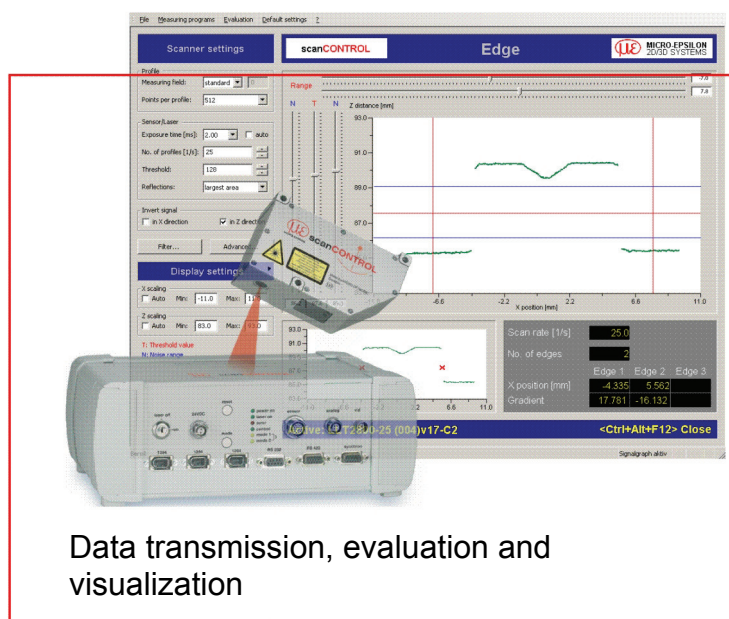


SENSORS & SYSTEMS

By far the best solution



INSTRUMENTATION
MICRO-EPSILON



Data transmission, evaluation and
visualization

scanCONTROL
Demo-Software 1.5

MICRO-EPSILON
MESSTECHNIK
GmbH & Co. KG
Königbacher Strasse 15

D-94496 Ortenburg

Tel. +49/85 42/1 68-0
Fax +49/85 42/1 68-90
e-mail: info@micro-epsilon.de
www.micro-epsilon.com

Certified in compliance with
DIN EN ISO 9001: 2000

Contents

1.	Introduction	4
1.1	Use of the Manual	4
1.2	Functional Scope of the scanCONTROL Demo-Software	4
1.3	Definition of Terms: Profile, Profile Sequence	4
1.4	Functions of the Measuring Programs	5
2.	Installation and Preparations for Measuring.....	6
2.1	Installation Requirements	6
2.2	Installation of the scanCONTROL Demo-Software	6
2.3	Installation of the Drivers under Windows 2000	9
2.4	Installation of the Drivers under Windows XP	12
3.	Working with the scanCONTROL Demo-Software	15
3.1	Starting the scanCONTROL Demo-Software	15
3.2	Elements in the Main Window.....	15
3.3	Menu Bar.....	16
3.4	Online Mode.....	18
3.5	Offline Mode.....	19
3.6	Scanner Settings.....	20
3.7	Filter Settings	22
3.8	Advanced Scanner Settings.....	24
3.9	File Settings	27
3.10	Displaying scanCONTROL Parameters in Offline Mode	28
3.11	Display Settings	31
3.12	Toolbar Options	31
3.12.1	Reset 2D-Display	32
3.12.2	Automatic Scaling of the 2D-Display	32
3.12.3	Keep Aspect Ratio	32
3.12.4	Zoom in 2D-Display	32
3.12.5	Move Profile	33
3.12.6	Display Extended Information of a Profile Point	33
3.12.7	Set Range	34
3.12.8	Set horizontal Threshold	35
4.	Functions of the Measuring Programs	36
4.1	Display Profile	36
4.2	Save Profile.....	38
4.3	Display Image Data.....	40
4.4	Angle	42
4.5	Circle	44
4.6	Edge.....	46
4.7	Peak.....	48
4.8	Flatness.....	50
4.9	Profile	52
5.	Status and Error messages	54
5.1	In Online Mode.....	54
5.2	In Offline Mode.....	55
6.	Notes	56
7.	Keyboard Shortcuts.....	57

1. Introduction

This user manual is designed to provide you with an overview of the functions available with the scanCONTROL Demo-Software. Together with the scanCONTROL measurement system, this software enables you to analyze typical measurement tasks. The scanCONTROL measurement system is a high speed sensor which is designed for use in industrial applications.

The package is characterized by high speed and accuracy of measurement. The scanCONTROL Demo-Software will show you ways of finding solutions to various applications, all combined with the ultimate in terms of accuracy. You can create your own measurement routines using the software ICONNECT.

As a basis, the supplied CD offers a simple development environment with examples.

Note: scanCONTROL is a synonym for scanCONTROL2800, scanCONTROL2810, scanCONTROL2700 and scanCONTROL2710 measuring systems.

1.1 Use of the Manual

The user manual contains general information on installation and use of the scanCONTROL Demo-Software.

Users of the scanCONTROL Demo-Software should read Chap. 2 ("Installation and preparations for measuring"). Chap. 3 ("Working with the scanCONTROL Demo-Software") explains the use of the basic functions in the measuring programs. In Chap. 4 ("Functions of the measuring programs") you will find user information relating to each of the measuring programs, with detailed explanations of how to use these programs.

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 Functional Scope of the scanCONTROL Demo-Software

The scanCONTROL Demo-Software offers a simple way of transferring profile data from the scanCONTROL measurement system and presenting them in a graphical representation. These profile data are then further processed and evaluated in measuring programs. All data are transferred via the IEEE1394 interface (FireWire, iLink) and can be saved as required using the scanCONTROL Demo-Software.

1.3 Definition of Terms: Profile, Profile Sequence

The terms "profile" and "profile sequence" are used repeatedly in this manual in the context of the scanCONTROL Demo-Software, and are defined as follows. A "profile" consists of a maximum of 1024 individual measurement points, each of which is defined by a X coordinate and a Z coordinate. The software synchronously analyzes these measured profile data according to geometric criteria such as angle, edge, circle or area. A time sequence of profiles is referred to as a "profile sequence".

Note: More information about the measuring principle can be found in the scanCONTROL2800/2810 and scanCONTROL2700/2710 instruction manual

1.4 Functions of the Measuring Programs

This list of functions is merely intended to provide a short overview. Detailed descriptions of all measuring programs can be found in Chap. 4.

- **Display profile** visualizes individual profiles and profile sequences and saves profiles in a format which is compatible with Microsoft Excel.
- **Save profile** saves profile sequences for offline analysis.
- **Display image data** visualizes image data of the CMOS matrix of scanCONTROL.
- **Angle** measures the angle between two segments of a profile.
- **Circle** measures a segment of a circle in a profile.
- **Edge** detects edges in a profile.
- **Peak** detects local minimum/maximum values in a profile.
- **Flatness** measures the flatness of a profile.
- **Profile** determines characteristic data for a significant section of a profile (e.g. glue bead, weld seam).

Note: All measuring programs are available in online and offline versions, with the exception of "Save profile" and "Display image data". The online version of a measuring program evaluates data directly from the scanCONTROL and displays them on a PC. The offline version loads a previously saved profile sequence and then evaluates it.

2. Installation and Preparations for Measuring

2.1 Installation Requirements

The following minimum system configuration is required for the scanCONTROL Demo-Software to be able to work properly:

- Windows 2000 (Service Pack 4) or Windows XP
- Internet Explorer 6 SP1
- Pentium III $\geq$ 800 MHz
- 256 MB RAM
- Screen resolution: 1024x768

Proceed as follows to run the scanCONTROL Demo-Software:

1. Install the IEEE1394 interface hardware, if not already equipped.
2. Install the scanCONTROL Demo-Software.
3. Connect the scanCONTROL measuring system via the IEEE1394 to the computer.
4. Install the driver for the scanCONTROL measuring system.

[CD]:\Documentation	Contains manuals, installation instructions and Quick Reference
[CD]:\Program\scanCONTROL	Contains the following software packages -scanCONTROL Demo-Software 1.5 -scanCONTROL 3D-View 1.2 -scanCONTROL 3D-Data 1.2
[CD]:\Program\DeveloperDemo	Demo program for scanner setting and visualization of profile data.
[CD]:\Support\DirectX8.1	Contains DirectX8.1
[CD]:\Support\Driver-CMU1394	Contains the driver files for scanCONTROL (version 6.3)
[CD]:\Support\Adobe Reader 9	Contains Adobe Reader 9
[CD]:\Support\FImageFilter	Contains filter files for including DirectX
[CD]:\Development	Contains an environment for developing own signal graphs for scanCONTROL and a SDK for integrating scanCONTROL in C and C++
[CD]:\Development\Iconnect\My Signalgraphs	Contains examples of signal graphs

Fig. 2.1: Content of the scanCONTROL 5.1 CD

2.2 Installation of the scanCONTROL Demo-Software

When you insert the scanCONTROL 5.1 CD the following installation dialog box appears which offers you a number of options. Alternatively you can start the dialog box with the [CD]:\setup.exe file.

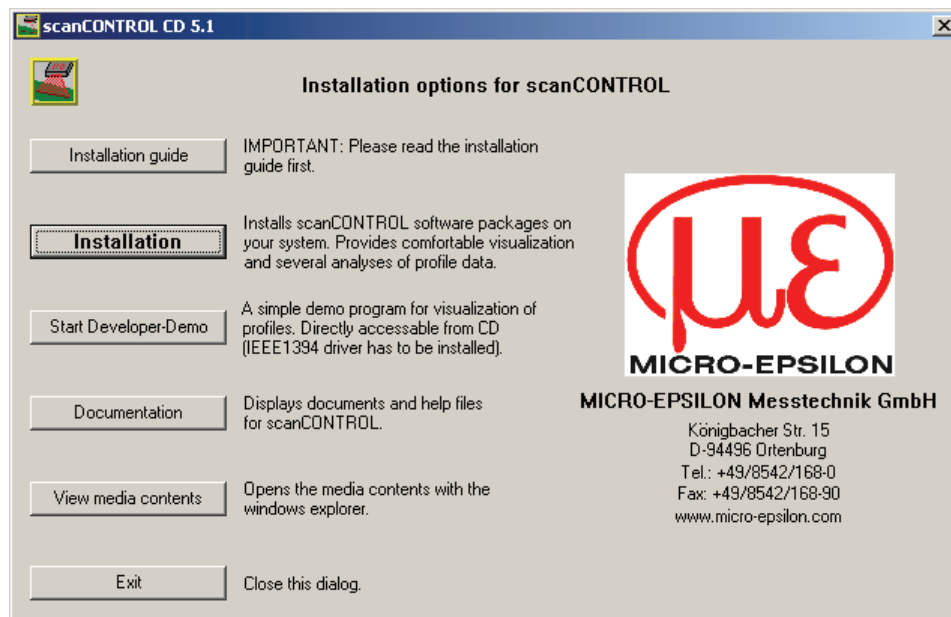


Fig. 2.2: Installation dialog box

Before you start to install the scanCONTROL Demo-Software, please check that the scanCONTROL measuring system is **not** connected to the computer.

➡ Click on the "Installation" button (see Fig. 2.2) to start installing the software.

An input field opens in which you are required to select the software packages to be installed.

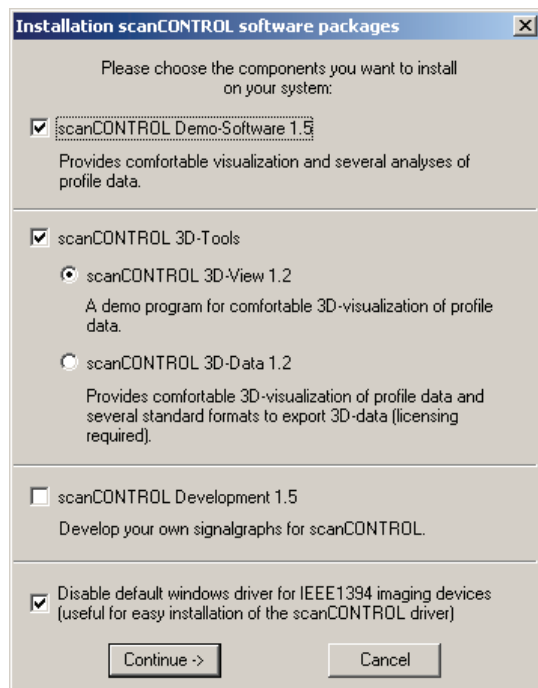


Fig. 2.3: "Installation scanCONTROL software packages" dialog box

➡ Activate the option "scanCONTROL Demo-Software 1.5" in the "Installation scanCONTROL software packages" dialog box (see Fig. 2.3).

➡ Activate the „Disable default windows driver for IEEE1394 imaging devices“ option to make the scanCONTROL driver installation easier (Windows XP only, refer to Chapter 2.4).

Optionally you can install scanCONTROL Development. This tool enables you to develop your own signal graphs for scanCONTROL and provides examples of signal graphs.

➡ Confirm the input field selection with "Continue ->".

The installation routine then checks your system environment and installs the additional components, if necessary. These components are displayed in a dialog box before they are installed (see Fig. 2.4).

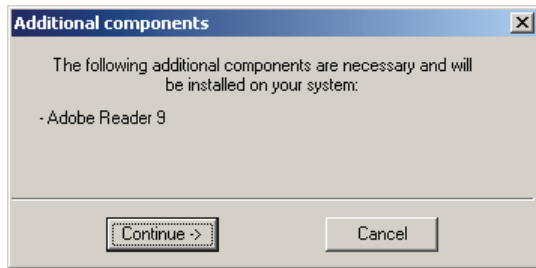


Fig. 2.4: "Additional components" dialog box

➡ Confirm the dialog box with "Continue →".

The selected software packages will then be installed. Once all the software packages have been installed you may be requested to restart the computer. When the installation process has been completed you can install the driver for the scanCONTROL measuring system (see Chap. 2.3 and 2.4).

Note: Only use version 6.3 of the CMU driver. If a different driver or a different version of the CMU driver for the scanCONTROL is installed at a later date then it will not be possible to operate the scanner with the scanCONTROL Demo-Software.

2.3 Installation of the Drivers under Windows 2000

Preparing the installation

- ➡ Completely finish the installation of the scanCONTROL Demo-Software. This procedure is described in Chap. 2.2.
- ➡ Connect the scanCONTROL via the IEEE1394 interface to the PC.
- ➡ Switch on the scanCONTROL and the power supply.

The installation dialog will then appear on the screen (see Fig. 2.5).

(If no dialog appears, you can also call up the installation dialog via the Device Manager (Control Panel → System → Hardware → Device Manager). scanCONTROL is located under "Imaging Devices" or "Other Devices").

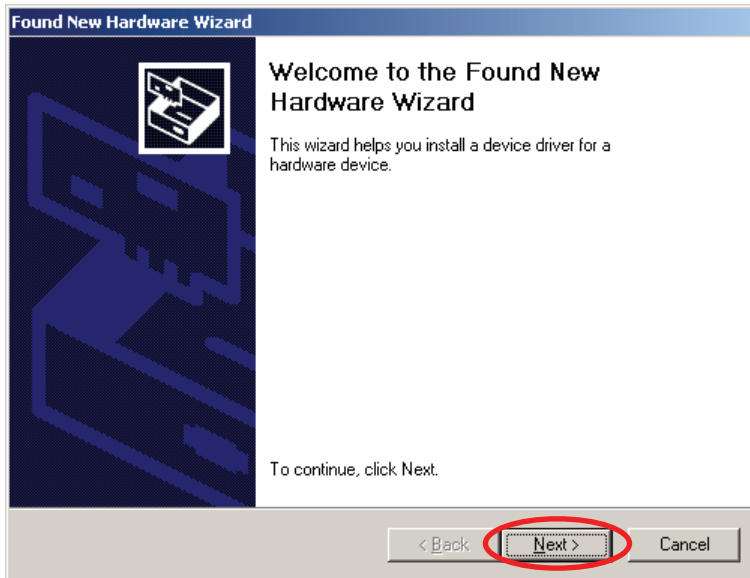


Fig. 2.5: Windows 2000 driver installation - step 1

- ➡ Click on "Next" to confirm this dialog (see Fig. 2.5).

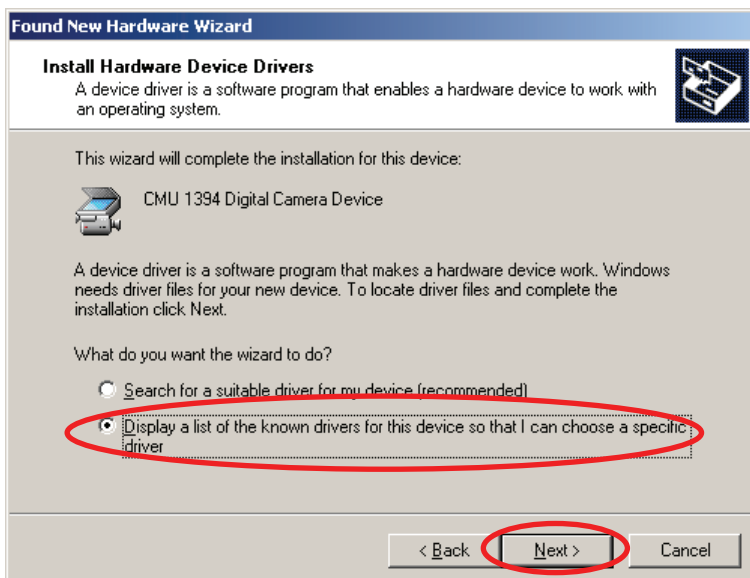


Fig. 2.6: Windows 2000 driver installation - step 2

- ➡ In the next dialog, select "Display a list of the known drivers for this device so that I can choose a specific driver".
- ➡ Click on "Next" to confirm this dialog (see Fig. 2.6).

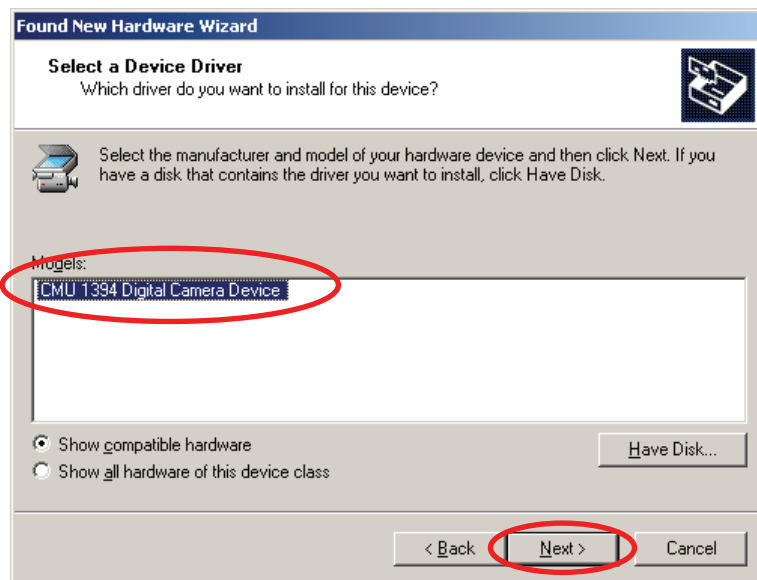


Fig. 2.7: Windows 2000 driver installation - step 3

➡ Select "CMU 1394 Digital Camera Device" from the list and click on "Next" to confirm (see Fig. 2.7).

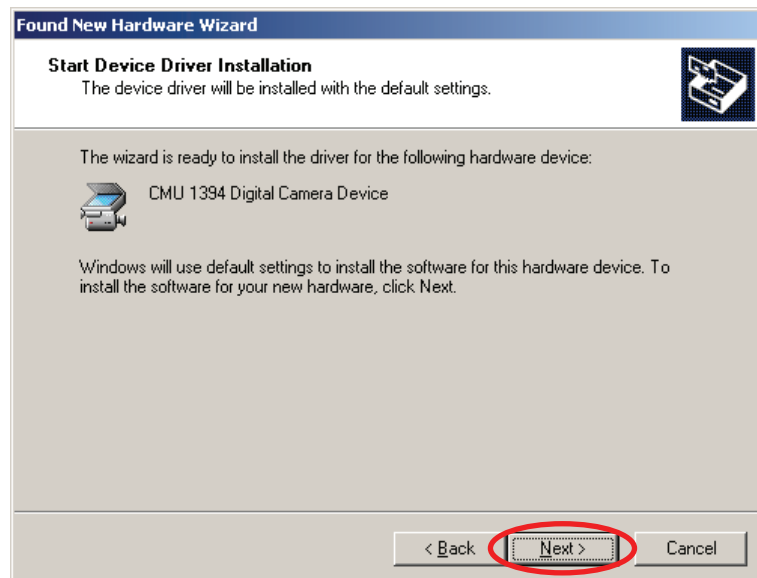


Fig. 2.8: Windows 2000 driver installation - step 4

➡ Click on "Next" to confirm the next dialog (see Fig. 2.8).

The dialog "Digital signature not found" will then appear.



Fig. 2.9: Windows 2000 driver installation - step 5

➡ Click on "Yes" to confirm this dialog (see Fig. 2.9).



Fig. 2.10: Windows 2000 driver installation - step 6

➡ Click on "Finish" in the next dialog (see Fig. 2.10).

The scanCONTROL driver is now installed.

Note: Only use version 6.3 of the CMU driver. If a different driver or a different version of the CMU driver for the scanCONTROL is installed at a later date then it will not be possible to operate the scanner with the scanCONTROL Demo-Software.

Note: To install the driver at a later date, call up the installation dialog via the Device Manager (Control Panel → System → Hardware → Device Manager). scanCONTROL is located under "Imaging devices" or under "Other devices".

Note: If you are requested to choose the driver files manually you will find the files in the installation directory of scanCONTROL Demo-Software: *[Installation path]\Program\Driver-CMU1394*

2.4 Installation of the Drivers under Windows XP

Preparing the installation

- ➡ Completely finish the installation of the scanCONTROL Demo-Software. This procedure is described in Chap. 2.2.
- ➡ Connect the scanCONTROL via the IEEE1394 interface to the PC.
- ➡ Switch on the scanCONTROL and the power supply.

The installation dialog will then appear on the screen.

(If no dialog appears, you can also call up the installation dialog via the Device Manager (Control Panel → System → Hardware → Device Manager). scanCONTROL is located under "Imaging Devices" or "Other Devices").

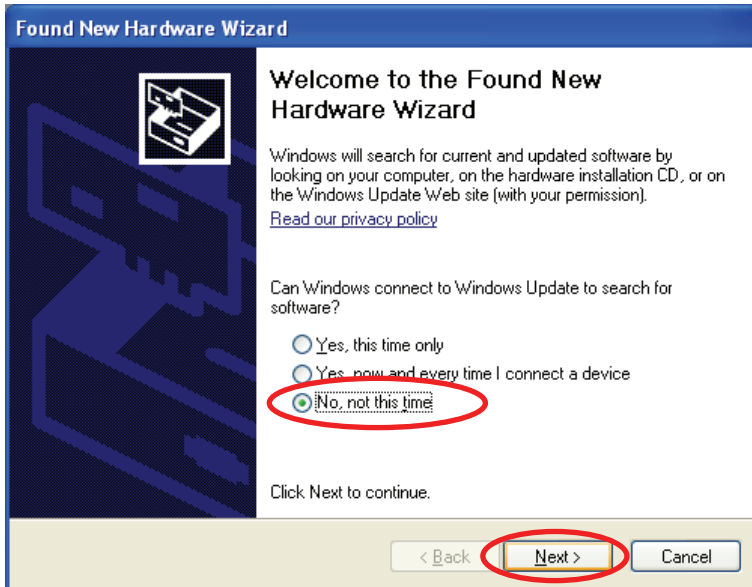


Fig. 2.11: Windows XP SP2 driver installation

If the Service Pack 2 is installed on your PC, then the "Hardware Update Wizard" will appear.

- ➡ Select "No, not this time" and click on "Next" to confirm (see Fig. 2.11).

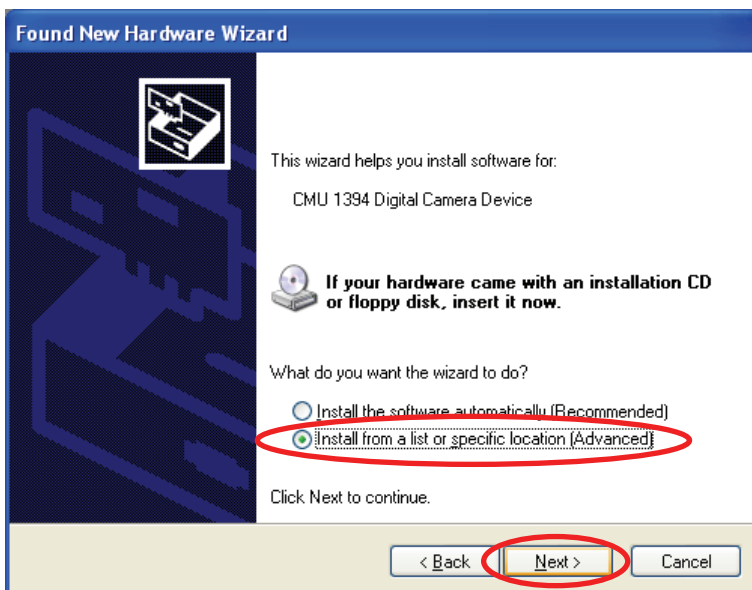


Fig. 2.12: Windows XP driver installation - step 1

- ➡ Select "Install from a list or specific location (advanced)".
- ➡ Click on "Next" to confirm this dialog (see Fig. 2.12).

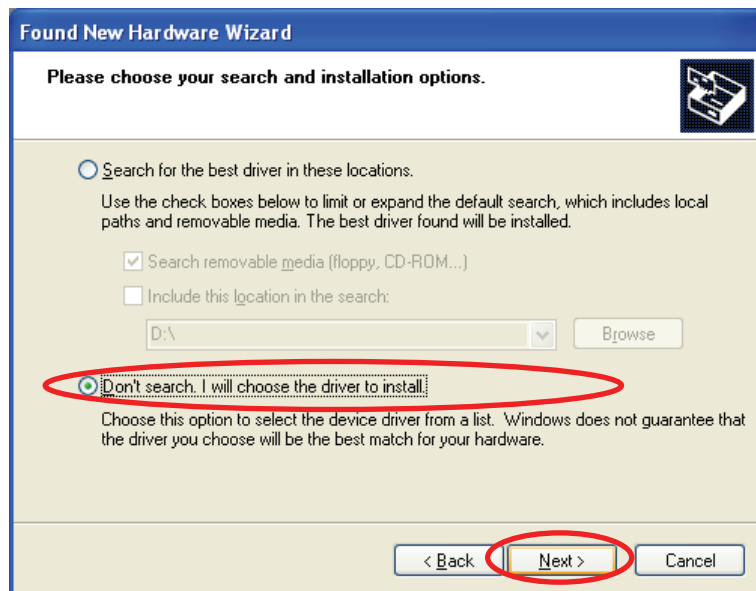


Fig. 2.13: Windows XP driver installation - step 2

- In the next dialog, select "Don't search. I will choose the driver to install".
- Click on "Next" to confirm this dialog (see Fig. 2.13).



Fig. 2.14: Windows XP driver installation - step 3

- Select "CMU 1394 Digital Camera Device" from the list and click on "Next" to confirm (see Fig. 2.14). The "Hardware installation" dialog will then appear.

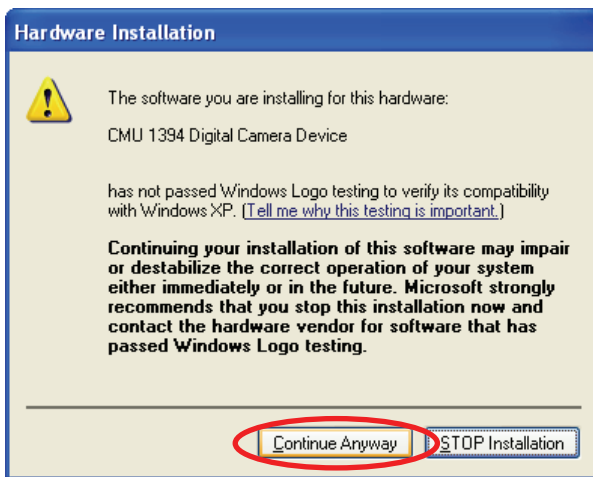


Fig. 2.15: Windows XP driver installation - step 4

➡ Click on "Continue anyway" to confirm this dialog (see Fig. 2.15).

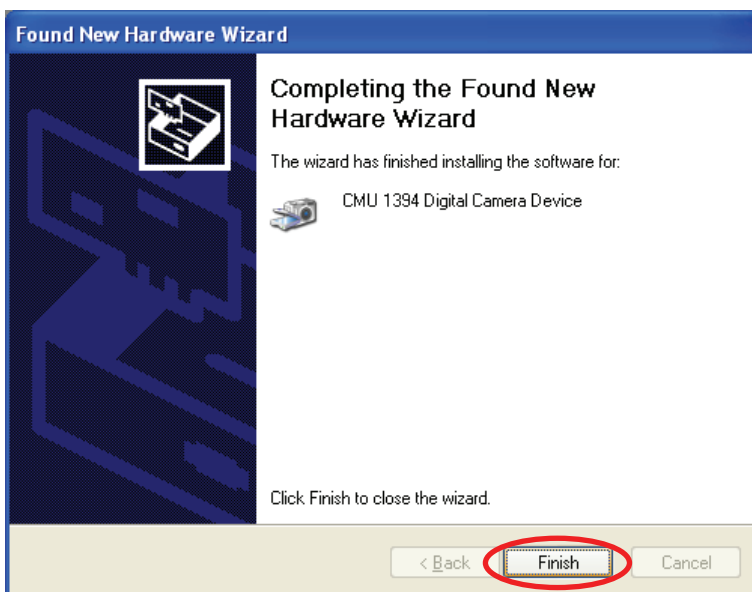


Fig. 2.16: Windows XP driver installation - step 5

➡ Click on "Finish" in the next dialog (see Fig. 2.16).

The scanCONTROL driver is now installed.

Note: Only use version 6.3 of the CMU driver. If a different driver or a different version of the CMU driver for the scanCONTROL is installed at a later date then it will not be possible to operate the scanner with the scanCONTROL Demo-Software.

Note: To install the driver at a later date, call up the installation dialog via the Device Manager (Control Panel→ System→ Hardware→ Device Manager). scanCONTROL is located under "Imaging devices" or under "Other devices".

Note: If you are requested to choose the driver files manually you will find the files in the installation directory of scanCONTROL Demo-Software: *[Installation path]\Program\Driver-CMU1394*

3. Working with the scanCONTROL Demo-Software

3.1 Starting the scanCONTROL Demo-Software

- Once the installation of the software and the driver is completed you can start the software. To do this, use the program shortcut on your desktop or select "scanCONTROL Demo-Software" in the Startup menu.

Once you have started the program, the main window for starting the measuring programs will be displayed.

3.2 Elements in the Main Window

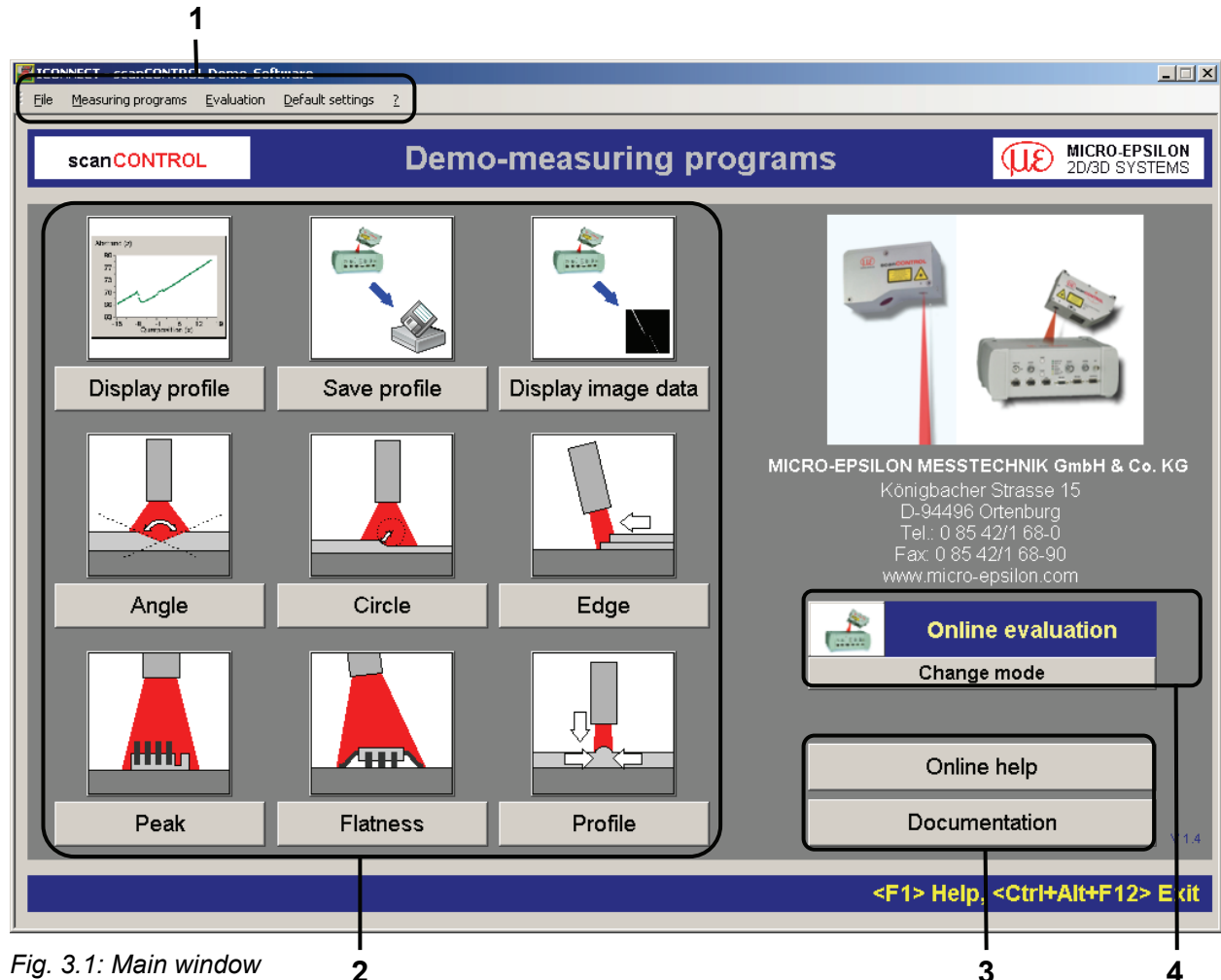


Fig. 3.1: Main window

Main window:

- 1 Menu bar:** Used to call up all the measuring programs and settings which are available in the software.
- 2 Options display:** Used to launch the individual measuring programs.
- 3 Documentation:** Used to call up individual documentation.
- 4 Online/offline mode:** Used to change between online and offline mode. The current mode is displayed in the field with the blue background.

Note: The elements in the main window offer access to the same functions as the buttons in the menu bar.

Note: In offline mode, the functions "Save profile" and "Display image data" are deactivated.

Note:

- Never disconnect the IEEE1394 connection between the scanCONTROL and the computer while the software is running.
- Never switch off the power supply to the scanCONTROL while the software is running.
- Never press the reset/user mode button on the controller while the software is running.
- Never activate the standby mode or hibernation of your computer when the measuring system is connected to the computer.

This may cause the operating system to shut down unintentionally.

3.3 Menu Bar

The following functions can be called up from both the menu bar and via the main window:

- Starting a measuring program
- Changing between online mode and offline mode
- Calling up the entire documentation

The "Default settings" function which is used to reset the measuring programs back to the default settings is only accessible via the menu bar.

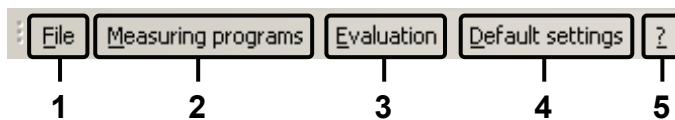


Fig. 3.2: Menu bar

Note: You can use keyboard shortcuts to speed up your work. The key combinations are displayed on the menu bar next to the corresponding function, e.g. <Ctrl + Alt + F12> for "Exit". A listing of all keyboard shortcuts can be found in Chap. 7

Menu bar functions:

1 File:

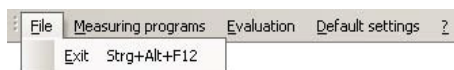


Fig. 3.3: Menu "File"

This menu item only contains the "Exit" function. This function is used to close the scanCONTROL Demo-Software.

2 Measuring programs:

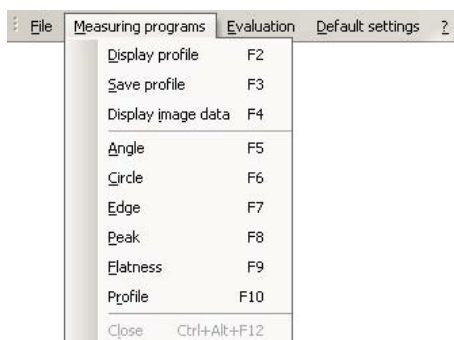


Fig. 3.4: Menu "Measuring programs"

This menu item contains all of the available measuring programs and the "Close" function. "Close" is used to terminate the active measuring program and return to the main window. It is not possible to select a new measuring program from an active measuring program. First close the active measuring program, then start the desired measuring program.

3 Evaluation:

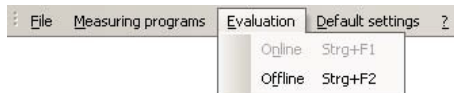


Fig. 3.5: Menu "Evaluation"

This menu item is used to switch between online mode and offline mode. It is not available while a measuring program is active.

4 Default settings:

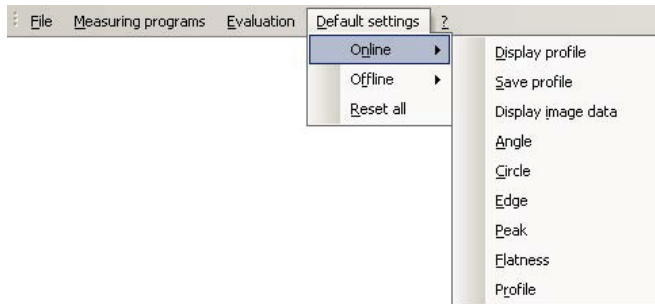


Fig. 3.6: Menu "Default settings"

You can use this function to restore the individual measuring programs back to their default settings. It is separately available for the online and offline versions of the measuring programs. Use the "Reset all" option to reset all of the measuring programs.

5 ?:

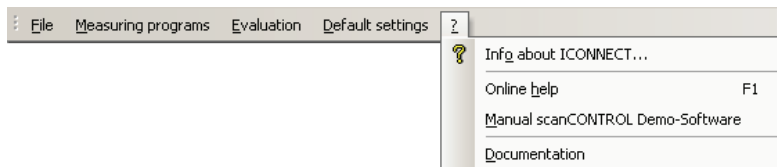


Fig. 3.7: Menu "?"

This function is used to call up individual documents. If you click on the menu option "Online help" while a measuring program is open then the documentation for this measuring program will appear.

3.4 Online Mode

In online mode, the scanCONTROL Demo-Software evaluates data currently being measured by scanCONTROL.

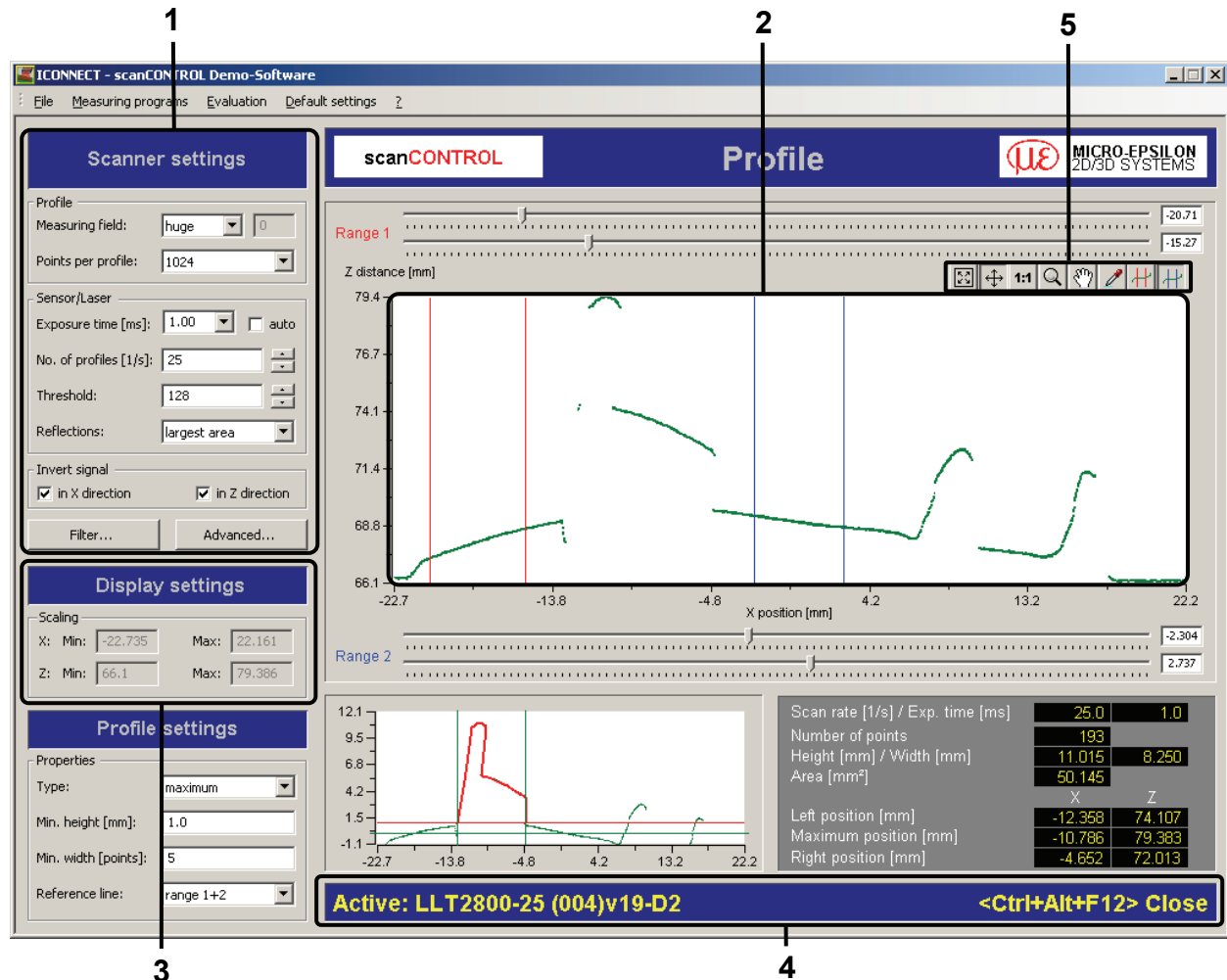


Fig. 3.8: Online mode

Online mode:

The illustration shows the typical structure of a measuring program in online mode, as well as the shared input and output fields of the measuring programs. A detailed description for each field is provided further below in this user manual.

1 Scanner settings: These values are used to change the scanCONTROL settings.

2 2D-display: This display is used to visualize the profile which has just been measured. The display depends on the parameters in the input fields "Scanner settings" and "Display settings".

3 Display settings: You can use this input field to configure the scaling of the 2D-display.

4 Status bar: Status messages and error messages are displayed in the status bar. For more detailed information refer to Chap. 5 ("Status and error messages").

5 Toolbar: Use the toolbar to scale the 2D display, to activate various options for the mouse interaction and to set ranges directly with the mouse.

Note: Depending on the measuring program, the display in online mode may also include additional input fields.

Note: The settings for a measuring program are saved and reused later when the measuring program is started again. To restore the default settings, use the "Default settings" function from the menu bar.

Note: The "Display image data" measuring program does not include the function "Display settings".

3.5 Offline Mode

In offline mode the software evaluates data which have already been recorded. Use this mode to analyze profile sequences later on in a measuring program. To record the data, use the measuring program "Save profile".

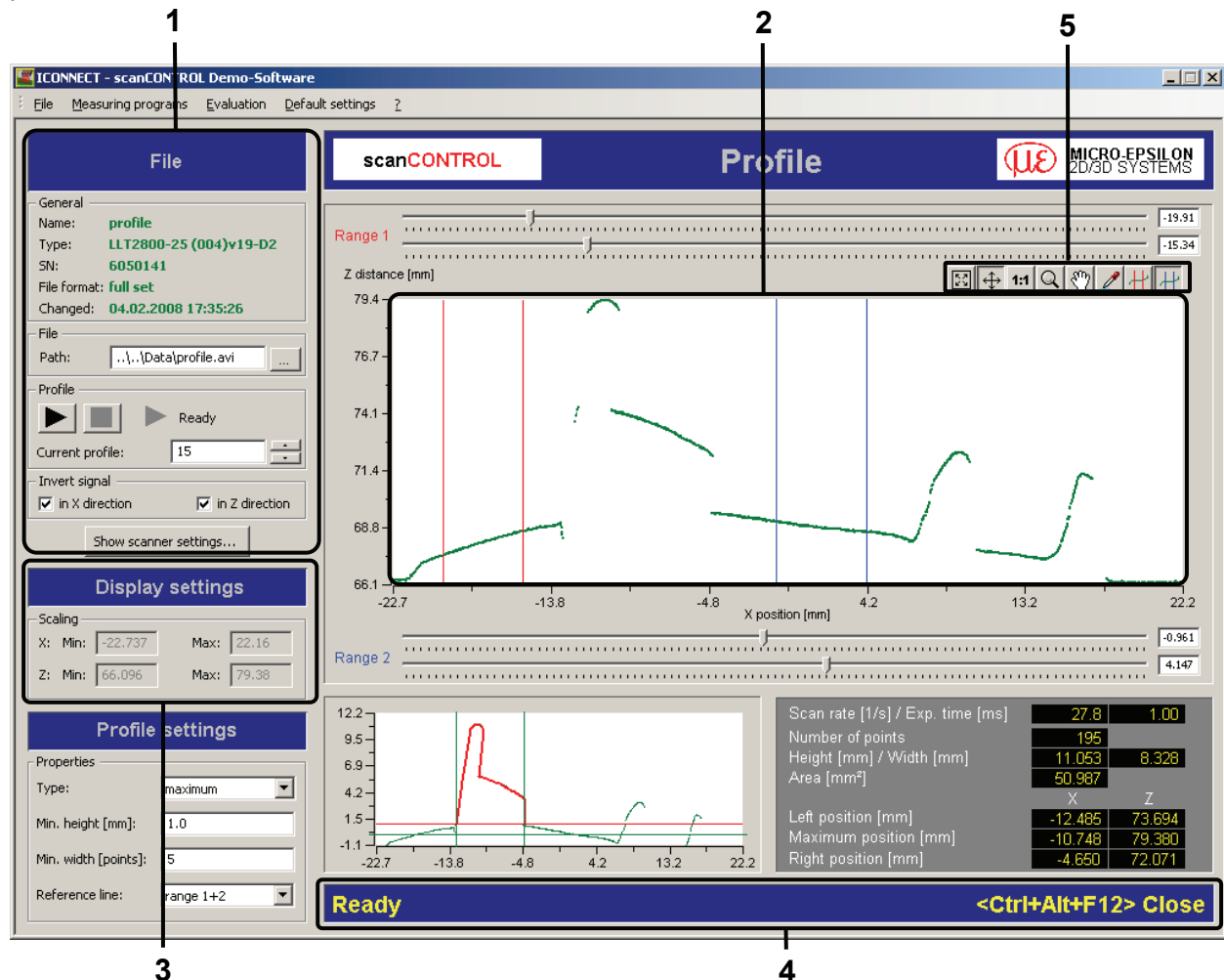


Fig. 3.9: Offline-Mode

Offline mode:

The illustration shows the typical structure of a measuring program in offline mode, as well as the joint input and output fields of the measuring programs. A detailed description for each field is provided further below in this user manual.

1 File: In this input field you can select a previously saved profile sequence and start or stop the playback of that profile sequence.

2 2D-display: This display is used to visualize a previously loaded profile. The display depends on the parameters in the input fields "Scanner settings" and "Display settings".

3 Display settings: You can use this input field to configure the scaling of the 2D-display.

4 Status bar: Status messages and error messages are displayed in the status bar. For more detailed information refer to Chap. 5 ("Status and error messages").

5 Toolbar: Use the toolbar to scale the 2D display, to activate various options for the mouse interaction and to set ranges directly with the mouse.

Note: The measuring programs "Save profile" and "Display image data" are not available in offline mode.

3.6 Scanner Settings

Use the parameters in this box to configure the scanCONTROL for your measuring task. Please note that the parameters "Measuring field"/"Points per profile" and the parameters "Exposure time"/"No. of profiles" are dependent on each other. This section tells you about the following functions:

- Configurable parameters in the input fields.
- Impact of the parameters on the measurement.
- Restrictions on the resolution and exposure time.

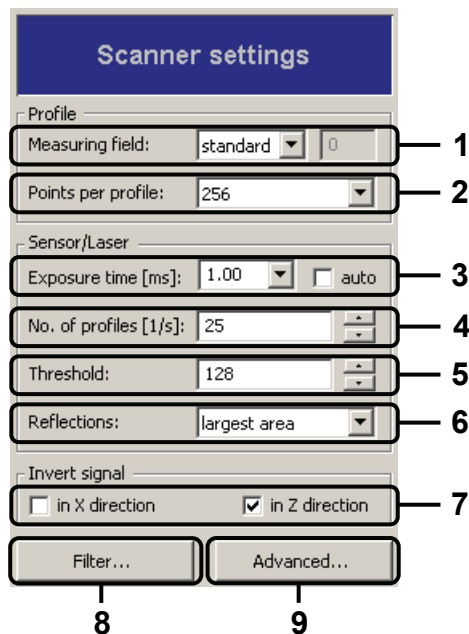


Fig. 3.10: "Scanner settings" input field

Parameters in the "Scanner settings" input field

1 Measuring field: Select one of the values to set the measuring field of the scanner (see the scanCONTROL2800/2810 and scanCONTROL2700/2710 instruction manual), depending on the type of sensor:

- **scanCONTROL 2700 / scanCONTROL 2710:**
 - **small:** Measuring field index 7, 640 x 120 pixels
 - **standard:** Measuring field index 2, 640 x 360 pixels
 - **large:** Measuring field index 0, 640 x 480 pixels
 - **custom...:** You can select the measuring field index (0 - 7)
- **scanCONTROL 2800 / scanCONTROL 2810:**
 - **small:** Measuring field index 95, 256 x 256 pixels
 - **standard:** Measuring field index 50, 512 x 768 pixels
 - **large:** Measuring field index 18, 768 x 768 pixels
 - **huge:** Measuring field index 0, 1024 x 1024 pixels
 - **custom...:** You can select the measuring field index (0 - 95)

With this entry you specify the resolution in the direction of the X and the Z axis. The value for the X axis is also influenced by the "Points per profile" box!

2 Points per profile: This parameter defines the number of points that make up a profile. Depending on the type of sensor you can choose between the following values:

- **scanCONTROL 2700 / scanCONTROL 2710:**
 - 80
 - 160
 - 320
 - 640
- **scanCONTROL 2800 / scanCONTROL 2810:**
 - 64 (optional)
 - 128 (optional)
 - 256
 - 512
 - 1024

With this parameter you specify the resolution in the direction of the X axis. This value has priority over the entry in the "Measuring field" box but does not have any influence on the resolution in the direction of the Z axis.

3 Exposure time [ms]: With this parameter you select the exposure time for the scanner. The measuring program "Display profile" shows you the saturation in the resultant display. This is influenced mainly by the exposure time and should be between 60% and 80% for a measurement.

- **Minimum:** 0.01 ms.
- **Maximum:** 40.0 ms.
- **auto:** Select this box to activate the automatic exposure time control of the scanCONTROL measuring system.

4 No. of profiles [1/s]: This parameter regulates the number of measurements per second. This value has priority over the entry in the "Exposure time" box.

- **Minimum:** 25.
- **Maximum:** 100 (scanCONTROL 2700/2710) and 4000 (scanCONTROL 2800/2810) respectively.

5 Threshold: This value specifies the level of intensity at which the scanner recognizes a reflection. The measuring program "Display profile" shows you the saturation in the resultant display. The saturation is influenced mainly by the threshold and should be between 60% and 80% for a measurement.

- **Minimum:** 0.
- **Maximum:** 1023.

6 Reflections: This box is for specifying which reflection is recognized as a profile point. This parameter is only of importance for multiple reflections.

- **first:** The reflection closest to the scanner.
- **last:** The reflection furthest away from the scanner.
- **largest area:** The reflection with the largest area.
- **highest intensity:** The reflection with the highest intensity.

7 Invert signal:

- **in X direction:** The signal is inverted on the Z axis.
- **in Z direction:** The signal is inverted in the middle of the measurement range parallel to the X axis. This function is enabled in the default settings.

8 Filter...: With this button you access the "Filter settings" dialog box (see Chap. 3.7)

9 Advanced...: With this button you access the "Advanced scanner settings" dialog box (see Chap. 3.8)

Note: To be able to use the "Invert signal" function, scanCONTROL requires a firmware version ≥ 13 . Check the firmware version on the status line if necessary (see Chap. 3.4 and 5).

Note: The "Scanner settings" box is only available in online mode!

Note: For further information on the configuration of the measuring system, please refer to the scanCONTROL2800/2810 and scanCONTROL2700/2710 instruction manual and in the documents "Quick reference scanCONTROL" and "Manual scanCONTROL (Part B)" (see Chap. 3.3).

3.7 Filter Settings

In combination with the scanCONTROL measuring system the scanCONTROL Demo-Software offers you the possibility of equidistantly resampling the profile data in the X direction and of filtering the profile data. If you want to use the filter functions, it is recommended to activate the equidistantly resampling.

➡ Use the "Filter..." button in the "Scanner settings" box (see Chap. 3.6) to open the "Filter settings" dialog box.

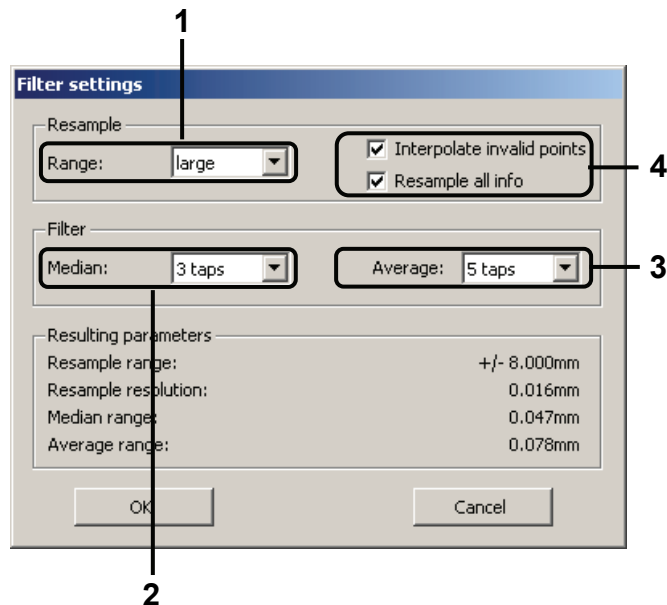


Fig. 3.11: „Filter settings“ dialog box

Parameters in the "Filter settings" dialog box

1 Range: The range which is equidistantly resampled.

Setting	Resampled range	
	scanCONTROL 2xxx-25	scanCONTROL 2xxx-100
none	deactivated	deactivated
tiny	±0,8 mm	±4,0 mm
very small	±1,0 mm	±5,0 mm
small	±2,0 mm	±10,0 mm
medium	±4,0 mm	±20,0 mm
large	±8,0 mm	±40,0 mm
very large	±10,0 mm	±50,0 mm
huge	±20,0 mm	±100,0 mm

2 Median: With this parameter you activate a median filter.

- **none:** The median filter is not used.
- **3 taps:** You use a median filter with a filter size of three.
- **5 taps:** You use a median filter with a filter size of five.
- **7 taps:** You use a median filter with a filter size of seven.

3 Average: With this parameter you activate an average filter.

- **none:** The average filter is not used.
- **3 taps:** You use an average filter with a filter size of three.
- **5 taps:** You use an average filter with a filter size of five.
- **7 taps:** You use an average filter with a filter size of seven.

4 Interpolate invalid points: If equidistantly resampling is active, this specifies whether invalid points will be replaced by neighbouring valid points using linear interpolation. Gaps will be closed if this parameter is active. In order to leave gaps open you must not activate this parameter.

Resample all info: If equidistantly resampling is active, this parameter specifies which data will be recalculated according to the equidistantly resampling. Deactivate this parameter to recalculate the X and Z coordinates only. Activate this parameter to recalculate all data (X / Z coordinates, width, intensity, threshold, moment 0th and 1st order). This parameter has no influence on the 2D display.

Confirm your settings with the "OK" button.

Note: Activate the "Resample all info" parameter to store a profile sequence (see Chapter 4.2) and analyze it later with the "scanCONTROL 3D-View" software.

Note: To be able to use the filter functions, scanCONTROL requires a firmware version ≥ 17 . Check the firmware version on the status line if necessary (see Chap. 3.4 and 5).

Note: The "Filter settings" dialog box is only available in online mode!

3.8 Advanced Scanner Settings

The "Advanced scanner settings" dialog box offers you extended settings for the scanCONTROL measuring system.

The screenshot shows the "Advanced scanner settings" dialog box with the following sections and settings:

- 1 Scanner:** Type: LLT2810-100(004)v19-D1, SN: 7030022, Next scanner button.
- 2 Processing:**
 - ☒ Suppress backlight
 - ☒ Video filter
 - ☒ High resolution
 - ☒ Calibration
 - ☐ Head and tail
- 3 Sensor:**
 - Laser power: standard
 - Trigger: internal
 - Shutter alignment: center
 - ☐ Delay shutter
 - Switch off laser: if short circuit
- 4 Peak:**
 - Min. width: 2, Max. width: 1023
 - Min. intensity: 0, Max. intensity: 1023
- 5 Analog out:**
 - Frequency [kHz]: 110
 - ☒ Hold last valid point
 - Voltage range X: +/-10V
 - ☐ Invert X
 - Voltage range Z: +/-10V
 - ☒ Invert Z
- 6 Miscellaneous:**
 - ☒ Loop back parameters
- 7 Counter input (DIn):**
 - ☐ Count positive edges
 - ☐ Count negative edges
- 8 CMM trigger:**
 - ☐ Enable CMM trigger
 - ☐ Invert trigger output
 - Trigger output: Port 1
 - Trigger divisor: 1
 - Mark-space ratio: 1 : 1
 - Skew correction [µs]: 0

Buttons: OK, Cancel

Fig. 3.12: „Advanced scanner settings“ dialog box

Note: Only experienced users of the scanCONTROL measuring system should adjust any settings in this dialog box.

Parameters in the "Advanced scanner settings" dialog box

- 1
 - **Type:** The currently used type of measurement system and the associated firmware version are displayed.
 - **SN:** The serial number of the currently used measurement system is displayed.
 - **Next scanner:** If a number of measurement systems are connected to the PC, you can change between the individual measurement systems with this button.

- 2
 - **Suppress backlight:** With this entry field you activate the automatic backlight compensation.
 - **Video filter:** You activate this parameter to improve the image quality.
 - **High resolution:** With this parameter you activate the subpixel resolution for the Z values.
 - **Calibration:** You use this parameter to activate the calibration.
 - **Head and tail:** You can only use this parameter with the subpixel resolution deactivated. With the parameter activated the head, center and tail of a reflection are calculated for each coordinate. The centers are entered in the first reflection, the head points in the second reflection and the tail points in the third reflection. This parameter has no effect on the display.
- 3
 - **Laser power [mW]:** You can operate the scanner laser at two different power levels or switch it off.
 - **Off**
 - **reduced:** scanCONTROL 2700/2710: 2 mW, scanCONTROL 2800/2810: 1 mW, if not specified otherwise.
 - **standard:** scanCONTROL 2700/2710: 10 mW, scanCONTROL 2800/2810: 15 mW, if not specified otherwise.
 - **Trigger:** This function enables you to control the scanCONTROL measurement system via the synchronous input on the controller (scanCONTROL 2800/2810) and via the RS422 interface (scanCONTROL 2700/2710) respectively.
 - **internal:** scanCONTROL transfers continuously according to the setting "No. of profiles [1/s]"

Please use the following trigger settings only when you control scanCONTROL via the synchronous input on the controller and via the RS422 interface respectively:

- **pos. edge:** scanCONTROL is triggered with positive edges whereas the exposure time corresponds to the parameter „Exposure time“.
- **neg. edge:** scanCONTROL is triggered with negative edges whereas the exposure time corresponds to the parameter „Exposure time“.
- **pos. pulse:** scanCONTROL is triggered with positive edges whereas the exposure time corresponds to the length of the positive trigger-pulse.
- **neg. pulse:** scanCONTROL is triggered with negative edges whereas the exposure corresponds to the length of the negative trigger-pulse.

Note: More information about the trigger function of scanCONTROL can be found in the scanCONTROL2800/2810 and scanCONTROL2700/2710 instruction manual.

- **Shutter alignment:** With this parameter you determine how the specified scan rate is maintained with active automatic exposure time control.
 - **center:** The intervals are in each case aligned to the center of the interval.
 - **right:** The intervals are in each case aligned to the end of the interval.
 - **left:** The intervals are in each case aligned to the start of the interval.
 - **none:** The intervals are not aligned.
 - **Delay shutter:** With this parameter you determine whether the automatic exposure-time control is computed based on the original data (deactivated) or based on the filtered data (activated).
 - **Switch off laser:** With this parameter you configure the laser safety interlock of scanCONTROL depending on the protective circuit of pins 3 and 13 of the synchronous input (This parameter is only available using scanCONTROL 2800/2810).
 - **if left open:** The laser is switched off with the pins open.
 - **if short circuit:** The laser is switched off with the pins connected. This parameter is only effective for laser class 2M (IIM).
- 4
 - **Peak Min. width:** Minimum width of a reflection to be detected as a valid profile point.
 - **Peak Max. width:** Maximum width of a reflection to be detected as a valid profile point.
 - **Peak Min. intensity:** Minimum intensity of a reflection to be detected as a valid profile point.
 - **Peak Max. intensity:** Maximum intensity of a reflection to be detected as a valid profile point.

- 5
 - **Frequency [kHz]:** With this parameter you specify the frequency of the analog outputs of the scanCONTROL. You can deactivate the analog outputs by selecting 0 kHz.
 - **Minimum:** 0 kHz
 - **Maximum:** 150 kHz
 - **Hold last valid point:** Activate this parameter to substitute invalid values at the analog outputs with the respective last valid values.
 - **Voltage range X:** With this parameter you can select the voltage range of the analog output for the X coordinates.
 - **±10 V** ▪ **-10...0 V**
 - **±5 V** ▪ **• 0...10 V**
 - **Voltage range Z:** With this parameter you can select the voltage range of the analog output for the Z coordinates.
 - **±10 V** ▪ **-10...0 V**
 - **±5 V** ▪ **• 0...10 V**
 - **Invert X:** With this parameter you can invert the analog output for the X coordinates.
 - **Invert Z:** With this parameter you can invert the analog output for the Z coordinates.
- 6
 - **Loop back parameters:** With this parameter you activate the parameter loop back. The scanCONTROL settings are saved in the profile file in the measuring program "Save profile" (see Chap. 4.2) if "Loop back parameters" is activated and can then be displayed again later in offline mode (see Chap. 3.5).
- 7
 - **Count positive/negative edges:** Use this parameter to activate the internal counter of scanCONTROL. The counter input is only available as an option for scanCONTROL. Select whether the internal counter is to count positive edges, negative edges or both types of edges.
- 8
 - **Enable CMM trigger:** Select this box to activate the programmable trigger output of the scanCONTROL. The programmable trigger output is only available as an option for the scanCONTROL.
 - **Invert trigger output:** With this parameter you invert the trigger output.
 - **Trigger output:** The port at which the trigger signal is issued.
 - **Port 1** ▪ **Port 3**
 - **Port 2** ▪ **Port 4**
 - **Trigger divisor:** This gives the division ratio between the trigger signals and the profiles. Select a value "n" to issue one trigger signal for every nth profile.
 - **Min:** 1
 - **Max:** 255
 - **Mark-space ratio:** This gives the mark-space ratio for the decreasing edge.
 - **1:4** ▪ **2:1**
 - **1:3** ▪ **3:1**
 - **1:2** ▪ **4:1**
 - **1:1**
 - **Skew correction [µs]:** This parameter provides a time correction of the trigger signal in increments of 0.5 µs.
 - **Minimum:** -256.0 µs
 - **Maximum:** 255.5 µs

Confirm your settings with the "OK" button.

Note: The parameter "Switch off laser" and the input field "Analog out" are only available using the scanCONTROL 2800 or scanCONTROL 2810 type of sensor.

Note: For further information on the parameters for the measuring system described here, please refer to the documents "Quick reference scanCONTROL" and "Manual scanCONTROL (Part B)" (see Chap. 3.3).

Note: The "Advanced scanner settings" dialog box is only available in online mode!

3.9 File Settings

In offline mode you will see the "File" box instead of the "Scanner settings" box. You can use this to open and play back a saved profile sequence. The "General" part in the upper section of the box displays information about the last played back profile sequence.

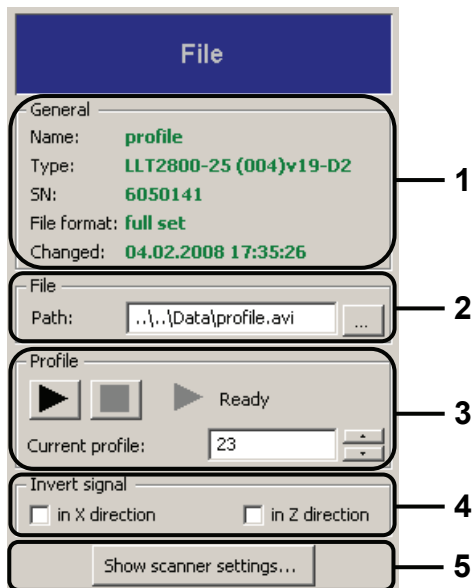


Abb. 3.13: „File“ input field

Parameters in the "File" input field:

- 1
 - **Name:** The name of the profile sequence.
 - **Type:** The type of measuring system used for recording the profile sequence.
 - **SN:** The serial number of the measurement system used for recording the profile sequence.
 - **File format:** This indicates which information is contained in the saved profile sequence.
 - **x/z only:** The X and Z coordinates of the individual measurement points are saved.
 - **x/z + data:** A complete reflection is saved in the profile sequence. In a reflection the following information is contained for each measurement point: X/Z coordinates, width, intensity, threshold, moment of 0th and 1st order.
 - **full set:** All four reflections, the time stamp and, where applicable, the measurement system parameters used during saving.
 - **Changed:** The modification date of the profile sequence.
- 2
 - **Path:** In this input field you specify the complete path of the file to be played back. Alternatively, you can use the button „...“.
 - **...:** This opens a dialog box for selecting the profile file to be played back. After choosing the file, the entry field „Path“ is updated.
- 3
 - **Play:** This starts the playback of the selected profile sequence.
 - **Stop:** This stops the playback of the selected profile sequence.
 - **Current profile:** While a profile sequence is being played you will see a run-through of the profile numbers in this box. If you stop the playback you can activate any individual profile directly by entering the profile number.
- 4
 - **Invert signal in X direction:** The signal is inverted on the Z axis.
 - **Invert signal in Z direction:** The signal is inverted in the middle of the measurement range parallel to the X axis.
- 5
 - **Show scanner settings:** You press this button to display the scanCONTROL settings selected when the profile sequence was saved (see Chap. 3.10).

Note: The following software packages save the measurement system parameters:

- scanCONTROL Demo-Software (version 1.2 and above)
- scanCONTROL2810 Sensor Edition
- scanCONTROL Setup-Software 2X10
- DeveloperDemo (version 2.0 and above; option must be activated)

Note: You can only play back "avi" files which have been recorded using the following programs:

- scanCONTROL Demo-Software
 - scanCONTROL2810 Sensor Edition
 - scanCONTROL Setup-Software 2X10
 - DeveloperDemo (version 2.0 and above)
-

Note: The "File" box is only available in offline mode!

3.10 Displaying scanCONTROL Parameters in Offline Mode

When playing back saved profile sequences, you have the possibility of displaying the scanCONTROL settings used during saving.

▶ Press the button „Show scanner settings...“ in the „File“ box (see Chap. 3.9). You then access the „Scanner settings“ dialog box.

In the dialog box you can choose between the following tabs:

Scanner settings: The standard settings of the measurement system are displayed. You will find a precise description of the individual parameters in Chap. 3.6.

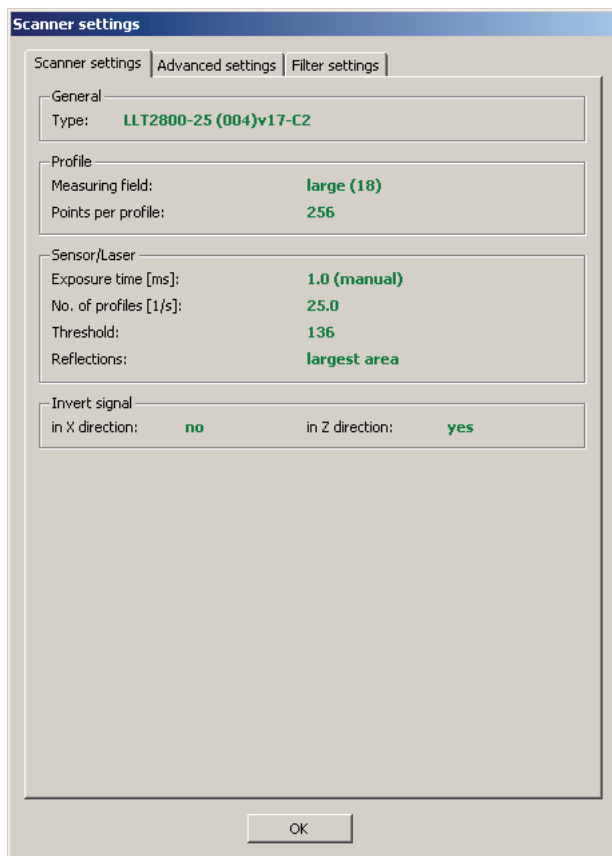
Advanced settings: The extended settings of scanCONTROL are displayed. You will find a precise description of the individual parameters in Chap. 3.8.

Filter settings: The filter settings of scanCONTROL are displayed. You will find a precise description of the individual parameters in Chap. 3.7.

Note: The following software packages save the scanCONTROL parameters:

- scanCONTROL Demo-Software (version 1.2 and above)
 - scanCONTROL2810 Sensor Edition
 - scanCONTROL Setup-Software 2X10
 - DeveloperDemo (version 2.0 and above; option must be activated).
-

Note: The information used during saving is only available in the file format „full set“.



Scanner settings

Scanner settings | Advanced settings | Filter settings

General

Type: **LLT2800-25 (004)v17-C2**

Profile

Measuring field: **large (18)**

Points per profile: **256**

Sensor/Laser

Exposure time [ms]: **1.0 (manual)**

No. of profiles [1/s]: **25.0**

Threshold: **136**

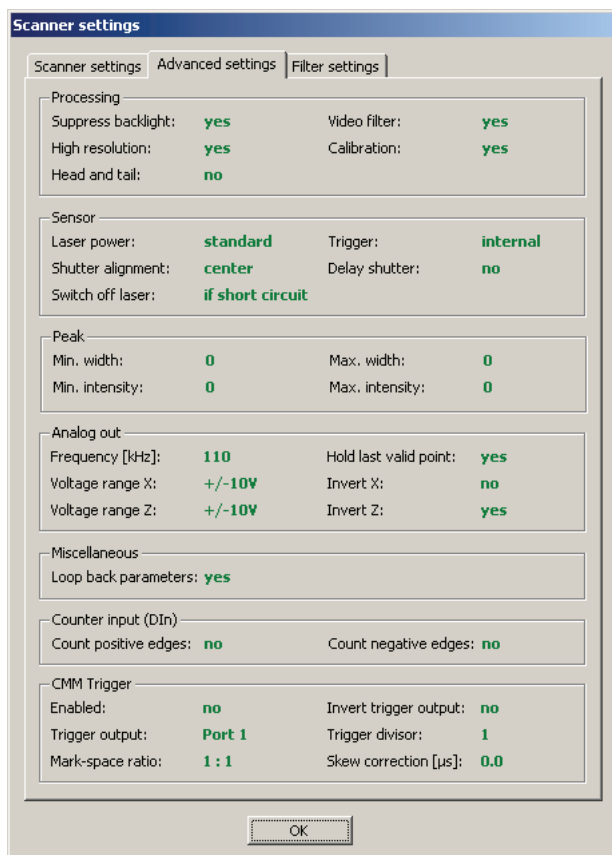
Reflections: **largest area**

Invert signal

in X direction: **no** in Z direction: **yes**

OK

Fig. 3.14: Tab sheet "Scanner settings" in the "Scanner settings" dialog



Scanner settings

Scanner settings | Advanced settings | Filter settings

Processing

Suppress backlight: **yes** Video filter: **yes**

High resolution: **yes** Calibration: **yes**

Head and tail: **no**

Sensor

Laser power: **standard** Trigger: **internal**

Shutter alignment: **center** Delay shutter: **no**

Switch off laser: **if short circuit**

Peak

Min. width: **0** Max. width: **0**

Min. intensity: **0** Max. intensity: **0**

Analog out

Frequency [kHz]: **110** Hold last valid point: **yes**

Voltage range X: **+/-10V** Invert X: **no**

Voltage range Z: **+/-10V** Invert Z: **yes**

Miscellaneous

Loop back parameters: **yes**

Counter input (DIn)

Count positive edges: **no** Count negative edges: **no**

CMM Trigger

Enabled: **no** Invert trigger output: **no**

Trigger output: **Port 1** Trigger divisor: **1**

Mark-space ratio: **1 : 1** Skew correction [µs]: **0.0**

OK

Fig. 3.15: Tab sheet "Advanced settings" in the "Scanner settings" dialog



Fig. 3.16: Tab sheet "Filter settings" in the "Scanner settings" dialog

3.11 Display Settings

The parameters in this input field influence the way in which the 2D-display is represented.

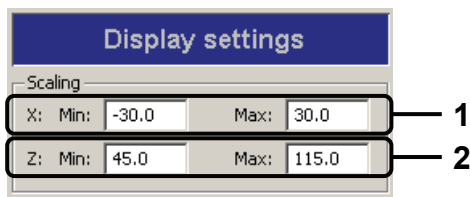


Fig. 3.17: "Display settings" input field

Parameters in the "Display settings" input field:

- 1 - **X scaling:** Use these parameters to configure the scaling of the X axis in the 2D-display. The entries in the "Min:" and "Max:" fields are values in mm.
 - **Min/Max:** Use these parameters to manually adjust the scaling for the X axis.
- 2 - **Z scaling:** Use these parameters to configure the scaling of the Z axis in the 2D-display. The entries in the "Min:" and "Max:" fields are values in mm.
 - **Min/Max:** Use these parameters to manually adjust the scaling for the Z axis.

Note: "Display settings" is available both in online mode and in offline mode.

Note: The "Display image data" measuring program does not include the function "Display settings".

3.12 Toolbar Options

In each of the individual measuring programs a toolbar is located top right to the 2D display. This provides the possibilities of scaling the 2D display, activating various options for the mouse interaction and setting range selections and thresholds directly with the mouse. You can also display extended information of a selected profile point. Different selection options are available depending on the active measuring program. A list of all the possible settings is shown in the following.

-  Reset the 2D display to the complete measuring field (see Chap. 3.12.1)
-  Activate automatic scaling of the 2D display (see Chap. 3.12.2)
-  Keep aspect ratio (see Chap. 3.12.3)
-  Activate "Zoom" mode (see Chap. 3.12.4)
-  Activate "Move profile" mode (see Chap. 3.12.5)
-  Activate "Display extended information of a profile point" mode (see Chap. 3.12.6)
-  Activate "Set vertical range (red)" mode (see Chap. 3.12.7)
-  Activate "Set vertical range (blue)" mode (see Chap. 3.12.7)
-  Activate "Set range" mode (see Chap. 3.12.7)
-  Activate "Set horizontal range" mode (see Chap. 3.12.7)
-  Activate "Set horizontal threshold" mode (see Chap. 3.12.8)

You will find detailed descriptions of the individual functions in the following.

3.12.1 Reset 2D-Display



Press this button in order to reset the 2D-display. Thus, the complete measuring field is shown and the profile transferred by scanCONTROL is displayed.

3.12.2 Automatic Scaling of the 2D-Display



You activate or deactivate the automatic scaling of the 2D display by pressing this button. If automatic scaling is activated, the 2D display will be automatically adapted to the smallest and largest measured values of the scanner. If automatic scaling is deactivated, the specified values from the "Min." and "Max." input fields (see Chapter 3.11) will be applied to the scaling of the 2D display.

3.12.3 Keep Aspect Ratio



Press this button in order to activate or deactivate the "Keep aspect ratio" option. Activating this option the display is scaled so that the real aspect ratio of the displayed profile is retained. Deactivating this option the scaling is adapted separately for the X and Y axes to the settings made in the "Min." and "Max." input fields (see Chapter 3.11).

3.12.4 Zoom in 2D-Display



You activate or deactivate the "Zoom" mode by pressing this button. In the "Zoom" mode you can zoom in parts of the 2D-display and so directly set the scaling of the 2D-display with your mouse. The values in the "Min." and "Max." input fields (see Chapter 3.11) are updated automatically. Proceed as follows:

- Move the mouse pointer to any corner of the desired range to be zoomed in.
- Now mark the range to be zoomed in. Hold the left mouse button pressed and move the mouse pointer to the opposite corner of the range to be zoomed in.
- Release the mouse button. The marked range will be zoomed in.

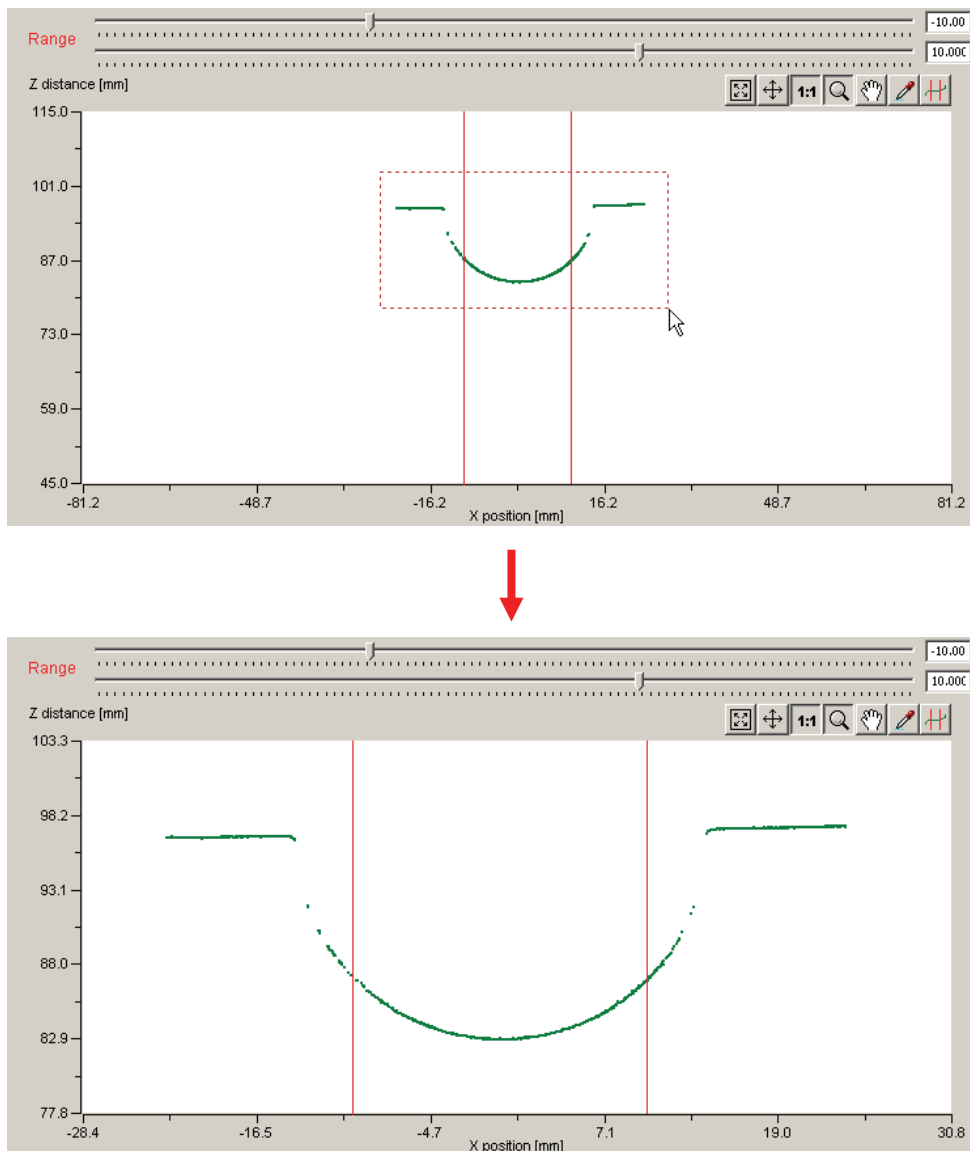


Fig. 3.1: Zooming in the 2D-display

3.12.5 Move Profile



You activate or deactivate the "Move profile" mode by pressing this button. You can move the profile on the 2D display with an active "Move profile" mode. Proceed as follows:

- Move the mouse pointer into the 2D display.
- Press the left mouse button and keep it pressed.
- Now move the mouse pointer in order to move the profile.

3.12.6 Display Extended Information of a Profile Point



Press this button to activate or deactivate the "Display extended information of a profile point" mode. Proceed as follows:

- Move the mouse pointer onto the desired profile point.
- Click on the profile point with the left mouse button.

The information for the point will now be displayed left to the toolbar for 5 seconds.



Fig. 3.2: Extended information of a profile point

The following information is displayed:

- **X:** The X coordinate of the point
- **Z:** The Z coordinate of the point
- **Intensity:** The maximum intensity of the reflection from which the point has been calculated
- **Width:** The width of the reflection from which the point has been calculated

3.12.7 Set Range



Press the respective button in order to adjust the associated range in the 2D display directly with the mouse. Proceed as follows:

- Move the mouse pointer to any corner or side of the range to be set.
- Now mark the range to be set. Hold the left mouse button pressed. Move the mouse pointer to the opposite corner or side of the range to be set.
- Release the mouse button. The selected range will now be applied.

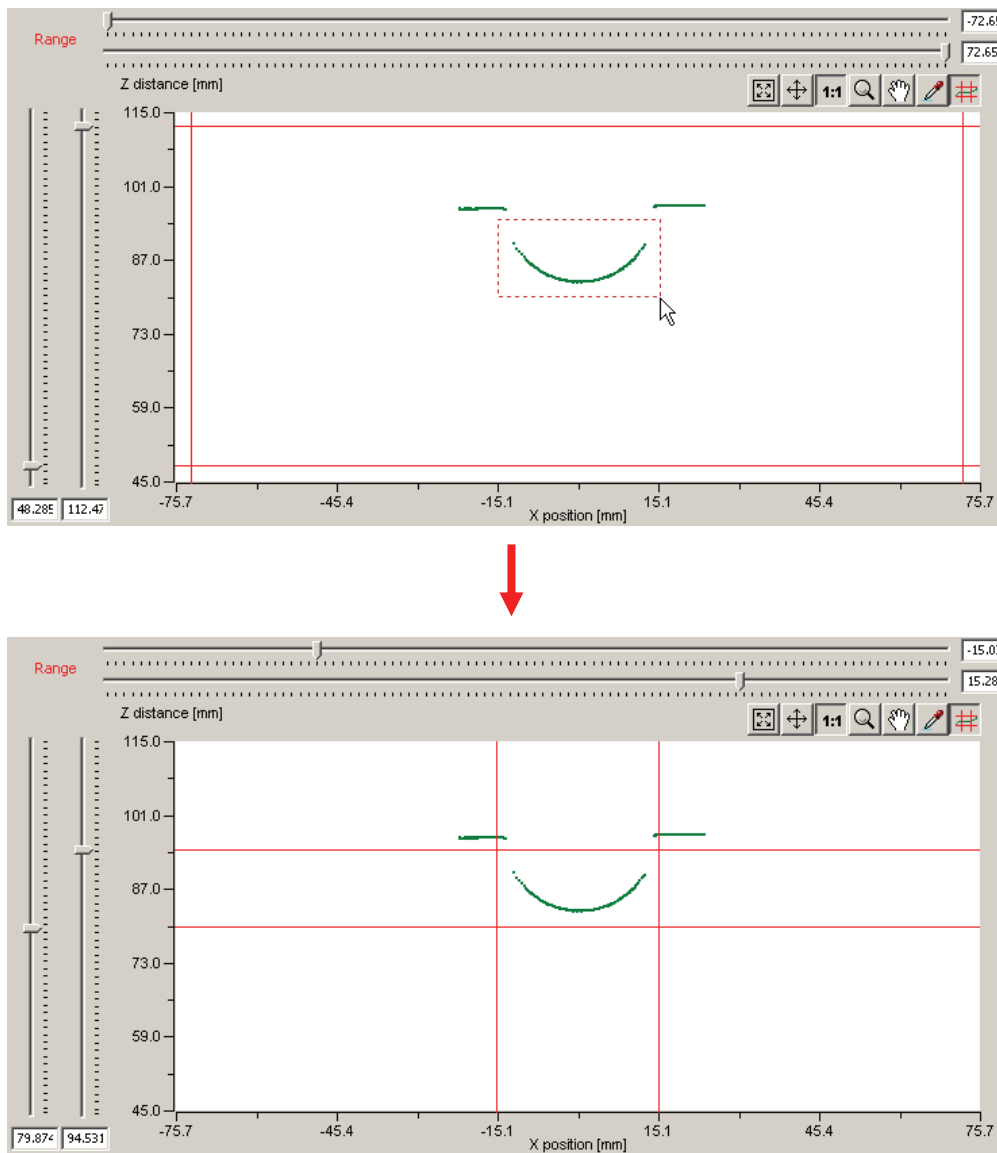


Fig. 3.3: Set range

3.12.8 Set horizontal Threshold



Press this button in order to adjust horizontal thresholds in the 2D display directly with the mouse. Proceed as follows:

- Move the mouse pointer in the 2D display so that it is located at the desired height of the threshold.
- Now click the left mouse button in order to set the threshold.

4. Functions of the Measuring Programs

4.1 Display Profile

Use the “Display profile” measuring program in order to display individual profiles and a sequence of profiles. The measuring program also calculates the saturation of the signal in a selected range. Additionally you can save the profiles in a format which is compatible with EXCEL.

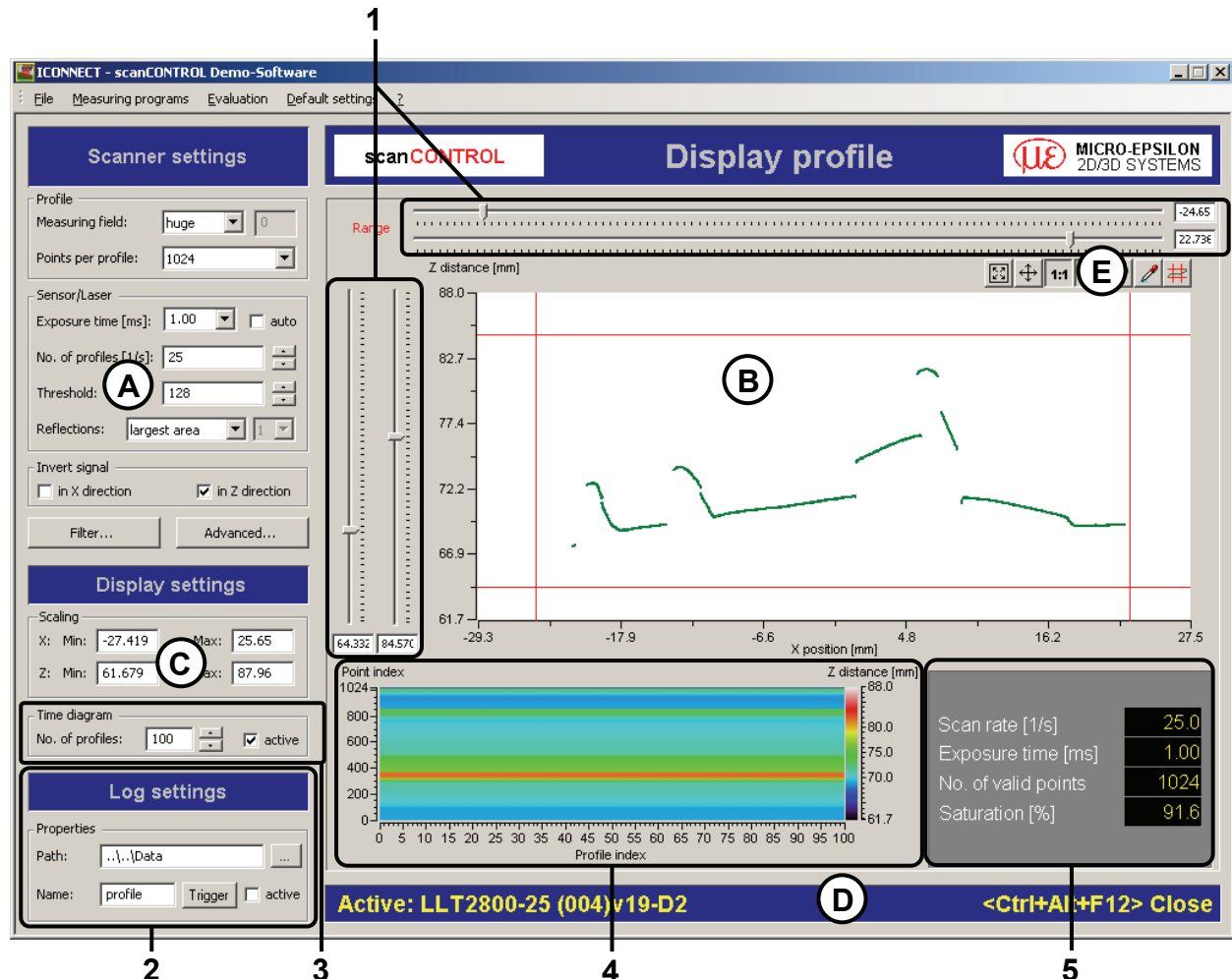


Abb. 4.1: Measuring program "Display profile"

Input fields and associated parameters in the measuring program "Display profile":

- A Scanner settings:** With these values you can change the settings of scanCONTROL. In offline mode this input field is replaced with the "File" input field. Detailed information on each of the parameters can be found in Chap. 3.6 "Scanner settings" and Chap. 3.9 "File settings".
In the “Display profile” measuring program you have the possibility to transfer all measured reflections from scanCONTROL and display a selected reflection as a profile. For this purpose select the “all reflections” option for the “Reflections” parameter. Now select the reflection to be displayed. Reflection “1” is the reflection with the smallest distance to the sensor and reflection “4” is the reflection with the largest distance to the sensor.
- B 2D-display:** This display visualizes the profile which has just been measured.
- C Display settings:** You can use this input field to configure the representation of the 2D-display. Detailed information on each of the parameters can be found in Chap. 3.11 "Display settings".
- D Status bar:** The status bar contains status messages and error messages.
- E Toolbar:** Use the toolbar to scale the 2D display, to activate various options for the mouse interaction and to set ranges directly with the mouse. Detailed information can be found in Chap. 3.12.

- 1 **Range:** Use the sliders to adjust the red lines which delimit the range in the 2D display, or input the values. You can also set the range limits in the 2D display directly using the mouse (see Chapter 3.12).
- 2 **Log settings:** This defines the settings for the profile logs.
 - **Path:** The directory in which the files are saved.
 - **Name:** The name of the profile.
 - **Trigger:** Press this button to record a single profile.
 - **Active:** Use this function to start the log. The log starts and ends with the selection of this checkbox.
- 3 **Time diagram (Settings):** These parameters are used to configure the display of the time diagram (4) for displaying profile sequences.
 - **No. of profiles:** This indicates the number of profiles to be displayed.
 - **Active:** Activates/deactivates the display of profile sequences.
- 4 **Time diagram (Diagram):** When the time diagram is activated you can use this display to see the time sequence of a sequence of profiles. The vertical axis represents the index of the measurement points along the profile and is scaled in accordance with the parameter "Points per profile" which is set under "Scanner settings". The individual profiles are entered on the horizontal axis as a function of time. You can adjust the scaling for this axis in the settings under "Time diagram". The distance Z to the sensor is symbolized using the colors shown in the key on the right.
- 5 **Result/status display:**
 - **Scan rate [1/s]:** This display shows the effective scan rate being used by the scanCONTROL Demo-Software to evaluate the scanner data. The scan rate may deviate from the parameter "No. of profiles [1/s]" set in "Scanner settings" if the computer does not have sufficient processing power.
 - **Exposure time [ms]:** The currently used exposure time
 - **No. of valid points:** The number of valid points which have been detected for the current profile.
 - **Saturation [%]:** The saturation of the signal which is selected with the area marked in red. This can be adjusted as required by changing the values for "exposure time" and "threshold". We recommend a saturation value between 60% and 80%.

Note: The program saves the profiles in the SYLK format (*.slk). This format can be imported into Microsoft Excel. One profile is saved in each file, whereby the file names are automatically incremented. If, for example, "profile" is specified as the profile name, the files "profile_0001.slk", "profile_0002.slk" etc. are generated. The profile counter is reset after 4000 profiles.

4.2 Save Profile

The measuring program "Save profile" is used to create recordings of profile sequences. The scanCONTROL Demo-Software creates a file which can then subsequently be loaded again with a measuring program in offline mode. Use this function to analyze fast processes offline. In the process the profiles are first stored in the computer's RAM and then saved in a file.

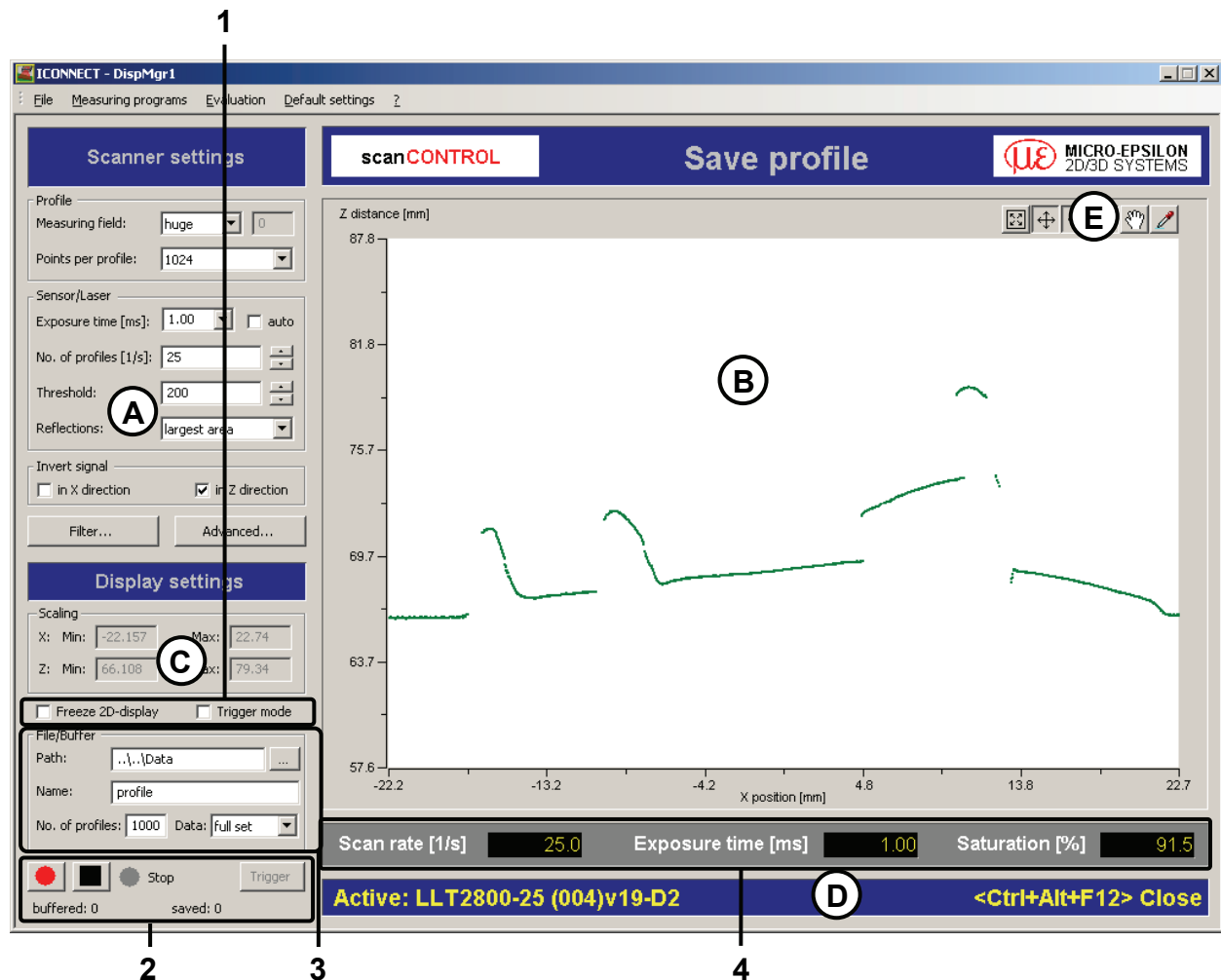


Fig. 4.2: Measuring program "Save profile"

Input fields and associated parameters in the measuring program "Save profile":

- A Scanner settings:** With these values you can change the settings of scanCONTROL. Detailed information on each of the parameters can be found in Chap. 3.6 "Scanner settings".
 - B 2D-display:** This display visualizes the profile which has just been measured.
 - C Display settings:** You can use this input field to configure the representation of the 2D-display. Detailed information on each of the parameters can be found in Chap. 3.11 "Display settings".
 - D Status bar:** The status bar contains status messages and error messages.
 - E Toolbar:** Use the toolbar to scale the 2D display, to activate various options for the mouse interaction and to set ranges directly with the mouse. Detailed information can be found in Chap. 3.12.
- 1 Freeze 2D-display/Trigger**
- **Freeze 2D-display:** Deactivates the 2D-display. When the display is deactivated the performance of the system rises, allowing profiles to be saved at a higher scan rate. This option is automatically deactivated when starting the measuring program.
 - **Trigger mode:** Activates the trigger mode, see also section "Record".

2 Record

- **Trigger mode**, not active: Press the red Record button to start recording the profile sequences. Now the profiles are stored in the RAM. The program will indicate the progress status in the field "Buffered:[profile number]". The profiles are stored in the selected file if the maximum number of profiles is reached. Press the Stop button to abort buffering and start saving. The length of the process will vary according to the size of the profile sequence. The program will indicate the progress status in the field "saved:[profile number]".
- **Trigger mode**, active: Press the red Record button. The program is ready to buffer profile sequences in the RAM. Press the trigger button to buffer a single profile. The profiles are stored in the selected file if the maximum number of profiles is reached. Press the Stop button to abort buffering and start saving. The length of the process will vary according to the size of the profile sequence. The program will indicate the progress status in the field "saved:[profile number]".

3 File/Buffer:

- **Path:** The directory in which the file is saved.
- **Name:** Enter a name for the profile sequence you wish to save here.
- **No. of profiles:** The maximum number of profiles to be saved in the file. This number should not be chosen higher than required, as the proportion of the RAM which is reserved for the profiles depends on it. You can record up to a maximum of 4000 profiles.
- **Data:** Use this field to select the informations which are stored in the profile file. This setting is crucial for the resulting file size of the profile file.
 - **x/z only:** Stores the X and Z coordinates of the individual measurements. This setting minimizes the file size.
 - **x/z + data:** Stores the data of the selected reflection (X and Z coordinate, width, maximum, threshold, moment (order: 0 and 1)).
 - **full set:** Stores all four reflections, the time stamp and the settings for scanCONTROL (only if "Loop back parameters" is active, see Chap. 3.8). This setting enlarges the file size.

4 Result/status display

- **Scan rate [1/s]:** This display shows the effective scan rate being used by the scanCONTROL Demo-Software to evaluate the scanner data. The scan rate may deviate from the parameter "No. of profiles [1/s]" set in "Scanner settings" if the computer does not have sufficient processing power.
- **Exposure time [ms]:** The currently used exposure time
- **Saturation [%]:** The saturation of the current signal. This can be adjusted as required by changing the values for "exposure time" and "threshold". We recommend a saturation value between 60% and 80%.

Note: To store the scanCONTROL settings in the profile file, select the file format "full set" and activate "Loop back parameters" in the advanced scanner settings (see Chap. 3.8).

Note: There may be a discrepancy between the setpoint value and the actual value for the scan rate used for saving if the number of scans is set too high or the processing power of the PC is insufficient.

4.3 Display Image Data

The measuring program "Display image data" is used to display the original signal recorded on the image matrix of the scanCONTROL. This measuring program is useful for detecting and eliminating sources of errors and interference, such as overexposure or multiple reflections.

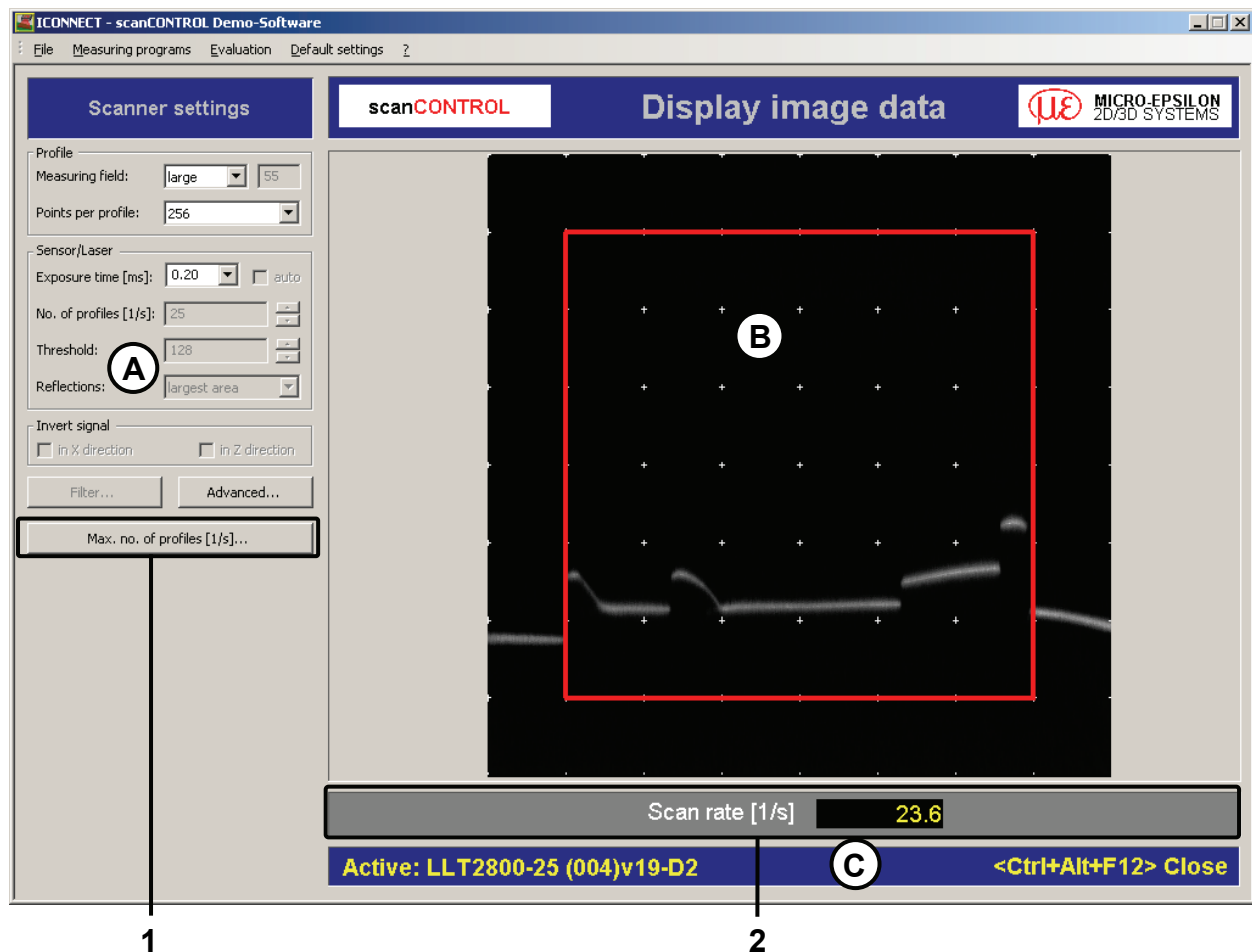


Fig. 4.3: Measuring program "Display image data"

Input fields and associated parameters in the measuring program "Display image data":

- A Scanner settings:** With these values you can change the settings of scanCONTROL. Detailed information on each of the parameters can be found in Chap. 3.6 "Scanner settings". Only the values "Measuring field", "Points per profile" and "Exposure time" are available in the "Display image data" measuring program.
- B 2D-display:** This display visualizes the image data which has just been measured by the CMOS array. The measuring field selected with the "Measuring field" parameter (see Chapter 3.6) is shown on the display as a red rectangle.
- C Status bar:** The status bar contains status messages and error messages.
- 1 Max. no. of profiles [1/s]...:** With this button you open the dialog "Max. no of profiles [1/s]" where you can determine the maximum possible profile frequency depending on the currently selected scanner settings (see below).
- 2 Result/status display:**
 - **Scan rate [1/s]:** This value shows the effective scan rate being used by the program to evaluate the scanner data.

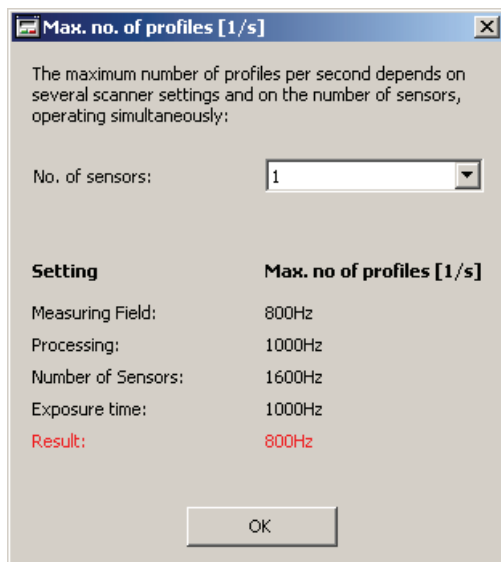


Fig. 4.1: Dialog "Max. no. of profiles [1/s]"

The maximum possible profile frequency which scanCONTROL can be operated with depends on various scanner settings and on the number of sensors, operating simultaneously. You can analyze the maximum possible profile frequency in this dialog.

- **No. of sensors:** With this setting you determine the effect of the number of scanCONTROL sensors to be operated simultaneously on the Fire Wire controller (see below).
- **Measuring field:** The maximum profile frequency resulting from the setting of the "Measuring field" parameter.
- **Processing:** The maximum profile frequency resulting from the setting in the "Processing" (see Chapter 3.8) input field.
- **Number of sensors:** The maximum profile frequency resulting from the setting of the "No. of simultaneous operating sensors" parameter (see above).
- **Exposure time:** The maximum profile frequency resulting from the setting of the "Exposure time" parameter.
- **Result:** The maximum profile frequency resulting from the above restrictions.

Note: Further information on the maximum profile frequency can be found in the document "Quick reference scanCONTROL".

4.4 Angle

This measuring program calculates the angle between two selected ranges of a profile. The program calculates the best line fit through the points in the selected range and measures the angles between these lines and the X axis, as well as the angle between the two lines. The measured angles are continuously updated in the results display.

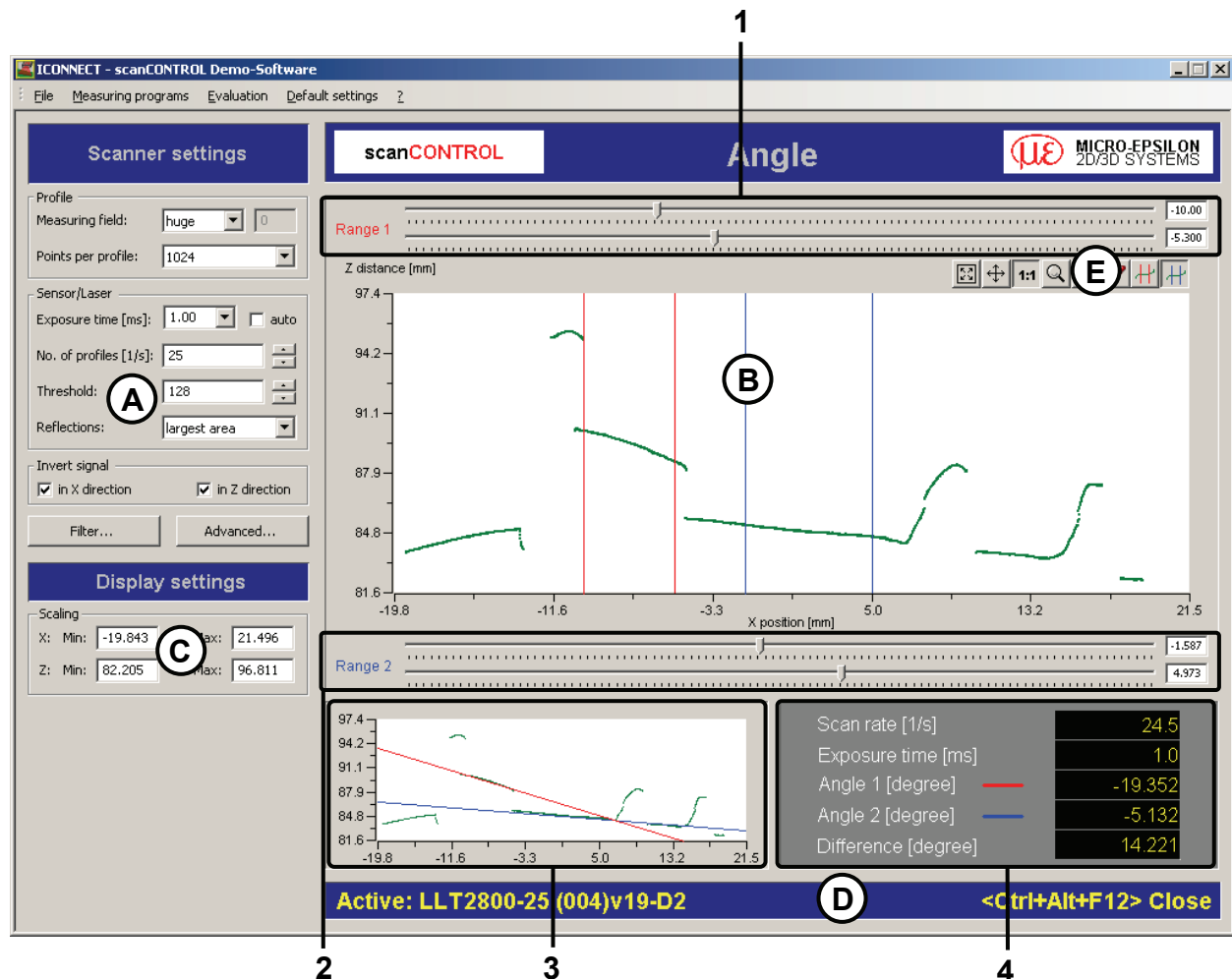


Abb. 4.4: Measuring program "Angle"

Input fields and associated parameters in the measuring program "Angle":

- A Scanner settings:** With these values you can change the settings of scanCONTROL. In offline mode this input field is replaced with the "File" input field. Detailed information on each of the parameters can be found in Chap. 3.6 "Scanner settings" and Chap. 3.9 "File settings".
- B 2D-display:** This display visualizes the profile which has just been measured.
- C Display settings:** You can use this input field to configure the representation of the 2D-display. Detailed information on each of the parameters can be found in Chap. 3.11 "Display settings".
- D Status bar:** The status bar contains status messages and error messages.
- E Toolbar:** Use the toolbar to scale the 2D display, to activate various options for the mouse interaction and to set ranges directly with the mouse. Detailed information can be found in Chap. 3.12.
- 1 Range 1:** Use the two sliders to adjust the red lines which delimit range 1 in the 2D-display, or input the values. You can also set the range limits in the 2D display directly using the mouse (see Chapter 3.12).
- 2 Range 2:** Use the two sliders to adjust the blue lines which delimit range 2 in the 2D-display, or input the values. You can also set the range limits in the 2D display directly using the mouse (see Chapter 3.12).

- 3 Result display:** The currently measured profile and the calculated line fits are shown in this display.
- 4 Result/status display:**
- **Scan rate [1/s]:** This display shows the effective scan rate being used by the scanCONTROL Demo-Software to evaluate the scanner data. The scan rate may deviate from the parameter "No. of profiles [1/s]" set in "Scanner settings" if the computer does not have sufficient processing power.
 - **Exposure time [ms]:** The currently used exposure time
 - **Angle 1 [degree]:** This shows the currently measured value for the angle between the line fit in range 1 and the positive X axis.
 - **Angle 2 [degree]:** This shows the currently measured value for the angle between the line fit in range 2 and the positive X axis.
 - **Difference [degree]:** Here the program calculates the difference between the angles in range 2 and range 1.

4.5 Circle

This measuring program is used to fit a circle to profile points in a range marked by two range lines. The center point and the diameter of the circle in relation to the X axis and the Z axis are computed.

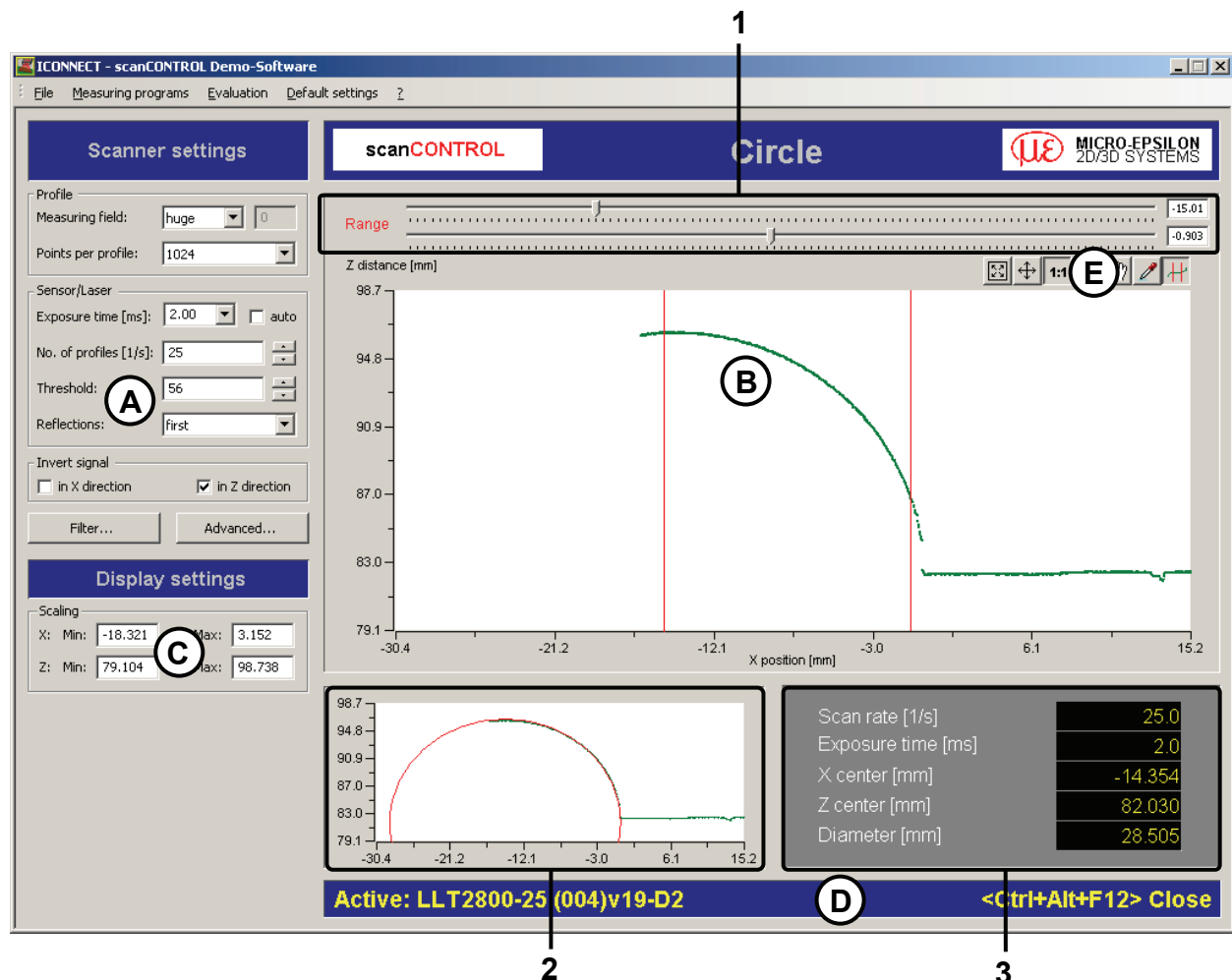


Abb. 4.5: Measuring program "Circle"

Input fields and associated parameters in the measuring program "Circle":

- A Scanner settings:** With these values you can change the settings of scanCONTROL. In offline mode this input field is replaced with the "File" input field. Detailed information on each of the parameters can be found in Chap. 3.6 "Scanner settings" and Chap. 3.9 "File settings".
- B 2D-display:** This display visualizes the profile which has just been measured.
- C Display settings:** You can use this input field to configure the representation of the 2D-display. Detailed information on each of the parameters can be found in Chap. 3.11 "Display settings".
- D Status bar:** The status bar contains status messages and error messages.
- E Toolbar:** Use the toolbar to scale the 2D display, to activate various options for the mouse interaction and to set ranges directly with the mouse. Detailed information can be found in Chap. 3.12.
- 1 Range:** Use the two sliders to adjust the red lines which delimit the range in the 2D-display, or input the values. The program then calculates a circle through the points in this range. You can also set the range limits in the 2D display directly using the mouse (see Chapter 3.12).
- 2 Result display:** The currently measured profile and the calculated circle are shown in this display.

3 Result/status display:

- **Scan rate [1/s]:** This display shows the effective scan rate being used by the scanCONTROL Demo-Software to evaluate the scanner data. The scan rate may deviate from the parameter "No. of profiles [1/s]" set in "Scanner settings" if the computer does not have sufficient processing power.
- **Exposure time [ms]:** The currently used exposure time
- **X center [mm]:** This shows the X axis coordinate of the center point.
- **Z center [mm]:** This shows the Z axis coordinate of the center point.
- **Diameter [mm]:** This shows the diameter of the overall circle.

4.6 Edge

This measuring program is used to measure the position and gradient of edges in a profile. A noise range (blue horizontal lines) and a threshold value (red horizontal line) are defined for this purpose, whereby the threshold value must lie within the noise range. An edge is detected if the profile runs right through the noise range. The position of an edge is calculated from the intersecting point between the profile and the threshold value. The gradient of an edge is calculated from the intersecting points between the profile and the edges of the noise range.

The result display indicates all detected edges with a red cross. The measured values for the first three edges are continuously updated in the result display.

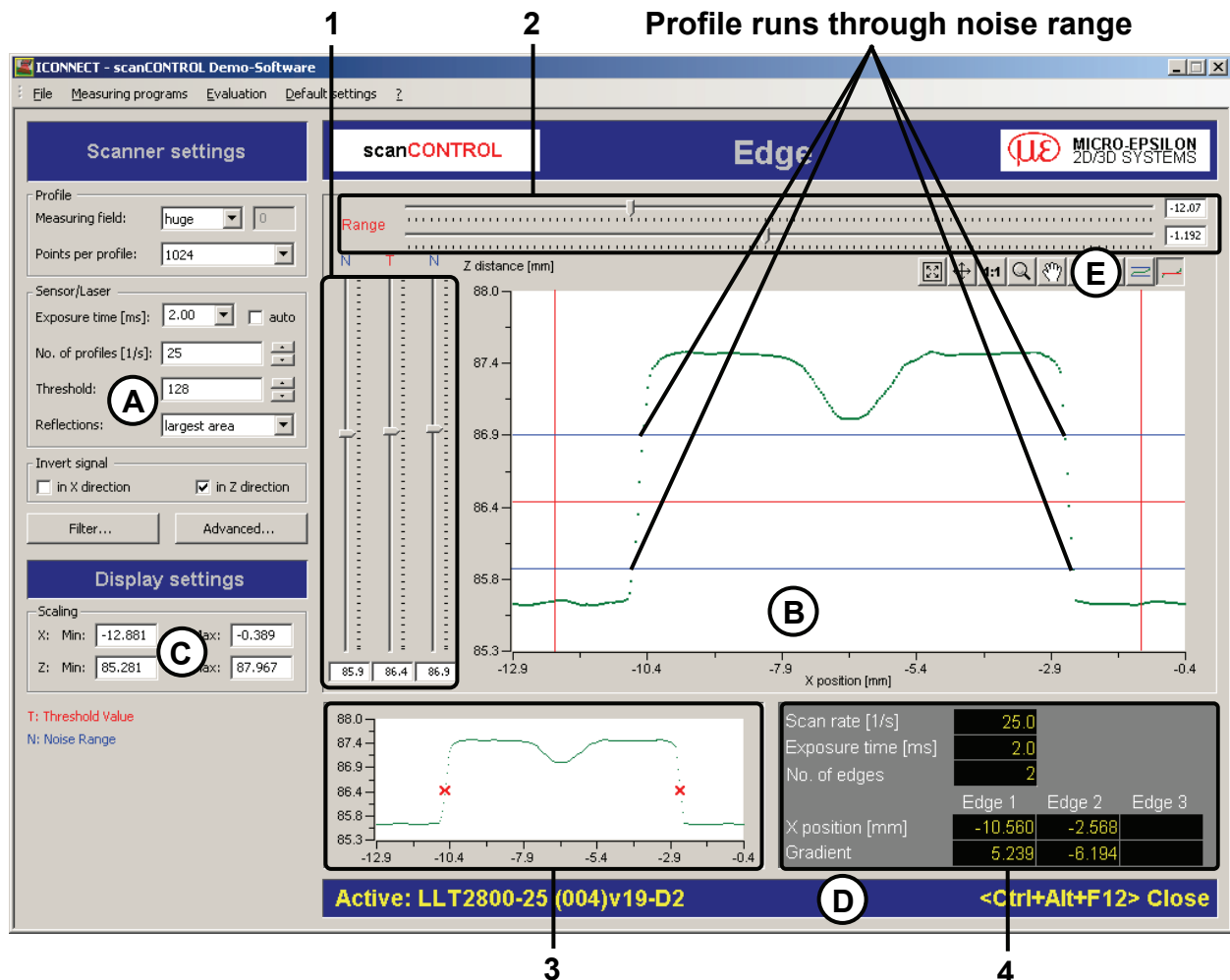


Abb. 4.6: Measuring program "Edge"

Input fields and associated parameters in the measuring program "Edge":

- A Scanner settings:** With these values you can change the settings of scanCONTROL. In offline mode this input field is replaced with the "File" input field. Detailed information on each of the parameters can be found in Chap. 3.6 "Scanner settings" and Chap. 3.9 "File settings".
- B 2D-display:** This display visualizes the profile which has just been measured.
- C Display settings:** You can use this input field to configure the representation of the 2D-display. Detailed information on each of the parameters can be found in Chap. 3.11 "Display settings".
- D Status bar:** The status bar contains status messages and error messages.
- E Toolbar:** Use the toolbar to scale the 2D display, to activate various options for the mouse interaction and to set ranges directly with the mouse. Detailed information can be found in Chap. 3.12.

- 1 Threshold value/noise range:**
 - **Noise range (blue):** The size of the blue noise range in the 2D-display can be adjusted by moving the two sliders marked by "N" or by entering/changing the values in the according input fields. You can also set the range limits in the 2D display directly using the mouse (see Chapter 3.12).
 - **Threshold value (red):** The position of the red threshold value in the 2D-display can be adjusted by moving the slider marked by "T" or by entering/changing the value in the according input field. You can also set the threshold in the 2D display directly using the mouse (see Chapter 3.12).
- 2 Range:** Use the two sliders to adjust the red lines which delimit the range in the 2D-display, or input the values. The program will then only detect edges within this range. You can also set the range limits in the 2D display directly using the mouse (see Chapter 3.12).
- 3 Result display:** The results display shows the currently measured profile and the edges detected in it. Edges are identified with a red cross.
- 4 Result/status display:**
 - **Scan rate [1/s]:** This display shows the effective scan rate being used by the scanCONTROL Demo-Software to evaluate the scanner data. The scan rate may deviate from the parameter "No. of profiles [1/s]" set in "Scanner settings" if the computer does not have sufficient processing power.
 - **Exposure time [ms]:** The currently used exposure time
 - **No. of edges:** At this point the program indicates the number of edges detected in the currently measured profile.
 - **X position [mm]:** This display shows the position of the first three measured edges. The edge with the smallest X coordinate counts as the first edge.
 - **Gradient:** This display shows the gradient of the first three measured edges. The edge with the smallest X coordinate counts as the first edge.

4.7 Peak

This measuring program is used to detect local minimum/maximum values within a profile. In the process, a reference line is fitted first. A minimum height in relation to the reference line is specified then. All points which have a greater distance to the line than the minimum height are potential candidates for peaks. If a definable number (Min. width) of these points lie next to each other the program will detect a peak, whereby the peak position is defined by the point with the maximum distance to the line.

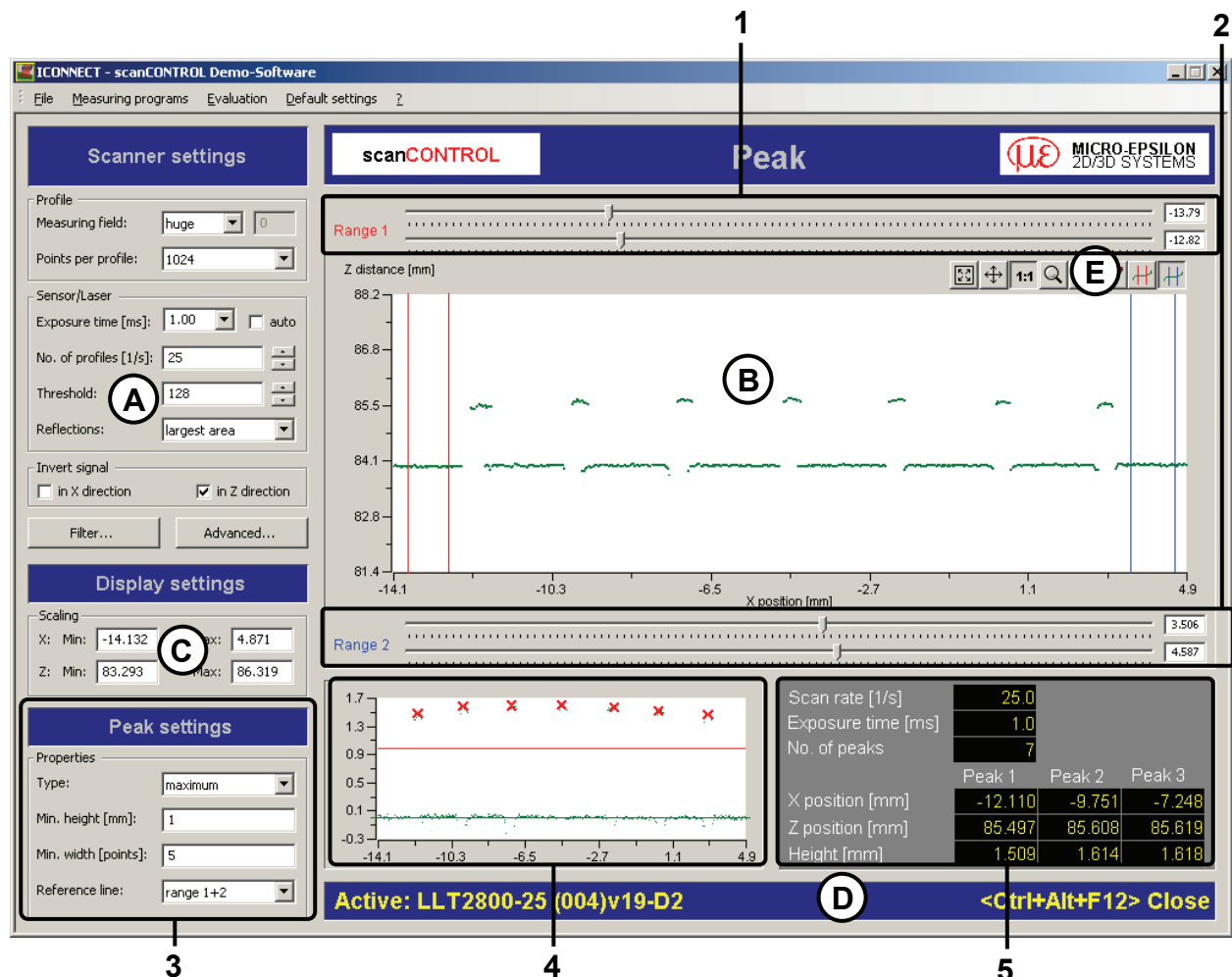


Fig. 4.7: Measuring program "Peak"

Input fields and associated parameters in the measuring program "Peak":

- A Scanner settings:** With these values you can change the settings of scanCONTROL. In offline mode this input field is replaced with the "File" input field. Detailed information on each of the parameters can be found in Chap. 3.6 "Scanner settings" and Chap. 3.9 "File settings".
- B 2D-display:** This display visualizes the profile which has just been measured.
- C Display settings:** You can use this input field to configure the representation of the 2D-display. Detailed information on each of the parameters can be found in Chap. 3.11 "Display settings".
- D Status bar:** The status bar contains status messages and error messages.
- E Toolbar:** Use the toolbar to scale the 2D display, to activate various options for the mouse interaction and to set ranges directly with the mouse. Detailed information can be found in Chap. 3.12.
- 1 Range 1:** Use the two sliders to adjust the red lines which delimit range 1 in the 2D-display, or input the values. You can also set the range limits in the 2D display directly using the mouse (see Chapter 3.12).

- 2 Range 2:** Use the two sliders to adjust the red lines which delimit range 2 in the 2D-display, or input the values. You can also set the range limits in the 2D display directly using the mouse (see Chapter 3.12).
- 3 Peak settings:**
 - **Type:** Use this parameter to define whether the program is looking for local minimum values or local maximum values.
 - **Min. height [mm]:** Use this setting to specify the minimum distance from the points to the reference line for them to be recognized as a peak.
 - **Min. width [points]:** Use this setting to specify the minimum number of points which must lie next to each other and satisfy the criterion "Min. height [mm]" to be recognized as a peak.
 - **Reference line:** This indicates how the reference line is determined.
 - **Range 1 + 2:** The program generates a reference line which corresponds to the line fit through all points in ranges 1 and 2.
 - **Range 1 + 2 step:** The program calculates the direction vector of the reference line from the points in ranges 1 and 2. The position of the reference line is only formed from the points in range 1.
 - **Range 1:** The program only calculates the reference line from the points in range 1.
- 4 Result display:** The result display shows the currently measured profile, the reference line (green line), the minimum height (red line) and the measured peaks (red crosses).
- 5 Result/status display:**
 - **Scan rate [1/s]:** This display shows the effective scan rate being used by the scanCONTROL Demo-Software to evaluate the scanner data. The scan rate may deviate from the parameter "No. of profiles [1/s]" set in "Scanner settings" if the computer does not have sufficient processing power.
 - **Exposure time [ms]:** The currently used exposure time
 - **No. of peaks:** At this point the program indicates the number of peaks detected in the currently measured profile.
 - **X position [mm]:** This display shows the X coordinate of the first three measured peaks. The peak with the smallest X coordinate counts as the first peak.
 - **Z position [mm]:** This display shows the Z coordinate of the first three measured peaks. The peak with the smallest X coordinate counts as the first peak.
 - **Height [mm]:** Here, the program calculates the distances between the first three peaks and the reference line.

4.8 Flatness

This measuring program evaluates the flatness of a profile. To do this, it calculates how many points in the profile lie within a user-specified tolerance. The program fits a line in an adjustable range to do this. You can define an upper and lower tolerance limit in relation to this line. The measuring program then determines how many points in the current profile lie above, below and within this tolerance, as well as the positions of the highest and lowest points.

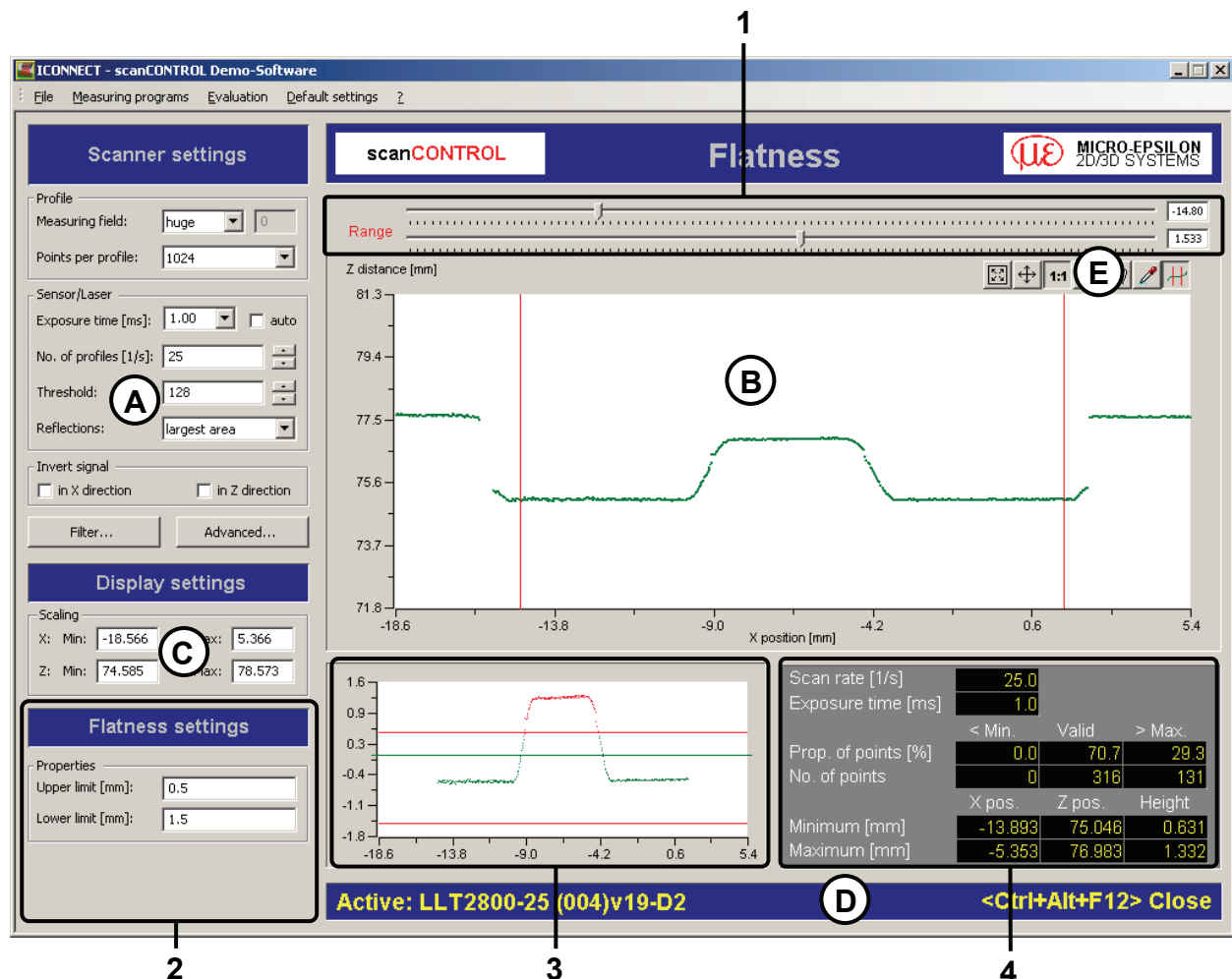


Fig. 4.8: Measuring programs "Flatness"

Input fields and associated parameters in the measuring program "Flatness":

- A Scanner settings:** With these values you can change the settings of scanCONTROL. In offline mode this input field is replaced with the "File" input field. Detailed information on each of the parameters can be found in Chap. 3.6 "Scanner settings" and Chap. 3.9 "File settings".
- B 2D-display:** This display visualizes the profile which has just been measured.
- C Display settings:** You can use this input field to configure the representation of the 2D-display. Detailed information on each of the parameters can be found in Chap. 3.11 "Display settings".
- D Status bar:** The status bar contains status messages and error messages.
- E Toolbar:** Use the toolbar to scale the 2D display, to activate various options for the mouse interaction and to set ranges directly with the mouse. Detailed information can be found in Chap. 3.12.
- 1 Range:** Use the two sliders to adjust the red lines which delimit the range in the 2D-display, or input the values. The program will then calculate the flatness within this range. You can also set the range limits in the 2D display directly using the mouse (see Chapter 3.12).

- 2 **Flatness settings:** You use these parameters to define the tolerance limits of your measurement in relation to the determined reference line. Enter a value in each of the input fields "Upper limit" and "Lower limit". The program displays the tolerance limits as red lines in the results display.
- 3 **Result display:** The results display shows the currently measured profile, the reference line (green line) and the selected tolerance limits (red lines). The following color coding is used for detected points:
 - Green: points within the tolerance range.
 - Red: points above the upper limit of the tolerance range.
 - Blue: points below the lower limit of the tolerance range.
- 4 **Result/status display:**
 - **Scan rate [1/s]:** This display shows the effective scan rate being used by the scanCONTROL Demo-Software to evaluate the scanner data. The scan rate may deviate from the parameter "No. of profiles [1/s]" set in "Scanner settings" if the computer does not have sufficient processing power.
 - **Exposure time [ms]:** The currently used exposure time
 - **Prop. of points [%]:** At this point the program indicates the proportion of points as a percentage which lie below, within and above the tolerance limits.
 - **No. of points:** At this point the program indicates the number of points which lie below, within and above the tolerance limits.
 - **Minimum:** Here the program shows the X/Z coordinates and the distance (height) of the point with the greatest negative distance to the reference line.
 - **Maximum:** Here the program shows the X/Z coordinates and the distance (height) of the point with the greatest positive distance to the reference line.

4.9 Profile

The measuring program "Profile" is used to determine characteristic data for a significant section of a profile. Examples of significant sections of a profile include a glue bead or a weld seam.

First, the measuring program determines the points belonging to the significant section of the profile. A reference line is fitted to do this. A minimum height in relation to the reference line is specified by the user. All points with a distance to the line which is greater than the minimum height are potential candidates for the profile section being looked for. If a definable number (Min. width) of these points lie next to each other then the program detects a "significant profile section".

The results display contains information about the height, width and area of the currently detected section.

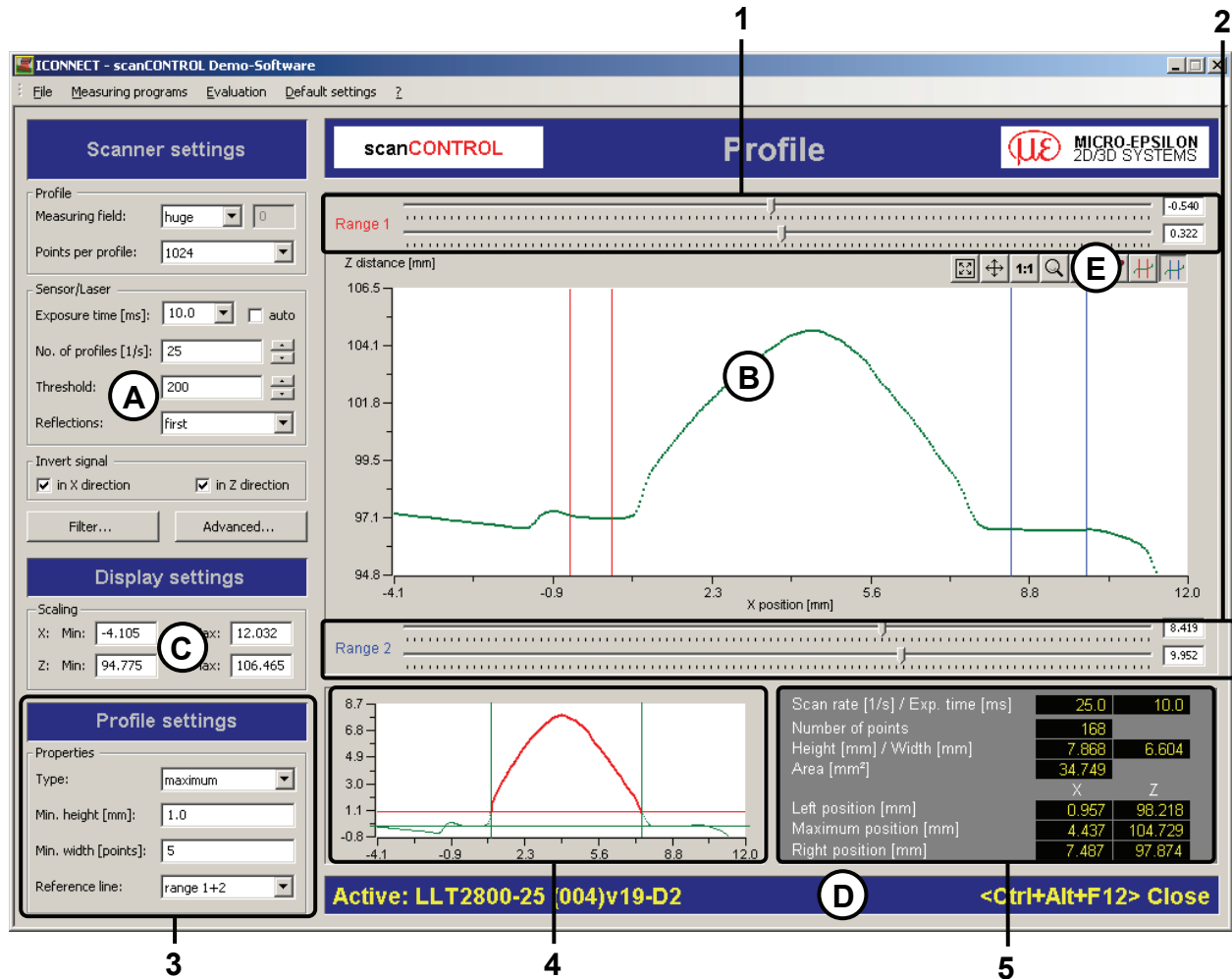


Fig. 4.9: Measuring program "Profile"

Input fields and associated parameters in the measuring program "Profile":

- A Scanner settings:** With these values you can change the settings of scanCONTROL. In offline mode this input field is replaced with the "File" input field. Detailed information on each of the parameters can be found in Chap. 3.6 "Scanner settings" and Chap. 3.9 "File settings".
- B 2D-display:** This display visualizes the profile which has just been measured.
- C Display settings:** You can use this input field to configure the representation of the 2D-display. Detailed information on each of the parameters can be found in Chap. 3.11 "Display settings".
- D Status bar:** The status bar contains status messages and error messages.
- E Toolbar:** Use the toolbar to scale the 2D display, to activate various options for the mouse interaction and to set ranges directly with the mouse. Detailed information can be found in Chap. 3.12.

- 1 Range 1:** Use the two sliders to adjust the red lines which delimit range 1 in the 2D-display, or input the values. You can also set the range limits in the 2D display directly using the mouse (see Chapter 3.12).
- 2 Range 2:** Use the two sliders to adjust the red lines which delimit range 2 in the 2D-display, or input the values. You can also set the range limits in the 2D display directly using the mouse (see Chapter 3.12).
- 3 Profile settings:**
 - **Type:** Use this parameter to define whether the section of the profile should be defined by a local minimum value or a local maximum value.
 - **Min. height [mm]:** Use this setting to specify the minimum distance from the points to the reference line for them to be recognized as a significant section of the profile.
 - **Min. width [points]:** Use this setting to specify the minimum number of points which must lie next to each other and satisfy the criterion "Min. height [mm]" to be recognized as a significant section of the profile.
 - **Reference line:** This indicates how the reference line is determined.
 - **Range 1 + 2:** The program generates a reference line which corresponds to the line fit through all points in ranges 1 and 2.
 - **Range 1 + 2 step:** The program calculates the direction vector of the reference line from the points in ranges 1 and 2. The position of the reference line is only formed from the points in range 1.
 - **Range 1:** The program only calculates the reference line from the points in range 1.
- 4 Result display:** The result display shows the currently measured profile, the reference line (horizontal green line), the minimum height (horizontal red line), the significant section of the profile (red points) and the left hand and right hand limits of the detected section (vertical green lines).
- 5 Result/status display:**
 - **Scan rate [1/s]:** This display shows the effective scan rate being used by the scanCONTROL Demo-Software to evaluate the scanner data. The scan rate may deviate from the parameter "No. of profiles [1/s]" set in "Scanner settings" if the computer does not have sufficient processing power.
 - **Exposure time [ms]:** The currently used exposure time
 - **Number of points:** The number of points in the profile section.
 - **Height [mm]:** The maximum height of the profile section.
 - **Area [mm²]:** The area of the profile section.
 - **Left position [mm] X/Z:** The point which delimits the section on the left.
 - **Maximum position [mm] X/Z:** The highest point in the profile section.
 - **Right position [mm] X/Z:** The point which delimits the profile section on the right.

5. Status and Error messages

Status messages and error messages are displayed in each measuring program. The possible messages are shown below.

5.1 In Online Mode

Message	Description	Action
Active: LLT[Type] ([Option])[Version]	There is no fault present. The measurement is active.	-
Active: scanCONTROL [Type]([Option]) [Version]		
No points in region of interest	No data are being received from the scanCONTROL.	Vary the distance between the scanner and the measured object, or increase the selected exposure time.
No LLT found on IEEE1394-Bus	scanCONTROL is not connected via IEEE1394 to the PC, or the power supply to the scanCONTROL has been switched off, or no CMU-driver is installed.	Check the IEEE1394 connection and check whether the scanner is switched on and connected to a power supply. Also check whether the CMU-driver is installed.
LLT S/N not found on IEEE1394-Bus	scanCONTROL Demo-Software was last used with a different model of scanCONTROL.	Open the "Advanced scanner settings" dialog box and press the button "Next" to select the current scanCONTROL.
No free LLT found on IEEE1394-Bus	All of the scanners connected to the PC are already being used by other programs.	Close other programs which are accessing scanCONTROL.
Internal error	An unknown fault has occurred.	Close scanCONTROL Demo-Software and restore the basic settings on the controller by pressing the Reset button on the controller.
LLT-parameters invalid		
Error while data transfer		
Wrong driver version CMU	An incorrect version of the CMU-driver has been installed.	Reinstall the driver as described in section 2 ("Installation of the drivers")
LLT is already in use	The currently used scanner is already being used by another program.	Close the other program accessing the scanCONTROL or press the button "Next" to select another scanner.
Invalid device	The currently operated IEEE 1394 device is not a scanCONTROL.	Open the dialog box "Advanced scanner settings" and press the button "Next" to select a scanCONTROL or close scanCONTROL Demo-Software and connect the scanCONTROL to the PC.
Data transfer interrupted	The data transfer between scanCONTROL and the PC has been interrupted.	Check the IEEE1394 connection between scanCONTROL and the PC. Close scanCONTROL Demo-Software, reconnect scanCONTROL to the PC and restart the software.
Inconsistent: No. of profiles	The selected value for the parameter "No. of profiles" is too large. Please refer to Quick reference scanCONTROL to get more informations.	Decrease the value for the parameter "No. of profiles"
Inconsistent: Exposure time / No. of profiles	The selected scanner settings "Exposure time" and "No. of profiles" are mutually exclusive.	Type in consisting values for the parameters „Exposure time“ and „No. of profiles“.

Inconsistent: Meas. field / Points p. profile / No. of profiles	The selected scanner settings "Measuring field", "Points per profile" and "No. of profiles" are mutually exclusive. Please refer to Quick reference scanCONTROL to get more informations.	Type in consisting values for the parameters „Measuring field“, „Points per profile“ and „No. of profiles“.
Corrupt profile	The transmitted profile is damaged	Deactivate the filter or reset the parameters to the default settings

5.2 In Offline Mode

Message	Description	Action
Ready	The system is ready.	There is no fault present. You can use the Play button to play back a new profile sequence. If a profile sequence has already been played back then the individual profiles can now be displayed.
Play	A profile sequence is being played back.	There is no fault present. Wait until the playback has finished or interrupt playback by pressing the Stop button.
Couldn't open file	The specified name or path was incorrect.	Select the correct directory containing your recorded profile sequence.
No points in region of interest	No data were received from the scanCONTROL during the recording.	Repeat the recording of the profile.

6. Notes

Please note the following when operating the scanCONTROL Demo-Software.

- 1 - Never disconnect the IEEE1394 connection between the scanCONTROL and the computer while the software is running.
 - Never switch off the power supply to the scanCONTROL while the software is running.
 - Never press the reset/user mode button on the controller while the software is running.
 - Never activate the standby mode or hibernation of your computer when the measuring system is connected to the computer.

This may cause the operating system to shut down unintentionally.

- 2 Only use version 6.3 of the CMU driver. If a different driver or a different version of the CMU driver for the scanCONTROL is installed at a later date then it will not be possible to operate the scanner with the scanCONTROL Demo-Software.
- 3 Select the ? → Help menu item or press the <F1> key directly in a measuring program to display help information about that measuring program.
- 4 The measuring program "Display profile" shows the saturation in the result display. This is greatly influenced by the exposure time and the threshold value and affects the way in which the profile data are calculated. The saturation should be between 60% and 80% during a measurement.
- 5 There may be a discrepancy between the setpoint value and the actual value for the no. of scans per second if the number of scans is set too high or the processing power of the PC is insufficient.
- 6 Use the parameter „Measuring field“ in the „Scanner settings“ to define the resolution in the directions of the X axis and the Z axis. The value of the X axis is also influenced by the input field „Number of points per profile“, and takes priority over the „Measuring field“ parameter. Choosing a measuring field of, for example, 512 x 256 pixels and a resolution of 1024 points per profile is not consistent. In this case a measuring field of 1024 x 256 is selected automatically.
- 7 If you have played back a profile sequence in offline mode and then wish to make changes to the measurement settings or the display settings, these changes will not become effective until the next profile is displayed. To do this, select a new profile under "Current profile".
- 8 Proceed as follows to print out or save a profile: Generate a screenshot by pressing the "Print" key on your PC keyboard. Switch to image editing software like Microsoft Paint (under Accessories) or Word. Press <Ctrl + V> to paste the screenshot, and then print out the screenshot or save it as a file in the relevant program.
- 9 Proceed as follows if you cannot see a profile in the "2D-display" and no error messages are displayed in the "status bar": Close the active measuring program. Restore the factory settings for the selected measuring program via the option "Default settings" in the menu bar. Restart the selected measuring program. Valid parameters are then loaded into the "Scanner settings", and the complete measuring range is displayed in the "2D-display".

7. Keyboard Shortcuts

You can use the keyboard shortcuts below to speed up your work. The following combinations are available:

Key shortcut	Action
F1	Opens the complete documentation for the scanCONTROL Demo-Software (from the main menu only)
	Opens the Help file for the active measuring program (only from within a measuring program)
F2	Starts the measuring program "Display profile" (from the main menu only)
F3	Starts the measuring program "Save profile" (from the main menu in online mode only)
F4	Starts the measuring program "Display image data" (from the main menu in online mode only)
F5	Starts the measuring program "Angle" (from the main menu only)
F6	Starts the measuring program "Circle" (from the main menu only)
F7	Starts the measuring program "Edge" (from the main menu only)
F8	Starts the measuring program "Peak" (from the main menu only)
F9	Starts the measuring program "Flatness" (from the main menu only)
F10	Starts the measuring program "Profile" (from the main menu only)
Ctrl+F1	Switches to online mode (from the main menu only)
Ctrl+F2	Switches to offline mode (from the main menu only)
Ctrl+Alt+F12	Closes the scanCONTROL Demo-Software (from the main menu only)
	Closes the current measuring program and switches to the main menu (from an active measuring program only)



MICRO-EPSILON

www.micro-epsilon.de

MICRO-EPSILON
MESSTECHNIK
GmbH und Co. KG
Königbacher Str. 15
D-94496 Ortenburg
Tel. +49/85 42/1 68-0
Fax +49/85 42/1 68-90
e-mail: info@micro-epsilon.de

X9751130-A070108ALI

