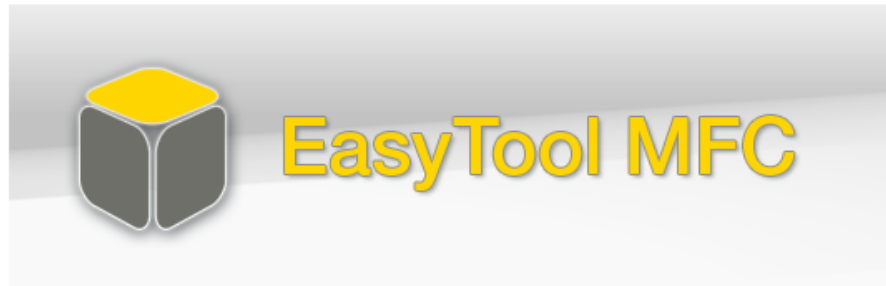


EasyTool MFC

Multifunction Controller Tool



Version 2.0.0, License = Full version

[New Project](#)

[Open Project](#)

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Recently Opened Projects

Operating Instructions

HESCH

AUTOMATION



Imprint

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5/13/2015 / 1.1	1.2 SR1	General update
7/23/2015 / 1.2	1.2 SR3	General updates and additions. Chapter 7 (Driver Installation) has been supplemented.
3/8/2016 / 1.4	1.4 SR2	Chapter 6.2.5 (Filter function in FB library supplemented). Chapter 6.8 - 6.10 (Data Logger, Block Search, Cross References) supplemented. Function (Recording) and (zoom back) supplemented. New chapter structure.
7/11/2017 / 1.5	1.5 SR1	Chapter 3.5 (Device languages) supplemented. Chapter 5 Functional description (Password assignment) supplemented Chapter 4.2.13 User blocks deleted (function no longer available in software)
11/27/2018 / 1.6	1.5 SR1	Links adapted
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1 General

1.1 Foreword

The operating instructions serve for a better understanding of the software program. It is imperative that the user is familiar with the operating system used and its standard functions.

In many examples in these operating instructions, the functions are only shown for analog values; the functions also apply analogously to digital values. Since many elements are interlinked within the application, the manual should be studied in its entirety.

Within the manual, important passages are marked by the following element:



Note!

The symbol marks useful additional information and user tips.

On the website <https://www.hesch-automation.com/en/products/multifunction-controller/> there is an FAQ area for registered users, which covers both the software and the hardware.

1.2 Product description

The EasyTool MFC software program is used to configure and parameterize various hardware platforms with the EasyTool MFC runtime system. The tool supports the following hardware-specific configuration options:

- Creation of user-defined operating pages, which serve for the individual configuration and operation of the target system
- Creation of user-defined programs / applications based on various basic libraries and their wiring
- Test of the operating structure and the program in the form of a device simulation
- Diagram-oriented online display of process values to support program testing and commissioning
- Debugging of the program to test the entire application

1.3 System requirements

Recommended operating system: Windows 7 or higher.

2 Initial program start

After EasyTool MFC has been installed on the computer, the software is ready for operation. It is not necessary to enter a license number.

To transfer a created project to the HE 5697 MFC, you need a USB dongle (license key). The dongle is available at AXXERON HESCH electronics GmbH.

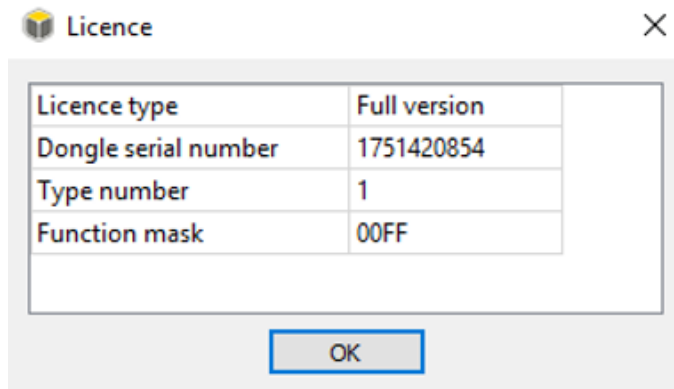


Figure 1 License key

2.1 USB-Dongle

If the USB dongle is not inserted when the program starts, the software requires a restart to transfer a project to the HE 5697 MFC after the USB dongle has been inserted into any USB port on the computer.

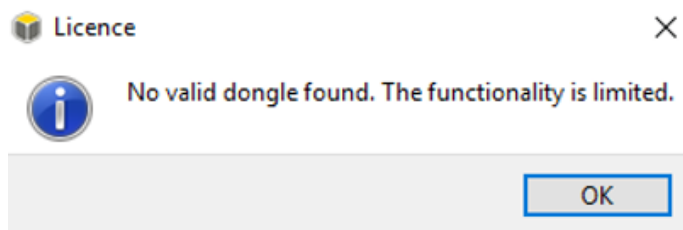


Figure 2 Warning message at program start

3 The structure of the EasyTool MFC

The tool itself is based on the standard operation of modern software programs and essentially supports all standard functions in the area of program operation. The individual items of the main menu and the project menu are briefly described below. Most of the functions are additionally addressed in later chapters and described in more detail.

3.1 The main menu

The main menu is divided into five menu items and supports the operator in his general work with the tool.

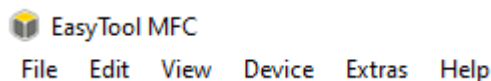


Figure 3 Main menu

3.1.1 The main menu item "File"

The following actions can be carried out in the main menu item *File*:

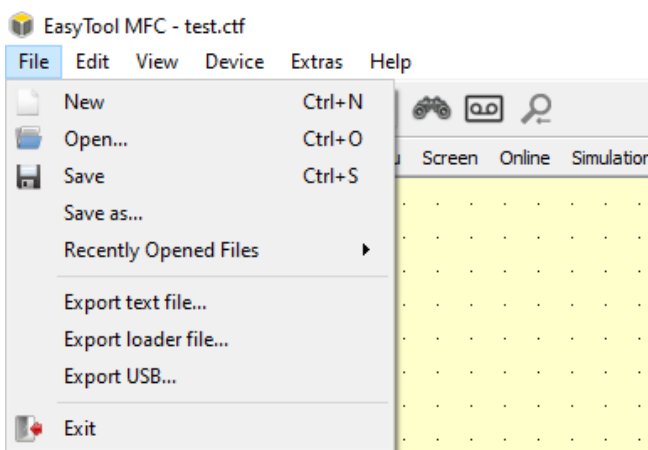
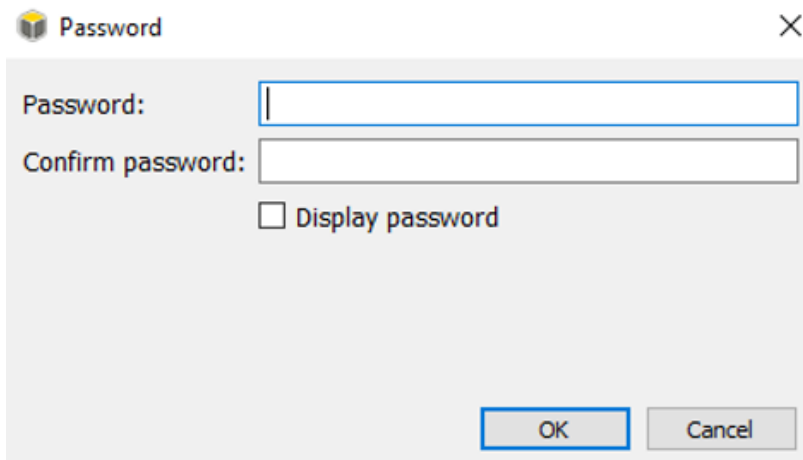
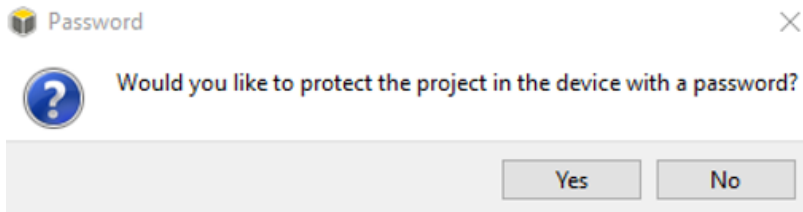


Figure 4 File Menu

- The menu item *New* creates a new project.
- The menu item *Open* browser dialog.
- The *Save* menu item is used to save the current project. A standard file browser dialog is opened for saving. After the one-time assignment of a project/file name, all project changes are saved to the same file when the menu item is activated again. The saved file contains all the information required for use with EasyTool MFC. Possibly used image files are contained in the project file.
- The menu item *Save as* is used to save the current project under a different name. A standard file browser dialog is opened as well.
- The menu item *Recently Opened Files* contains a list of the most recently edited project files.
- The menu item *Exit* terminates the EasyTool MFC.

- The menu item *Export loader file* (software version 1.4 and higher) enables the user to export the project for the "EasyLoader MFC" (file extension *.ctl). The exported project can be protected with a password (as an option), which protects the project from unauthorized editing and reading.



3.1.2 The main menu item *Edit*

The following actions can be done in the main menu item *Edit*.

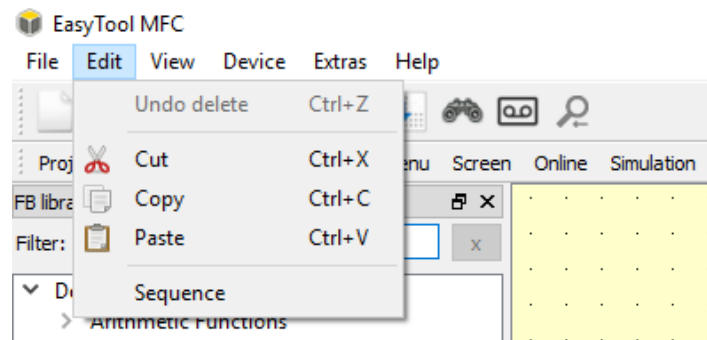


Figure 5 Edit Menu

- The menu item *Cut* is essentially identical to the standard operating system function *Cut*. You can cut (remove) block elements, text elements, and elements from the area of the screen editor. Multiple selection is allowed.
- The menu item *Copy* is essentially identical to the standard operating system function copy. You can copy block elements, text elements, and elements from the area of the screen editor. Multiple selection is allowed.
- The menu item *Paste* is essentially identical to the standard operating system function *paste*. Elements that have been edited using the *Cut* or *Copy* function can be pasted again at permitted positions in the project using the *Paste* function.
- The menu item *Sequence* is used to define the sequence in which functions from the project are processed (calculated). The sequence is indispensable for the correct execution of the project and is discussed in more detail in the chapter on project creation.

3.1.3 The main menu item *View*

In the main menu item *View* you can switch between the individual project-specific parts / views of the project menu. In addition, the currently selected views marked by a check mark. The description of the entire project menu is given in the chapter 4.

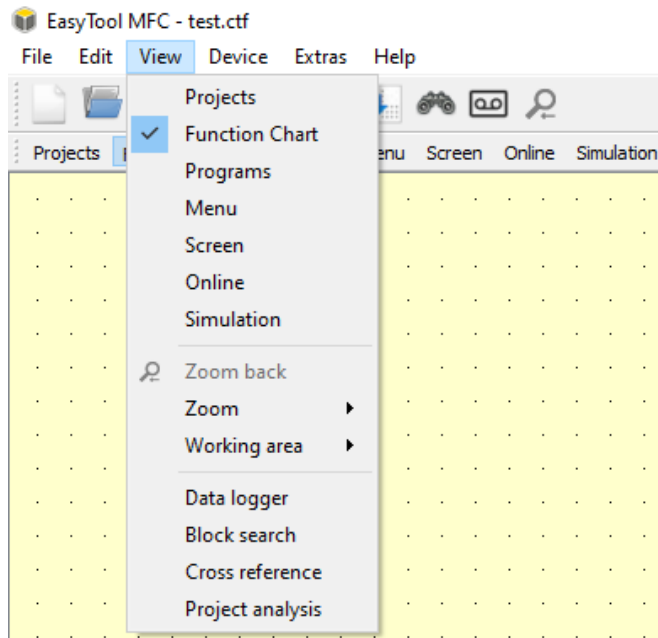


Figure 6 View Menu

3.1.4 The main menu item *Device*

The following actions can be carried out in the main menu item *Device*:

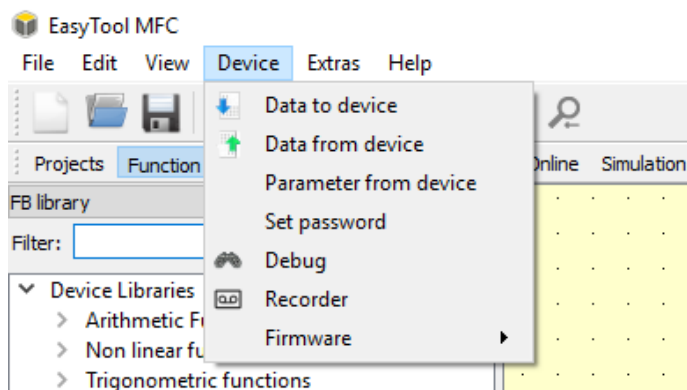


Figure 7 Device menu

- The menu item *Data to device* is used to transfer a project to the target system (device or simulation).
- The menu item *Data from device* is used to transfer an already created project in the target system (device or simulation) back to the EasyTool MFC.
- The menu item *Parameter from device* is used to transfer the block parameters of a project that has already been transferred and is currently open in EasyTool MFC.
- The menu item *Set password* is used to assign a project password, which is later required for transfer to the target system or to the EasyTool MFC. Thus, projects can be protected against access by unauthorized persons.
- The menu item *Debug* is used to switch the debugging function of EasyTool MFC on and off.
- The menu item *Firmware* is used to update the device firmware as well as to support firmware tests or reset functions.

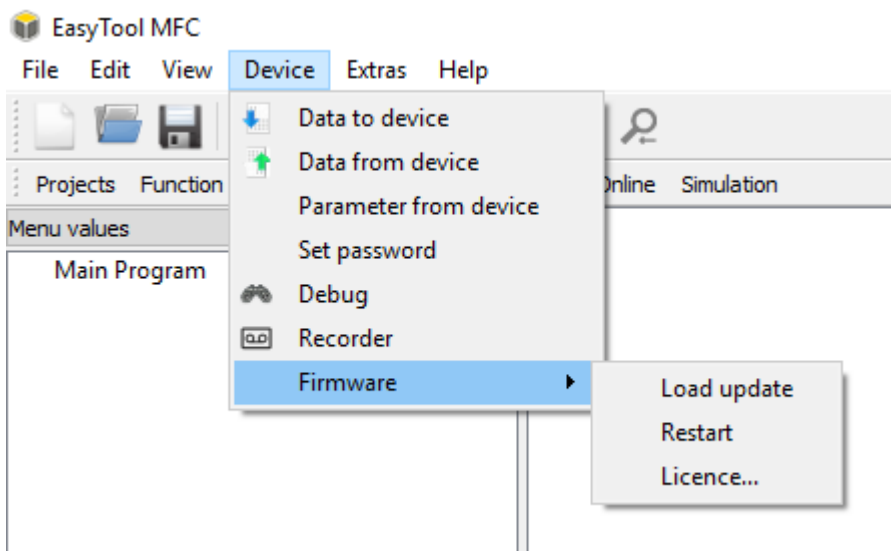


Figure 8 Menu item Device ► Firmware

3.1.5 The main menu item *Extras*

The following actions can be carried out in the main menu item *Extras*:

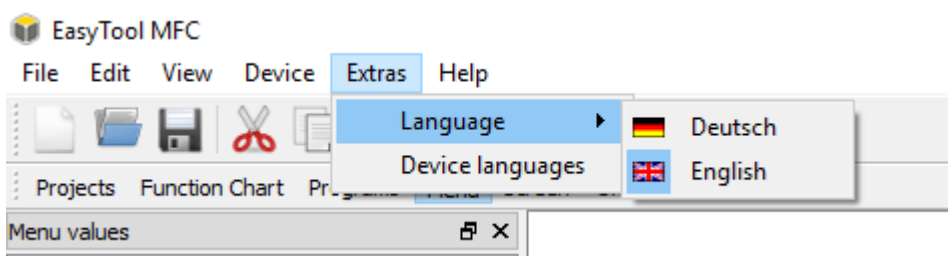


Figure 9 Menu Item Extras ► Language

- The *Language* menu item (Figure 9) is used to select the language for the EasyTool MFC. After the selection has been made, EasyTool MFC is prompted to restart. Language switching only works after a restart. If the prompt to restart is ignored, EasyTool MFC continues to work with the previously selected language.
- The menu item *Device languages* (Figure 10) opens the dialog *Device languages*.

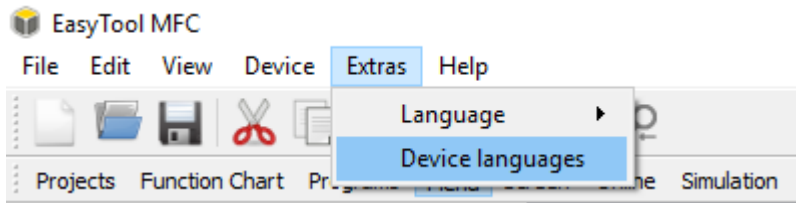


Figure 10 Menu Item Extras ► Device Languages

3.1.6 The main menu item *Help*

The following actions can be carried out in the main menu item *Help*:

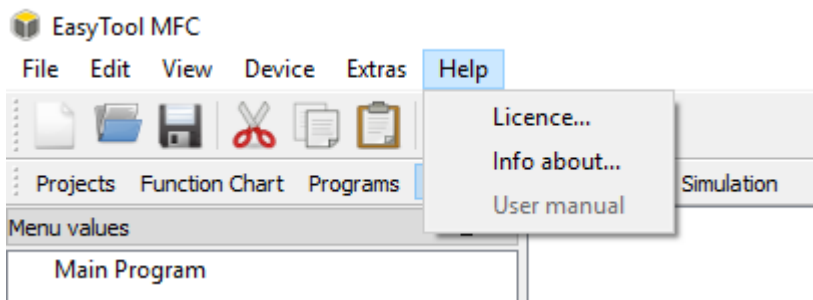


Figure 11 Menu Item *Help*

- The menu item *Licence* displays the licence type and dongle serial number.
- The menu item *Info about...* is mainly used to display the EasyTool MFC software version number.

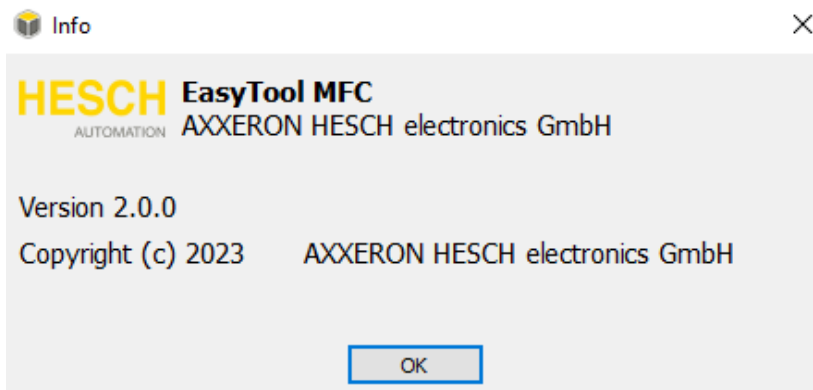


Figure 12 Info window

3.2 The views

Various EasyTool MFC user areas are used to create and edit a project.

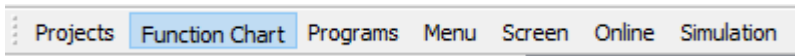


Figure 13 The views

The individual areas of EasyTool MFC are described in more detail in the chapter 4.











3.3 The selection menu

The selection menu provides quick access to frequently used functions in the EasyTool MFC.



Figure 14 Selection menu

The functions of the individual menu items are explained in the chapter 3.1. The following functions can be selected from the selection menu:

Symbol	Function
	File / New
	Open file
	File / Save
	Edit / Cut
	Edit / Copy
	Edit / Paste
	Device / Data to the device
	Device / Debug
	Recorder
	Zoom back (only in online view)

3.4 Setting the working area

3.4.1 User-defined windows in the function chart

It is possible to add additional windows (functions) to the area of the function chart. To do this, the mouse must be placed on a frame of a window, for example a library. After pressing the right mouse button, a selection menu appears (see Figure 15).

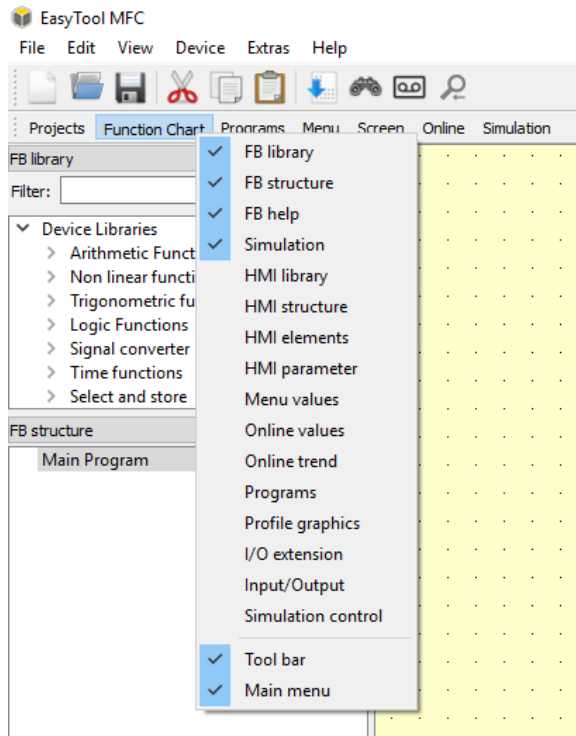


Figure 15 Window selection menu

Here, an additional function such as *Input/Output* can be selected with the left mouse button. The additional function appears at a new location within the function chart. The placement of the new window can be changed by moving it with the pressed left mouse button. It is also possible to superimpose windows (see Figure 16).

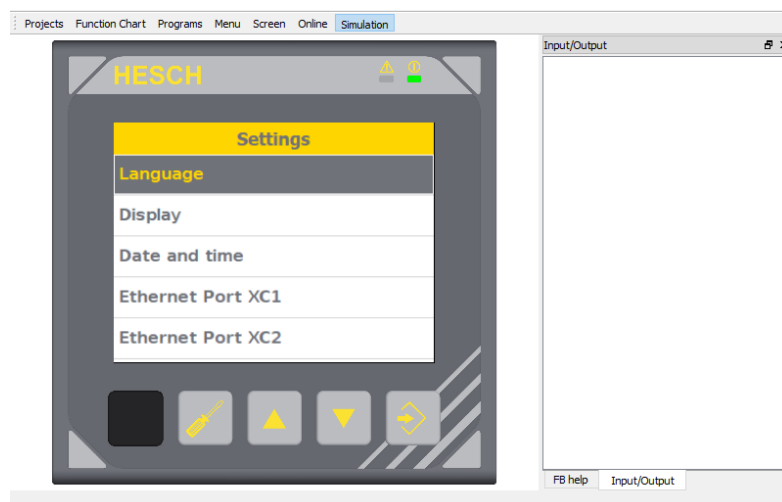


Figure 16 Docked window arrangement

In addition, the windows can also be placed "freely" over the function chart (see Figure 17).

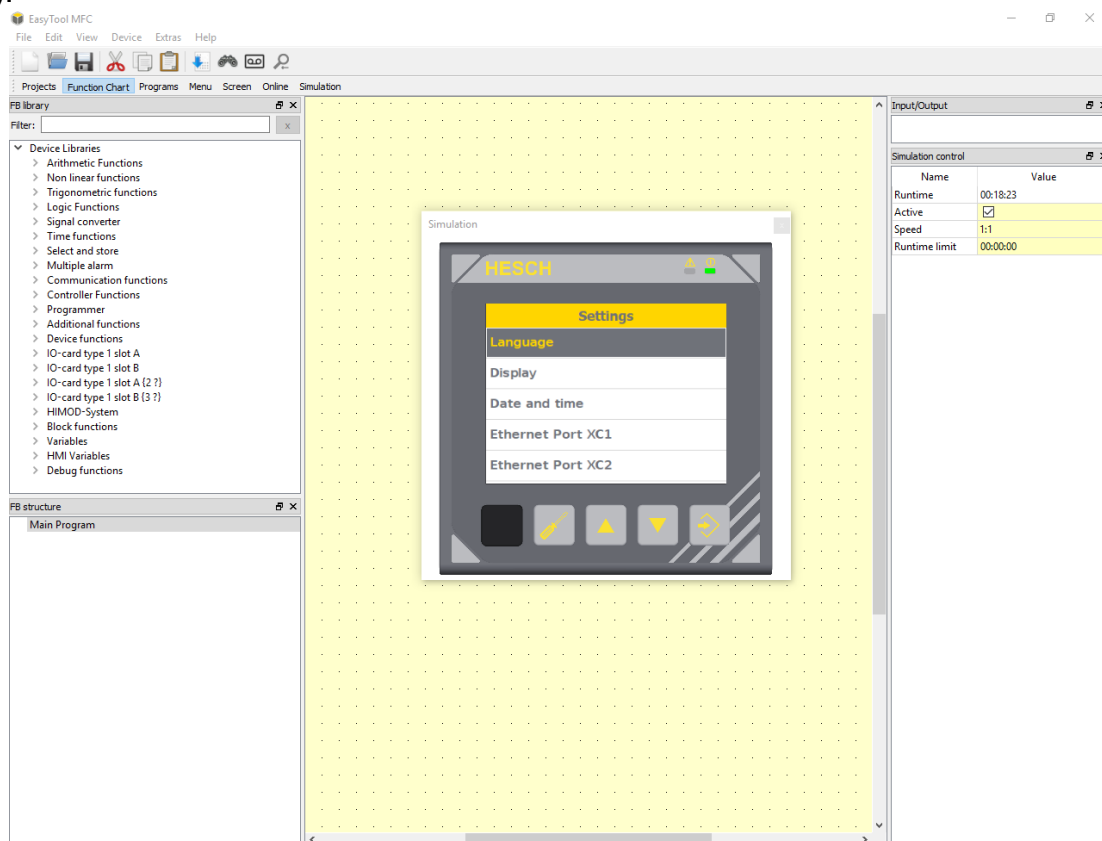


Figure 17 Free window arrangement

This type of window arrangement and function extension is possible in all project areas.

3.5 Device languages

As of software version 1.5, the device language can be changed as required. The function is explained step-by-step below.

3.5.1 Configuration of the Language Scope

The menu command *Extras* ► *Device Languages* opens the dialog Device Languages (see Figure 18).

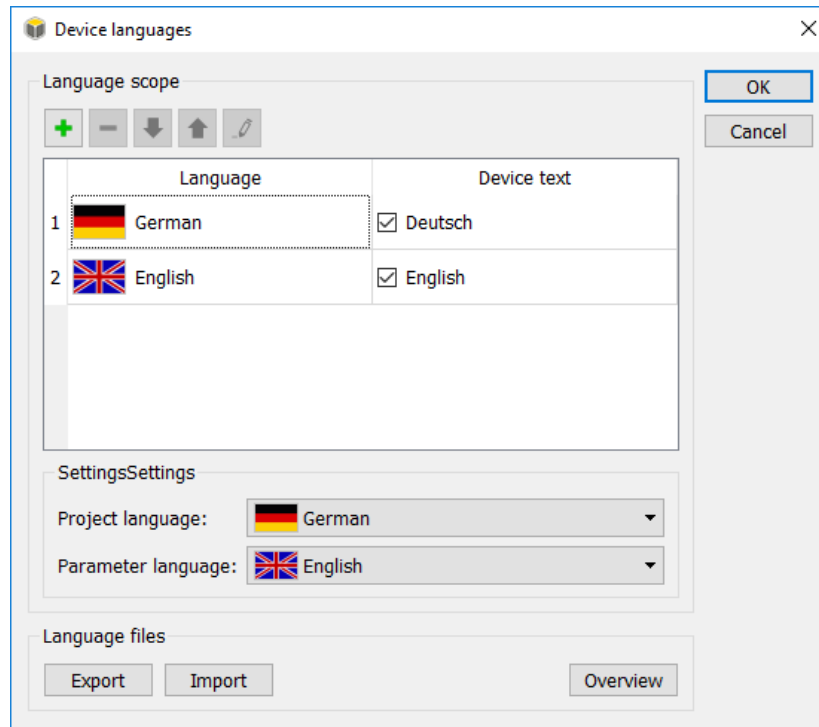








Figure 18 Dialog Device languages

Element	Function
	Add a new language to the project
	Delete a language from the project
 	Change the order of languages
	Edit the Property of a Language

3.5.2 Adding a language

Press  to add a new language to the project. The language selection dialog box appears.

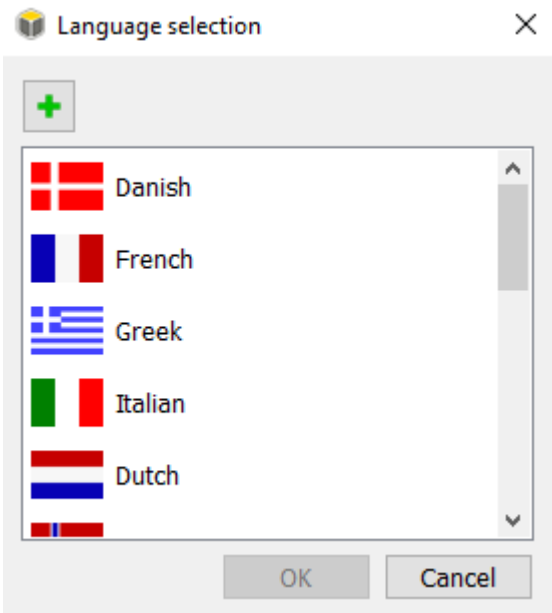



Figure 19 Language Selection Dialog Box

The (mostly European) languages can be selected from the list. If the desired language is not included in the list, it can be selected via the dialog button  *Add language* see Figure 20.

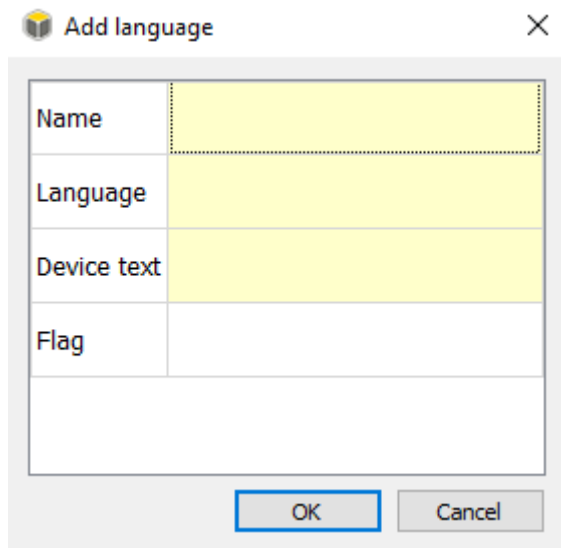


Figure 20 Add Language Dialog

Element	Function
Name	Unique name of the language within the project
Language	Text which appears under Language Scope
Device text	Text which is displayed during language selection
Flag	Flag is any image that is displayed in the tool and in the language selection. The optimal size of the image is 45 × 30 pixels.

3.5.3 Export of language files

In the Device languages dialog, a language file can be exported as a CSV file via the "Export" button. The following dialog allows you to specify the languages of this file:



Figure 21 Export Dialog

Element	Function
Source language	Language used as a basis by the translator
Target language	Language to be created by the translator

3.5.4 The translation

The exported language file is translated in Excel. Please note the following when opening the file.

If the file is opened by double-clicking, it is not displayed correctly formatted (see Figure 22).

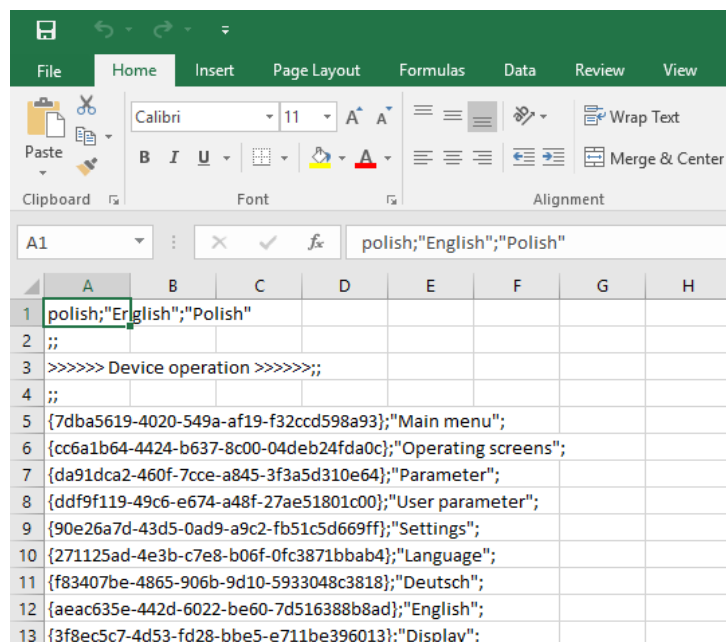


Figure 22 Unformatted file view in Excel

Chapter 3: The structure of the EasyTool MFC

This ensures that the data is formatted correctly:

1. Select column A
2. Select "Text to columns" in the Data menu. The text conversion wizard opens. Click "Next".

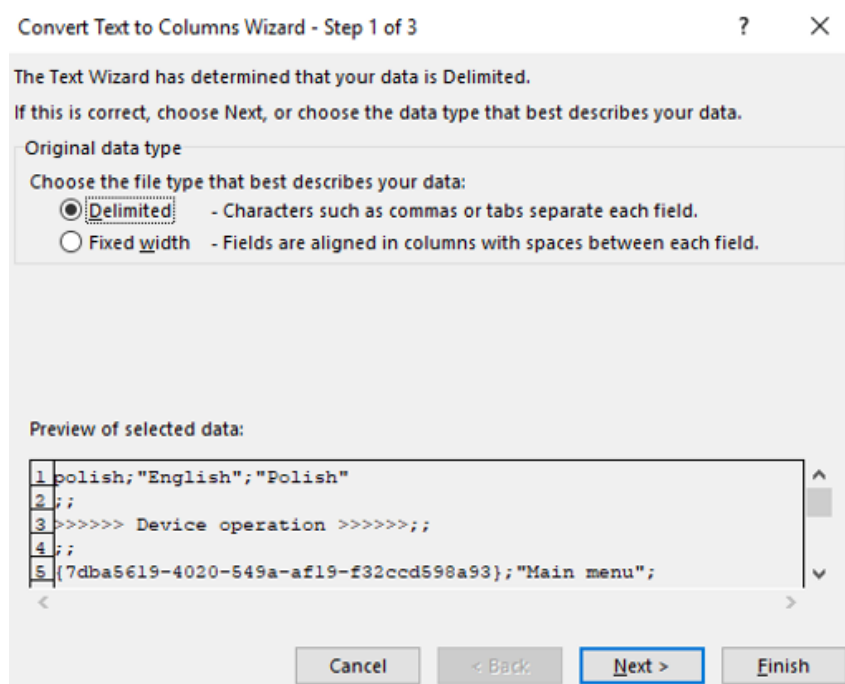


Figure 23 Excel Text Conversion Wizard Step 1 of 3

3. Select "Semicolon" as separator and click "Next".

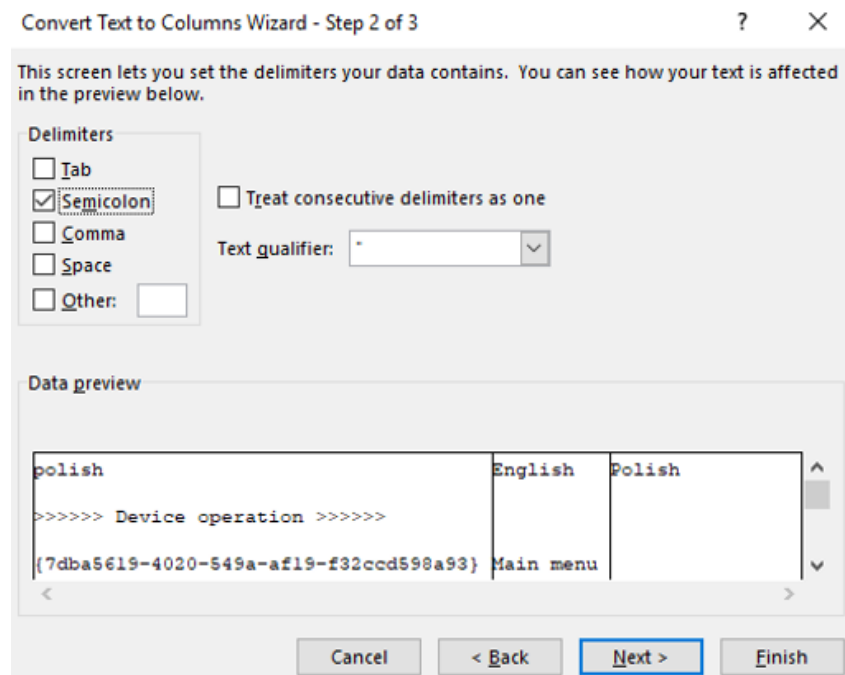


Figure 24 Excel Text Conversion Wizard Step 2 of 3

4. In the following dialog, select "Standard" as the data format for the columns and then click on "Finish".

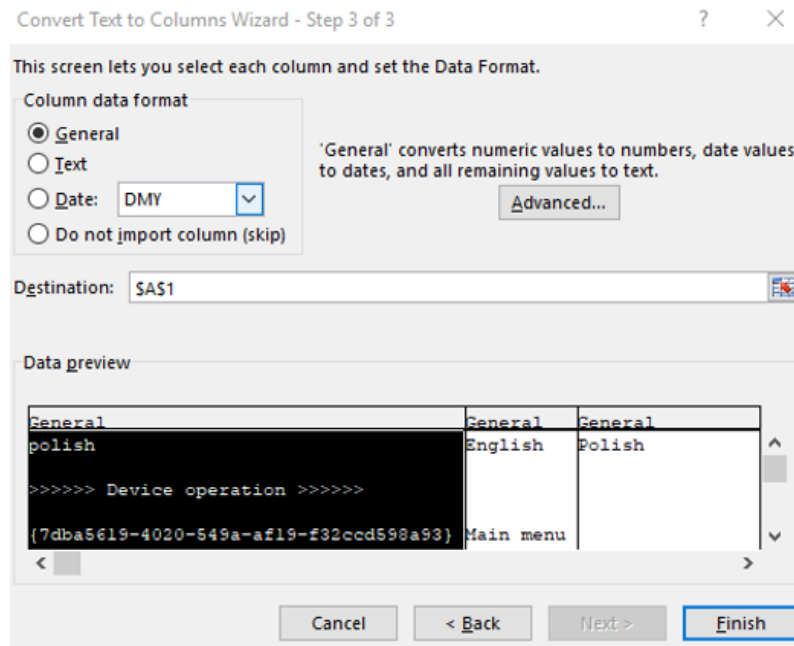
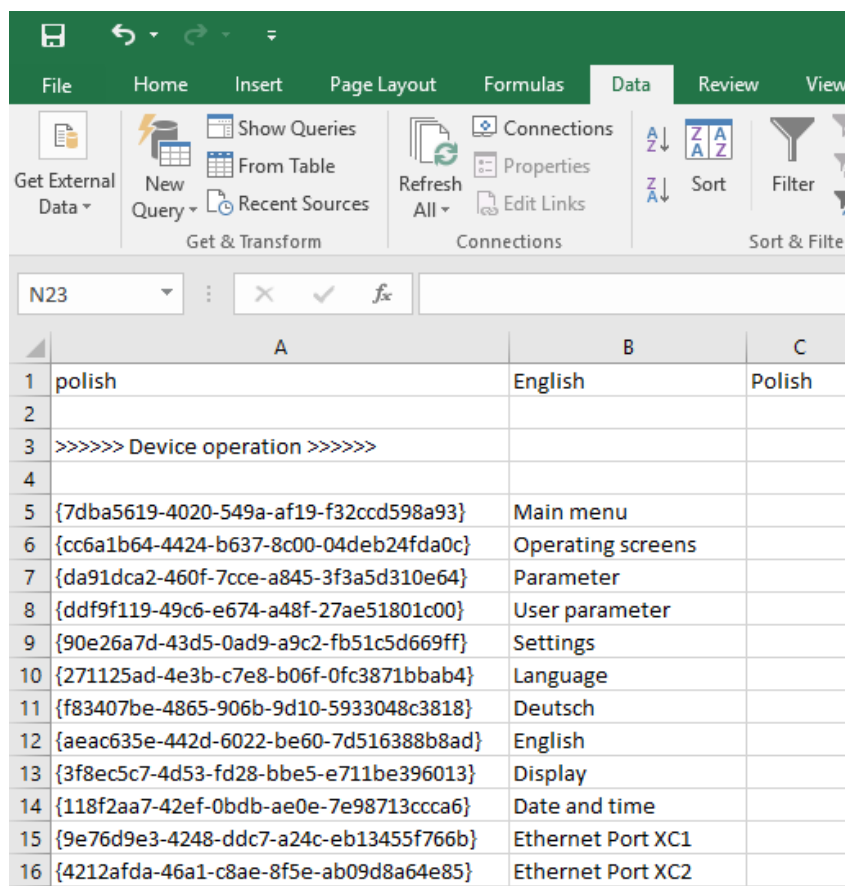


Figure 25 Excel Text Conversion Wizard Step 3 of 3

5. The data is now displayed correctly and the translation can be done in column C.



	A	B	C
1	polish	English	Polish
2			
3	>>>>>> Device operation >>>>>>		
4			
5	{7dba5619-4020-549a-af19-f32ccd598a93}	Main menu	
6	{cc6a1b64-4424-b637-8c00-04deb24fda0c}	Operating screens	
7	{da91dca2-460f-7cce-a845-3f3a5d310e64}	Parameter	
8	{ddf9f119-49c6-e674-a48f-27ae51801c00}	User parameter	
9	{90e26a7d-43d5-0ad9-a9c2-fb51c5d669ff}	Settings	
10	{271125ad-4e3b-c7e8-b06f-0fc3871bbab4}	Language	
11	{f83407be-4865-906b-9d10-5933048c3818}	Deutsch	
12	{aeac635e-442d-6022-be60-7d516388b8ad}	English	
13	{3f8ec5c7-4d53-fd28-bbe5-e711be396013}	Display	
14	{118f2aa7-42ef-0bdb-ae0e-7e98713ccca6}	Date and time	
15	{9e76d9e3-4248-ddc7-a24c-eb13455f766b}	Ethernet Port XC1	
16	{4212afda-46a1-c8ae-8f5e-ab09d8a64e85}	Ethernet Port XC2	

Figure 26 Excel file view after text conversion

3.5.5 Importing language files

Once the translation has been completed, the language file can be imported in the Device languages dialog via the "Import" button.

When importing, only those texts are imported whose unique identifier (column 1) matches the texts in the project.



Note!

The file must be in the same CSV format as it was exported, EasyTool cannot import files in Excel or OpenOffice format. The target language defined in the CSV file must be included in the language scope of the project, otherwise an error message will be displayed.

3.5.6 Language overview

In the "Device Languages" dialog, the "Overview" button can be used to open a dialog with a table in which all texts in all languages can be displayed and also changed.

This function is used to check whether all translations are complete and to quickly change individual texts. In the table, the fields with the changeable texts are highlighted in color. The fixed device texts in German and English as well as the texts in the project language cannot be changed.

3.5.7 Function block "LANG"

In the library under "Additional Functions" there is the new block "LANG", which can be used to set and query the device language.

The language can be set via the analog input "dl" (Device Language). The input only reacts to changes so that two-point operation is possible. (Change via the function block, change via the "Settings - Language" menu. If the input remains unwired, language switching is performed exclusively via the language menu.

The values of the input correspond to the order of the active device languages in the language scope. If "German, English, French" is defined there, a 1 causes a switchover to German, 2 to English and 3 to French. All others are ignored.

The input values are arithmetically rounded.

The currently effective language can be queried via the analog output "dl".

3.5.8 HMI Element "Language"

The new "Language" element is located in the HMI library. With this element a language switching on a user side can be realized in a simple way.

The parameters of the "Appearance" category correspond to those of the "Text" control.

In addition to the text, a country flag is added. In the screen editor of EasyTool this is fixed according to the set language of the tool. The device will display the country flag matching the currently effective national language.

The "Text" parameter can be empty, in this case only the country flag is displayed. If the text parameter contains the keyword "%{LANGUAGE}", this is replaced in the device by the name of the currently set language.

3.5.9 Other information

All language information is stored in the project file by the tool. This also includes the self-defined languages with the image file for the flag. This makes it possible to transfer the project file to another user and be sure that he has all the necessary information.

The language files in CSV format are only required for the translation process. Although they are not needed for the further work with the project and the download into the device, it is useful to archive them so that the translations are not lost, e.g. because the project file was changed or damaged.

If a text is added in the project, then the translations that have already been carried out are also exported when the language file is exported, so the new text is easy to find because the corresponding field in the target language is empty.

If a text is changed in the project and translations already exist for this text, the translations are deleted because they no longer match the text after the change.

3.5.10 Language menu in the HE 5697 MFC

The menu item "Language" is located in the main menu of the HE 5697 MFC under "Settings". As of version 1.4 you can set the fixed languages German and English. The language setting only affects the main menu and the parameters. As of version 1.5 the menu contains all languages defined in EasyTool under Device Languages. In addition to the text, the corresponding country flag is displayed.



Figure 27 Screen view HE 5697 MFC Language

3.5.11 HMI Element Language

The element displays the country flag of the currently set language, as well as any additional text.

Touching this screen item displays the language menu from the previous chapter.

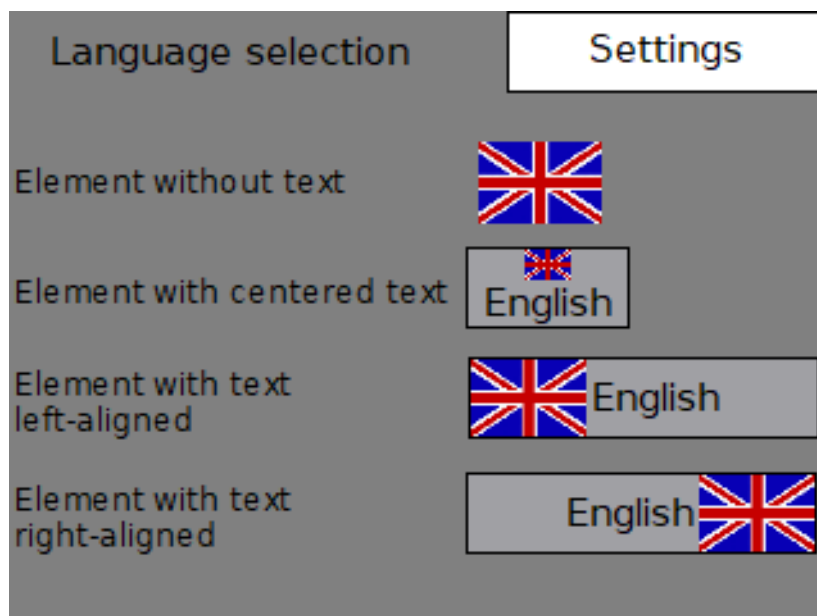


Figure 28 Screen view HE 5697 MFC Language selection

4 The Views in Detail

The different views serve to select all project planning areas which are necessary for the creation of a project. The selection can also be made via the View main menu. The individual areas are described in the following chapters.

4.1 "Projects" View

The project menu shows an overview of the most recently edited (opened) projects. Furthermore, it is possible to create a new project or to open the last used project folder.

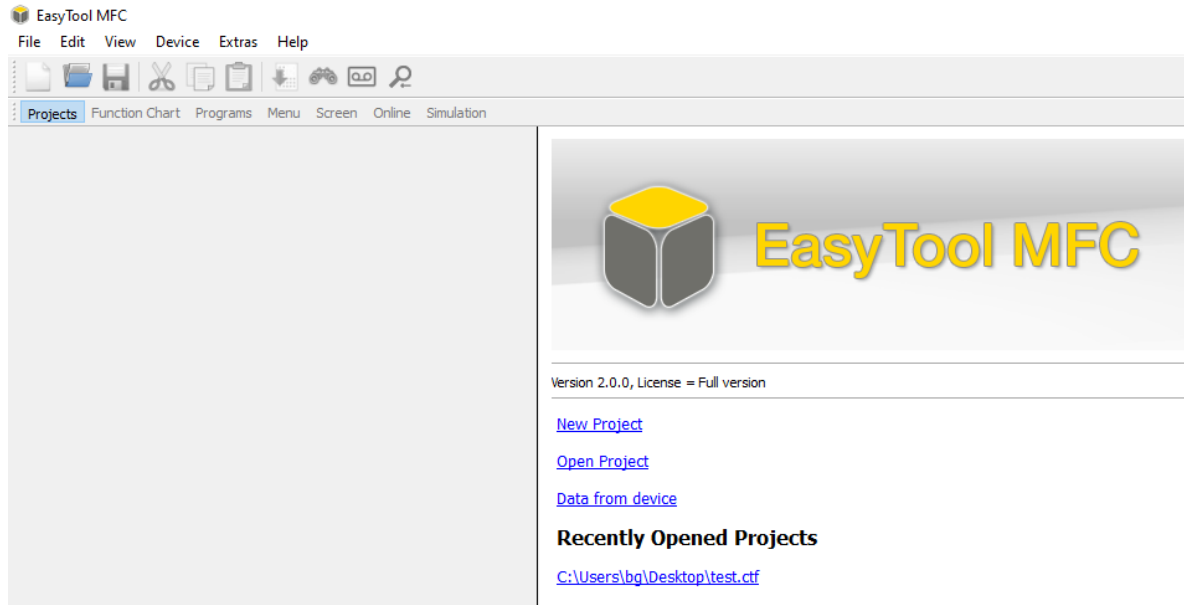


Figure 29 Project Menu

The selection is made by clicking with the left mouse button. After selecting a new project or an already existing project, EasyTool MFC switches to the area of the function chart.

If "Open project" is selected, a standard file browser is opened for selecting a project. After selection, EasyTool MFC also switches to the area of the function chart here.

4.2 Function Chart View

The function chart provides all the functions required for creating the application (sequence program).

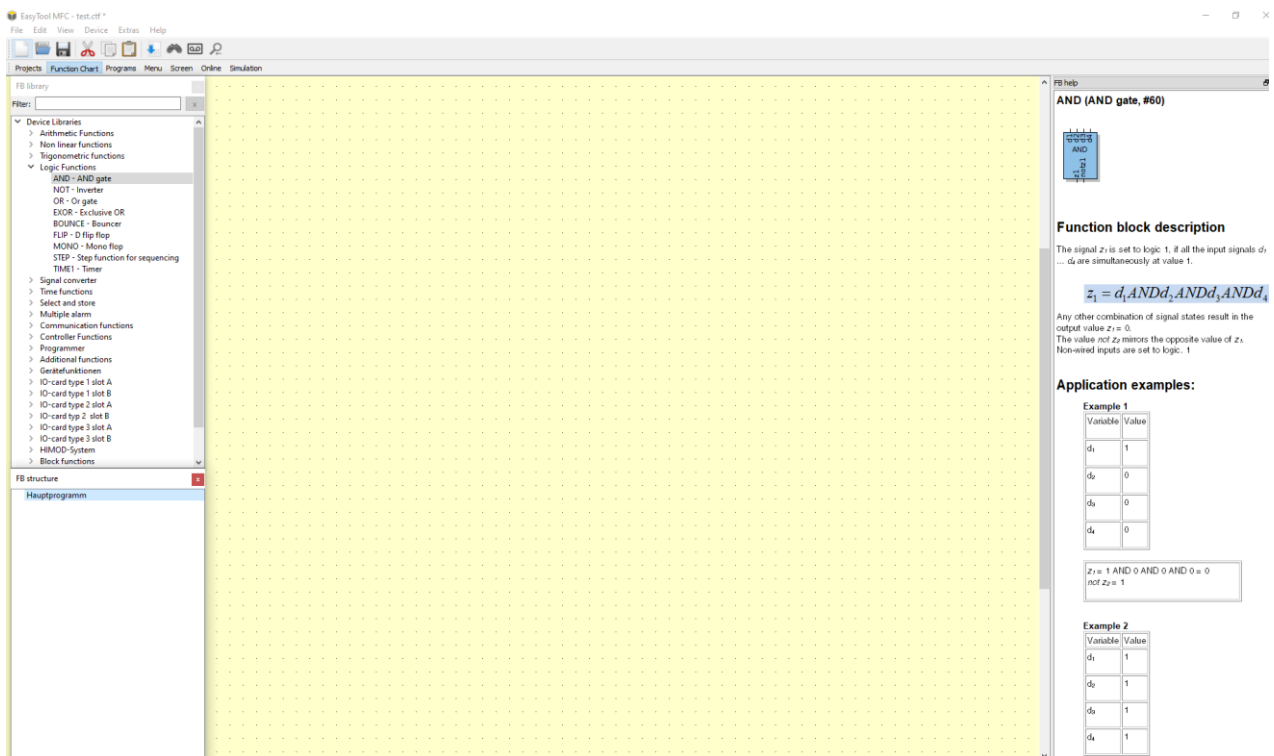


Figure 30 View of function chart (factory setting)

In addition, the function chart also offers the elementary functions for testing the application in simulation as well as extensive debugging functions.

4.2.1 The Editor Window

The editor window (yellow background) is used to create / draw the entire process sequence. The drawing field itself has an almost unlimited size and can be zoomed in and out using the zoom function (+/- keys or scroll function of the mouse). This makes it possible to display the entire process flow in a single display. However, this procedure only makes sense for the smallest processes. For larger process flows, you should use the structure help "Structure block" (see 4.2.9).

4.2.2 Typical Editing Functions in the Editor

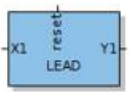
Within the editor window, standard operating system functions such as ("Copy & Paste"), cut, select (also multiple selection) and move can be used. For this you can use the key combinations of the operating system (e.g. Ctrl+C for copying with Windows) or the EasyTool MFC functions described in chapters 3.1.2 and 3.3.

4.2.3 Help in the Function Chart

The FB Help window describes the selected function from the library area.

FB help

LEAD (Differentiator, #50)



Function block description

This function block calculates the difference quotient according to the equation:

$$y_1(t) = C \cdot \left[y_1(t - 100ms) + a \cdot \{x_1(t) - x_1(t - 100ms)\} \right] + y_0$$

Where T = time constant, a = gain, y_0 = output shift

The differentiation constant is:

$$C = \frac{T}{T + 100ms}$$

A positive edge at the *Reset* input sets $y_1 = y_0$ and the difference quotient to 0.

Figure 31 Example: Help for the "LEAD" time function

4.2.4 The Simulation in the Function Chart

The simulation in the function chart is used to test the application without using the target system. Within the simulation, the target system can be operated as far as possible in the same way as the original target system. The simulation of physical inputs and outputs is also possible in the Function Chart view, but requires the display of an additional window (see chapter 3.4.1). It is a good idea to simulate a system with many inputs and outputs in the Simulation area.

4.2.5 The Function Block Libraries

The function block libraries provide all functions that can be used within the application. The libraries depend on the target system used. Therefore, not all of the libraries shown in this documentation are always available.

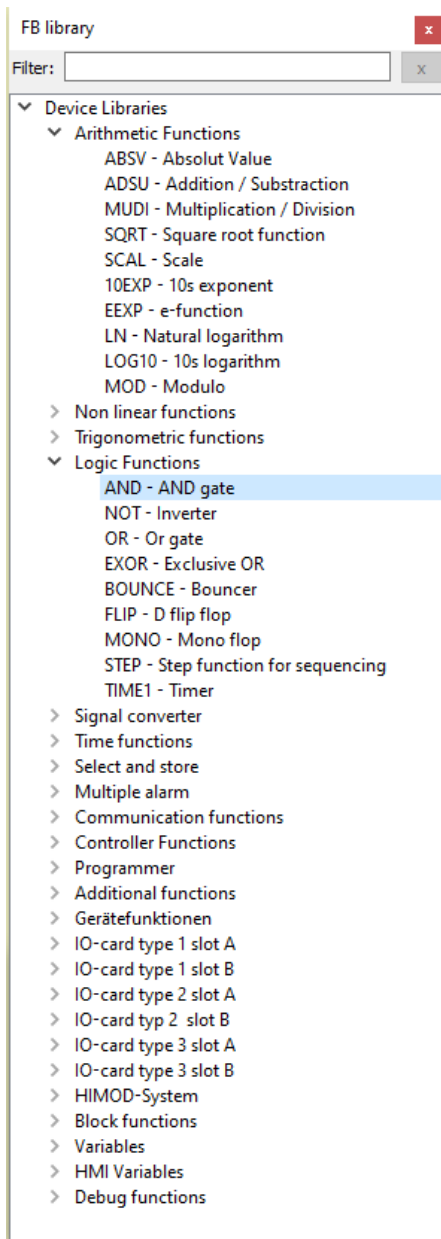
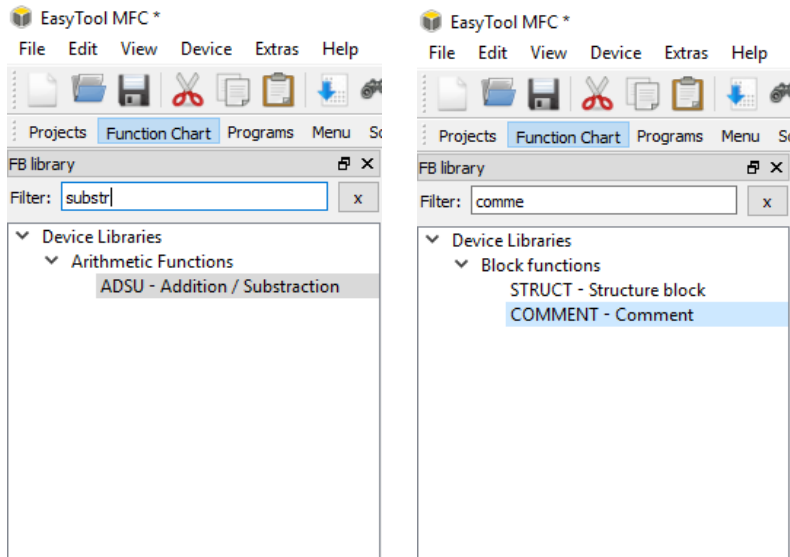


Figure 32 Function chart libraries

From software version 1.4 there is a filter input field in the FB library. This facilitates the search for corresponding function blocks. By entering a text, the display of the library entries is filtered accordingly. It searches for library names as well as block names and block types.



4.2.6 Selection and placement of functions

The selection of the individual functions from the libraries is carried out with the help of the pressed left mouse button. After selecting the function from the Library window, the function can be dragged to the yellow drawing area by holding down the left mouse button. The placement is done by releasing the left mouse button (Drag and Drop). The placement can be changed at any time afterwards. This can be done by selecting the function with the left mouse button and pressing the left mouse button. Multiple selection is possible with the standard operating system options (widen frame with mouse + Ctrl key). Only selected functions can be moved.

After the placement and also at any later time, an application-oriented name can be assigned to the function block. For this the function block must be selected with the right mouse button and the "Rename" menu selected with the left mouse button.

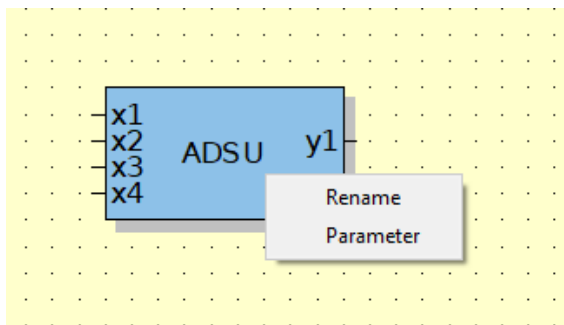


Figure 33 Assign block names I

A new name can be assigned to the block in the now opened dialog. Press the OK key to accept the name.

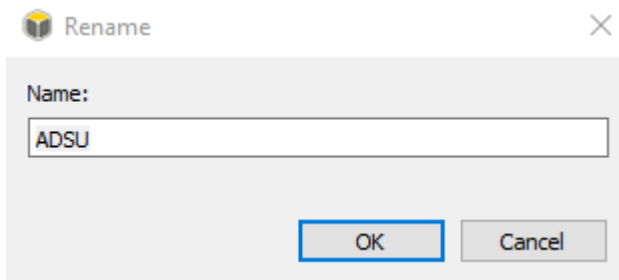





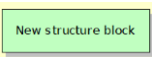
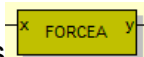
Figure 34 Assign block names



Note!

The assignment of a new name changes the block size and thus affects the display and possibly the visibility of other elements. Individual names should therefore be assigned immediately after the placement.

The functions differ in the coloring in relation to their use within the application.

- Standard Function Blocks 
- Process variables (sources and sinks) 

- HMI variables (variables for operation)
- Structural blocks 
- Forcing blocks 

The individual functions and parameters of the different blocks are described later in the manual.

4.2.7 The parameters of functions

The function of blocks can depend on parameters, depending on the version. The parameters themselves are contained in the description of the blocks. To change a parameter of a block, the parameter dialog must be opened. This is done either by double-clicking the function block with the left mouse button or by selecting the function block with the right mouse button and selecting the parameter dialog with the right mouse button.

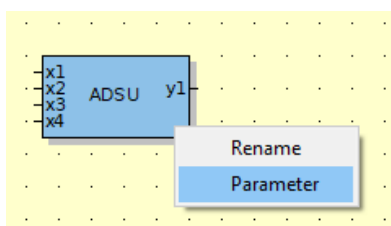


Figure 35 Selection Block Parameter dialog

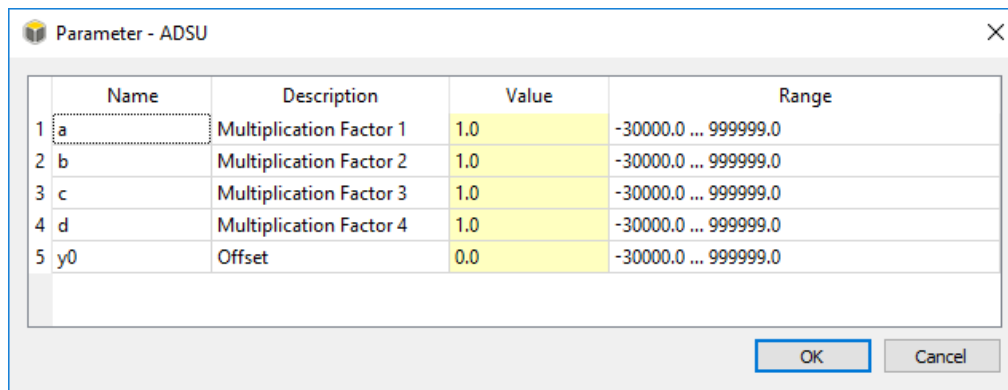


Figure 36 Parameter dialog

The parameters of the function block can be selected by double-clicking on the value of the parameter (yellow field) and be adjusted by keyboard input or selection. The parameters of the block are only accepted after confirmation with the OK key.



Note!

The parameters are not transferred to the target system at this time, even if it is connected to EasyTool MFC.

4.2.8 Connecting functions

In order to establish the function of the application, it is essential that the individual functions are connected with each other. The function blocks are connected to each other with the mouse. The first step is to select the block that forms the signal source with the left mouse button and move the mouse pointer to the signal source (one of the block outputs). The output must be marked "green" for wiring (see Figure 37)

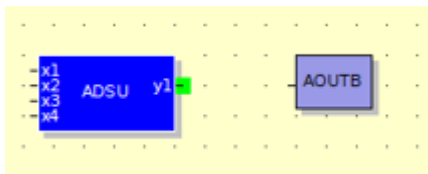


Figure 37 Wiring of blocks I

With the left mouse button pressed down, a wiring line can now be drawn from the output in the direction of the signal sink (input at the target block) (see Figure 38).

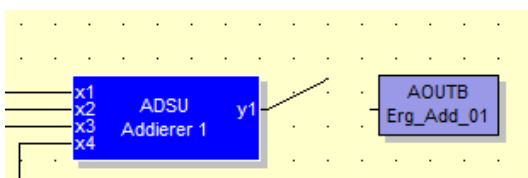


Figure 38 Wiring of blocks I

When the input of the target block is reached, this is marked "green". If the left mouse button is now released, the connection has been made (see Figure 39). If the connecting line disappears after releasing the left mouse button, the input of the target block was not selected.

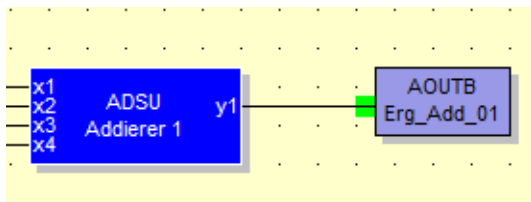


Figure 39 Wiring of blocks III



Note!

A connection is only possible between inputs and outputs of the same type. Block functions are available for converting signal types (analog / digital). These are contained, for example, in the "Signal converter" library.

4.2.9 The structure of the application

The structure of the application is an essential component for readability and later extension as well as problem search. Although the function chart offers the option of creating the entire application (process flow) on an editor sheet, this inevitably leads to confusion in larger processes.

The structure blocks allow the application to be divided into areas such as zones, inputs/outputs, rooms, trades or other logical parts for the process.

All blocks necessary for the use of structures can be found in the library "Block functions".

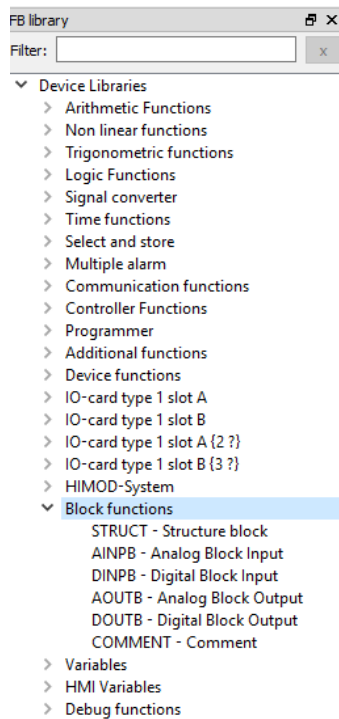


Figure 40 Library "Block functions"

The structure block provides the essential function. After placing the structure block, it can be renamed like any other block. The structure block can then be opened by double-clicking the block. You can now see an empty editor window, which can be used like the main editor window. The active structure is displayed in the Structure window. The currently displayed structure is highlighted in gray. You can use other structure blocks in a structure block. The individual structures are then all displayed in the Structure window and can also be selected in this window with the left mouse button (see Figure 41).

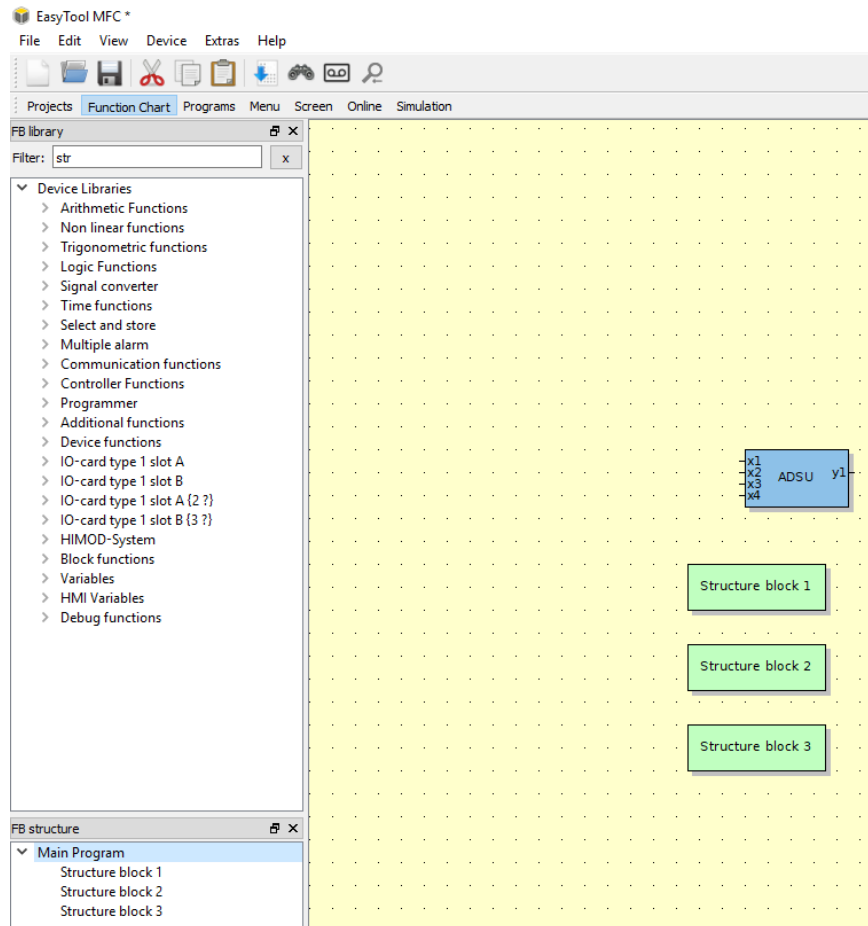


Figure 41 Structures in the Function Chart

It is also possible to paste a structure block in the editor window. When pressing the right mouse button in a free area of the editor window, a menu with the option of placing a structure block appears.

Structure blocks can be connected to other structures using inputs and outputs of a structure or with connection functions (see 4.2.10). The inputs and outputs of the structure are also part of the library Block functions. To provide a structure block with inputs and outputs, the analog and digital inputs/outputs from the Block functions library must be placed in the editor. Like any block, these can be given a name and automatically appear as connecting elements on the structure block.

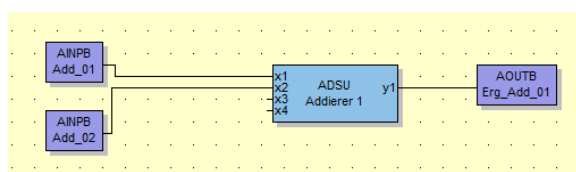


Figure 42 Inputs and outputs for a structure block

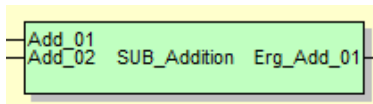


Figure 43 The inputs and outputs of the structure block

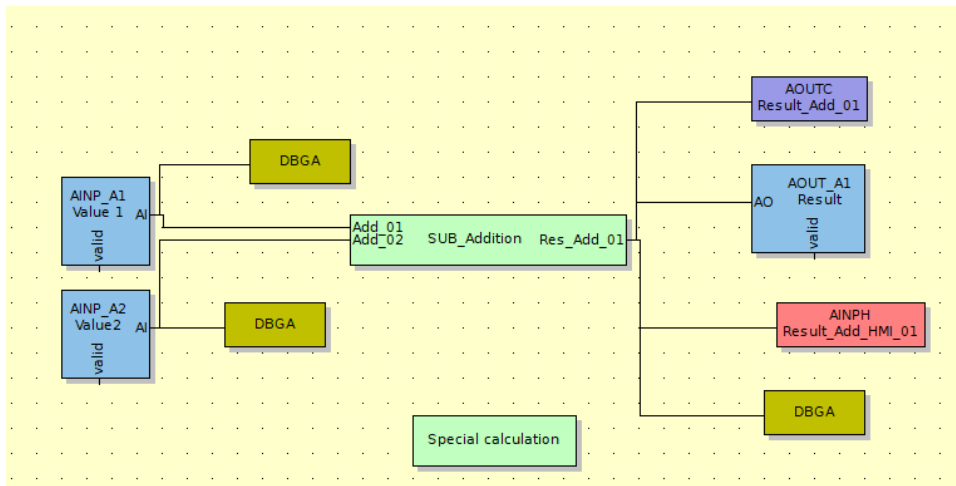


Figure 44 Structure blocks in the application



Note!

You can exit a structure either via the Structure window (right-click to select another structure), or by pressing the right mouse button in a free space within a structure. In this case EasyTool MFC changes to the next higher structure.

4.2.10 The connection functions

Within an application, it may happen that the connection of blocks is not possible due to long lines or that the legibility of the application is impaired. In this case there are connection blocks (data sources and data sinks). The required blocks can be found in the Variables library and differ according to data type, source and sink. The blocks can be placed, wired and renamed like standard function blocks. Fig. 45 shows how the connection between source and sink is established without a direct connection line. The example is of course nonsensical, but is intended to illustrate the principle of how a variable can be "transported" without a connecting line.

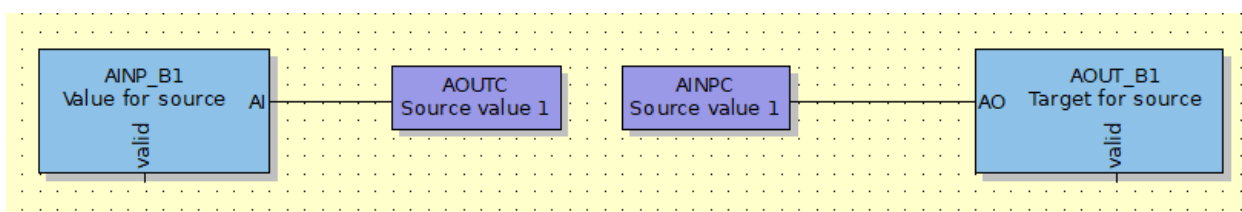


Figure 45 Source and sink (used as an example)

Source and sink can be used both within an editor window and between any structure blocks.

4.2.11 Communication with operation and visualization

The function chart area can exchange data with the screen area (operating & visualizing) via various functions. To access data from the screen area to the function chart area, the data connections from the "HMI variables" library must be used. The HMI blocks can be used like all other blocks. After placing an HMI block, the data is available in the screen area (see 4.5) or data from the HMI can be used in the function chart.

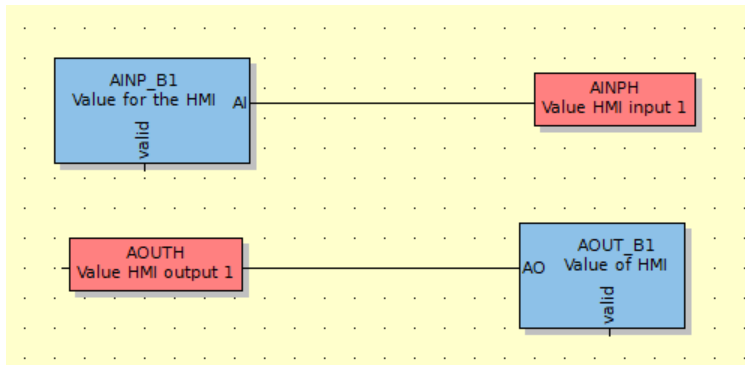


Figure 46 Use of HMI variables





Note!

When using the HMI variables, pay attention to the direction of action. An input to the HMI "transports" a value from the application to the HMI. An output gives the possibility to change a value in the HMI and to "transport" it to the application.

4.2.12 Debug functions

The debug functions are an essential component for testing an application and its operation. In addition, they are an aid to facilitate commissioning for larger applications.

The functions are contained in the library "Debug functions" and can be used like all other blocks. The functions can be used to display values within the application but also to actively change values within the application. To be able to use the debug functions, the project must first be transferred to the simulation (main menu Device ► Data to device or the symbol key ). The debug mode can then be started (main menu Device ► Debug or the symbol key ). If the debug mode is active, the background color of the editor is switched to light green.



Note!

As long as the mode is active, no drawing actions are allowed. To return to the drawing mode, the debug mode must be terminated by selecting the Debug function again. The editor changes the background color back to yellow.

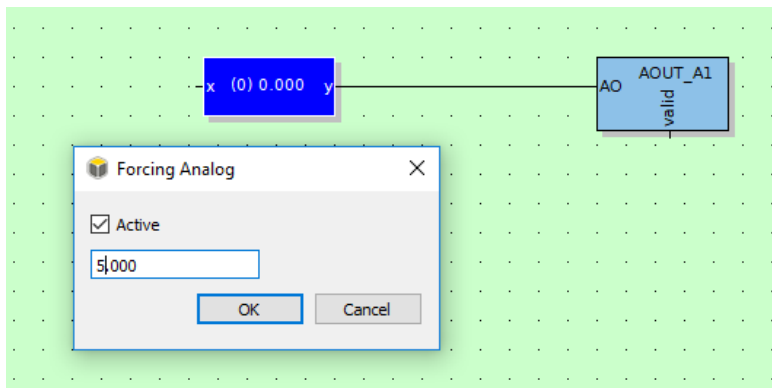


Figure 47 Exemplary use of debug functions

The debug display functions become active immediately after switching on the debug mode. The forcing functions must be activated while the debug mode is switched on. All you need to do is double-click the forcing block. A prompt appears in which forcing is activated (tick "Active") and the forcing value can be entered.



Note!

The forcing functions remain active if the debug mode is exited and they have not been deactivated before (check mark "Active" is not set). The forcing functions remain active or inactive until the next time an application is sent to the target system, depending on the last setting.

4.2.13 Additional functions / Device functions

The libraries "Additional functions" and "Device functions" contain functions around the target system.

- The LED block is used to control the LEDs of the target system
- The "Key" block is used to evaluate the control buttons of the target system
- The block "Clock" contains all values around date and time
- The "Trend" function is used for recording and displaying hydrographs on the target system. The diagram pages in the target system can be accessed via the HMI or via the text-based operating menu in the target system.
- The function "CONST" offers the possibility to use constants within the application. The constants can be changed via the parameters of the block.
- The "RELAIS" (RELAY) function is used to activate the relays of the target system.

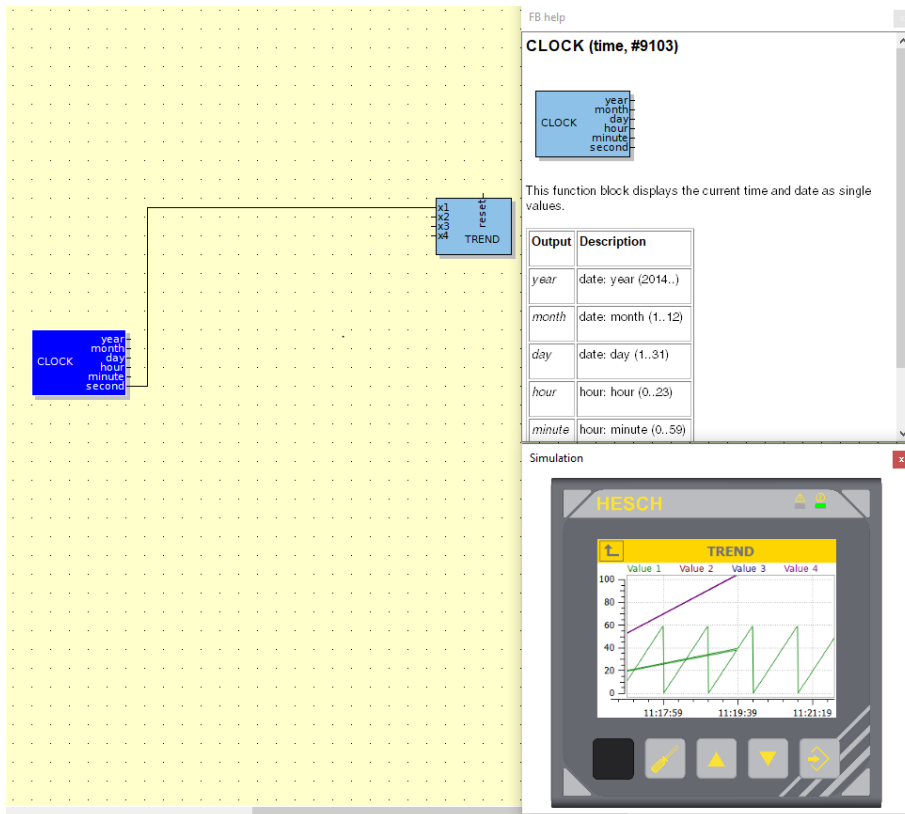


Figure 48 Additional functions

Fig. 56 shows two of the special functions and the representation of the hydrograph in the simulation.

4.2.14 The Sequence of Processing

In many cases, the sequence in which function blocks are processed plays a decisive role. In order to ensure that a certain sequence is adhered to, the sequence can be defined. To set it, you need to activate the "Sequence" function (menu: Edit ► Sequence).

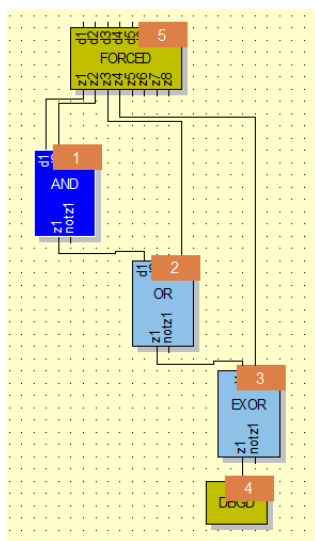


Figure 49 The block sequence

If the sequence does not correspond to the requirements, it can be changed by clicking on the sequence number (number highlighted in orange). The first sequence number (block) selected after activation is assigned the number one. The editing of the sequence can be terminated by selecting the "Sequence" function again (menu: Edit ► Sequence). The sequence is defined separately for the main editor and all structures. Of course, the structure blocks also receive a number for the sequences.

**Note!**

If the sequence is not specified, the blocks are numbered according to their order of placement.

4.3 "Programs" View

The view Programs is intended for the configuration of the program editor. The programmer can execute 20 programs each with 60 segments (program steps).

4.4 "Menu" View

The Menu view allows the user to configure the text-based parameterization in the target system in a user-oriented way. Thus, the operator will later only have the parameters available which are useful for the use and not all parameters of all blocks.

4.5 "Screen" View

The Screen view supports the entire editing for visualization and operation of the target system.

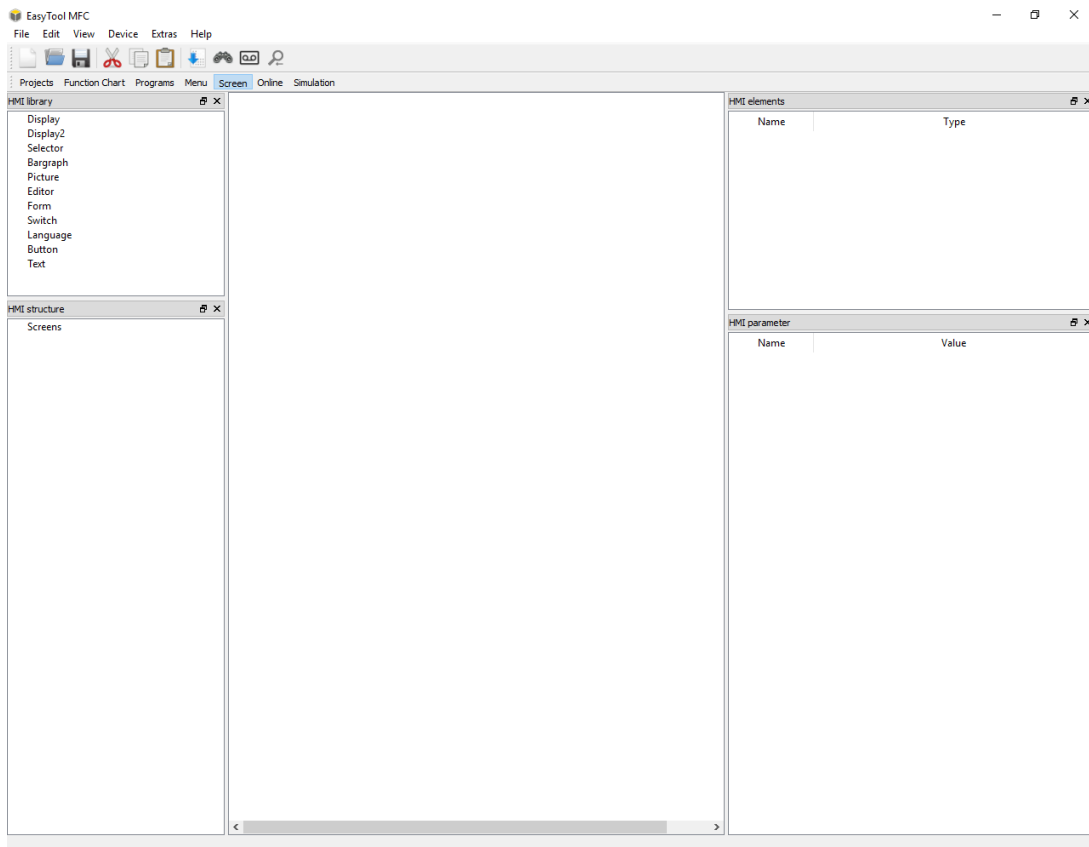


Figure 50 Screen editor (factory setting)

The factory setting can be extended by functions like any other area (see 3.4.1). In the case of the screen editor, it may be useful to add the simulation function to get a first quick impression of the visualization and operation without using the Simulation area.

4.5.1 The operating pages

It is possible to create user-defined operating pages for the target system. The pages must be designed so that the operator is able to control and operate the entire application. The operating pages that are loaded into the target system can be seen in the "Structure" overview. This structure is empty for a new project. The first operating page can be created in the "Structure" area using the right mouse button. A menu with "Add screen" appears.

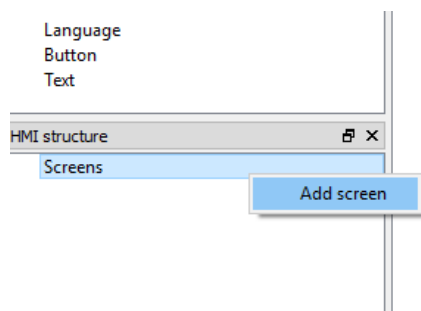


Figure 51 Add screen

By selecting the dialog a new screen with the name "Screen 1" is created. By selecting this new screen in the Structure area with the right mouse button, it is possible to give the screen a unique name or to delete the screen. The same functions are available to add or remove additional screens from the application.

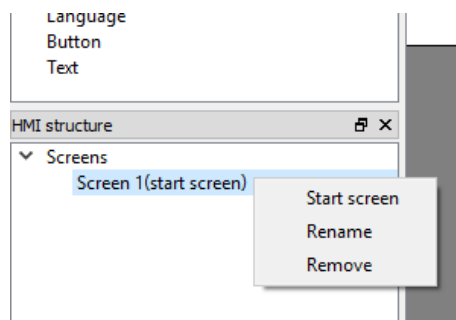


Figure 52 Edit screen




Note!

The order of the screens does not matter, since the call is made via the visualization elements and is therefore completely user-oriented.

Each screen has, in addition to its name, two parameters: the background color (selection via the three dots after clicking with the right mouse button) and the option to select an image as background. For the selection and the import of the image see the element „Image“ in chapter 4.5.2.

To change the operating pages during later editing, simply select the desired page with the right mouse button in the Structure area. For example, elements can be easily copied from one operating page to another.

4.5.2 The visualization elements

The structure of the visualization and operation is supported by elements in the library (window library). All elements have parameters which influence the function and display of the elements. The parameters in this chapter are identified by quotation marks. The parameters of an operating element are displayed in the Parameter window and can either be entered directly or must be selected via an additional menu. This menu can be opened by right-clicking the button with the three dots  after selecting the parameter. After a selection has been made in the now opened dialog, the value is accepted by closing the dialog with "OK".

All elements have in common that the position, size and color can be adjusted via the parameters. The color must take into account the specificity of the alpha channel.

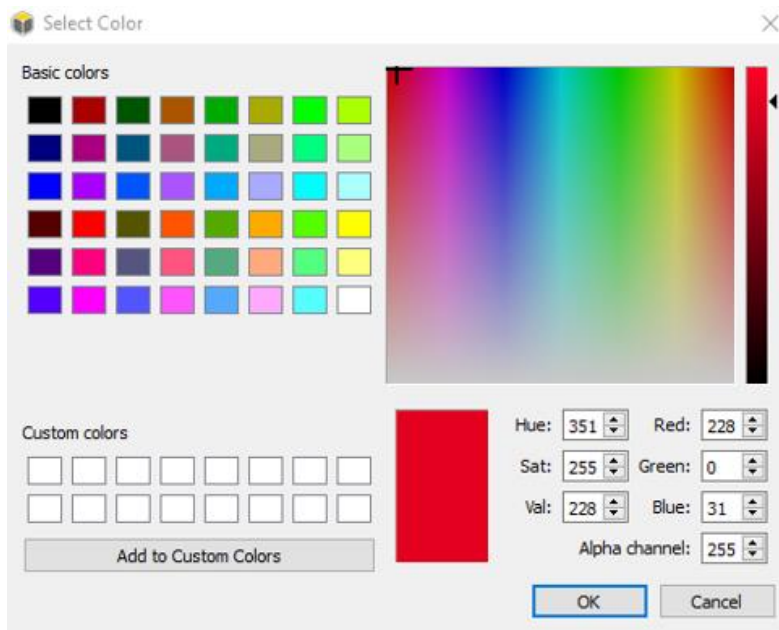


Figure 53 Dialog Menu "Color Selection"

This appears in the "Color selection" dialog menu and sets the transparency of the color (255 = no transparency / 0 = no more color).

The following elements are available:

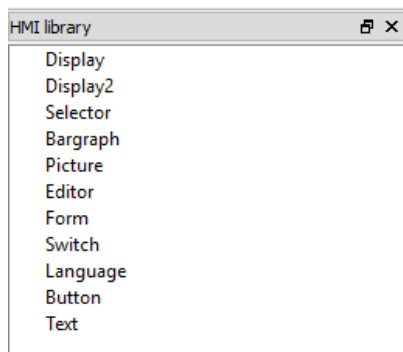


Figure 54 HMI Library Screen

**Note!**

Values/variables can only be processed in the screen area for values that have been created as HMI variables in the function chart.

**Note!**

In the installation directory, the software provides images for creating the operating pages (see also chapter 4.5.7).

Display

- The element "Display" is used to display values; the display (text, colors) can be switched depending on a digital value "State". The value to be displayed is selected with the parameter "Text variable" (key with three dots). The type of display can be adjusted for both states with the "Text" parameter. The value itself is displayed in the text by the entry "%.1f". The display of the value can be adjusted with respect to the decimal places by changing the number in the entry "% 1f". The "1" stands for one decimal place. For example, if a "0" was entered, no decimal place would be displayed. A text behind and or before the entry "%.1f" is possible. The display element also supports this function:
 - Hiding the display depending on a variable "Invisible"

Selector

- With the selector module any analog value can be assigned to an AOUTH (analog HMI output in the function chart). This makes it possible, for example, to transfer preset offset values (5%; 10%; ...) to the function chart (the application).
- If, for example, there is an application with different transport routes through a furnace, this element can be used to give clear names to the different routes, such as "with cooling", "without cooling" instead of just a number.
- In the example Figure 55 the selection list has 2 entries with fixed analog values for an HMI output.

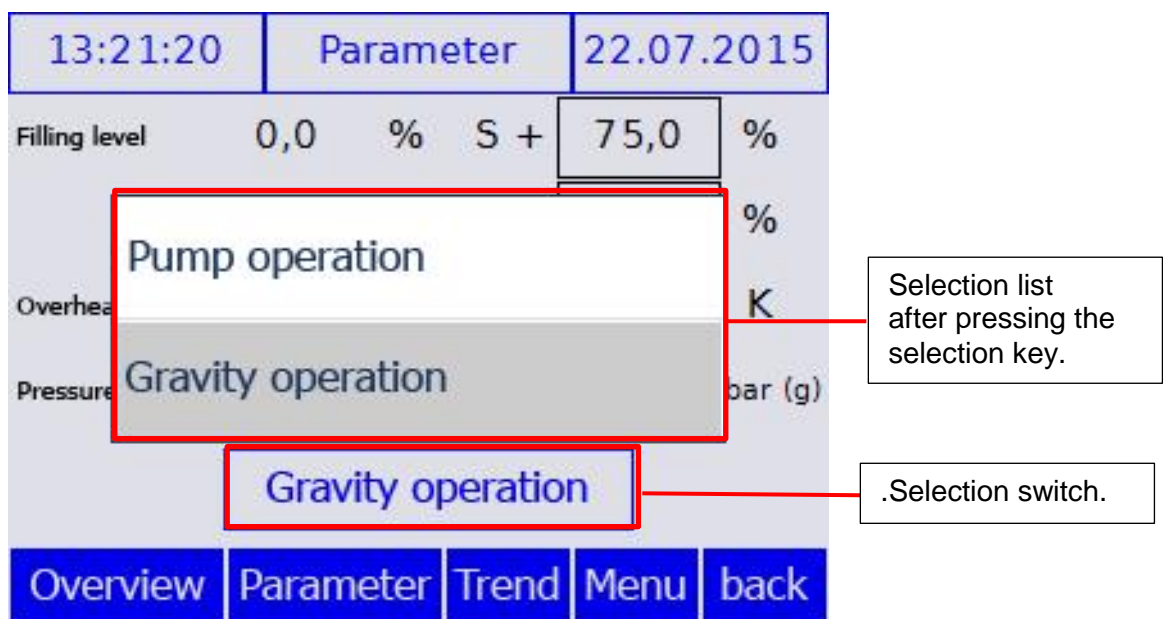
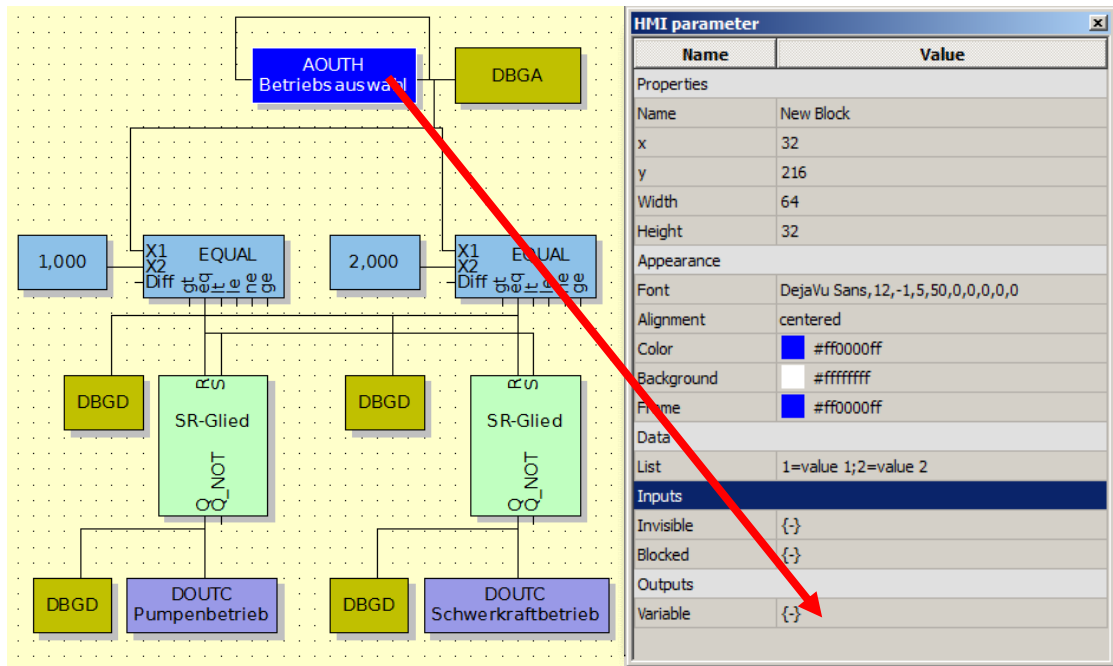



Figure 55 Example for the Selection element

Bar graph

- The element "Bargraph " is used to display a bar which changes its size depending on a "value". The horizontal or vertical alignment is determined by the "Alignment" parameter, the width and height by the standard parameters of the properties. The values for minimum and maximum as well as the "Start value" of the bar graph can either be fixed with the parameters "Minimum", "Maximum" and "Start value" in the "Appearance" area or can be variably controlled via a value using the same parameters in the "Inputs" area. The control via the inputs has priority over the parameters from the appearance area. As an additional function, the bar graph can be used as a sensor (see also the "Button" element; the value to be changed is addressed via the status parameter (output). The "Bargraph" element also supports this function:
 - Hiding the bargraph depending on a variable "Invisible"
 - The blocking of the value change depending on a variable "Blocked"

Picture

- The "Picture" element is used to display images that must be imported into the EasyTool MFC. jpg, png and bmp formats are supported. The import as well as the selection of already imported images is done via the parameters "Image 1" and "Image 2". After selecting the image selection (button with three dots ) , an import menu appears (see Figure 56). After selecting the import function, a standard file browser dialog is displayed. The graphic can now be searched for and imported here. The graphic is then displayed in the import window and can be selected. The image element also supports these functions:
 - Hiding the diagram depending on a variable "Invisible"
 - The function of a sensor depending on a variable "State" (output)
 - Switching between "Image 1" and "Image 2" depending on a variable "State" (input)
 - Blocking the "Sensor" function and the screen change depending on a "Blocked" variable

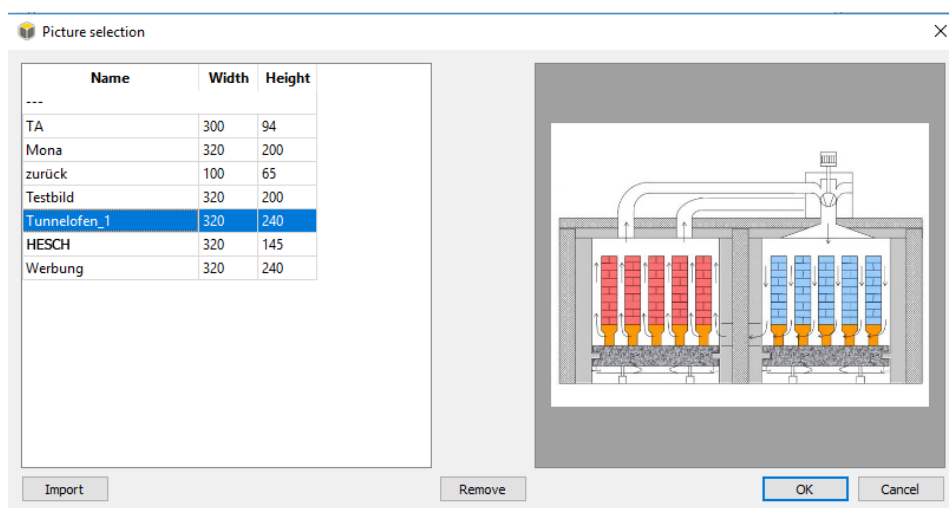


Figure 56 Diagram import window

Editor

- The element "Editor" offers the possibility to display and change analog values "Variable" (output). The value is entered on the target system via a numeric keypad. The editor element also supports these functions:
 - Hiding the value depending on a variable „Invisible“
 - The blocking of the value change depending on a variable „Blocked“

Form

- The element "Form" can be used without value assignment as a pure drawing element, for example to create frames. If the element is used with a value "State" (input and output), the status of a digital value status 1 and status 2 can be displayed by changing the color (status input) or the digital value can be changed status (output). The "Form" element also supports these functions:
 - Hiding the form depending on a variable "Invisible"
 - Blocking the "Change value" function and the screen change depending on a variable "Blocked"
 - The "Form" element can take on three different forms using the "Appearance" parameter
 - Rectangle
 - Rounded rectangle
 - Ellipse

Switch

- The element "Switch" is almost identical to the element "Button" with two exceptions:
 - The change between "State 1" and "State 2" remains after actuation until the switch is actuated again.
 - The switch does not support switching to another screen.

Sensor

- "Button" is used to change a digital value and/or to change the screen view. The button can be executed as plain text or as a graphic using the image parameter. The graphic is imported in the same way as the image element. The change between "State 1" and "State 2" takes place when the sensor is pressed. The "Button" element also supports these functions:
 - Hiding the sensor depending on a variable "Invisible"
 - The function of a sensor depending on a variable "State" (output)
 - Switching to another screen "Screen". The selection is made by selecting the menu (button with three dots) and selecting the target screen.
 - Blocking the "Button" function and the screen change depending on a variable „Blocked“.

Text

- The Text element is used purely to display a text. The element provides parameters for customizing the display of the text. The "Text" element also supports this function:
 - Hiding the text depending on a variable "Invisible".



Note!

In EasyTool MFC, all fonts installed on the PC can currently still be used. Of course, not all of them can be displayed on the target system. Similar fonts are searched and used in the target system after sending the project. This applies to all text entries in the "Screen" area.

The use of operating elements is analogous to the use of function blocks in the function chart. The element is selected with the right mouse button and dragged to the operating page with the right mouse button pressed. When the right mouse button is released, the element is placed. The later changing of the position is possible with the parameters of the element or with the mouse.

4.5.3 Overview of the operating elements used

The "Elements" window shows an overview of all elements used in the currently selected operating page. This list makes it easy to select an element to edit. For this it is necessary that the elements get a unique name after the placement.

4.5.4 The sequence of the operating elements on an operating page

It is possible to determine the sequence of superimposed operating elements in order to intentionally cover certain areas. The sequence of the elements is determined by the sequence in the list in the "Elements" window. To change the order, the element to be moved must be selected with the right mouse button in the window "Element". A selection menu appears in which the element can be moved either "to back" or "to front".

Name	Type
Brennzone 1	Screen (3)
Fehlerfrei	Text
Alarmtext 4	Text
Alarmtext 3	Text
Alarmtext 2	Text
Alarmtext 1	Text
Brennzone 1 He...	Text

to back
to front

Figure 57 Sequence of operating elements

With this function, it is possible, for example, to assign a priority to alarm texts, which are superimposed in the same area of an operating page.

4.5.5 Special parameters of the operating elements

There are some special parameters in the "Screen" section that allow direct access to certain parameters of the target system. The parameters must be used instead of the "Text" parameter (factory setting usually %.1f). The following special parameters are available:

- %{VERSION} = Version number, e.g. "1.0.146 Beta"
- %{DATETIME} = Date and time, e.g. "8/19/2014 11:01:28"
- %{DATE} = Date, e.g. "8/19/2014"
- %{TIME} = time, e.g. "11:01:28"
- %{STIME} = Time, e.g. "11:01"
- %{SECONDS} = Conversion of a number of seconds into the time format "00:00:00"
- %{INTERFACE1} = Information of the first interface
- %{INTERFACE2} = Information of the second interface
- %{INTERFACE3} = Information of the third interface


State 1	
Text	%{DATETIME}
Color	#ffffff
Background	 #fff08400
Frame	#00000000

Figure 58 Special parameters in the "Screen" area

4.5.6 Examples of operating pages

By using the different operating elements, it is possible to create operating pages ranging from trivial simplicity to a professional presentation. The following illustrations show some possibilities for setting up operating pages.

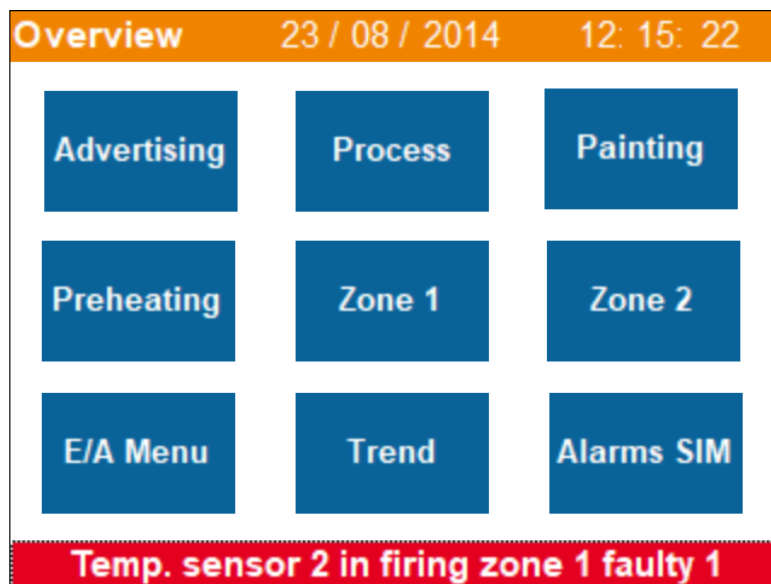


Figure 59 Example selection page

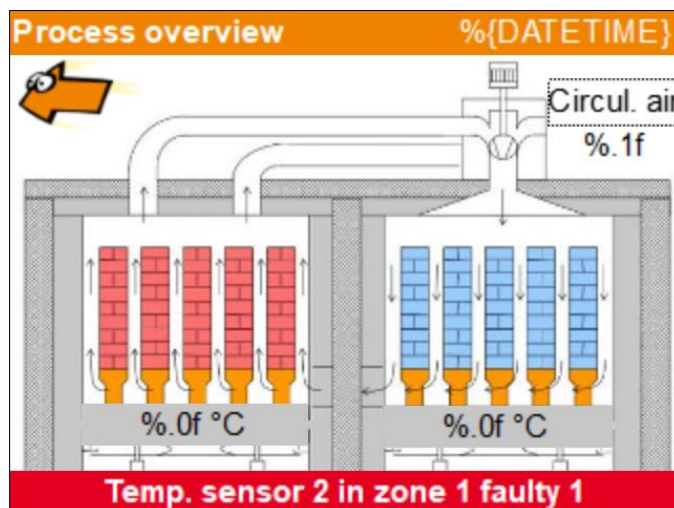


Figure 60 Example process picture

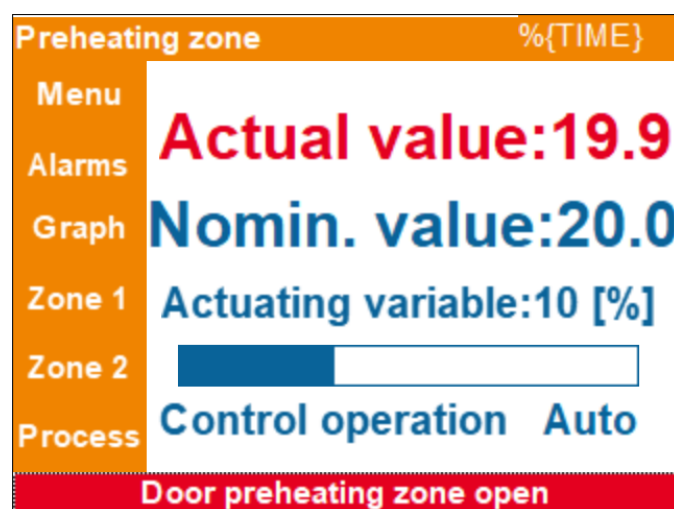


Figure 61 Example operating page with left operating menu

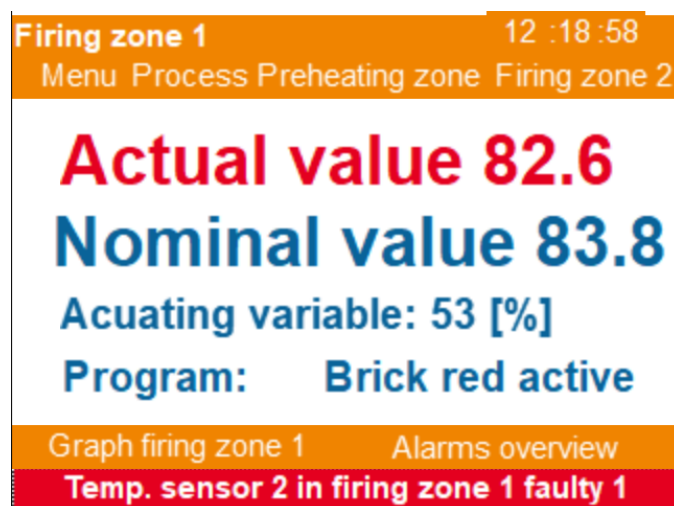


Figure 62 Example operating page with upper operating menu and alarm text



Note!

The degrees of freedom of the visualization should not be an approach for creating the operating pages more complex than necessary. The focus should be on user-friendliness.

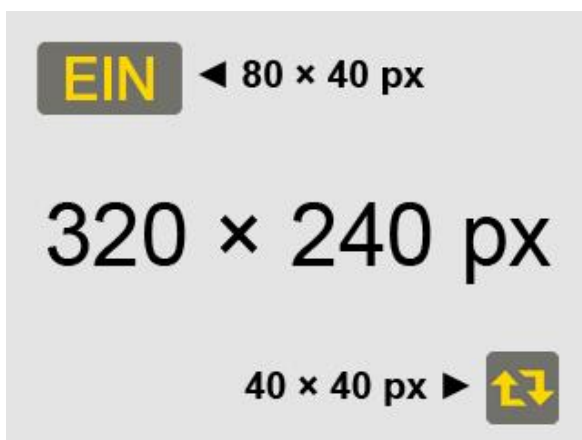
4.5.7 Images for project creation

To facilitate the project creation, the software offers some graphics in the installation directory, in the sub-path "Images", which can be used freely for the creation of the operating pages.

Example: C:\Program Files (x86)\EasyTool MFC-1.2 SR1\Images\Palette1



Figure 63 Supplied images in the installation directory



When using other image/graphic material, the following recommendation should be observed. For ease of use, it is recommended to use the touch buttons not smaller than 40x40 px at a resolution of 72 DPI.

The adjacent figure shows the size ratio of two touch buttons on the device screen.

4.6 View Online

The online area makes it possible for the user to display selected values in tabular and graphical form during debug mode and is therefore a very helpful tool for testing the application in simulation mode or later when commissioning the target system.

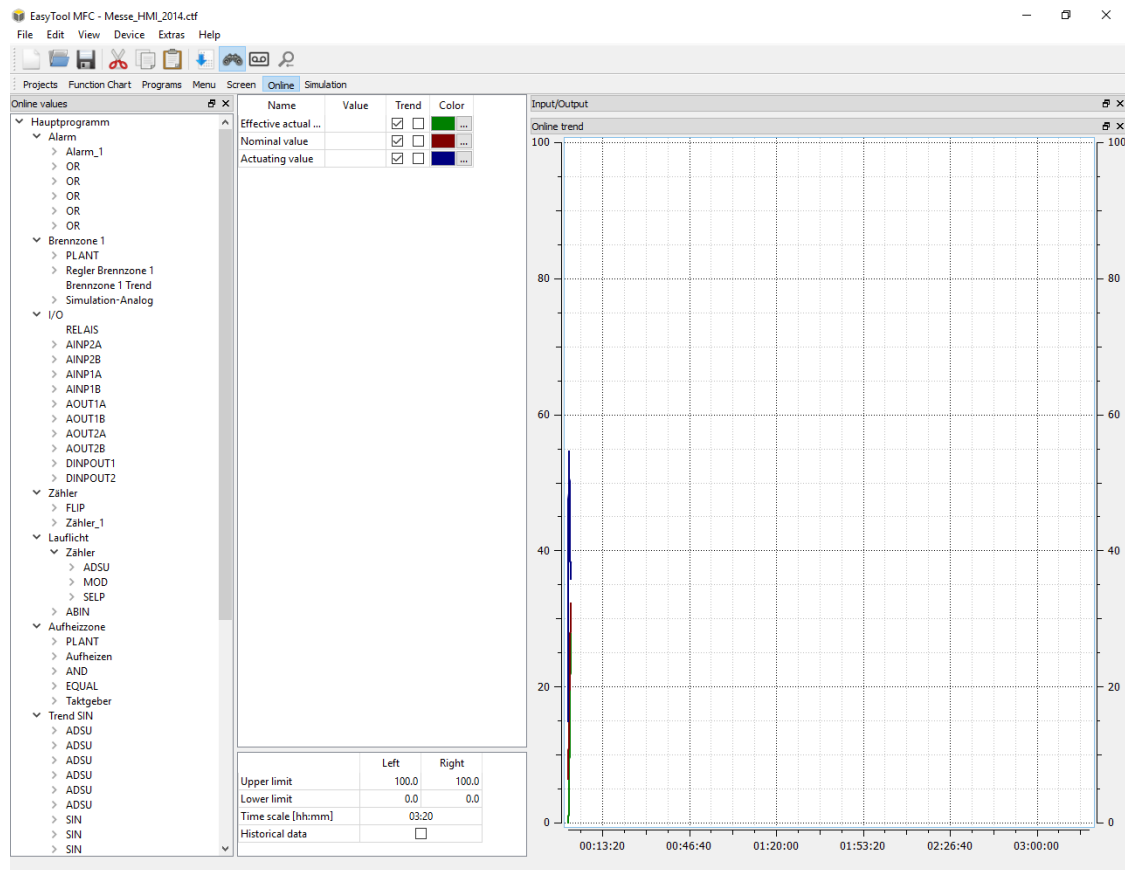




Figure 64 Online view

The values are selected by selecting the value in the "Values" area and moving the selected value to the middle area while holding down the left mouse button. As soon as the debug mode has been started (this can be in any project area), the recording starts in the online trend.

The recorded data can be stored locally as *.csv using the function . However, this does not apply to the past from the time of recording.

The scaling of the diagram is defined with the values "Upper limit" and "Lower limit". Exiting the debug mode also terminates data recording in the online area.

In the online view, the recorded trend can be zoomed in by expanding a frame. The prerequisite is the activation of the "Historical data". Zooming out is done step by step with the "Zoom back" tool .



Note!

The graphical display is deleted with the next start of the debug mode. If you switch between the project areas, for example to the function chart and back, the values are retained.

4.7 View Simulation

The "Simulation" area is used to simulate the application at the size of the target system. The simulation function is identical to the simulation in all other areas. This area is more suitable for systems with a larger number of inputs and outputs for simulation than the other process areas.

Thereby, the function is identical to the simulation in all other areas. In general, all fields highlighted in yellow are suitable for input and thus values can be specified. All other fields are used to output process values.

The input of analog values is done after selecting the field by double-clicking with the right mouse button. The digital values are activated by setting a check mark and can be deactivated again by clicking again with the right mouse button.

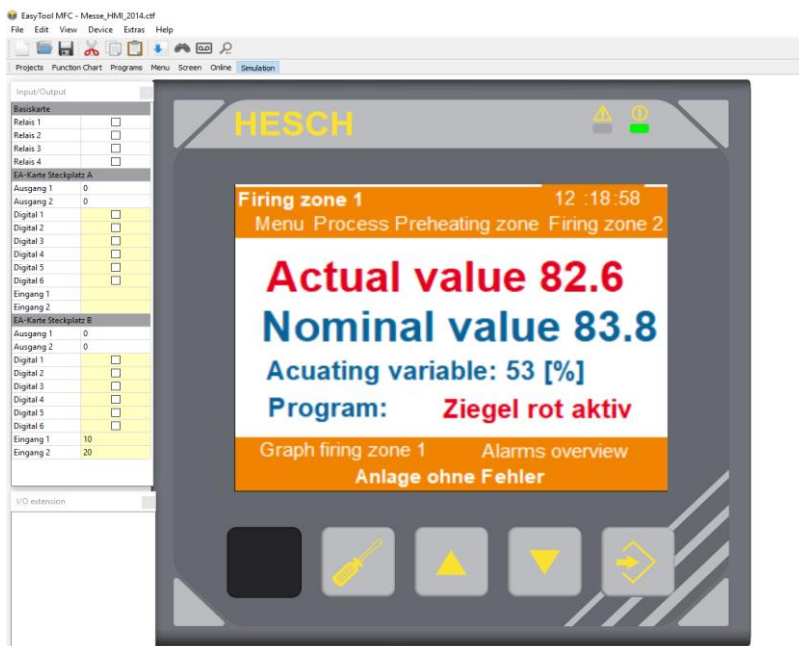


Figure 65 Simulation with a larger number of inputs/outputs

4.8 Data Logger View

Via the menu "View - Data-Logger" the log data stored on the device can be loaded into the EasyTool MFC and saved as *.csv on the computer.

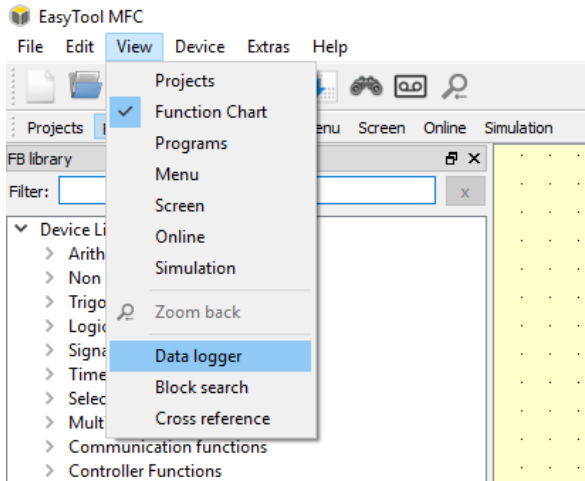


Figure 66 Selecting the Data Logger

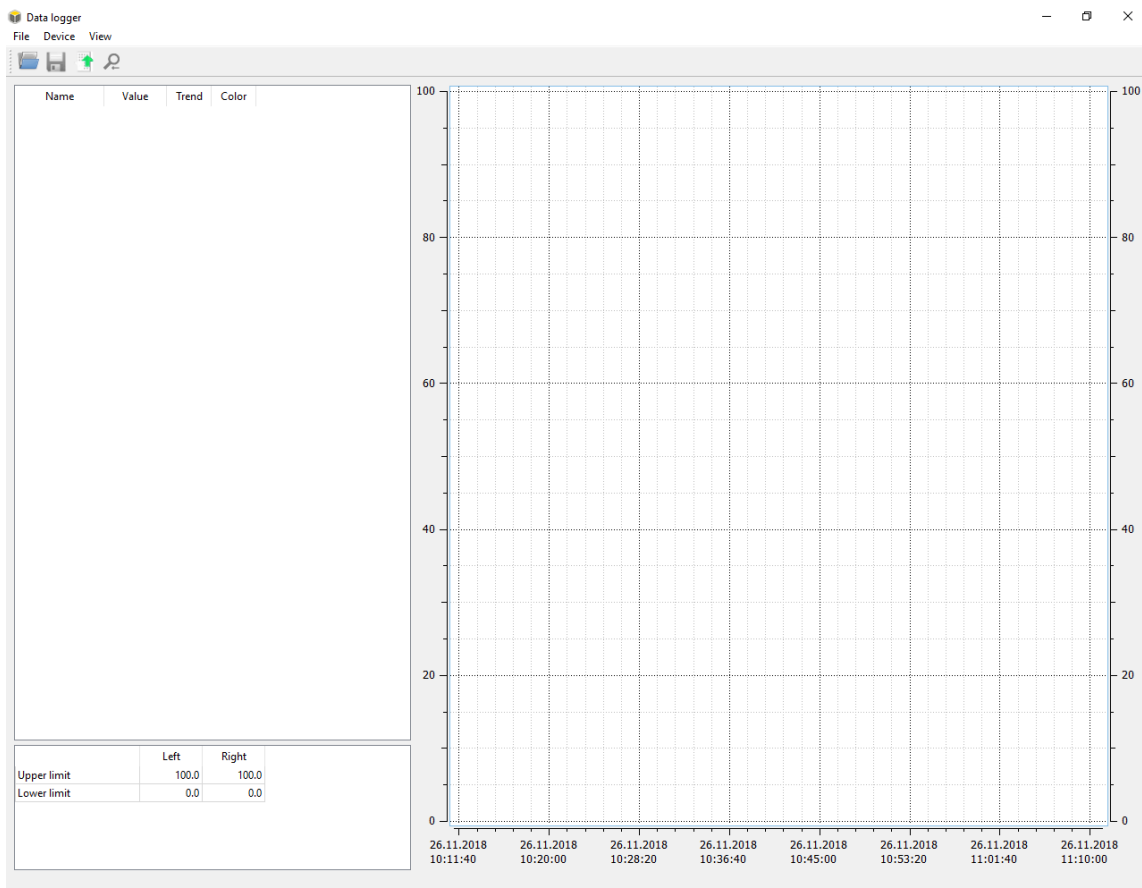



Figure 67 Data Logger View

The communication window opens via the "Device - Data from device" menu . The type of connection must be selected there. "OK" confirms the selection and reads the directory on the MFC. A file selection is then displayed.

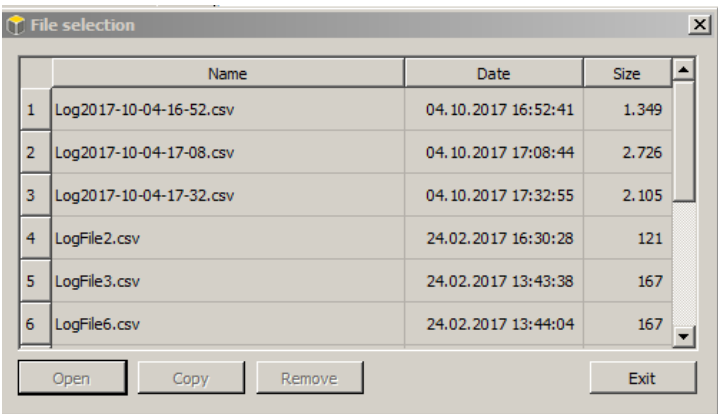


Figure 68 Data logger file selection

- "Open": Loads the log data to the Easy Tool MFC
- "Copy": copies the selected *.csv file(s) to the clipboard and then opens a dialog for saving.
- "Delete": deletes all selected log data on the device.
- "Exit": closes the dialog

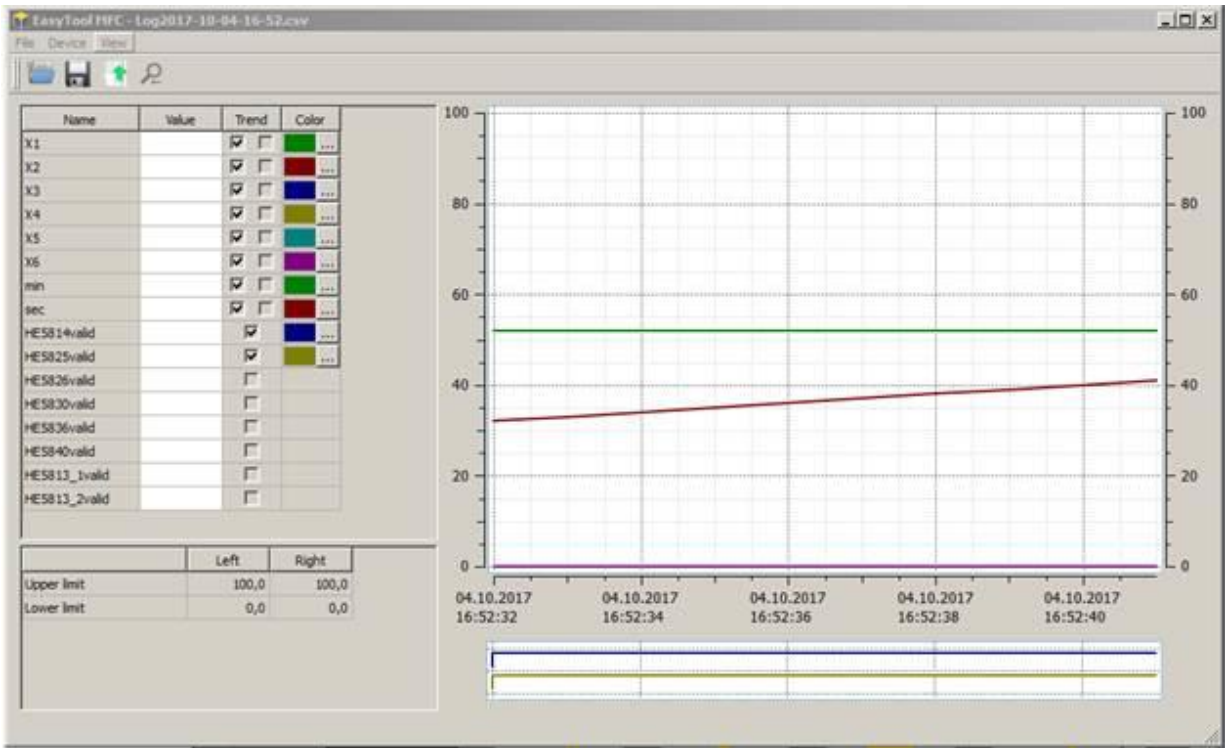


Figure 69 Display of the selected log data

4.9 Block search view

Via the menu "View - Block search" a window is opened which shows all blocks used in the project in a tree structure. Via the input field "Filter" blocks can be searched by their type or name. A mouse click on a block jumps to the position of the block in the function chart.

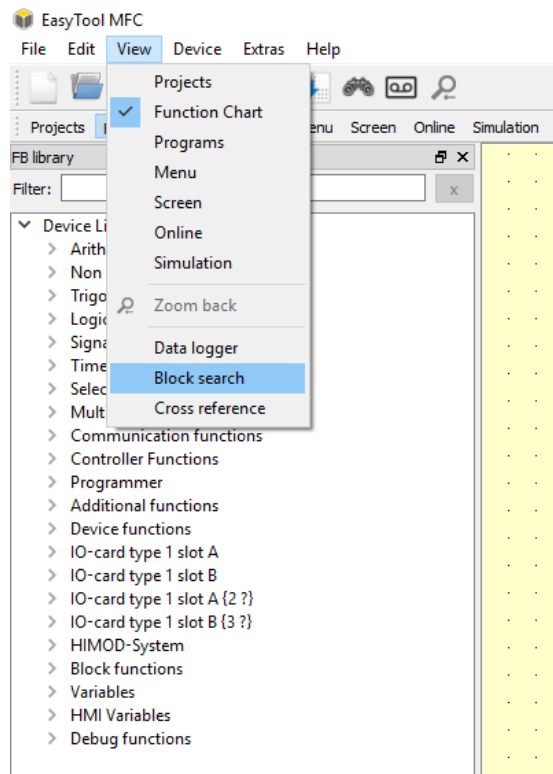


Figure 70 Selecting Block search

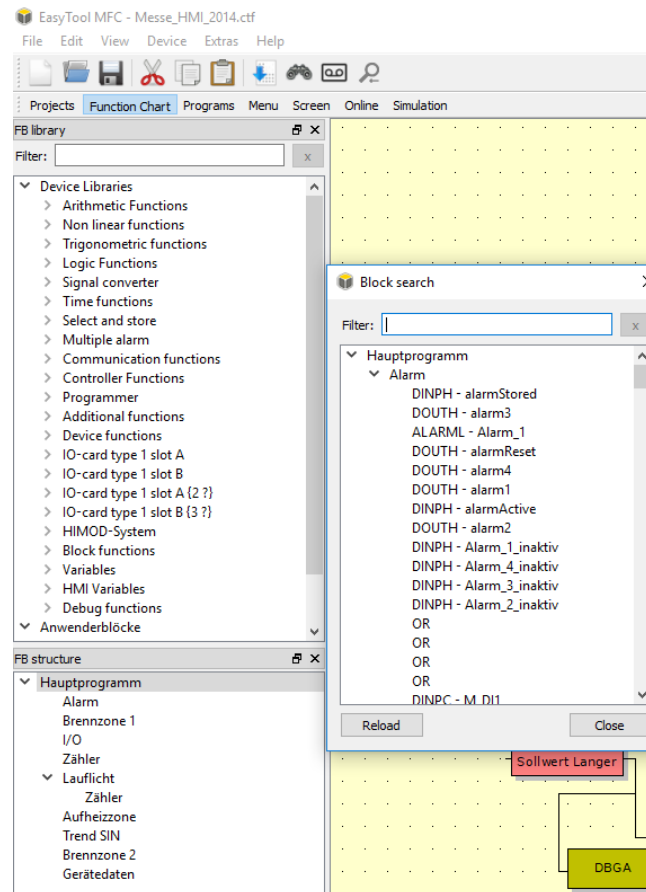
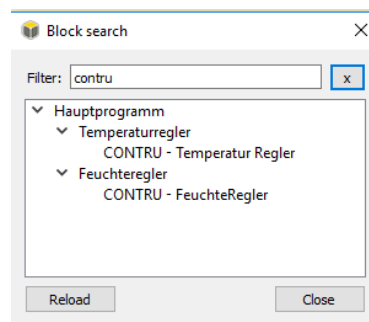


Figure 71 Block search view



By entering a search term, for example for all controllers "Contru", the selection is displayed filtered. You can also search for assigned names.

A click on the desired block leads to the target (see Figure 72).

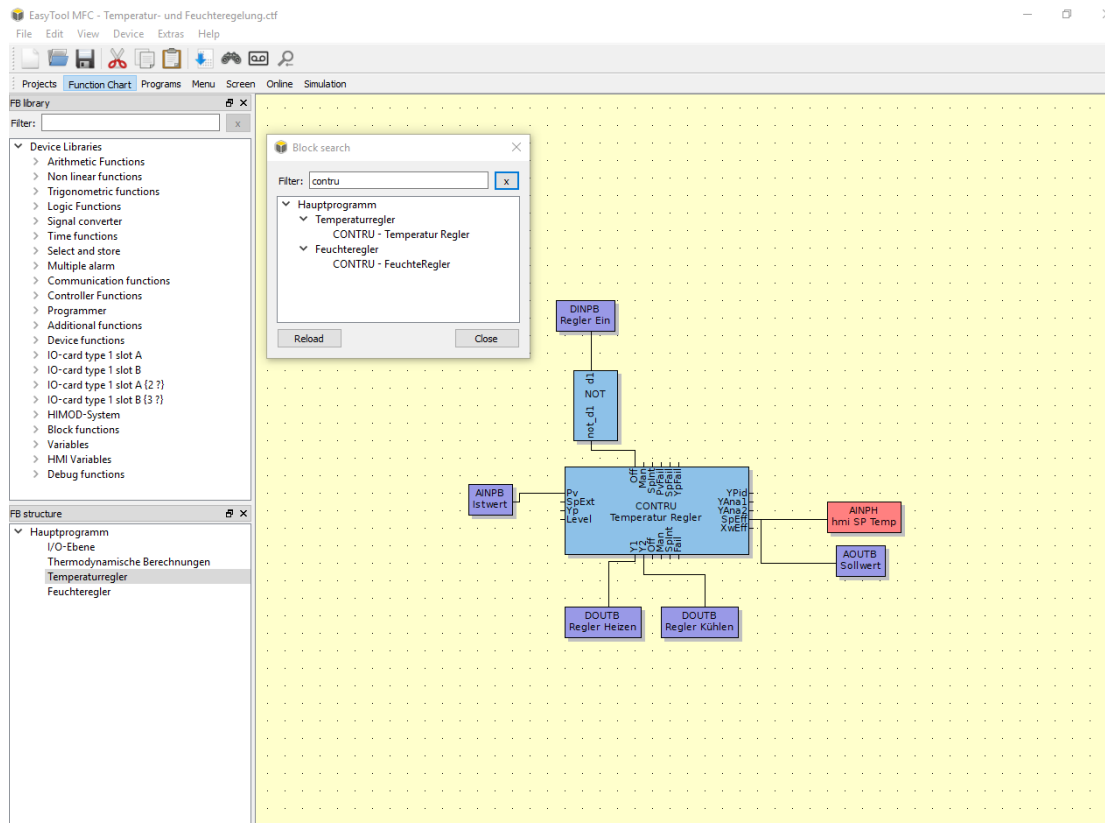


Figure 72 Result of the block search

4.10 Cross-references view

Via the menu "View – Cross reference" a window is opened which shows all sources with their assigned sinks, as well as HMI variables with their assigned controls. The variables can be searched for via the "Filter" input field.

A mouse click on an element jumps to the position of the element in the function chart or in the screen editor. Alternatively, the cross-references window can also be opened via a context menu of the variables in the function chart or screen editor. In this case, only the corresponding element is displayed. The jump to the element by mouse click is done as described.

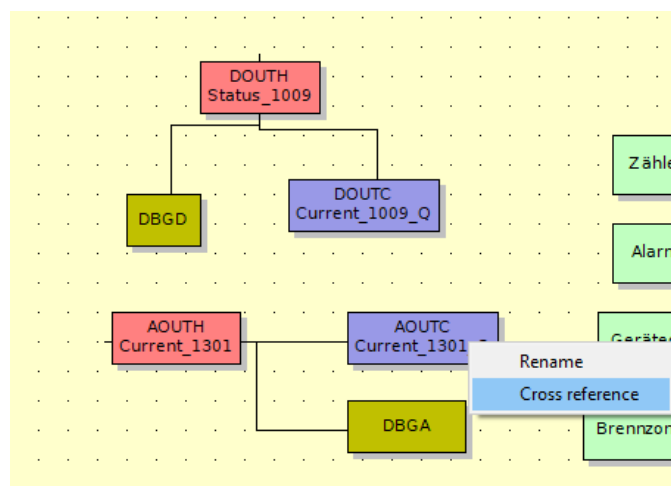


Figure 73 Right click on sources or sinks (HMI controls are also possible)

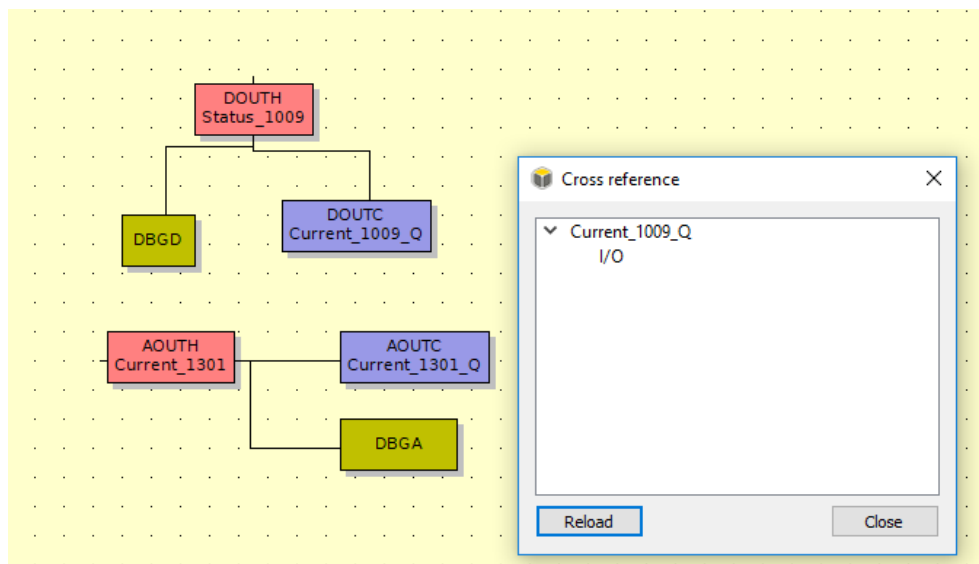


Figure 74 Example: Cross-references

In Fig. 82 the cross-references are listed. A simple click on a branch takes you directly to the target.

The screenshot shows a software interface with a grid of buttons: 'Advertising', 'Preheating', 'E/A Menu', 'Trend', and 'Alarms SIM'. A red banner at the bottom reads 'Temp. sensor 2 in firing zone 1 faulty 1'. A 'Cross reference' dialog box is open, showing a tree view with 'G_Stunde' expanded. To the right, an 'HMI parameter' table is visible.

Name	Value
Properties	
Name	Stunde
x	231
y	0
Width	25
Height	21
Appearance	
Font	Arial, 12, -1, 5, 50, 0, 0, 0, 0
Alignment	right align
State 1	
Text	12:
Color	#ffffff
Background	#ff08400
Frame	#0000000
State 2	
Text	%1f
Color	#ff00000
Background	#ffa0a0a4
Frame	#ff00000
Inputs	
Invisible	{-}
State	{-}
Text variable	{G_Stunde}

Figure 75 Second option "View – Cross reference"

Analogous to the first method, the variable can now be selected and with one click you jump to the target.

5 Functional descriptions

5.1 Password allocation/ admission control

As of software version 1.5 the password functionality is optimized.

5.1.1 „PASSH" function block

This block can be used to determine the currently effective access level (analog output "level"). The value range is from 0 to 3.

Via the analog input "level" either

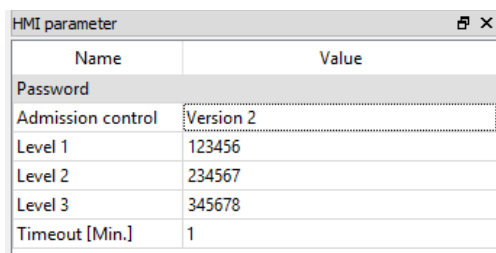
- the base level can be specified (parameter InpMode = "Base level". The base level is the level that is active after the startup or that is switched back to after a timeout has elapsed.
- The access level can be specified (parameter InpMode = "Active level".

5.1.2 Admission control mode selection

When you select the "Operating pages" item in the HMI structure of the HMI editor, the passwords for the three levels can be set under "HMI parameters".

These parameters are extended by a new item "Admission control" with the selection "Version 1" and "Version 2".

If "Version 2" is selected, a new parameter "Timeout" appears. The timeout is defined in minutes, adjustable are the values 1 to 10, as well as "no timeout" are adjustable.



Name	Value
Password	
Admission control	Version 2
Level 1	123456
Level 2	234567
Level 3	345678
Timeout [Min.]	1

In "Version 1" mode, all devices behave as before, i.e. admission control is only active for the "Button" screen element, and here only for switching screens.

In "Version 2" mode, the new admission control becomes active for new devices. Furthermore, the new parameter "Admission control V2" appears for all HMI elements except for "Display" and / "Text". The previous parameter "Admission control" is hidden from the sensor and is therefore ineffective.

The admission control settings in the HMI elements are identical for both versions.

5.1.3 New HMI element "Display2"

The element is derived from the current element "Display".

It has 4 instead of 2 states, these are selected via an analog input instead of a digital input.

In addition to texts and colors, an image can be defined for each state. If image and text are defined, then the text is in front of the image (text background transparent).

The element has the same outputs as the button element, i.e. "State" and "Screen". This makes it possible to use the element to adjust the access levels.

5.1.4 New selection "Password dialog" for "Button" and "Display 2"

In these elements the selection "Dialog#Password" is additionally displayed at the screen output. This displays a dialog for managing the access level in the device.

5.1.5 Reaction when an HMI element is actuated on the device

If an admission control (version 2) has been defined for an HMI element and the operator presses the element, the system first checks which access level is active.

If the current level is greater than or equal to the level defined for the element, the action is executed immediately.

If the current level is smaller than the level defined for the element, one of the following dialogs is shown.

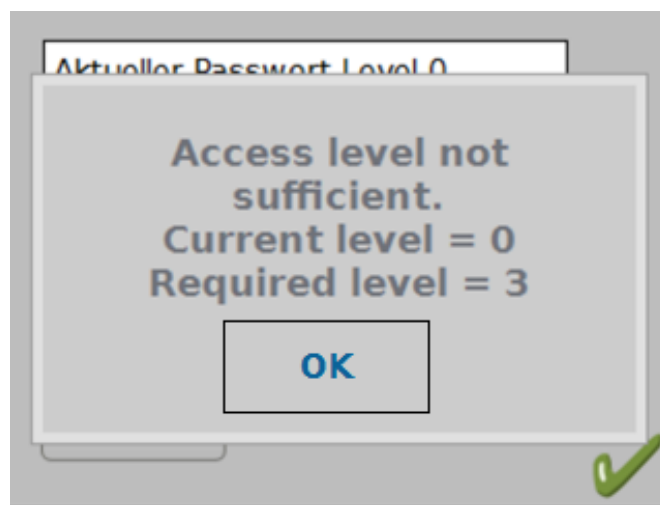


Figure 76 Screen display access level

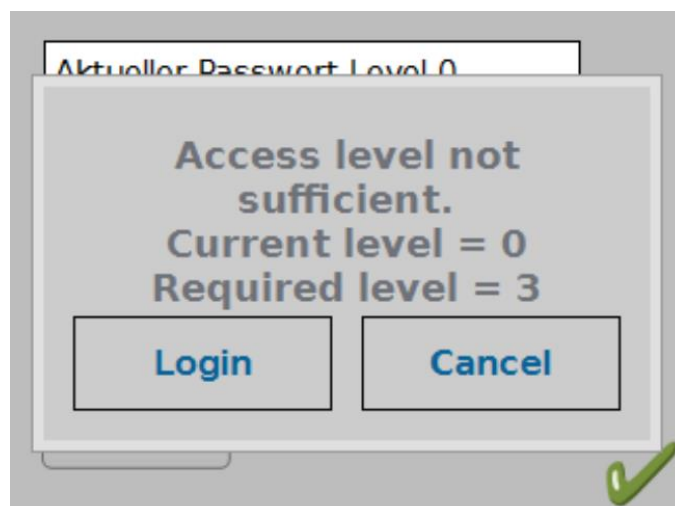


Figure 77 Screen display access level

Figure 77 shows if the function block "PASSH" is used and the parameter "InpMode = Active level" is set. The access level is thus permanently set to the value of the analog input of the PASSH, the level cannot be changed.

Figure 78 is displayed for all other configurations. By pressing the "Login" button and entering a password, the access level can be set as required. The password is entered via the known number pad. The access level can also be reduced by entering a password.

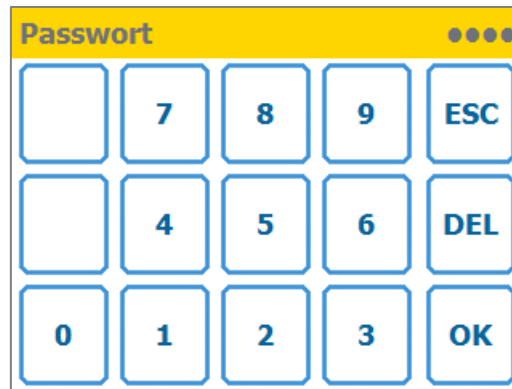


Figure 78 Number pad

After changing the access level, the corresponding HMI element must be activated again.

5.1.6 Password-Dialog

The dialog is used to centrally change the access level. You can use it to change to a higher or lower access level "Log in", or to change to access level 0 "Log off".

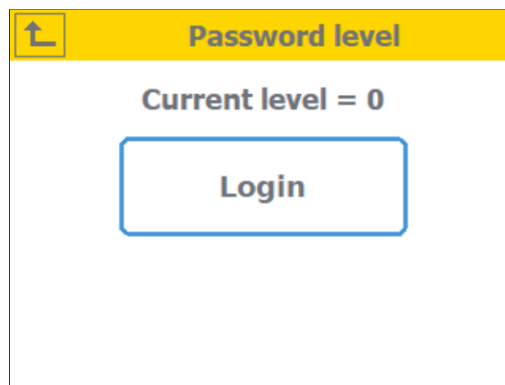


Figure 79 Password dialog for "not logged in" state

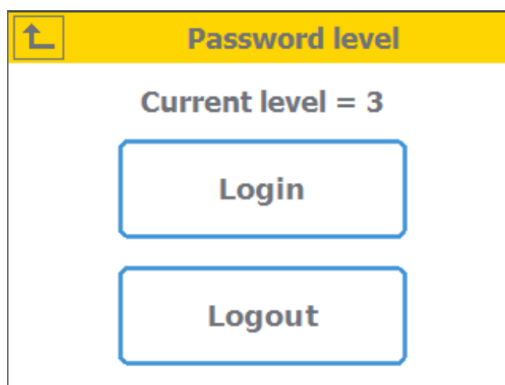


Figure 80 Password dialog for "logged in" state

The dialog in Figure 80 is displayed if you are currently in access level 0. Fig. 89 shows the dialog in all other access levels.

5.1.7 Timeout

In version 1 of the admission control, the password was requested at each screen transition, if this was defined for the corresponding button. In version 2, the password is requested if the current access level is not sufficient. Once the access level has been successfully changed, it remains effective and the password does not have to be re-entered. After a timeout has elapsed (see Tool, chapter 5.1.2, the access level either falls back to 0 or to the value defined in the function block PASSH in the mode "Base level" (see Tool, chapter 5.1.1).

The timeout time is restarted with each user action, i.e. each press of one of the four hardware buttons or each touch.

5.1.8 Compatibility

If an old tool is used to load a project into a device, old and new devices behave as before, i.e. admission control version 1 is active. If a new tool is used to load a project into an old device, this will also behave as before, i.e. the admission control version 1 is active, regardless of the selection of the admission control version in the tool. The new admission control is, if version 2 is selected, only effective in combination of new tool and new device.

6 Demo projects

In the installation directory of EasyTool MFC in the subpath "Examples" there are Prefabricated demo projects and a short description of the respective project.

Example: C:\Program Files (x86)\EasyTool MFC-1.2 SR1\Examples



Property Damage Warning!

Demo projects included in the delivery serve to illustrate procedures and possibilities and do not represent a ready-to-use application solution.

AXXERON HESCH electronics GmbH assumes no responsibility for damage caused by improper use of demo projects in applications.
