Operating Manual

INDUSTRYmonitor Program Help

HBM

Contents   Page

1 INDUSTRYmonitor Main Windows

1.1 Main window of the INDUSTRY-monitor, user level Superuser

You are now located in the user level "Superuser". In this user level you have all rights. You can:

- Register new devices (equipment)
- Define general settings for the program
- Change settings on parameter sets and memory management
- Display measured plots and results for the registered equipment (devices)
- Access stored data
- Add plug-ins

Screen setup; what is displayed?

The screen is divided into three columns:

- The left column shows the list of available equipment with the *IP address*[1] in brackets. If you tap an equipment item, it is displayed in the center or masked out.

  superimposes further information on the respective equipment; masks out the advanced information and is displayed once you have superimposed the information. To the left of the equipment name an LED indicates the last process result: green = OK, red = NOK. Yellow signifies that the process is still

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1. Ethernet address of the MP85A

running. If the LED appears in gray, the connection to the equipment is interrupted (refer to Device selection). If this occurs after the PC has run up, the start of the PC program may, for example, have occurred before the start of the MP85A and the equipment has therefore not (yet) been found. Tap the equipment symbol to establish reconnection. If no data storage is possible, ✖ is displayed under the LED (refer to Data storage).

At the bottom left you will find two symbols with which you can either output the middle column of the screen display ( ) or the complete screen display ( ) to the Windows standard printer

- The central column shows the measured plots and results of up to four equipment items or the dialog called via the menu. When you display advanced information for *one* equipment item, only this equipment is shown in the center.
  Refer also to What is displayed for measured plots/results?

- The right column contains the available menu items. The displayed menu items depend on the user level and whether the advanced information is displayed (/).

If the interface connection to an equipment item fails, the graph for this item is masked out or – in the detailed view – no further display occurs and a message window showing the affected IP address is displayed for approx. 30 seconds. However, continuous attempts are made to reconnect the equipment. With a successful connection a message window notifying of this restoration of the connection is superimposed for approx. 30 seconds. You can change whether and for how long the message windows are displayed via the file ProgramSettings.ini in the installation folder of the INDUSTRYmonitor.

Displaying several equipment items (measured plots, results)

If you tap an equipment item in the left of the list, a window with the measured plots and results of this equipment is displayed in the central section. Tapping again masks out the display. You can display up to four equipment items (four windows in the central region). The multiple display is only possible when you are displaying no advanced information (is displayed next to all the equipment to the left of the screen in the equipment list).

Header line

You can change the information and texts displayed in the header row via the file CustomizedControlTexts.ini in the folder for the relevant displayed language, e.g. en for English.
Refer to Adapting the header row.

Menu items

You can change the displayed menu items, the associated symbols and the order or structure of the menu

items. In addition you can add further functions via plug-ins (refer to Plug-ins). Therefore it is possible that in your configuration not all or also other menu items are visible or other names or symbols are used. Help on the individual dialogs can be obtained in the dialog itself via 🔵.

(System): Enables devices to be removed from the equipment list and new ones added, passwords in the user management to be changed and general system settings to be made. The menu item is only shown when you are displaying *no* advanced information (🔍) on an equipment item.

(Program): With this menu item you define the various general program settings, e.g. the language or the full-screen display. You can also terminate the program via this menu item. The menu item is only shown when you are displaying *no* advanced information (🔍) on an equipment item.

(General settings): This menu item defines the settings for the MP85A. This relates, for example, to the settings for the transducers, the signal conditioning, the evaluation and the alarm and range windows. The menu item is only displayed when you are displaying advanced information (🔍) on an equipment item.

(PS backup): Enables saving files on the MMC or SD Card (data and parameters) to the PC. The menu item

is only displayed when you are displaying advanced infor-

mation ( ) on an equipment item.

(Change of user): Changes the user level.

(Change of program): If configured, you call another program with this menu item.

(Archive): Leads to the data management. Here you can display measured plots and results from files.

(Log file): Leads to the log file settings. The settings can only be changed in the user level Superuser; in all other levels only the display of the log file is possible. The menu item is only shown when you are displaying *no*

advanced information ( ) on an equipment item.

If a page or a dialog with the button is displayed in the center of the screen, you must quit this page or

dialog by tapping or – if present – , otherwise

you cannot select any other menu item. If is dis-
played, you cannot undo the working step.

When you call a settings menu in which parameters can be changed (is displayed), the current configuration is saved in a binary parameter set on the PC.

If you click to quit the dialog, the saved settings are loaded again from the PC (Undo function). However, then PC_BINARY and not the original parameter set is then displayed as the current parameter set.

On termination of the program the query appears of whether the current settings should be saved for the next start. If you answer with Yes, the current settings are saved to Parameter set 31 in the flash memory.

A button with the symbol quits a submenu and returns you to the next higher level.

A list of possible errors, causes and measures for rectification can be found here.

Refer also to the section Software and firmware update, backup/restore with explanations about transferring settings to other PCs.

1.1.1 Adapting the header row

The file CustomizedControlTexts.ini specifies which information is displayed in the central column of the screen (program window). Depending on the language of the program user interface, the file is loaded from the subfolder for the corresponding language, e.g. the folder *it* for the

Italian version. The file CustomizedControlTexts.ini in the installation folder is only used if no language-specific file is found.

The file includes an explanatory comment at the start about the syntax. The individual entries are introduced with a text in square brackets, e.g. [EASYMONITOR_-Control0], then the settings follow. The individual settings are introduced by a code word, followed by an equals sign and the (optional) details about the code.

In the configuration a differentiation is made in the two

display modes: Overview displays (is displayed adjacent to the equipment) or the display of advanced information (is displayed adjacent to at least one of the equipment items).

Overview display

Here, the header row consists of two sections. You can configure the left section and the heading of the right section. The content of the right section is always the process result; this display cannot be configured. The left section is described with the two entries [SMALLMONITOR_Control0] and [SMALLMONITOR_Control1]. The two entries determine the heading and content of the left section. [SMALLMONITOR_Control2] determines the heading of the right section.

Displaying information in the expanded view

Here, the header row consists of four sections. Each section contains a text for the heading and the content. On the far left the first section is described with the two entries [EASYMONITOR_Control0] and [EASYMONI-TOR_Control1]. The two entries determine the heading

and content of this section. [EASYMONITOR_Control2] and [EASYMONITOR_Control3] determine the heading and content of the second section, etc.

Configuring a heading

- First row: after the code word *Text=* it contains the identifier *@TEXT* (a static text is displayed) and, separated by a comma, the text itself.
- Second row: this contains the code word *Format=* and can include additional text. In this case you have to use *{0}* as a placeholder for the text specified in the first line and write the additional text before or after *{0}*. Otherwise you do not need any entry after *Format=*.
- Third row: this contains the code word *UpdateType=* and the details of the time of display. Since no heading is changed, the details are omitted.

Configuring a content field

- First row: this contains the code word *Text=* and the identifier for that which is to be displayed. If applicable, further parameters may be necessary, e.g. with *@TEXT* or *@SDO*, refer to *Possible identifiers and their parameters*.
- Second row: this contains the code word *Format=*, the placeholder *{0}* for the content and (optional) additional text. Write the additional text before or after *{0}*. Inclusion of the placeholder *{0}* is always required here.
- Third row: this contains the code word *UpdateType=* and the details of the time of display; refer to *Possible display times*.

Possible identifiers and their parameters

@PSNUMBER: Parameter set number; no other parameters are needed.

@FPNUMBER: Fitting point number; no other parameters are needed.

@DEVICENAME: Device name; no other parameters are needed.

@PSNAME: Parameter set name; no other parameters are needed.

@PROCNUMBER: Process number; no other parameters are needed.

@FPNAME: Fitting point name; no other parameters are needed.

@WORKPIECENAME: Workpiece description; no other parameters are needed.

@WORKPIECEFOLDER: Name for the selected sub-folder in the storage folder (data storage); no other parameters are needed.

@TEXT: Any text; the text to be displayed is specified after the identifier and separated by a comma.

@SDO: Sends an SDO to the equipment and displays the result. Here, several parameters are required which are separated from one another by commas: the SDO index in hexadecimal notation, the SDO subindex in decimal notation and the format of the SDO. (The format of the value to be specified is defined by the second row *Format=*.) Admissible format definitions are *STRING*, *INT8*, *INT16*, *INT32* and *FLOAT*.

In this version of the INDUSTRYmonitor fitting points are not available.

Possible display times

You can specify one or more time points separated by commas, which are to be displayed with the desired information.

ONTIMER: the information is displayed or refreshed approximately every 100 ms.

ONPSCHANGED: the information is refreshed on a change of the parameter set.

ONPROCESSCOMPLETED: the information is refreshed on transition into the status ***Process: Completed***.

ONPROCESSRUNNING: the information is refreshed on transition into the status ***Process: Running***.

ONPROCESSSTARTED: the information is refreshed on transition into the status ***Process: Started***.

ONPROCESSMISSED: the information is refreshed when the program finds that a process has not been acquired by the PC, i.e. that the process counter has been incremented by two. This may occur, for example, if the PC has been blocked by other actions or programs and was not able to fetch any new data. Generally, new data is acquired from the equipment every 100 ms.

1.1.2   Plug-ins

After the installation the INDUSTRYmonitor displays four plug-ins produced by HBM. The plug-ins are intended as examples for the development of your own plug-ins in C#. Three of them make their functions available within the INDUSTRYmonitor, the fourth one is a separate program. You can remove these plug-ins from the INDUSTRY-monitor or add further plug-ins at any time.

Further information on the creation of plug-ins is provided in the file HowToWritePlugins.txt in the Plugins folder in the installation folder. The folder also contains the source code of the HBM Examples 1 to 3 in C#. The MP85A Toolkit is needed for creating plug-ins.

SDO Terminal

The plug-in superimposes a window with which you can communicate with the active equipment via SDOs.

To do this you specify the *Index* and *Subindex* as well as the format (*Type*) of the SDO and touch *Read* to read the SDO or touch *Write* to write the SDO to the equipment.

If you need certain SDOs again and again, give them a name (*Description*) and touch **+**. Then you can select the SDO from the list at the top of the window. The list can contain up to ten entries; **–** removes an entry from the list.

Touch , to move the plug-in as a symbol into the left display column. Touching again displays the window once more at the old position.

Workpiece Scanner

The plug-in can receive information from a bar-code reader and transfer it as a workpiece ID to the INDUSTRYmonitor.

You call the plug-in and use the scanner to read off the bar code. The information read off is displayed in the window. You terminate the plug-in with . At the end of the process the workpiece ID which has been read in is displayed together with the process data in the INDUSTRYmonitor.

Touch , to move the plug-in as a symbol into the left display column. Touching again displays the window once more at the old position.

Min/Max Viewer

This shows you the minimum and maximum values of the two DAQ channels (x and y) during the last process.

Touch , to move the plug-in as a symbol into the left display column. Touching again displays the window once more at the old position.

I-P.M.

The program monitors the folder specified for the data storage in the INDUSTRYmonitor and converts the files which are present there so that they can be evaluated by the I-P.M. software from CSP GmbH & Co. KG for auto-mated process monitoring (the format used by the soft-ware is also designated as *IPM*). The conversion operates in the background and you can close the window again after activation.

In the default setting the folder for the data storage is read out and used by the INDUSTRYmonitor. However, you can specify a folder which is different from this.

1.1.3   Software and firmware update, backup/restore

Software update

With a software update the user.config file with the user-related settings is incorporated from the previous installation. With a clean installation the file is created when the program is first started. All other files with settings for the user interface are overwritten and should be backed up beforehand if required. The data and parameter sets stored on the SD card of the MP85A are not changed.

The following files in the subfolders de, en and fr of the installation folder of the INDUSTRYmonitor are overwritten:

- navigation1.txt, navigation2.txt
- CustomisedControlTexts.ini
- SPSInfoFile.txt
- the files in the help subfolder

Firmware update

You update the firmware using the program PME-Update. With the program a new firmware version can also be transferred to several devices simultaneously. The device settings are also retained when updating the firmware. However, we recommend that the device settings are backed up before the update.

With the MP85A process controller, in order to avoid interfering with the running of a process (no measurement or evaluation is carried out during an update), from firmware version 2.22 you can specify that the Firmware is updated only after manual confirmation on the device, (***F-update: allowed!***). If confirmation does not occur within 15 minutes, then no change to the firmware is made.
See also General settings.

The program has its own help.

Backup/restore, copying the settings to another PC (cloning)

All the settings of an MP85A process controller can be saved to the MMC/SD card via the built-in keypad and then, for example, transferred to another MP85A process controller.

During a device backup no measurement or evaluation is carried out and the response times of the device to software or controls are extended!

Procedure for saving the settings

1. Press the *SET* key for *at least two seconds*.
   CAN BUS is displayed.

2. Press the *+* key until the display *System-State* is displayed.

3. Press the *SET* key.
   Backup Save (save system status) is displayed.

4. Confirm by pressing *SET*.

The data are now saved on the MMC/SD card Wait until the process has finished and the measurement is displayed again.

Procedure for loading the settings

1. Press the *SET* key for *at least two seconds*.
   CAN BUS is displayed.

2. Press the **+** key until the display *System-State* is displayed.

3. Press the *SET* key.
   Backup Save is displayed.

4. Press the **+** key.
   Backup Restore (restore system status) is displayed.

5. If you do not want to modify the settings for the interfaces, press the **+** key again so that *Backup Load-Com* appears (load settings without changing the communication settings).

6. Confirm by pressing *SET*.

The data are now loaded onto the MMC/SD card. Wait until the process has finished. The progress is shown in the display.

Also, the software settings can be transferred to another PC. To do this, first install the software and then copy the following files from the language folders de, en and fr that are relevant to you to the folders of the same name on the new PC:

• navigation1.txt, navigation2.txt

• CustomisedControlTexts.ini

• SPSInfoFile.txt

- all the image and graph files you have created
- the files in the help subfolder if you have made changes

In addition you must copy the user.config file. You can display the path to this file with **System → About**; refer also to Program components. If you have created your own language files or plug-ins, you must also copy the files or folders.

> Do not carry out any manual changes to the user.config file. Incorrect entries could prevent proper program operation and lead to the program crashing. Delete the file to produce a correct user.config file.

1.2 Main window of the INDUSTRY-monitor, user level Tool Setter

You are now located in the user level "Tool Setter". In this user level you can register new devices (equipment), change the settings for parameter sets and memory management, display measured plots and results for the registered equipment and access saved data.

Screen setup; what is displayed?

The screen is divided into three columns:

- The left column shows the list of available equipment with the *IP address*[1] in brackets. If you tap an equipment item, it is displayed in the center or masked out.

  superimposes further information on the respective equipment; masks out the advanced information and is displayed once you have superimposed the information. To the left of the equipment name an LED indicates the last process result: green = OK, red = NOK. Yellow signifies that the process is still running. If the LED appears in gray, the connection to the equipment is interrupted (refer to Device selection). If this occurs after the PC has run up, the start of the PC program may, for example, have occurred before the start of the MP85A and the equipment has therefore not (yet) been found. Tap the equipment symbol to establish reconnection. If no data storage is possible, ✖ is displayed under the LED (refer to Data storage).

  At the bottom left you will find two symbols with which

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1. Ethernet address of the MP85A

you can either output the middle column of the screen

display ( ) or the complete screen display

( ) to the Windows standard printer

- The central column shows the measured plots and results of up to four equipment items or the dialog called via the menu. When you display expanded information for *one* equipment item, only this equipment is shown in the center.
  Refer also to What is displayed for measured plots/results?

- The right column contains the available menu items. The displayed menu items depend on the user level and whether the expanded information is superimposed (/).

If the interface connection to an equipment item fails, the graph for this item is masked out or – in the detailed view – no further display occurs and a message window showing the affected IP address is displayed for approx. 30 seconds. However, continuous attempts are made to reconnect the equipment. With a successful connection a message window notifying of this restoration of the connection is again displayed for approx. 30 seconds. Whether and how long the message windows are displayed can be changed by the Superuser.

Displaying several equipment items (measured plots, results)

If you tap an equipment item in the left of the list, a window with the measured plots and results of this equipment is displayed in the central section. Tapping again

masks out the display. You can display up to four equipment items (four windows in the central region). The multiple display is only possible when you are displaying *no*

expanded information (is displayed next to all the equipment to the left of the screen in the equipment list).

Menu items

The displayed menu items, the associated symbols and the order or structure of the menu items can be changed or further functions added by the Superuser. Therefore it is possible that in your configuration not all or also other menu items are visible or other names or symbols are used. Help on the individual dialogs can be obtained in

the dialog itself via .

(General settings): This menu item defines the settings for the Data storage. The menu item is only displayed when you are displaying expanded information

( ) on an equipment item.

(PS backup): Enables saving files on the MMC or SD Card (data and parameters) to the PC. The menu item is only displayed when you are displaying expanded infor-

mation ( ) on an equipment item.

(Change of user): Changes the user level.

(Change of program): If configured, you call another program with this menu item.

(Archive): Leads to the data management. Here you can display measured plots and results from files.

(Log file): Leads to the log file settings. In the user level Tool Setter you can only view the log file.

If a page or a dialog with the button ✓ is displayed in the center of the screen, you must quit this page or dialog by tapping ✓ or – if present – ✗, otherwise you cannot select any other menu item.

When you call a settings menu in which parameters can be changed (✗ is displayed), the current configuration is saved in a binary parameter set on the PC.

If you click ✗ to quit the dialog, the saved settings are loaded again from the PC (Undo function). However, then PC_BINARY and not the original parameter set is then displayed as the current parameter set.

In the user level Tool Setter not all keys of a Windows keyboard are available. The following keys are blocked: the Windows keys and the Alt+Tab and Ctrl+Esc key combinations.

A list of possible errors, causes and measures for rectification can be found here.

1.3 Main window of the INDUSTRY-monitor, user level Worker

You are now located in the user level "Worker". In this user level you can display measured plots and results of the registered equipment and access stored data.

You must change to one of the other user levels to be able

to register equipment or make settings: tap on ⚷
([Change user]).

⚠️

If a page or a dialog with the button ✅ is displayed in the center of the screen, you must quit this page or

dialog by tapping ✅ or – if present – ❌, otherwise

you cannot select any other menu item. If ❌ is displayed, you cannot undo the working step.
In the Worker user level not all keys of a Windows keyboard are available. The following keys are blocked: the Windows keys and the Alt+Tab and Ctrl+Esc key combinations.

Screen setup; what is displayed?

The screen is divided into three columns:

* The left column shows the list of available equipment with the *IP address*[1] in brackets. If you tap an equipment item, it is displayed in the center or masked out.

  📷 superimposes further information on the respec-

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1. Ethernet address of the MP85A

tive equipment; 🔍 masks out the advanced information and is displayed once you have superimposed the information. To the left of the equipment name an LED indicates the last process result: green = OK, red = NOK, yellow = process is still running. If the LED appears in gray, the connection to the equipment is interrupted. If this occurs after the PC has run up, the start of the PC program may, for example, have occurred before the start of the MP85A and the equipment has therefore not (yet) been found. Tap the equipment symbol to establish reconnection. If no data storage is possible, ❌ is displayed under the LED. In this case and with a continuous gray LED contact the worker responsible.

At the bottom left you will find two symbols with which you can either output the middle column of the screen display (🖨) or the complete screen display (🖨) to the Windows standard printer

- The central column shows the measured plots and results of up to four equipment items or the dialog called via the menu. When you display advanced information on *one* item of equipment, only this equipment is displayed in the center. The result of the last process is displayed as a green (OK) or red (NOK) margin around the graph.

- The right column contains the available menu items. The displayed menu items depend on the user level

and whether the advanced information is displayed

(/).

If the interface connection to an equipment item fails, the graph for this item is masked out or – in the detailed view – no further display occurs and a message window showing the affected IP address is displayed for approx. 30 seconds. However, continuous attempts are made to reconnect the equipment. With a successful connection a message window notifying of this restoration of the connection is again displayed for approx. 30 seconds. Whether and how long the message windows are displayed can be changed by the Superuser.

Displaying several equipment items (measured plots, results)

If you tap an equipment item in the left of the list, a window with the measured plots and results of this equipment is displayed in the central section. Tapping again masks out the display. You can display up to four equipment items (four windows in the central region). The multiple display is only possible when you are displaying *no*

advanced information (is displayed next to all the equipment to the left of the screen in the equipment list).

Change of Program

If configured, you call another program with this menu item.

Archive

Leads to data management, the archive. Here you can display measured plots and results from files.

Log File

Leads to the settings for the Log file. In the user level Worker you can only view the log file.

The displayed menu items, the associated symbols and the order or structure of the menu items can be changed or further functions added by the Superuser. Therefore it is possible that in your configuration not all or also other menu items are visible or other names or symbols are used. Help on the individual dialogs can be obtained in the dialog itself via .

A list of possible errors, causes and measures for rectification can be found here.

1.4   Measured Plots and Results

The central section of the screen offers you two display options:

1. Measured plots including envelope curves or toler-ance windows, equipment names and process results of up to four equipment items (tap as applicable to the

    left on , then the required equipment).

2. Expanded information on the process results of *one*

    item of equipment (after tapping).

The result of the last process is displayed as a green (OK) or red (NOK) margin around the graph.

You have several ways of drawing out a section (zooming) in the graph:

 zooms to the size of the alarm window

 zooms to the size of the range window

 zooms on the displayed plot

Tap the displayed symbol at the lower left in the graph to switch to the next symbol.

Manual: If you draw out, for example, from the upper left corner of the range to the bottom right, then the range marked out by the rectangle is zoomed. You can start to draw out from each corner and zoom over again many

times. Tap to again display the original graph (the symbol appears after a manual zoom).

Windows, which are not considered in the evaluation, are shown in light gray.

Expanded information/detailed view (is displayed)

- In the upper line *Workpiece name*[1], active parameter set number, *Description*[2] and the current process number are displayed. This display can however be changed by the Superuser.

- The *Process result*[3], the current values in the two measurement channels, the process status and any warnings are displayed to the right of the graph with the measured plot and envelope curve, or the toler-ance band or the tolerance windows. If either the transfer memory (Transf, Mem.) or the MMC/SD Card memory (MMC/SD mem.) is almost full, then the respective LED is initially yellow, then red. Depending on the selected saving method (**General settings → Data storage → Saving method**) the processes con-tinue to be monitored in these cases *or the test rig is stopped*.

- Below the graph the number of plotted points used for the evaluation is displayed as well as the reasons for stopping and – if triggered – for the alarm. Tap *Details* to display the results and coordinates of the entry and exit points as well as the limit results of the last pro-cess.
  Refer also to Limit values.

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1. The workpiece name is generally passed from an external source, e.g. a PLC, before the respective process
2. name and type of the parameter set
3. the LED is yellow as long as the process has not yet conclud-ed

- The plug-in *Min/Max Viewer* shows you the minimum and maximum values of the two DAQ channels (x and y) during the last process and can also be called from the overview display if you minimize it in the left column in the detailed view. The plug-in *Workpiece Scanner* can receive information from a bar-code reader and transfer it to the INDUSTRYmonitor as a workpiece ID.
  Refer also to Plug-ins.

1.5 Possible errors, their causes and re-medial measures

What error messages are there for the measurement and process status and how can I remedy the error?

The messages in square brackets are shown in the display of the MP85A.

What is the significance of the LEDs on the MP85A?

LED 1 (OK/NOK)

LED 1 (OK/NOK) / Process status	Red LED	Yellow LED	Green LED	LED flashes
Initialization after switching on the device	X			
Alarm	X			X
Process has started		X		X
Overall OK result			X	
Overall NOK result	X			

LED 2 (Status)

LED 2 (Status) / MP85A device status	Red LED	Yellow LED	Green LED	LED flashes
Initialization after switching on the device	X			
One of the following errors is present: EEPROM error, original calibration error, scaling error, MMC/SD card error or CAN bus error.	X			
Transducer error, ADC overflow or gross overflow (one or both measurement channels).	X			X
LCD error	X			X
CAN bus: Sending / receiving data			X	X
Status "Pre-operational"		X		
"Operational" status			X	

Only MP85ADP: Profibus status

MP85ADP Profibus status	Red LED	Yellow LED	Green LED	LED flashes
Status error	X			
Statuses BD_SEAR, WT_PARM, WT_CONF		X		
Status DATA_EX				X

Ethernet connection

LED status of Ethernet connection	Green LED	Yellow LED
Physical connection present		On
Sending / receiving data		Flashes
Transfer rate 100 Mbit/s	On	
Transfer rate 10 Mbit/s		On or flashes

What is to be taken into account when saving process data (plots/results)?

Using the saving method *No data loss*, all the process data are transferred completely to the chosen target system (PC or internal MMC). However, if no storage is possible there, for example, because the memory is full, then the signal "Process finished" *is not output* and the next process *cannot be started*, i.e. **the test rig stops**.

External memory medium

With this option the selected data are transferred over the interface. Generally in this case, a PC saves the data.

Use the fast Ethernet interface (100 Mbit) for the shortest possible transfer times.

Saving on the PC only occurs when there is a connection between the PC and MP85A and the program assistant PME Assistant, EASYmonitor or INDUSTRYmonitor has started. The relevant program can however be minimized. The programs EASYmonitor and INDUSTRYmonitor are a constituent part of the FASTpress suite.

The users registered under Windows must possess writing rights for the selected storage directory. The NTFS file system is required if you are recording many processes and through which in one test more than 65,000 files can be generated that are written to one single folder.

Multi-Media Card/SD Card memory medium

Measured plots, measurement results and parameter sets can be stored as required on the optional MMC/SD Card. You can store a different number of values depending on the available card. For a measured plot with, for example, 600 value triples (two channels plus time) almost 15 kbytes are needed, i.e. approx. 300,000 measured plots can be saved on one 1 GB card. In principle the card can also be removed during a measurement for reading out the data.

Do not use any high-speed cards. The speed of data transfer is limited internally in the device. To optimize the access times of the MMC/SD Cards, they should be defragmented or reformatted at regular intervals. Refer also to Data storage.

The files are always written into the MP85 subfolder on the MMC. The folder is generated, if it is not already present. Further subfolders are created within this folder as required.

How can I tell which file system is on my PC and which I should use?

Call the main folder on the hard disk (e.g. c:\) and the context menu **Properties**. In the following dialog (register card **General**) the file system used is given in the third line.

The NTFS file system is required if you are recording many processes and as a result more than 65,000 files may be generated on the PC during a test.

If the hard disk of your PC was not formatted with NTFS as supplied, we recommend that this is carried out retrospectively. The PC supplier normally provides a conversion program for this. Otherwise try to start CONVERT.EXE (in the Windows subfolder SYSTEM32) with the parameters c: /fs:ntfs, where c is the drive to be converted (CONVERT.EXE c: /fs:ntfs).

The conversion takes place without loss of data, but you should however first make a backup of your hard disk just to be sure.

2   System Menu

2.1   Device Selection

To be able to set up equipment and view results the IP addresses of the individual devices have to be entered. The devices are then displayed as equipment in the list on the left of the screen.

You have two ways of adding devices:

1. You enter the addresses manually.

2. You search through an address range (range of IP addresses). If you do not want to leave all the devices in the list, you can delete individual devices from the list.

You can also mix both methods: For example, first search through a range and then manually add further devices.

Adding device(s) manually

1. Tap the field next to the **IP** (the screen keyboard appears on the right).

2. Enter the IP address.

3. Tap (add IP to list).

Search through an address range

1. Tap the field *from IP address* in the range **Scan** (the screen keyboard appears on the right).

2. Enter the IP segment to be searched through (the first three groups of figures, e.g. *172.168.169*).

3. Restrict the search range as required with the field to the right of the group of figures and the field located below it *to IP address*.

4. Tap (Scan).

5. The IP address range is searched and all devices found are displayed in the list. Remove the devices not required from the list, because all devices in the list are displayed as equipment to the left of the screen after quitting the dialog.

Remove a device from the list

1. Tap the IP address to be removed in the IP list.

2. Tap (remove IP from the list).

2.2   User Administration

In this dialog you define the passwords for Tool Setter

(🔵) and Superuser (🔴). If possible, use a combination of at least eight letters and figures, e.g. *paKp12eL*. For the password there is no minimum length requirement, nor is a check made of whether the selected password can be classed as secure. Therefore, please follow the usual rules for creating passwords and, for example, do not use birthdays nor the name of your spouse.

The factory setting for the passwords are *asdf* (Tool Setter) and *1234* (Superuser). The passwords can only be changed in this dialog and only by a Superuser. To ensure correctness the password must be entered twice. If the two entries do not match, both entry fields are briefly high-lighted in red and the dialog remains open. Similarly you can display the passwords in plain text: activate **Show passwords**.

> Keep the password for the Superuser in a safe place. If you forget the password, you have to contact the Technical Support at HBM.

2.3   System Settings

The menu item is only displayed when you are displaying

no expanded information (not) on an equipment
item.

With the *Synchronization interval* you can ensure that
the device time is synchronized with that of the PC at reg-
ular intervals. In this way any possible inaccuracies in the
generation of the time in the MP85A are corrected. To do
this, select one of the intervals.

The *Curve history* determines how many curves can be

seen simultaneously in the graph of the detailed view (
is displayed). With the display of more than one item of
equipment, only the current curves are displayed.

Frame **Miscellaneous** enables you to:

- hide the Windows taskbar as long as the program is
  running
- use thick scrollbars which makes it easier to operate
  the program via a touch screen (the setting applies to
  all Windows programs and has to be reset by re-
  booting Windows)
- specify whether the device name shall be overwritten
  with the name stored in the parameter set or whether
  the name shall be retained when *loading* a parameter
  set.

3 Program Menu

3.1 Choice of Language

The dialog shows the corresponding international abbreviations, e.g. *de* or *en* for the available languages. Select

the required language and touch [✓].

The change only becomes active after restarting the program. You can however proceed without a restart and the menus are then converted to the selected language during the next reformation of the menu bar (for example,

use [icon]/[icon]).

3.2 Program components (About)

This dialog shows the program components that are installed and used. If problems with the program occur, the respective versions can be seen in the dialog.

At the bottom the path for the user.config file (User config path) is displayed which contains the settings of the current Windows user.

4 Basic Settings Menu

4.1 General device settings

Some details in this dialog are for information only, e.g.
hardware revision or device serial number. You can carry
out the following settings:

- Use the *device name* to improve the identification of
  a device in a group of several MP85As.
  The device name is displayed as an *equipment name*
  in the left section of the screen together with the
  device address. In the **System settings** menu you
  can define that the device name is retained, i.e. not
  overwritten, on *loading* the device settings or param-
  eter sets.

- You have to carry out hardware synchronization, if you
  are using more than one device. In this case you set
  one device as the *Master* and all others as *Slave*.
  This prevents the carrier frequency measuring ampli-
  fiers of the individual devices interfering with one
  another over transducer cables that run parallel. How-
  ever, only the measuring amplifiers are synchronized,
  not, say, the CAN bus interfaces or similar functions.
  You will find further information on this topic in the
  MP85A operating manual.

- The date and time are used for saving the results.
  The displayed time corresponds to that at the last
  update, e.g. on calling the dialog. Therefore, an excla-
  mation point is displayed after the time.
  Refer also to System settings for the method of auto-
  matic synchronization.

- As a Superuser you can also reset the process counter or overwrite all settings of the MP85A with the factory settings.

- Here you define whether a firmware update may always take place or only when it has been confirmed on the device itself. This means that you can inhibit a firmware update from starting via the network for all devices (e.g. in a running process). The update is then only executed after manual confirmation on the device (*F-update: allowed!*). If the confirmation does not occur within 15 minutes, then no change to the firmware is made.

4.2   Data Storage

The settings for data storage are identical for all parameter sets.

Here you enter which data is to be saved and where.

Storage requires a different amount of time depending on the medium selected. The storage process is displayed with a diskette on the left of the screen next to the equipment name. ✖ indicates that no storage is possible, for example because the selected target memory cannot be reached (network drive) or because the MMC/SD Card is full.

During storage initially only temporary files are created (with a tmp file name extension). It is only when all the data have been written to the file that the appropriate file name extension C85 or D85 is used.

In order to maintain clarity in the folder with the files you can define an interval after which a new subfolder is automatically created. The setting of *1440 minutes* generates a new folder in each case at 00:00 h with the date (e.g. 20100423 for April 23, 2010). All other settings generate a folder with the date and a subfolder in it with the time (e.g. 1014 for 10:14 h) according to the respectively expired number of minutes, e.g. with *480 minutes* every 8 hours after starting the measurement.

Target memory: (External) storage on the PC

This is the recommended and fastest method. For the *target memory* enter the folder in which the data are to be stored. The NTFS file system is required if you are recording many processes and through which in one test more than 65,000 files can be generated that are written to one single folder. You can restrict the number of files written to a folder by creating a new subfolder every x minutes. The date and time of creation are used as the folder name.

Target memory: Internal storage using a Multi-Media Card (MMC) or SD Card

Measurement plots and/or measurement results can be stored on the *MMC* [1] or *SD Card*[2] memory card. You can store a different number of values depending on the available card. For a measurement plot with, for example, 600 value triples (two channels plus time) almost 15 kbytes are needed, i.e. approx. 300,000 measurement plots can be saved on one 1 GB card. The number of acquired measurement points (per channel) is also displayed with the measurement plot in the expanded view. In principle the card can also be removed during a measurement for reading out the data. To optimize the card access times, you should defragment or reformat the card at regular intervals.

MMC or SD Cards must be formated with FAT16, not with NTFS, otherwise they are not recognized by MP85A. If necessary, reformat your card.

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1. Multi-Media Card, only use standard MMC Cards
2. Secure Digital Memory Card

You have two storage methods available:

1. Without data loss

All the data are stored. When storing, the RAM is always used first. Then the values are transferred from there to the PC or the MMC/SD Card. If insufficient free space is available in RAM for the next measurement, the next process is not started and the digital signal *Finished* is not set.

2. Process-optimized

If storage on the PC or the MMC/SD Card does not occur fast enough, the latest process data are not accepted into RAM (no free storage capacity) and are lost. This can be seen from the files, since one or more process numbers are missing. This always affects the whole of the data set to be saved, that is both pure statistical data and also complete plot data.

You should therefore use process optimized when you have to monitor very fast processes or the results or plots are only used for random sample controls.

Further settings: **Statistical processing**

The option enables you to stop the OK and NOK counters as well as the statistical processing, e.g. so as not to corrupt the statistical evaluation during a modification of window or tolerance band settings. The setting is only effective with parameter sets from the flash; the setting is *Off* in all other cases.

New results file for each process

Normally, all results are stored in *one* file; only the plot data are stored in a dedicated file for each plot. With this option you can also store the result of each process in a dedicated file.

4.3 Amplifier Menu

4.3.1 Sensor settings

In this dialog you carry out the general settings for the amplifiers in MP85A. For transducers with *TEDS*[1] simply accept the TEDS data (refer to [TEDS settings](#)); in all other cases you will find the required data in the data sheets for the relevant transducer.

Depending on the ***Transducer type*** used, you may have to provide further data, for example, for detecting the direction of rotation or for decoding the signals from SSI transmitters.

Here you set just the basic value for the (maximum possible) ***Measuring range***. The details for the actual scaling, i.e. the assignment between the actual measurement and the displayed physical quantity is set via **Set characteristic curve** or **Measure characteristic**.

For the ***Decimal point*** you can specify the number of displayed decimal places, but the resolution of the measurements is not affected by this.

You define the physical unit (the measured quantity) via ***Unit***.

No measurement (i.e. no process) is started while a transducer error is present.

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1. ***T***ransducer ***E***lectronic ***D***ata ***S***heet, containing all sensor data relevant to the MP85A

4.3.2   TEDS Settings

For transducers with TEDS it is usually sufficient if you activate the options *Find and use TEDS on device restart* and *Find and use TEDS during operation of device*. After restarting the MP85A (switch power off and on again), a search will be made for transducers with TEDS. They will be activated if found. If you cannot restart or if no full bridge, half bridge or LVDT transducer is connected, you must use button *Find and use TEDS*.

You may still measure or input the transducer characteristic even if you have read out the TEDS data (manually or via one of the options). However the TEDS data are no longer used in this case.

In order to display another unit than the one saved in the TEDS module, you can activate the option *Convert TEDS unit into current unit*. In this case, it must be possible to convert the unit; otherwise the TEDS error "unit conversion not possible" will be issued. You can, e.g. convert Pa (Pascal) into bar or psi, but not N (Newton) in mm (Millimeter). First select the required unit via Sensor Settings, then activate the TEDS option *Convert TEDS unit into current unit* and use finally button *Find and use TEDS*.

Carry out a zero balance if you have changed the unit or the conversion.

indicates that a TEDS module has been recognized in the channel.

🟢 indicates that all TEDS settings that could be carried out by the MP85A have been activated. (For example the template "Calibration table" is not supported as the MP85A can only make linear scaling.)

❌ is displayed in the respective column if errors occurred.

To save the settings made in this dialog permanently, you must save the parameter set into the Flash via the **PS Administration (Amplifier Settings)**. The settings can be different for each parameter set.

4.3.3   Set Characteristic Curve

Normally, the calibration certificate is used for setting the characteristic curve. Enter the details from the certificate in this dialog. If no calibration certificate is available, you can also measure the characteristic.

Normally, the transducer characteristic curve is given in the calibration certificate, i.e. the span (difference) in the output signal between the two points, "transducer not loaded" and "transducer loaded with nominal load". In this case specify in each case zero for the *Zero point (electrical/physical)*. Otherwise you have to calculate the figure for the span from the difference between the two measurements.

> The electrical values of the characteristic must lie within the selected measurement range (refer to <u>Sensor settings</u>). With a 4 mV/V measuring range you cannot therefore enter 5 mV/V for the ***Span electrical***.

You can correct the deviation of the zero value from the zero point in the existing installation situation via the ***Zero balance*** in <u>Signal conditioning</u>.

4.3.4   Measuring the Characteristic Curve

To measure a characteristic curve you must *always measure two* points. However, these need not necessarily be the zero-point and the full scale value. To keep the measurement deviations (errors) as small as possible the points applied should however lie at the limits of the range of the relevant physical quantity later used. For example, if you load a force transducer with forces between 10% and 50% of the nominal load, you can also use these values. The usual measurement points are the zero-point and 80% of the measuring range.

The measured values should not be located too close together.

Example: If the measurement is carried out at 0% and 5% of the measuring range, a deviation of 0.1% at the second measurement point (5% of the measuring range) leads to an error of 2% at the full measuring range (100% of the MR).

⚠️ The electrical values of the characteristic curve must lie within the selected measuring range (refer to <u>Sensor settings</u>). With a 4 mV/V measuring range (strain-gage transducer) a measurement of, for example, 80 mV/V (inductive displacement transducer) leads to overdriving.

Procedure

1. Establish the first point on the characteristic curve, for example, set a displacement transducer in the initial position; with force and the zero-point as the selected point: relieve the transducer of any load.

2. Touch .
   The measured value from MP85A appears under *1st point electrical*.

3. Enter the corresponding physical value under *1st point physical* , e.g. *0*.

4. Establish the second point on the characteristic curve, for example set the displacement using a gauge block; set the value for a force using weights or a reference transducer, etc.

5. Touch .
   The measured value from MP85A appears under *2nd point electrical*.

6. Specify the value of the set quantity under *2nd point physical* , e.g. *40* kN or *60* mm.

7. Repeat the procedure with the other channel.

Using *Shunt (internal): On* you can activate an available shunt resistance *in* the device. This resistance (87.1 kΩ) is wired in parallel to bridge arm 2 and gives an unbalance of approximately +1 mV/V with a 350 Ω transducer. After calibration this signal should always supply the *same measurement* ; therefore you can use it as a *control signal*. Calibration is however not possible with this function, because the exact magnitude of the measurement cannot be calculated.

4.3.5 Signal Processing (Zero Balance, Low-Pass Filter)

In this dialog the transducer zero signal is found in the present installation situation and eliminated for the ensuing measurements (zero-balanced).

Procedure for the zero balance

1. Relieve the load on the transducer or set the equipment to the "zero position".

2. Touch (Zero balance).
   The measured electrical signal is converted to the physical unit via the entered or measured characteristic curve.

Specify *Off* at *Overwrite zero value on parameter set change* if the measured zero values of the two channels are to apply for all parameter sets, i.e. they are not to change when the parameter set is changed.

The value at *Zero reference* is then always displayed when the value displayed at *Zero value* is measured. The function can, for example, be used to correctly display a displacement measurement in the range from 100 mm to

150 mm, although only a 50 mm displacement transducer is used: Measure the zero value (zero balance) in the 100 mm position and enter *100* as *Zero reference*. This value is then added to all the following measurements.

Low-pass filter

You can define filtering of the signals to improve the signal quality: *Low-pass filter*. In this way you can activate a filter with various cut-off frequencies to mask out interference frequencies superimposed on the signal. The setting does however have an effect on the sample rate and filter settings.

> The set cut-off frequency must be far enough *above* the maximum signal frequency so as not to influence the measurement of the events in the process. In cases of doubt the measurements must be carried out with various filter frequencies and the results compared, i.e. checked that fast signal changes are still properly acquired.

Note

- The low-pass filters are filters of the 4th order with a Bessel characteristic and therefore have a relative wide transition range between passing and blocking the signal. You can find further details in the operating manual for the MP85A.

- To eliminate propagation time differences due to different filter frequencies, you can always only use the *same filter frequency* for *both channels*; the respective other channel is changed automatically.

4.3.6 Sample Rate and Filter Settings

Depending on the applied filter, during the measurement a certain (internal) sample rate is initially used; refer to the table.

Low-pass filter	Internal sample rate (in measurements per second)
0.05 Hz	1.15
0.1 Hz	2.3
0.2 Hz	4.6
0.5 Hz	17
1 Hz	37.5
2 Hz	150
5 Hz	150
10 Hz	300
20 Hz	600
50 Hz	1200
≥100 Hz	2400

SSI transducers are always interrogated 1200 times per second.

4.3.7 Alarm and Range Windows

When initially setting a new MP85A, the defaults (factory setting) for the positions of the alarm window and the range window are identical, i.e. the windows are superimposed one above the other. The default for the corner points is -10/-10 and +10/+10.

Click on *Automatically adjust alarm and range window* to obtain suggested values. The alarm window is then set to a measuring range which is increased by 15% in all directions and the range window is set to a range increased by 10%.

The alarm and range windows must always be rectangular and so you can only enter two corner points. The alarm window must be larger than all other windows.

zooms to the size of the alarm window, zooms to the size of the range window and zooms to the displayed curve. Click on the displayed symbol at the lower left in the graphics to switch to the next symbol. Manual zoom: If you draw out, for example, from the upper left corner of the range to the bottom right, then the range marked out by the rectangle is zoomed. You can start to draw out from each corner and zoom over again many times. Click on to display the original graphics again (the symbol appears after a manual zoom).

also resets the zoom status and redraws the graph.

Alarm Window

This window is used to monitor the general equipment state and to protect the system from overload. Here you should enter the limits (or somewhat smaller or larger values) for the transducers used. When measurements lie outside of this window, an alarm message is triggered and the process is labeled as defective. The alarm message can be output via the digital outputs or as an interface message.

Do not specify *0* as the lower limit if this value could be obtained in normal operation or undercut slightly. Instead use a figure of, for example, -1% of the nominal transducer load.

Range Window

The range window defines the range in which the measurements are recorded and evaluated.

Outside of this window no values are recorded and no check takes place.

The range window is advantageous when a part of the measurements arising in the process is not relevant to the evaluation. For example, if the preliminary free travel taken up during a press-fit process is relatively large and not needed for the actual evaluation, then you can mask this range out which is unnecessary for the evaluation.

4.3.8   Control Settings

You must define the start, stop and end conditions for the process monitoring. An important criterion for the evaluation is also the *data reduction* which defines which measurements are used for checking. Using (Accept conditions) you can also accept conditions which have been changed in the meantime without having to quit the dialog.

Data reduction

In order not to unnecessarily increase the amount of data generated, the number of values to be checked (and possibly saved) is limited: Data reduction. Here, you define how high the resolution of the relevant channel is to be. When the current measurement *either* for the x channel *or* for the y channel is greater than the old measurement plus the specified difference, a measurement triple is stored, that is the values for both channels and the time value. Consequently, the *resolution* of your measurements in the x and y directions is always at least as good as stated here.

You should acquire at least 200 to 500 measured points to facilitate correct evaluation. If you acquire too few measured points, the specified windows or the envelope curve may not be evaluated as expected.

Only the saved measurement triples are checked also with regard to the range window, tolerance band respectively the envelope curve, or the tolerance windows. The alarm windows, start, stop and end conditions as well as the external inputs are immediately checked and evaluated on the pitch defined by the sample rate. With transducers with the SSI interface however the measurement is always read out 1200 times per second by the MP85A in response to acceptance signal sent to the transducers.

If you *Automatically adjust alarm and range window*, suggested values for data reduction are also determined, refer to Alarm and range windows.

Examples of too few measured points (Δx or Δy too large)
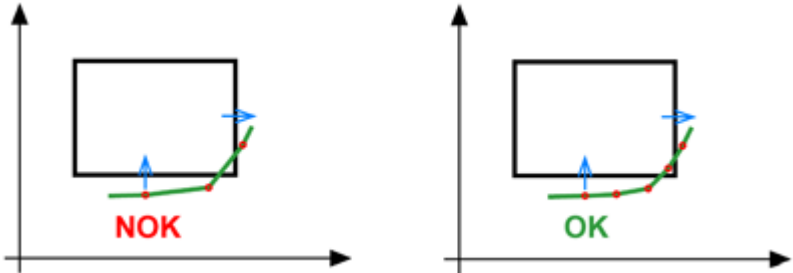
The graph on the left leads you to think the result is OK. However the process is assessed as NOK: Since no measured point lies within the window, there is neither an entry nor an exit and the result is NOK. Increase the number of measurements by reducing the Δx and/or Δy. If then—for the same curve—at least one measurement lies within the window, the result is assessed as OK (picture on the right).
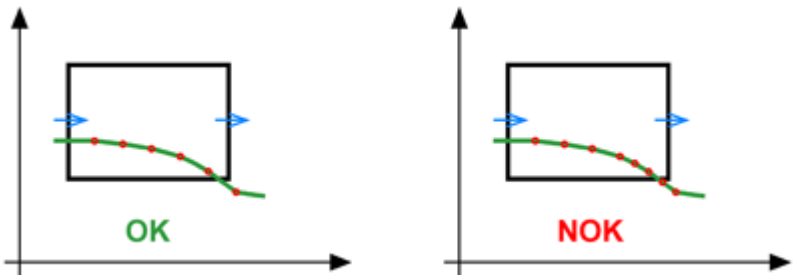
The graph on the left leads you to think the result is NOK. However, if the process is assessed as OK: the penultimately plotted measured point lies within the window (OK). The last drawn measured point already lies to the

right outside of the window, so that the y coordinate is no longer relevant. Increase the number of measurements by, for example, by reducing Δy (picture on the right). Then the exit at the lower edge is detected (the y value is already too low before the right edge of the window).

Start condition

The following methods are available to you for starting a process:

1. Using an external start signal (start/end event)
2. By exceeding/undercutting certain values in one or both channels (internal start condition, start above (below) reference value).

The process is also started when you have chosen starting via an external signal or internal condition and an appropriate interface command occurs.

Stop condition

The following methods are available to you for stopping a process:

1. Standstill detection
   If, during the defined time period, the measurement signal changes by less than the entered value, the process is regarded as finished and the evaluation is started.
2. Above/below reference value + Time until stop
   It is possible to check just one channel or also both channels. Enter the relevant reference values and the run-on time, i.e. the time duration over which measurements are to continue after these values have been reached.

The condition is only evaluated on undercutting the reference value plus the hysteresis or on exceeding the reference value minus the hysteresis when exceeding or undercutting has already occurred once. The hysteresis (5% of the range window) is necessary so that noise or small signal disturbances do not already interrupt the measurement at the time t_x. The percentage figure refers to the respective axis in the range window.

3. Stop on return of channel x
   Stopping occurs when the measurement in the x channel becomes smaller by more than the Δx used for the data reduction.
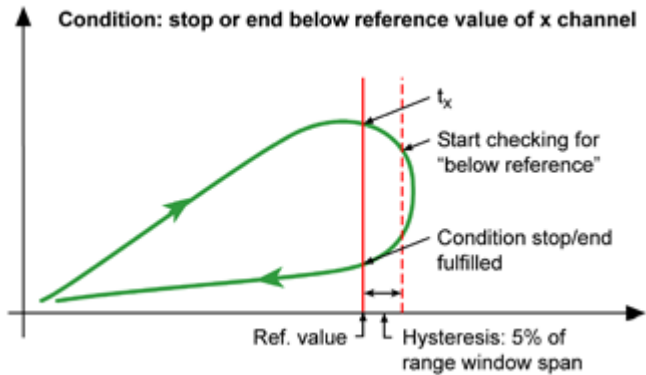

Fig. 1   Example of stop/end condition: ?"Below reference value on x channel".

End condition

⚠️ While the end condition remains unfulfilled, no saving of the data in RAM occurs and no finish signal is output, i.e. the test rig remains stationary.

You can terminate the measurement of a process in various ways:

1. With an external signal (start/end event).
   The same function also has an interface command. With an external signal stop and end times are identical.

2. Termination occurs when the start condition is exited again, which means you must also start with an (internal) start condition.
   Example: With "Above displacement" as the start condition, this means that the displacement specified for the start condition must be undercut again in addition to a hysteresis of 1% of the relevant axis in the range window.

3. Terminating with a condition (internally checked reference value, i.e. measurement from a channel).
   For termination using a condition, the condition first has to be evaluated, if on undercutting the reference value plus hysteresis or on exceeding the reference value minus hysteresis, exceeding or undercutting has already occurred once. The hysteresis (5% of the range window) is necessary so that noise or small signal disturbances do not already interrupt the measurement at the time t_x. The percentage figure refers to the respective axis in the range window.
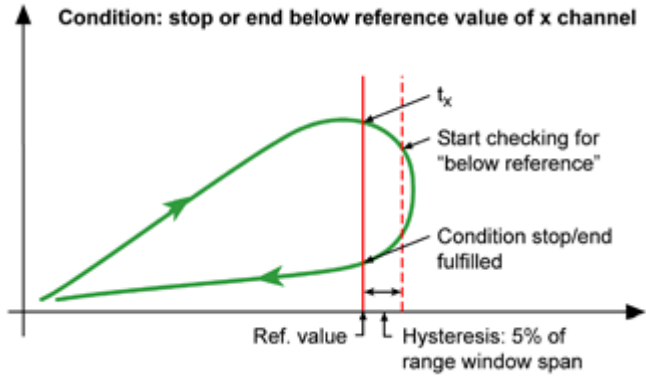
Fig. 2 Example of stop/end condition: ?"Below reference value on x channel".
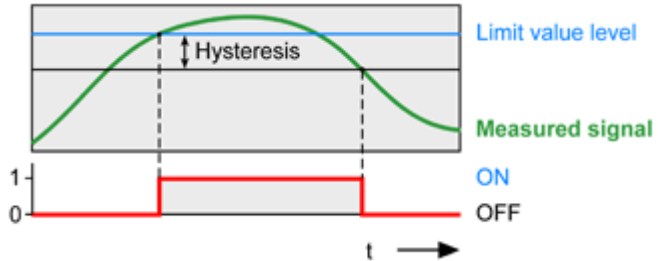
4.3.9 Limit Values

Limit values are used typically for real-time monitoring of security-related values. Up to four limit values can be monitored for each channel. The four limit values are defined and activated in separate dialogs. A digital output may be used to signal the result. Define this under the **Digital Outputs** menu.

Limit values can be defined but not activated (*Monitoring: Disabled*). All settings remain unchanged.

Limit value settings and their function are as usual: When the limit value is reached, this is designated as active. The hysteresis band lies under or over the limit value depending on the *Switching direction*. The level of an active limit is displayed as dotted line in the graph.

Limit value active if signal exceeds limit (above)

Limit value active if signal falls below limit
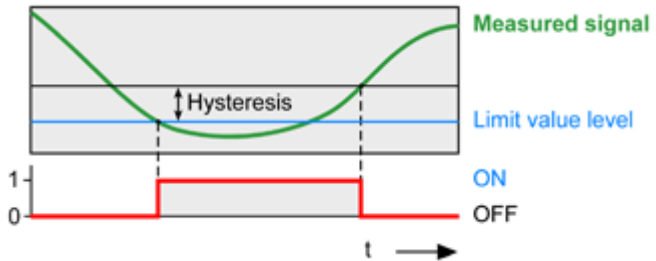
Use status in total result

The function enables you to specify values which have to be exceeded or undercut in order that a process is assessed as OK. When activated, these limits are taken into account in the process evaluation in addition to the specified windows, the tolerance band or the envelope curve, i.e. the process is only evaluated with OK when the limit condition has also been fulfilled (e.g. exceeding with **Switching direction: above level**).

The limit results are also symbolized with green LEDs in

the detailed view of an equipment item (is displayed) after touching *Details*, if the limit condition has been ful-

filled. A red LED indicates that the limit condition has not been fulfilled.

4.3.10 Digital Inputs

Only *changes* to the level on the inputs are evaluated, i.e. the *flanks*.

If you allocate more than one function to the same input, e.g. *Zero balance* and *Clear statistics* on *Input 1*, the functions will be handled in the following sequence: Zero balance—Shunt calibration—Load parameter set—Start/End process—Start transducer test—Clear statistics—Clear total statistics—Save statistics.

A different number of inputs are available depending on the MP85A type.

You may use up to four additional "software" digital inputs with the MP85ADP-S (version for switch and haptic testing), if the single digital input provided by the MP85ADP-S is not sufficient. Four switch states may be transmitted via the interface which provides you with five digital inputs in total.

4.3.11 Digital Outputs

With the digital outputs, certain system statuses can be transferred externally independent of the bus system. The messages *Process: Alarm*, *Process: OK*, *Process:*

Started, *Process: Running*, *Process: Result processed* and *Tolerance window x OK* or *Limit value x, channel a* are frequently used to output the current status.

The setting *Heartbeat* changes between ON and OFF with a frequency of 1 Hz and can be used as a watchdog function.

Parameter set bit 0 to *Parameter set bit 4* indicates which flash parameter set is loaded (active). Using the function only the number of a parameter set loaded from the flash memory can be determined.

With *Loading parameter set* you can check the time required for loading a parameter set: the next process can only start after the switchover, which can take up to 200 ms; the MP85A is only ready for measurement again after the switchover. Consequently, as long as the signal is active, no new process can be started.

Additionally you can specify whether the *Switching logic* should be *Positive*. For active status, e.g. limit value exceeded, the output then has depending on the power supply e.g. 24 Volt. If the switching logic is *Negative*, this level is output when status is *inactive*. More information about levels and output loads can be found in the MP85A Operating Manual.

A different number of outputs are available depending on the MP85A type.

4.4   Evaluation Menu

4.4.1   Select Evaluation Mode

You can choose between three different evaluation modes:

1. The monitoring of a process with verification of a certain progression: Tolerance window.

2. The monitoring of a process for conformance to an Envelope curve.

3. The monitoring of a process for conformance to a Tolerance band.

Touch the appropriate symbol to define the evaluation

mode and quit the dialog with ✓.

With *Consider status in evaluation you can* take the limit values into account in the process evaluation in addition to tolerance windows or the tolerance band or the envelope curve; refer to <u>Limit values</u>.

If you change the evaluation mode, you should delete the statistical data and the process counter via **General settings → General** or the MP85A Assistant, because they are not relevant to the new mode and would corrupt a new result. Back up, if necessary, files already produced, because counting starts at 1 again after resetting.

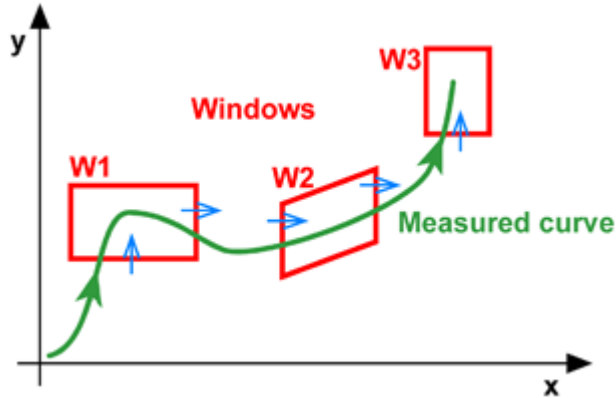### 4.4.2 The settings in the Evaluation mode (tolerance) window

Fig. 3   Example of Evaluation Mode Tolerance Window.

The measurements obtained are evaluated with the aid of the tolerance window. Here a differentiation is made between two types of evaluation:

1. Evaluation in real time, i.e. during the measurement (online window)
   The evaluation in real time can only be conducted for absolute (not for relative) windows and you can only use rectangular windows.

2. Evaluation after the measurement

You define the type of evaluation of a window via ***Further settings*** on the **Process evaluation parameters** tab.

You can zoom in the graph by *stretching a region*[1] in the

graph. ⬍ resets the zoom status.

Procedure

1. Load all the measured plots with which you would like to create the windows (**Used plots** tab).
   You can load the current plot from the device or load plots already saved from the archive. If you change to the archive, you can accept various plots into the list (*Short-list plot*) and then insert them here into the list as *Plots from archive buffer*.

2. If no windows exist yet, you can automatically create windows via the **Create new window** tab.
   Specify how many windows are to be created and how large they are to be.
   Alternatively you can just create *one* (any) window and then manually change the coordinates of this window. You change the window name via *Further settings* on the **Process evaluation parameters** tab.

3. Modify as required the window coordinates via the **Process evaluation parameters** tab: Select the appropriate *Window* and modify the displayed values with the arrow keys or tap the field and enter the numbers via the screen keyboard. Mark as applicable the appropriate corner of the window (●).
   If you have an MP85A-S with switch (switch test) or haptic function available, you can also activate the appropriate window function on this tab and process it via *Further settings*.

4. Via *Further settings* define the entry and exit sides as well as other window properties such as for

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1. If you draw out, for example, from the upper left corner of the range to the bottom right, then the range marked out by the rectangle is zoomed. You can start to draw out from each corner and zoom over again many times.

example the window name, entry/exit sides or a relative reference point; refer to <u>Tolerance window details</u>.

Entry and exit

Tap one of the displayed symbols to change the entry or

exit direction. The symbols change with each tap of

through and to no entry and exit. The course of the measured plot must follow the arrow direction.

Window (window properties)

Apart from the window name, you can define the following properties:

Window evaluation is active

Enables you to deactivate the current window, for example for test purposes or because the window is too often evaluated as NOK.

Take window into account in overall evaluation

Enables you to extract the evaluation of this window from the overall evaluation. Although the window is then still evaluated, the result does not contribute to the overall result, i.e. the window can be evaluated with NOK and the overall result can still be OK. In this way you can detect, for example, the start of wear on tools. Windows, which are not considered in the evaluation, are shown in light gray.

Evaluate window in real time

With this option you can only use a rectangular window. The option also excludes evaluation via relative coordinates (x/y relative), because they are only fixed after the

measurement. For a crossing window with min/max evaluation in real time you obtain an error message (NOK) in Example 1 to the right, when the coordinate x_1 is exceeded. To create a merge window, use a crossing window with min/max evaluation which is evaluated in real time (Example 2).

A maximum of four windows can be evaluated in real time. The window sequence can also be taken into account with evaluation in real time.
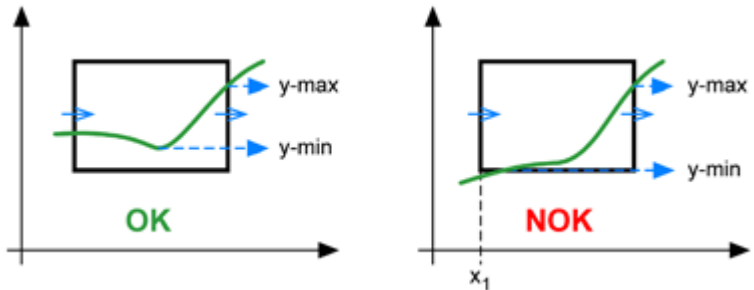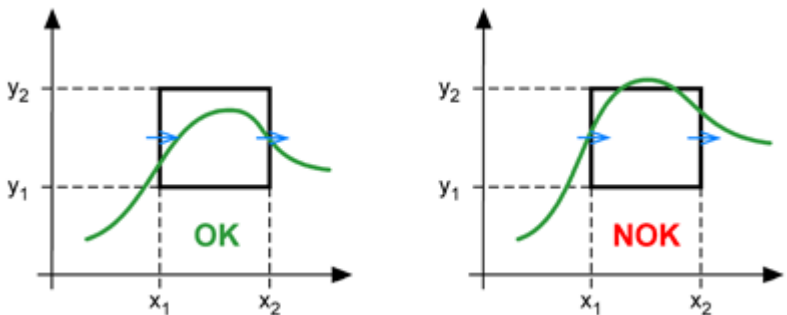

Fig. 4   Example 1, Evaluate window in real time.

Fig. 5   Example 2, Evaluate window in real time.

Take window sequence into account

The option of whether the next sequence window is mon-
itored (becomes active) when the measured plot has en-
tered the current sequence window or only when the
current sequence window has been exited, applies to all
windows for which the window sequence is monitored.
The evaluation of the sequence window with OK or NOK
is independent of this, i.e. the exit condition is also
checked in the first case. However, the entry condition
for the next sequence window is in the second case only
monitored once the current sequence window has been
exited.

This option is particularly interesting when the measured
plot crosses a range twice. Also with hysteresis plots you
can define a certain sequence for crossing via the defini-
tion of the window numbers and the entry and exit condi-
tions. The option is indispensable when the same x or y
range is crossed *twice* in the *same* direction. In Example 3
the plot must first cross Window 1 and then Window 2.
Since the MP85A always monitors coordinate ranges,
with the simultaneous monitoring of both windows without
a sequence and the entry and exit directions indicated by
the blue arrows Window 1 would be marked as OK and
Window 2 as not OK after the first section of the plot. OK
for both windows only occurs when the sequence is taken
into account: Since Window 2 is only active when Window
1 has been crossed, the same coordinate x_1 can now be
monitored twice. The fact that the plot in Example 3 again
crosses at the upper corner is not evaluated, because the
window has already been crossed and is therefore no
longer considered in the further monitoring. Here, it does

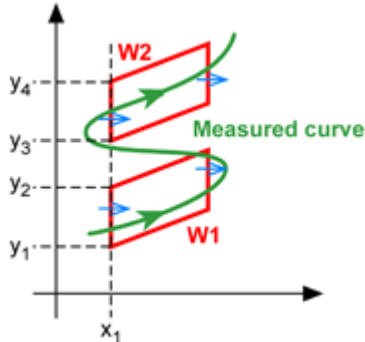not matter whether the window has been evaluated with OK or NOK.

Fig. 6   Example 3, Consider window sequence.

The option is similarly indispensable, if, for example, with two windows the same coordinate axis is monitored for the entry condition and the coordinates for windows to be crossed consecutively in the direction of the entry condition are not located consecutively (Example 4a): the entry coordinate y1 of Window 3 is lower than that of Window 2 (y2). If y1 were to be exceeded, Window 3 would therefore be checked first and evaluated with NOK ; Window 2 would be evaluated only at y2. Example 4b shows a similar case; here, the same y coordinate is monitored for all windows, but for different x coordinates.
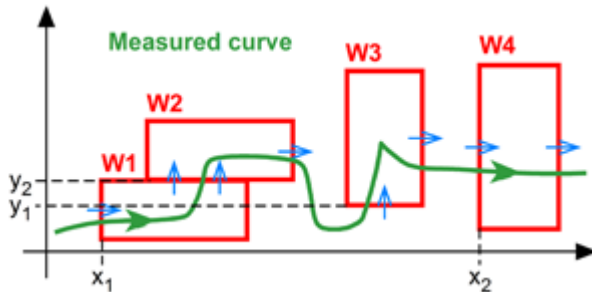
Fig. 7   Example 4a, Consider window sequence.
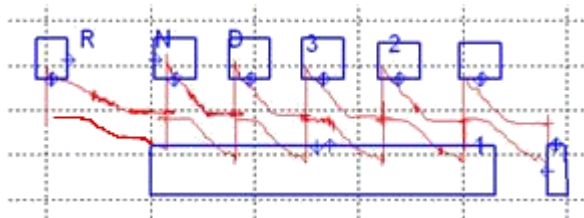
Fig. 8   Example 4b, Consider window sequence.

We recommend that either the option ***Consider window sequence*** is activated for *all* windows or for *none*.

x relative (Settings)

With this option the x coordinates can be calculated relative to a reference point (a certain position) and so, for example, be referenced to the end position or the merge position.

The selected reference point applies to *all* windows with relative x coordinates. Relative coordinates can only be used for evaluation *after* the measurement (*no evaluation in real time*).

Evaluation referenced to the end position: The end
position reached is set to the desired value and all x coor-
dinates are appropriately converted before the relative
windows are evaluated.
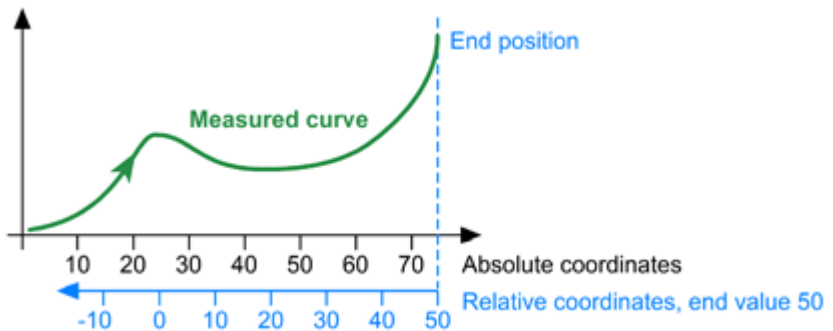
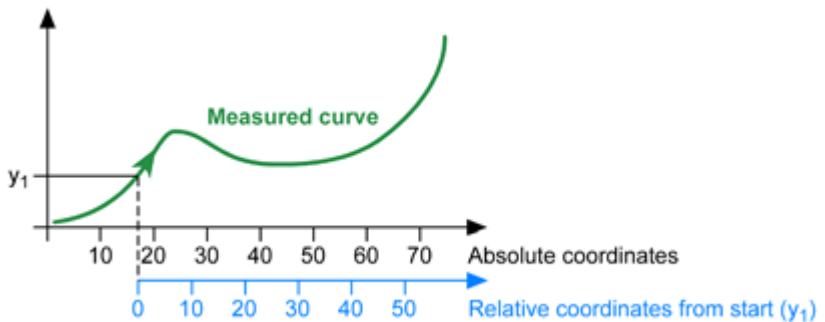Fig. 9   Example 5: Evaluation referenced to the end position.

***Evaluation referenced to the y channel***: On exceeding
or undercutting a certain y value, the reference point is set
to the desired value and all x coordinates are appropri-
ately converted before the relative windows are evalu-
ated.

Fig. 10   Example 6: Evaluation referenced to the y channel.

y relative (Settings)

With this option you can evaluate the plot relative to the minimum, maximum or mean which has been attained within the *second* tolerance window. The windows linked in this way are moved upwards or downwards in parallel to the y axis depending on the position of the value.

> The selected reference point applies to *all* windows with relative y coordinates. Relative coordinates can only be used for evaluation *after* the measurement (*no evaluation in real time*).

> With this option the *second* tolerance window is always used as a reference. You must in addition set the second window for the calculation which corresponds to the condition applied here, i.e. for the evaluation "relative to the mean" the y mean in the second window must be calculated.
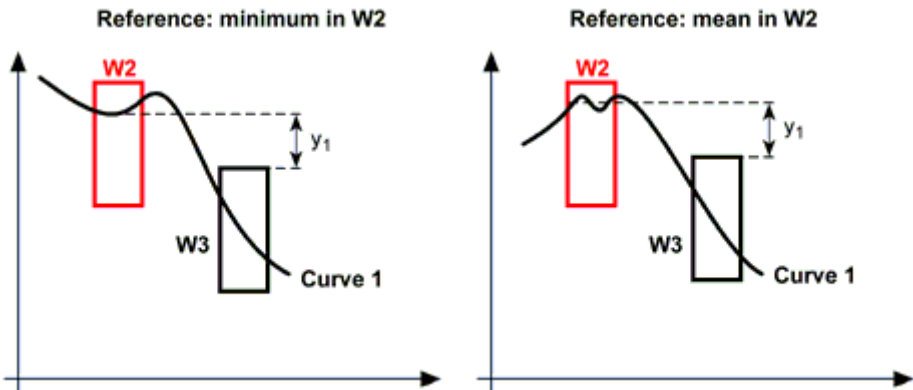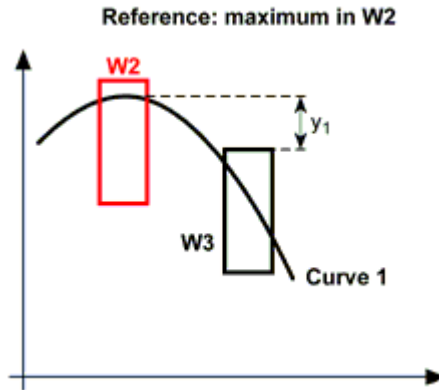
Fig. 11   Example 7: Window with the setting *y relative*.

Switching (only MP85A-S)

The switch test checks whether the switch in this window changes its state. Specify *Close* as the *switching direction* when the switch in this window has to change its state from "Open" to "Closed", otherwise specify *Open*. The check is made via one of the digital inputs of the MP85A-S; specify the input used under *Switching input*. If the switch bounce is to be ignored, activate the appropriate option. Otherwise the switch bouncing is evaluated as NOK.
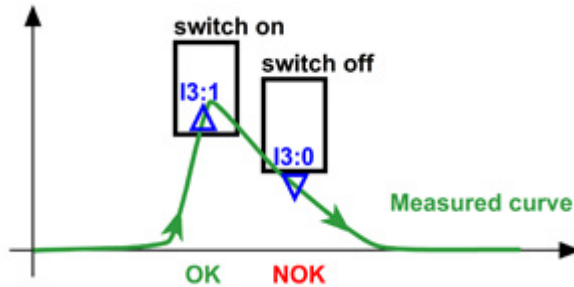
Fig. 12   Example 8: Switch test.

Note

- This window type cannot be used as a relative window.

- The evaluation takes place once the measurement has stopped, i.e. the real-time evaluation cannot be selected.

- The bounce of a switching process (switching on or off) is evaluated a maximum of 16 times in each case. If further bounces occur, the measurement is interrupted and the evaluation (statistics, etc.) is started. The process is generally labeled with NOK except when all windows have been evaluated with OK, i.e. bouncing only occurs with the last window.

- If the available digital input of the MP85ADP-S is not sufficient, you can transfer up to four switching events to the MP85ADP-S for evaluation (software input) via the interface.

- No entry or exit sides are needed for this window type.

- In the statistics the minimum/maximum values occurring in the window are not displayed, but rather the switching coordinates, i.e. the coordinates at which

the switch has changed its state. In addition to **OK** or **NOK**, **No switching process** is displayed when the switch has not changed its state or **Switch process repeated** if multiple switching has taken place.

Haptic (only MP85A-S)

The haptic test checks whether the switch in this window changes its state, i.e. the "feel" during operation. For this, enter the required forces and displacements. You can check only one parameter, a combination of any parameters or all the listed parameters. The test is NOK when one of the activated parameters is not satisfactory. The graph in the dialog shows the single parameters.

During the haptic test the plot must enter and exit the window at the side and only rectangular windows are admissible. Entry or exit on the upper or underside of the window is not possible.

Verifiable haptic parameters

Switch actuating force F_a: Specify the minimum switch actuating force $F_{a\ min}$ an. The switch actuating force is the force required to move the switch from the inoperative position over the switching point. The maximum switch actuating force $F_{a\ max}$ is determined by the upper edge of the window.

Restoration force F_r: Specify the maximum restoration force $F_{r\ max}$ an. The restoration force is the force at which the spring mechanism switches back. The minimum switch actuating force $F_{r\ min}$ is determined by the lower edge of the window.

Differential force: Define the minimum required and the maximum permissible difference from the actual switch actuating force F_a and the actual restoration force F_r.

Differential displacement: Define the minimum required and the maximum permissible displacement between the actual switch actuating force F_a and the actual restoration force F_r.

Force/displacement relationship: Define the minimum required and the maximum permissible relationship between the differential force and the differential displacement.

Click ratio: Define the minimum required and the maximum permissible relative differential force. With this test the differential force is calculated in percent of the switch actuating force and compared with the stated values.
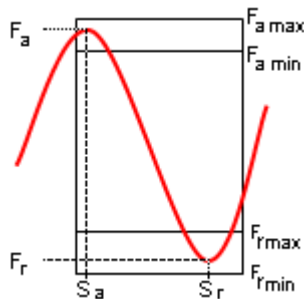
Fig. 13   Example 9: Haptic test.

4.4.3 The settings in the Envelope curve evaluation mode
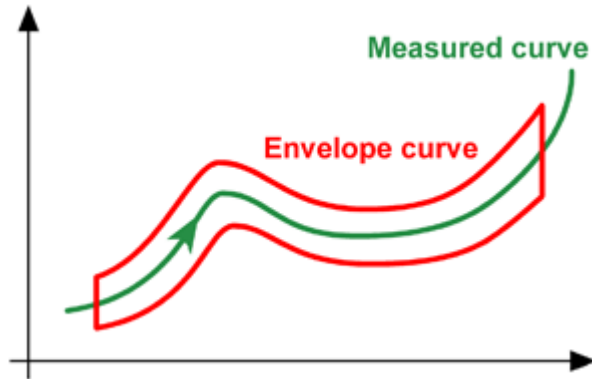
Fig. 14   Example of Envelope curve evaluation mode.

The measured plot must both enter and exit the envelope curve.

In the envelope curve mode only processes can be monitored in which the x values increase in one direction (no outward and return movement).

You can zoom in the graph by *stretching a region*[1] in the graph. ⚲ resets the zoom status.

---

1. If you draw out, for example, from the upper left corner of the range to the bottom right, then the range marked out by the rectangle is zoomed. You can start to draw out from each corner and zoom over again many times.

Procedure

1. Load all the measured plots from which the envelope curve is to be calculated (**Used plots** tab).
   You can load the current plot from the device or load plots already saved from the [archive](#). If you change to the archive, you can *accept various plots into the list* and then insert them here into the list as *Plots from archive buffer*.

2. If no envelope curve exists yet, you can automatically create an envelope curve via the **Create new envelope curve** tab.
   Specify how many sections the envelope curve is to comprise (*Number of sections*) and how large the offset to the mean of the displayed plots is to be (*Offset in y*). Then calculate the envelope curve: *Automatically create new envelope curve*.

3. Modify the individual sections as required (**Process envelope curve** tab): First select the appropriate **Section**. Then modify the displayed values with the arrow keys or tap the field and enter the numbers via the screen keyboard. The *Step size* defines the change of coordinates for each tap on one of the arrow symbols.

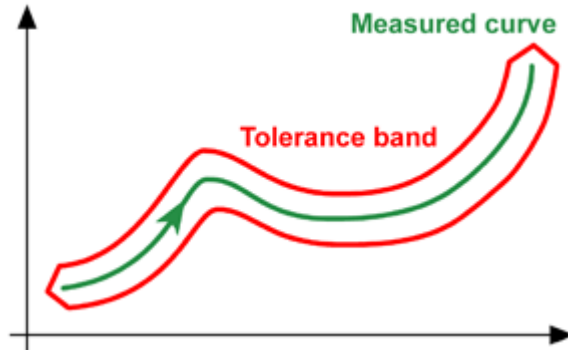### 4.4.4 The settings in the Tolerance band evaluation mode

Fig. 15 Example of Evaluation Mode Tolerance Band.

The measured plot must remain within the Tolerance band and it may neither enter nor exit it.

In the tolerance band mode only processes can be monitored in which the x values increase in one direction (no outward and return movement).

You can zoom in the graph by *stretching a region*[1] in the graph. resets the zoom status.

---

1. If you draw out, for example, from the upper left corner of the range to the bottom right, then the range marked out by the rectangle is zoomed. You can start to draw out from each corner and zoom over again many times.

Procedure

1. Load all the measured plots from which the tolerance band is to be calculated (**Used plots** tab).
   You can load the current plot from the device or load plots already saved from the [archive](). If you change to the archive, you can accept various plots into the list (*Short-list plot*) and then insert them here into the list as *Plots from archive buffer*.

2. If no tolerance band exists yet, you can automatically create an envelope curve via the **Create new tolerance band** tab.
   Specify from how many sections the tolerance band is to consist (*Number of sections*) and how large the offsets to the mean of the displayed plots are to be (*Offset in x* or *y*). To redivide any non-uniformly large sections, tap *Redivide sections*.

3. Calculate the tolerance band: *Automatically create new tolerance band*.

4. Modify the individual points as required (**Edit tolerance band** tab): Select the appropriate point via **Point no.** or the *arrow keys*[1] in the section **Select point** (point is identified by a blue circle in the graph). Then modify the displayed values in the section **Move point** with the arrow keys or tap the field and enter the numbers via the screen keyboard. The *Step size* defines the change of coordinates for each tap on one of the arrow symbols.

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1. goes to the next point to the left (clockwise), goes to the next point to the right (counterclockwise), and go five points further in each case

4.5   PS management (device settings)

Using this dialog you can save the current *device set-tings*[1], in parameter sets (PS) or load the settings from a saved parameter set. The parameter sets can be written to the MMC/SD Card, the flash EPROM in the device or the PC or read from the MMC/SD Card, flash EPROM or PC.

You can create up to 999 parameter sets. Each set of parameters and device settings should be given a unique name, for example in which you state the transducers (sensors) used, measuring ranges or evaluation criteria.

To load a parameter set you select the required parameter set (☑) and tap . The name of the currently loaded parameter set is displayed below in the dialog (*Loaded PS*).

Loading and saving cannot be undone, therefore is displayed instead of . Do not tap any of the buttons in the dialog, only on to quit the dialog without changes.

Procedure for saving

1. Select the required number of parameter sets (☑).

2. Enter the parameter set names.

---

1. e.g. the sensor settings, alarm/range windows or control settings

3. Save the settings with .

No process may be started while storage is running.

Saving the parameter sets takes some time and cannot be interrupted. Therefore, you receive an estimate of the time required in a dialog and have the choice of not executing the process. During saving, the time still remaining is displayed and the parameter set just saved is marked.

In the **System settings** menu define whether the device name is overwritten by the one in the stored parameter set or not during the *loading* of a parameter set.

Symbols used

selects all parameter sets

selects all parameter sets from the marked data set

selects all parameter sets up to the marked data set

deletes all selections

deletes all selections from the marked parameter set

deletes all selections up to the marked parameter set

deletes all selected (☑) parameter sets

loads (and activates) the selected (☑) parameter set into the amplifier (MP85A)

saves the current amplifier settings in the selected (☑) parameter sets or on the PC or MMC/SD Card.

5   PS backup

The dialog enables you to copy the files from the MMC/SD card in the MP85A or the parameter sets in the flash memory to a PC folder of your choice and vice versa. You can select several files by touching them; touching a file again deactivates its selection. The file names of the parameter sets consist of the device address and the parameter set number, i.e. a separate file is created for each set of parameters.

The folder BIN_PAR contains the parameter sets (binary) and a copy of the last overwritten parameter set. The file Parsets.inf contains the assignments between the files (parameter set numbers) and the parameter set names.

6 Change User Level

You use this page to change the user level. There are three levels:

Worker

You *do not* need any password for this level.

Tool Setter

You require the password and can then carry out settings. The factory setting for the password is *asdf*.

Superuser

You require the password and can then carry out *all* settings. The factory setting for the password is *1234*.

The two user levels Tool Setter and Superuser are exited if no entry has been made for a certain time. The display then switches to the last view used of the equipment and any dialogs called are closed (cancelled). The factory setting for the switchover is approx. 3 minutes.

Procedure

1. Touch the picture for the required user level.
2. Touch the entry field (the screen keyboard appears on the right).
3. Enter the password.
4. Touch .

You must quit the dialog with ⊘ or ⊗. As long as the dialog is displayed, no menu point can be selected on the right-hand side.

7 Archive

The archive enables you to view saved data. Depending on the file, these can only be results or results and plots. If you have called the archive from another *Menu*[1], you can also accept a number of files into a selection list which is then available to you after terminating the archive function. In all other cases the selection list is deleted when you quit the dialog.

The tabs are displayed in sequence, i.e. once you have concluded the entry of one tab, the next is displayed. However, you can manually select one of the other tabs at any time.

File filter

Here you specify the source of the data: either *PC* or *MMC/SD* (if available). Then select the path. If required, you can further restrict the selection of the displayed files. The description of the workpiece is generally transferred before the relevant process from an external *Source*[2]. Here, you can then search for parts of the description, for example, *314** finds all workpieces with a description starting with 314. Tap ➡ to access the file selection or directly tap the tab **File selection**.

File selection

This shows all files corresponding to the search criteria specified under **File filter**. Tap a file to access **Pro-**

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1. e.g. from Evaluation settings
2. e.g. a PLC

cesses. If you are located in a subfolder, [..] returns you to the next higher level.

Processes

Tap on a one of the plots in the linked list to display it [image] zoom on the displayed plot; you can however also manu-

ally *stretch a section*[1]. Tap [image] to display the original graph again.

When you tap *Short-list plot*, the **Selection** tab is displayed with all the selections already made. If you would like to view the *Process details* for a plot, you have to display it and tap the **Process details** tab.

Process details

This displays – if available – the process details (statistical data, entry and exit points, limit results) of the plot which has been selected on the **File selection** tab.

Green LEDs on the **Limit results** tab symbolize that the limit condition has been fulfilled. A red LED indicates that the limit condition has not been fulfilled.

With switch or haptic tests a further tab is available for the display of the details.

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1. If you draw out, for example, from the upper left corner of the range to the bottom right, then the range marked out by the rectangle is zoomed. You can start to draw out from each corner and zoom over again many times.

Selection

Shows all selections which have been added to the **File selection** tab with *Short-list plot*. (Delete list) clears the complete list; (Further selections) displays the **File selection** tab. You can however also define new search criteria via the **File filter** tab and add other files to the selection list.

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8   Settings for the Log File (Log)

Depending on the user level, here you can only view the log file or change the settings for it.

As Superuser you can define here where the log file is created, how large the file may be and which events are to be logged. If the defined size is exceeded, the oldest records at the start of the file are overwritten.

Use the option *Device communication* carefully, because here large amounts of data can arise quickly.

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