are possible when measurements are performed.

#### 4.1.1 Continuous Measurement

scanCONTROL measures continuously at the specified scan rate.

#### 4.1.2 Triggered Measurement

Depending on the type of sensor, the following interfaces are available for triggering scanCONTROL:

	scanCONTROL 25XX/26XX/29XX/30XX
RS422	half-duplex
Digital in	yes

Every trigger signal triggers a measurement operation. For technical details, please refer to the instruction manual of the measuring system used.

RS422 interface					
scanCONTROL 25XX/26XX/29XX			scanCONTROL 30XX		
Pin	Assignment	Cable color PC2600-x/ PC2900-x/PCR3000-x	Pin	Assignment	Cable color PC2600-x/ PC2900-x/PCR3000-x
4	GND-In1	green	10	GND-RS422	violet
11	RS422 -	gray-pink	11	RS422 -	gray-pink
12	RS422 +	red-blue	12	RS422 +	red-blue

Digital input					
scanCONTROL 25XX/26XX/29XX			scanCONTROL 30XX		
Pin	Assignment	Cable color PC2600-x/ PC2900-x/PCR3000-x	Pin	Assignment	Cable color PC2600-x/ PC2900-x/PCR3000-x
4	GND-In1	green	7	GND-In	black
6	In1	yellow	4	In1	green

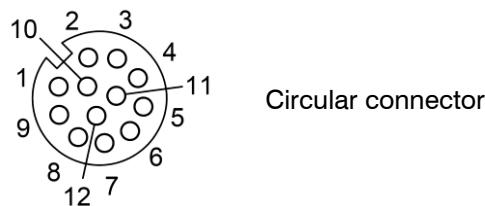


Fig. 3.22: scanCONTROL 25XX/26XX/29XX/30XX trigger input (RS422 interface half-duplex and digital input, view on solder side of plug)

### 4.2 Outputting Measured Values

#### 4.2.1 Pin Assignment of the Analog Outputs

For detailed information on pin assignment and use of analog outputs, please refer to the scanCONTROL operating instructions and the manuals for the bus and output terminals used.

#### 4.2.2 Pin Assignment of the Digital Outputs

For detailed information on pin assignment and use of digital outputs, please refer to the scanCONTROL operating instructions and the manuals for the bus and output terminals used.

#### 4.2.3 Pin Assignment of Serial Port

The scanCONTROL measuring system provides a serial port that can be used to output selected measured values. The RS422 port exists as half duplex.

scanCONTROL 25XX/26XX/29XX			scanCONTROL 30XX		
Pin	Assignment	Cable color PC2600-x/ PC2900-x/PCR3000-x	Pin	Assignment	Cable color PC2600-x/ PC2900-x/PCR3000-x
4	GND-In1	green	10	GND-RS422	violet
11	RS422 -	gray-pink	11	RS422 -	gray-pink
12	RS422 +	red-blue	12	RS422 +	red-blue

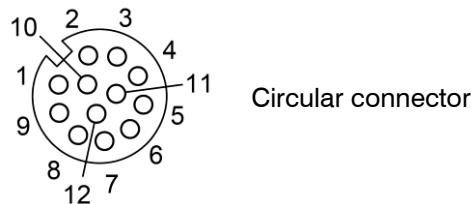


Fig. 3.23: scanCONTROL 25XX/26XX/29XX/30XX RS422 interface half duplex (view on solder side of plug)

#### 4.2.4 Converting the Measured Values to Real Coordinates

The scanCONTROL measuring system calculates measured values in sensor coordinates. Please use the following table to convert the measured values to real coordinates:

Measured value	Conversion
X coordinates [mm]	$y = (x - 32768) * a;$
Z coordinates [mm]	$y = (x - 32768) * a + b;$
Angle [°]	$y = 0.01 * x;$
Offset [mm]	$y = (x - 32768) * a + b;$
Sigma [mm]	$y = x * a;$
Height/width/distance/radius [mm]	$y = x * a;$
Area [mm <sup>2</sup> ]	$y = x * a^2;$
Temperature [°C]	$y = 0.1 * x - 273.10$

Whereby:

- x: Measured values in sensor coordinates.
- y: Converted measured values in millimeters or degrees.
- a: Scaling factor.
- b: Offset (center of measuring range).

The constants a and b have the following values depending on the type of sensor:

Type of sensor	a	b	Type of sensor	a	b
scanCONTROL 25X0-25	0.001	65	scanCONTROL 29X0-10	0.0005	55
scanCONTROL 25X0-50	0.002	95	scanCONTROL 29X0-25	0.001	65
scanCONTROL 25X0-100	0.005	250	scanCONTROL 29X0-50	0.002	95
scanCONTROL 26X0-25	0.001	65	scanCONTROL 29X0-100	0.005	250
scanCONTROL 26X0-50	0.002	95	scanCONTROL 30XX-25	0.001	85
scanCONTROL 26X0-100	0.005	250	scanCONTROL 30XX-50	0.002	125
scanCONTROL 27X0-25	0.001	100	scanCONTROL 30XX-100	0.005	270
scanCONTROL 27X0-50	0.002	210	scanCONTROL 30XX-200	0.007	310
scanCONTROL 27X0-100	0.005	450	scanCONTROL 30XX-430	0.010	520
			scanCONTROL 30XX-600	0.015	850

To invert the profile points, the following formula is used:

$$z[\text{mm}]_{\text{inverted}} = 2*b - a - z[\text{mm}]$$

### 4.3 Activating "User Modes"

The parameter sets (user modes) saved in the scanCONTROL measuring system can be activated using various interfaces. For further details, please refer to the instruction manual of the measuring system used.

In addition, scanCONTROL lets you activate user modes via the serial port or via Ethernet. Available interfaces for activating user modes:

	<b>scanCONTROL 25XX/26XX/29XX/30XX</b>
RS422 (ASCII)	half-duplex
RS422 (Modbus RTU)	half-duplex
Ethernet (Modbus TCP)	yes
Ethernet (TCP)	yes
Digital in	yes

**Note:** For detailed information on activating user modes, please refer to the "Quick Reference" document (see Chapter 3.6, Section 5 "Documentation").

#### 4.3.1 Activating User Modes Using the Serial Port (ASCII)

Configuration of the serial port:

- **Data bits:** 8
- **Parity:** none
- **Stop bits:** 2
- **Flow control:** none
- **Baud rate:** Preset on scanCONTROL.

Please use the following commands:

- Activate user mode: Use the following command to activate a user mode:

```
setq 0xf0f00624 0x[User mode no.]0000000
```

Example: Use the following command to activate user mode 2:

```
setq 0xf0f00624 0x20000000
```

- Determine the current user mode: Use the following command to retrieve the number of the user mode that is currently activated:

```
getq 0xf0f00624
```

scanCONTROL replies as follows:

```
#q 0xf0f00624 0x[User mode no.]0000000
```

**Note:** Specify [User mode no.] in hexadecimal format.

#### 4.3.2 Activating User Modes Using Modbus

Use the serial interface (Modbus RTU) or the Ethernet interface (Modbus TCP) to activate user modes using Modbus. The commands may be implemented as single write commands or as multiple write commands.

**Note:** If individual registers are written, register 32 always must be written last.

Please use the following commands:

- Activate user mode: Write the following holding registers to activate a user mode:

Register	Value	Description
37	0x[User mode no.]000	0x0000 for user mode 0, 0x1000 for user mode 1, ..., 0xf000 for user mode 15
36	0x0000	-
35	0xf0f0	scanCONTROL address for user modes (upper 16 bit)
34	0x0624	scanCONTROL address for user modes (lower 16 bit)
33	0x0000	-
32	0x0002	Corresponds to "setq"

- Determine the current user mode: Write the following holding registers to retrieve the number of the user mode that is currently activated:

Register	Value	Description
35	0xf0f0	scanCONTROL address for user modes (upper 16 bit)
34	0x0624	scanCONTROL address for user modes (lower 16 bit)
33	0x0000	-
32	0x0003	Corresponds to "getq"

The current user mode can now be read from register 37  
(format: 0x[User mode no.]000, e.g., 0x2000 for user mode 2).

#### 4.3.3 Activating User Modes via Ethernet (TCP)

Use a TCP client (port 502) to activate user modes via Ethernet (TCP).

Please use the following command:

- Activate user mode: Use the following binary byte sequence to activate a user mode:

Value	Description
0xf4	Transaction identifier (arbitrary, you may use any number instead of 0xf406)
0x06	
0x00	Protocol identifier (always 0)
0x00	
0x00	Command length
0x13	
0x01	Unit identifier (adjustable: 1 - 247)
0x10	Function code 16 (multiple write command)
0x00	
0x20	Start register
0x00	
0x06	Number of registers
0x0c	Number of bytes
0x00	
0x02	Corresponds to "setq"
0x00	
0x00	-
0x06	scanCONTROL address for user modes (lower 16 bit)
0x24	
0xf0	scanCONTROL address for user modes (upper 16 bit)
0xf0	
0x00	
0x00	-
0x[User mode no.]0	0x00 for user mode 0, 0x10 for user mode 1, ..., 0xf0 for user mode 15
0x00	-

#### 4.3.4 Loading of User Modes using 2D/3D Gateway

You may use the 2D/3D Gateway in order to load user modes via Profinet, Ethernet/IP or EtherCAT. The assignment of the Modbus registers 32-37 to the output data on the gateway is a prerequisite.

Please use the following command:

- Load user mode: Write the following output data bytes in order to load a user mode:

Assigned output data bytes	Corr. Modbus-Register	Value	Description
10-11	37	0x[User mode no.]000	0x0000 for user mode 0, 0x1000 for user mode 1, ..., 0xf000 for user mode 15
8-9	36	0x0000	-
6-7	35	0xf0f0	scanCONTROL address for user modes (upper 16 bit)
4-5	34	0x0624	scanCONTROL address for user modes (lower 16 bit)
2-3	33	0x0000	-
0-1	32	0x0002	Corresponds to "setq"

## 5. Appendix

### 5.1 Status and Error Messages

Various status and error messages are displayed in the status bar of the software. The following messages can appear:

Message	Description	Action
Active: scanCONTROL [Type]([Option])[Version]	No error. Measurement is active.	-
X of X sensors are active		
1 sensor is active		
No sensor is active	No error. No sensor is active.	Select a sensor and click the "Connect" button (see Chapter <a href="#">3.4</a> ).
Internal error	An unknown error has occurred.	Close Result Monitor and reset the sensor to the default settings by briefly interrupting the power supply.
Data transfer interrupted	An error occurred during data transfer.	
No scanCONTROL found	scanCONTROL is not connected to the PC via Ethernet or the scanCONTROL power supply is switched off.	Check the Ethernet connection and check whether the sensor is switched on and supplied with power. Check the Ethernet cable for defects. Check the scanCONTROL network setting (see Chapter <a href="#">3.18</a> )
No free scanCONTROL found	All sensors connected to the computer are already being used by other programs.	Close the other programs accessing scanCONTROL.
scanCONTROL is already in use	The currently used sensor is already used by other programs.	Close the other program that is accessing scanCONTROL or select a different sensor and click the "Connect" button (see Chapter <a href="#">3.4</a> ).
Invalid device	The currently operated device is not a scanCONTROL measuring system.	Select a different sensor and click the "Connect" button (see Chapter <a href="#">3.4</a> ) or close Result Monitor, connect scanCONTROL to the PC and restart the software.
Error while data transfer	The data transfer between scanCONTROL and the PC has been interrupted.	Check the Ethernet connection between scanCONTROL and the PC. Check the Ethernet cable for defects. Close Result Monitor, reconnect scanCONTROL to the PC and restart the software.
Corrupt profile	The transferred profile is corrupt.	Check the configuration of the connected scanCONTROL (see Chapter <a href="#">1.2</a> ).

No points in region of interest	No valid measuring points are located in the scanCONTROL measuring range.	Change the distance to the object to be measured. Check the configuration of the connected scanCONTROL (see Chapter <a href="#">1.2</a> ).
Too much profile data. Loss of data possible.	The amount of profile data transferred approaches the available bandwidth of the network.	Check the configuration of the connected scanCONTROL (see Chapter <a href="#">1.2</a> ) and reduce the amount of profile data transferred. Decisive for this are the number of connected measuring systems and the profile points, the profile format and the profile frequency.
Too much profile data. Data transfer not possible.	The amount of profile data transferred exceeds the available bandwidth of the network.	Decisive for this are the number of connected measuring systems and the profile points, the profile format and the profile frequency.

## 5.2 Notes and Tips on Using scanCONTROL

Please note the following when operating Result Monitor:

- 1 Never disconnect the connection between scanCONTROL and the PC while the software is running. Never disconnect the power supply of scanCONTROL while the software is running. This may cause the software to shut down unintentionally.
- 2 There may be a discrepancy between the setpoint value and the actual value for the scan rate if the number of scans is set too high for the processing power of the PC.
- 3 Select the "? → Online help" menu item or press the <F1> key to access a description of the dialog that is currently displayed.

### 5.3 Key Shortcuts

Use shortcut keys to work faster. The following shortcuts are available:

Key combinations	Action
F1	Open the online help
Ctrl + F1...F4	Save ring buffer sensor 1...4
Ctrl + O	Load parameters
Ctrl + S	Save parameters
Ctrl + R	Reset parameters
Ctrl + Alt + F1...F4	Activate scanCONTROL parameters sensor 1...4
Ctrl + 1...4	Activate logging of results sensor 1...4
Ctrl + F7	Adjusting Basic Settings
Ctrl + F8	Adjust scanCONTROL network settings

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**Note:** If some key shortcuts do not work, please check whether these shortcuts are used by other programs.

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