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bürkert

Type 8922

Software of f(x) configuration
Software der f(x)-Konfiguration
Logiciel de f(x) configuration

MAN 1000298844 EN Version: B Status: RL (released | freigegeben) printed: 18.05.2017

Operating Instructions - Software

Bedienungsanleitung - Software
Manuel d‘utilisation - Logiciel

MAN 1000298844 EN Version: B Status: RL (released | freigegeben) printed: 18.05.2017

We reserve the right to make technical changes without notice.
Technische Änderungen vorbehalten.
Sous réserve de modifications techniques.

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Operating Instructions 1705/00_EU-EN_00810515 / Original DE

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1 THE OPERATING INSTRUCTIONS

The operating instructions describe the basic operation of the f(x) configuration. Keep these instructions in a location which is easily accessible to every user and make these instructions available to every new owner of the product.

Important safety information.

Failure to observe these instructions may result in hazardous situations.

- ▸ The operating instructions must be read and understood.

1.1 Symbols

⚠ **DANGER!**

Warns of an immediate danger!

- ▸ Failure to observe the warning will result in fatal or serious injuries.

⚠ **WARNING!**

Warns of a potentially dangerous situation!

- ▸ Failure to observe the warning may result in serious injuries or death.

⚠ **CAUTION!**

Warns of a potential danger!

- ▸ Failure to observe the warning may result in moderate or minor injuries.

NOTE!

Warns of damage!

- Failure to observe the warning may result in damage to the device or other equipment.

❗ Indicates important additional information, tips and recommendations.

📖 Refers to information in these operating instructions or in other documentation.

▸ designates instructions for risk prevention.

→ designates a procedure which you must carry out.

✓ Indicates a result.

1.2 Definitions of terms

The term "product" used in these instructions always refers to Type 8922.

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2 AUTHORIZED USE

Non-authorized use of Type 8922 may be dangerous to people, nearby equipment and the environment.

The f(x) configuration is designed for the dynamic function extension of Bürkert devices.

- ▶ Use according to the authorized data, operating conditions, and conditions of use specified in the contract documents and operating instructions.
- ▶ Software only in conjunction with third-party devices and components recommended and authorized by Bürkert.
- ▶ Correct installation and careful use and maintenance are essential for reliable and faultless operation.
- ▶ Use the software only for its intended purpose.

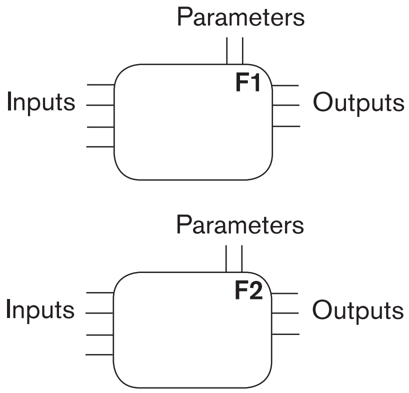
4 PRODUCT DESCRIPTION

The f(x) configuration is designed for the dynamic function extension of Bürkert devices. It allows a convenient configuration and implementation of additional functions.

Possible applications of f(x):

- Assignment of switching commands for Bürkert devices.
- Measurement data is relayed to external actuators or via büS to Bürkert devices.
- Saving and displaying recorded measure values.
- Implementation of control algorithms, as well as additional program logic.
- Provision of signal sources (e.g. ramp).
- Modification of signals (e.g. filter).

4.1 Basic principles



The f(x) configuration can be used to expand the device by one or more functions. Examples of functions are e.g. a timer, a graphical program or a controller.

Each function is run independently of the other.

The sequence consists of:

- Read in inputs
- Calculation 1 cycle of the function
- Read out outputs
- Wait until the next cycle time

Cycle time, e.g. 1 s

Source and destination of the inputs and outputs can be specified in the büS-Map. The procedure is described in the chapter "6.9 büS network configuration".

5 USER INTERFACE

This chapter describes the user interface of the graphical programming and refers to the symbols and terms of the Bürkert-Communicator.

The operating instructions for Bürkert-Communicator can be found on the Bürkert homepage at www.burkert.com.

5.1 Areas of the user interface

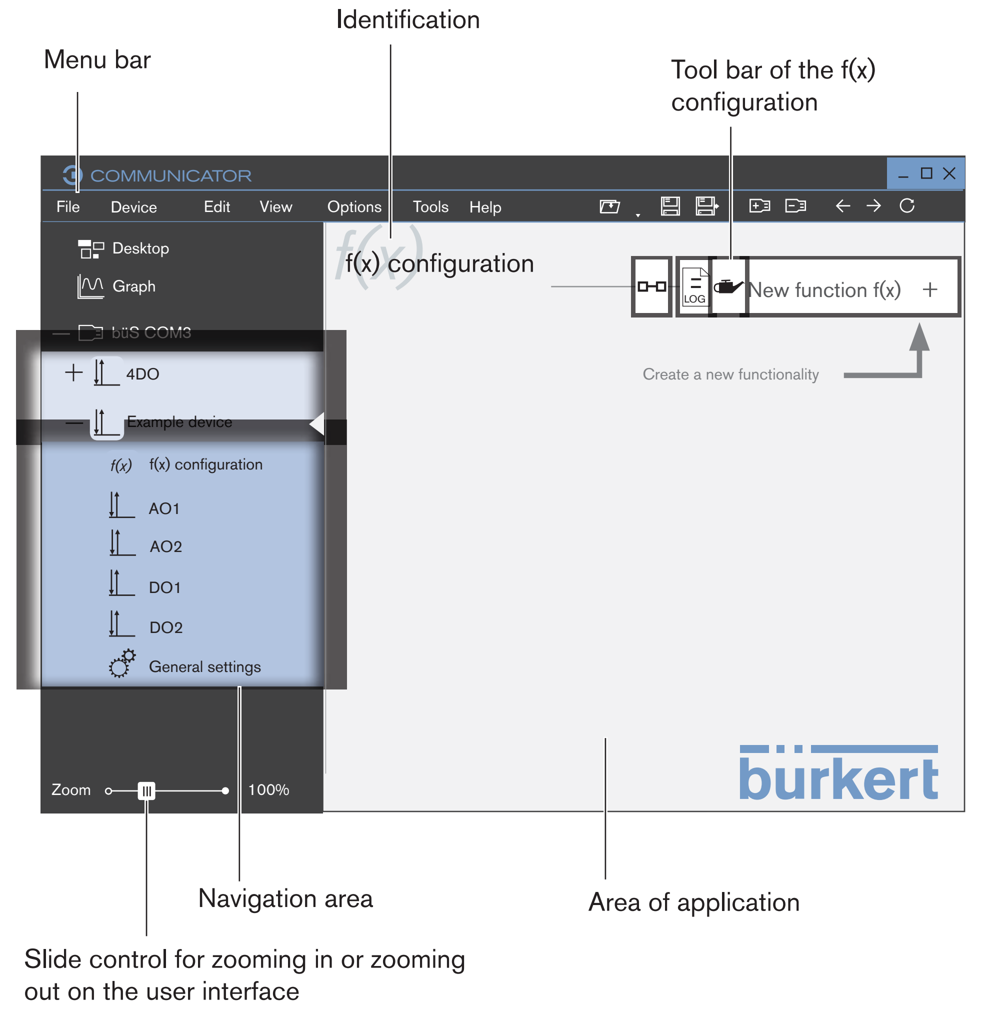

Identification
Menu bar
Tool bar of the f(x) configuration
COMMUNICATOR
File
Device
Edit
View
Options
Tools
Help
Desktop
Graph
büS COM3
4DO
Example device
f(x) configuration
AO1
AO2
DO1
DO2
General settings
Zoom
100%
f(x) configuration
New function f(x) +
LOG
Create a new functionality
bürkert
Navigation area
Area of application
Slide control for zooming in or zooming out on the user interface

Figure 1: Overview of user interface of the f(x) configuration

The symbols have tool tips (quick guide) which describe the commands.

Required user interactions are identified by orange operating elements.

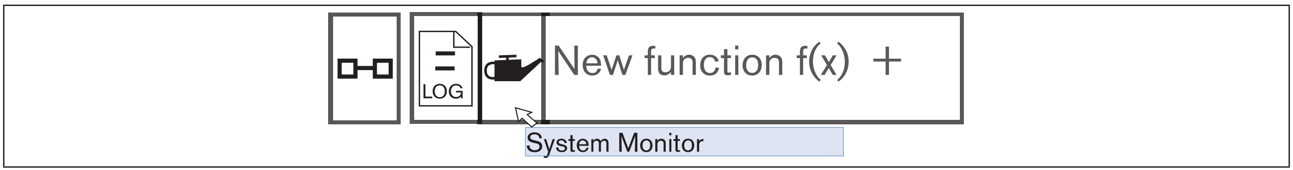
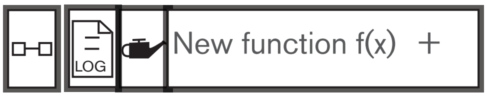

LOG
New function f(x) +
System Monitor

Figure 2: Tool tips

5.2 Tool bar of the f(x) configuration



Functions of the f(x) configuration on the tool bar:

Icon	Command or description
büS-Map	Navigate to the büS-Map.
LOG Fx-Log	Opens the Fx-Log.
System Monitor	Opens the System Monitor.
New function f(x) + Create a new functionality	Creates a new functionality.

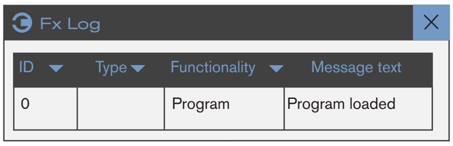
5.2.1 büS-Map

büS-Map is a representation of the currently connected büS network. büS-Map shows all devices and products connected to the interface with the respective inputs and outputs. The user can edit the büS network configuration here.

The configuration is described in chapter "6.9 büS network configuration".

5.2.2 Fx-Log

The Fx-Log is an internal log of the created f(x) functions. All messages are displayed since this view was last opened or since the device was last started.

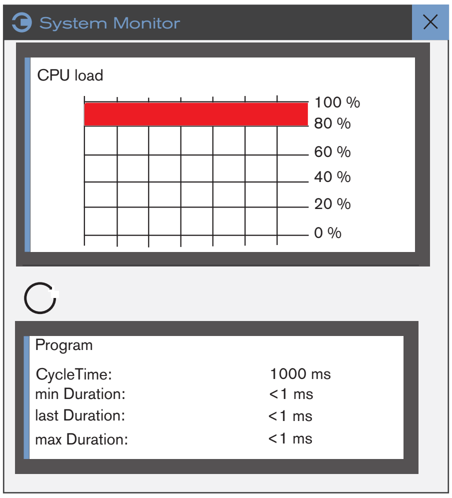


ID	Type	Functionality	Message text
0		Program	Program loaded

Figure 3: Fx-Log

5.2.3 System Monitor

The System Monitor provides an overview of the current utilization of the device. The processor load (CPU) is represented as a guide value. Also the minimum, maximum and the latest runtime is displayed for the cycle time and runtime analysis of each f(x) function.



Program

CycleTime: 1000 ms
min Duration: <1 ms
last Duration: <1 ms
max Duration: <1 ms

Figure 4: System Monitor

5.2.4 New function f(x)

This button allows the creation of a new f(x) function. The user can select either the graphical programming or a different functionality using a drop-down list.

The user can compile his own functions for graphical programming. An exact description follows in chapter "6.3 Creating a graphical f(x) function".

The other functionalities cannot be changed by the user. They are functions, which have been preprogrammed by the manufacturer and are available on the device, but must be created and can be parametrized by the user.

→ Select **New function f(x).**

→ Select required functionality.

5.3 Configured f(x) functions

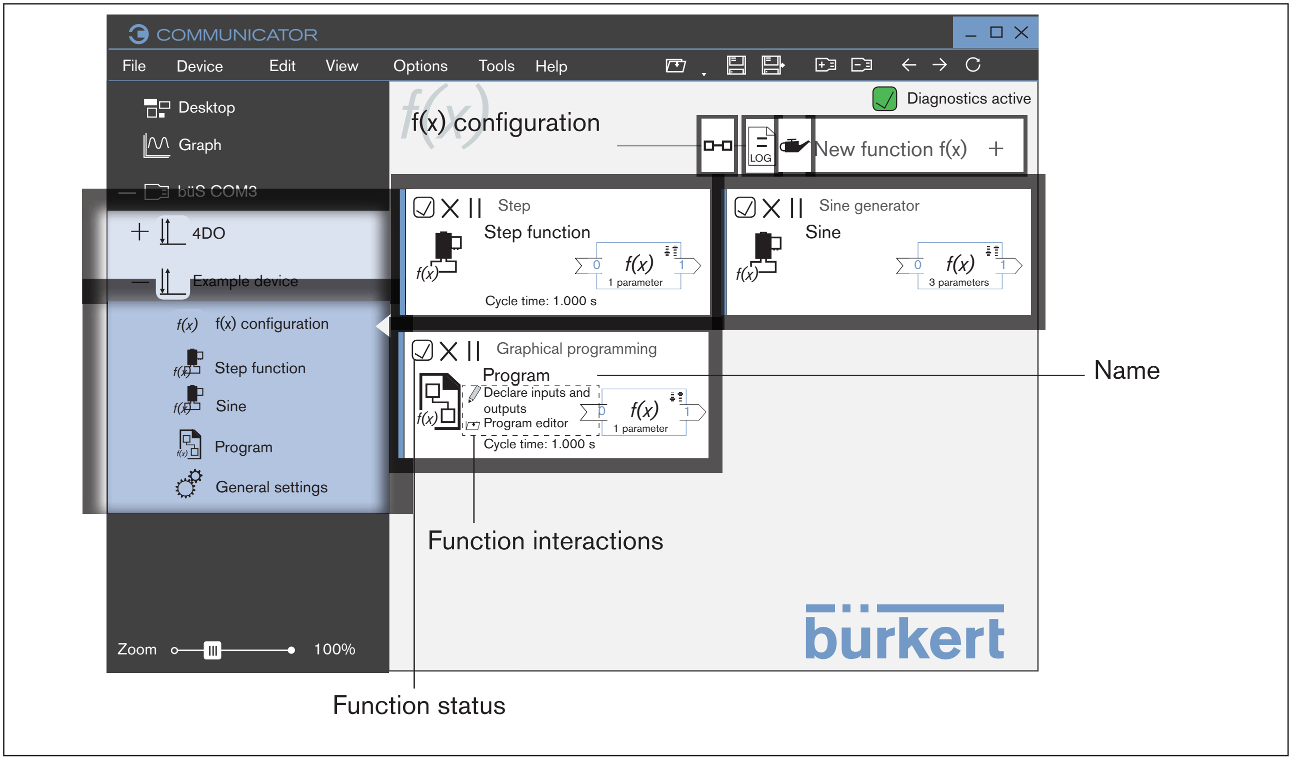

COMMUNICATOR
File
Device
Edit
View
Options
Tools
Help
Desktop
Graph
büS COM3
4DO
Example device
f(x) configuration
Step function
Sine
Program
General settings
Zoom
100%
f(x) configuration
Diagnostics active
LOG
New function f(x) +
Step
Step function
f(x)
1 parameter
Cycle time: 1.000 s
Sine generator
Sine
f(x)
3 parameters
Graphical programming
Program
Declare inputs and outputs
Program editor
f(x)
1 parameter
Cycle time: 1.000 s
bürkert
Name
Function interactions
Function status

Figure 5: Example with three configured f(x) functions

5.3.1 Function status

Icon	Status	Description
✖	Error	Function has an error, user action required (restart / new configuration).
🔧	Function is waiting	When all inputs consume their own values, the function starts independently, no user action required (when all inputs have been linked in the büS network configuration, see chapter "6.9").
☑	Function is running	

6 OPERATION AND FUNCTION

This chapter describes how to create and configure the graphical programming. The description of the procedure for the configuration refers to the symbols and terms of the Bürkert-Communicator user interface.

> The operating instructions for Bürkert-Communicator can be found on the Bürkert homepage at www.burkert.com.

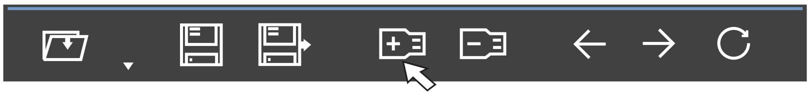
6.1 Starting Bürkert-Communicator

→ Start Bürkert-Communicator (e.g. via Windows start menu).

6.2 Add interface

The interfaces must be added by the user. The devices or products connected to the interface are then automatically added to a sub folder per device or product in the navigation area.

Icon	Menu	Command or description
⊞	***Add file / interface...***	Adds a new interface.



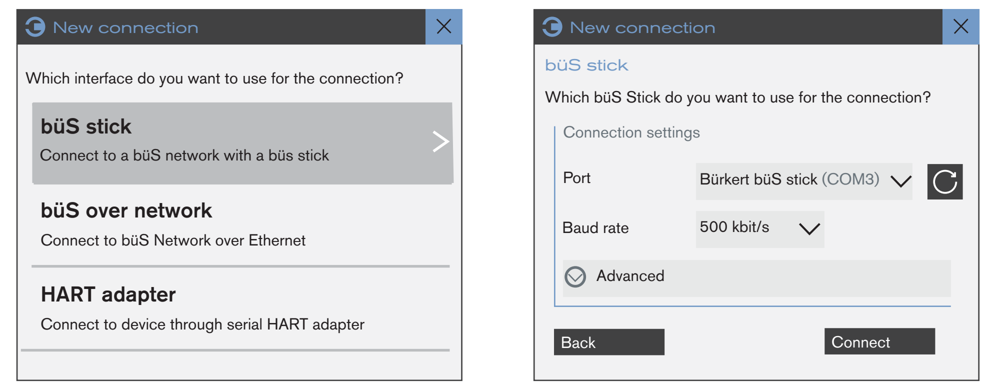
→ Click on ⊞.

A dialog field for selecting the interface opens followed by a dialog field for making further settings:

→ Select interface **büS stick**.

→ Click on **Connect**.

✔ The interface and the associated devices and products are transferred to the navigation area.



New connection

Which interface do you want to use for the connection?

büS stick
Connect to a büS network with a büs stick

büS over network
Connect to büS Network over Ethernet

HART adapter
Connect to device through serial HART adapter

New connection

büS stick

Which büS Stick do you want to use for the connection?

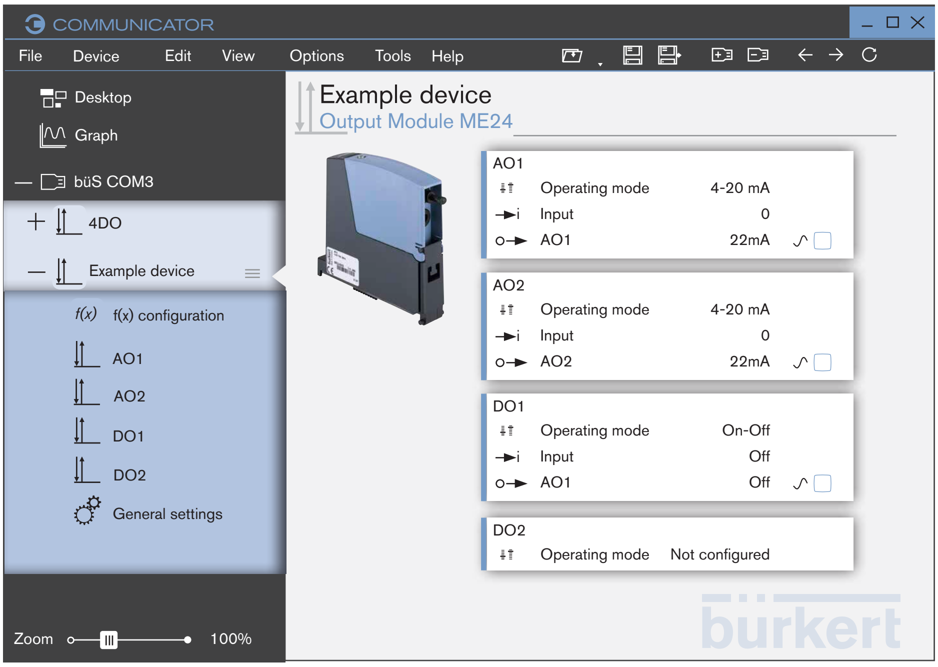
Connection settings

Port: Bürkert büS stick (COM3)

Baud rate: 500 kbit/s

Figure 6: Add interface (example)

6.3 Creating a graphical f(x) function


COMMUNICATOR
File
Device
Edit
View
Options
Tools
Help
Desktop
Graph
büS COM3
4DO
Example device
f(x) configuration
AO1
AO2
DO1
DO2
General settings
Zoom
100%
Example device
Output Module ME24
bürkert

AO1
Operating mode 4-20 mA
Input 0
AO1 22mA

AO2
Operating mode 4-20 mA
Input 0
AO2 22mA

DO1
Operating mode On-Off
Input Off
AO1 Off

DO2
Operating mode Not configured

Figure 7: Selecting f(x) configuration in the navigation area

→ Select device with f(x) function in the navigation area.

→ Select **f(x) configuration**.

→ Select **New function f(x)** on the tool bar.

→ Select **Graphical programming**.

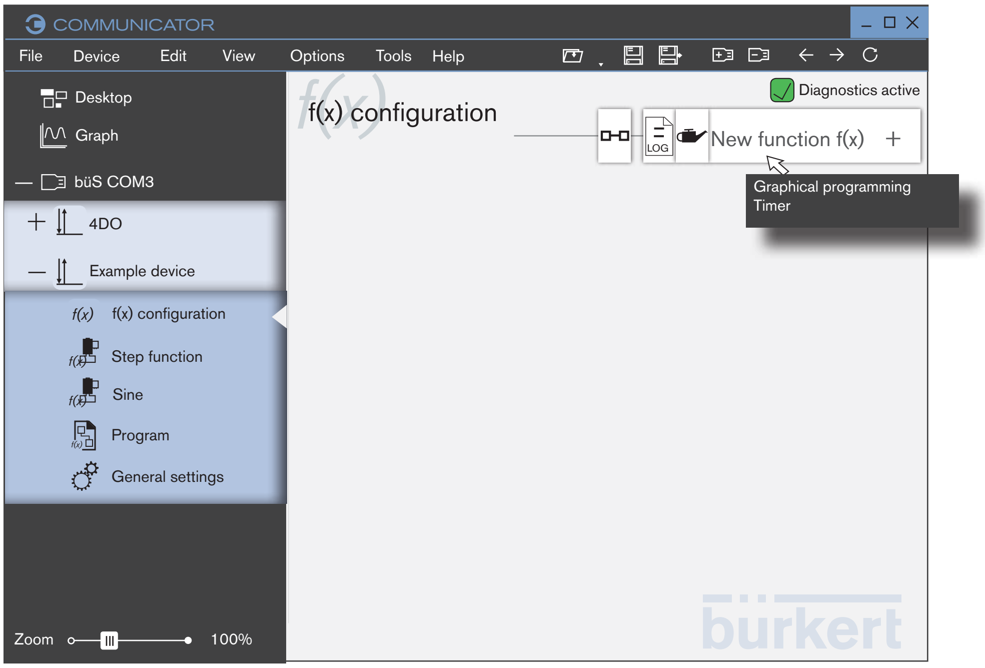
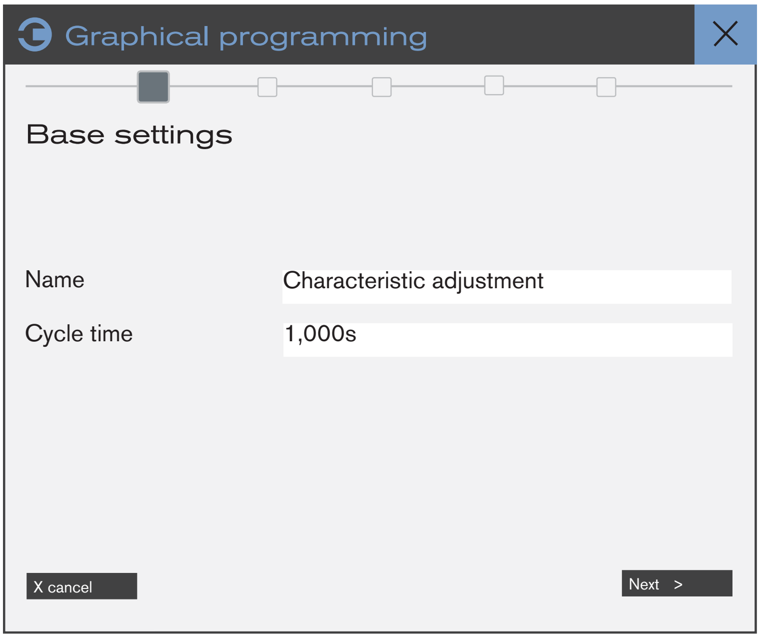

COMMUNICATOR
File
Device
Edit
View
Options
Tools
Help
Desktop
Graph
büS COM3
4DO
Example device
f(x) configuration
Step function
Sine
Program
General settings
Zoom
100%
f(x) configuration
Diagnostics active
LOG
New function f(x)
Graphical programming
Timer
bürkert

Figure 8: Selecting graphical programming

✓ Wizard for configuring the graphical programming opens.

6.4 Making base settings


Graphical programming
X cancel
Next >

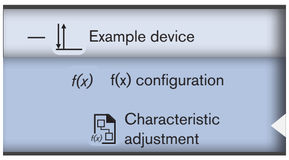
Base settings

Name: Characteristic adjustment

Cycle time: 1,000s

Figure 9: Base settings

→ Enter name and cycle time.
Name: Name assigned by the user appears in the navigation area as a device function.


Example device
f(x) configuration
Characteristic adjustment

This name also appears in the büS-Map and the setting levels.

Cycle time: Specify how often the function is to be recalculated, see chapter "4.1 Basic principles".

→ Click **Next**.

6.5 Selecting inputs and outputs or parameters

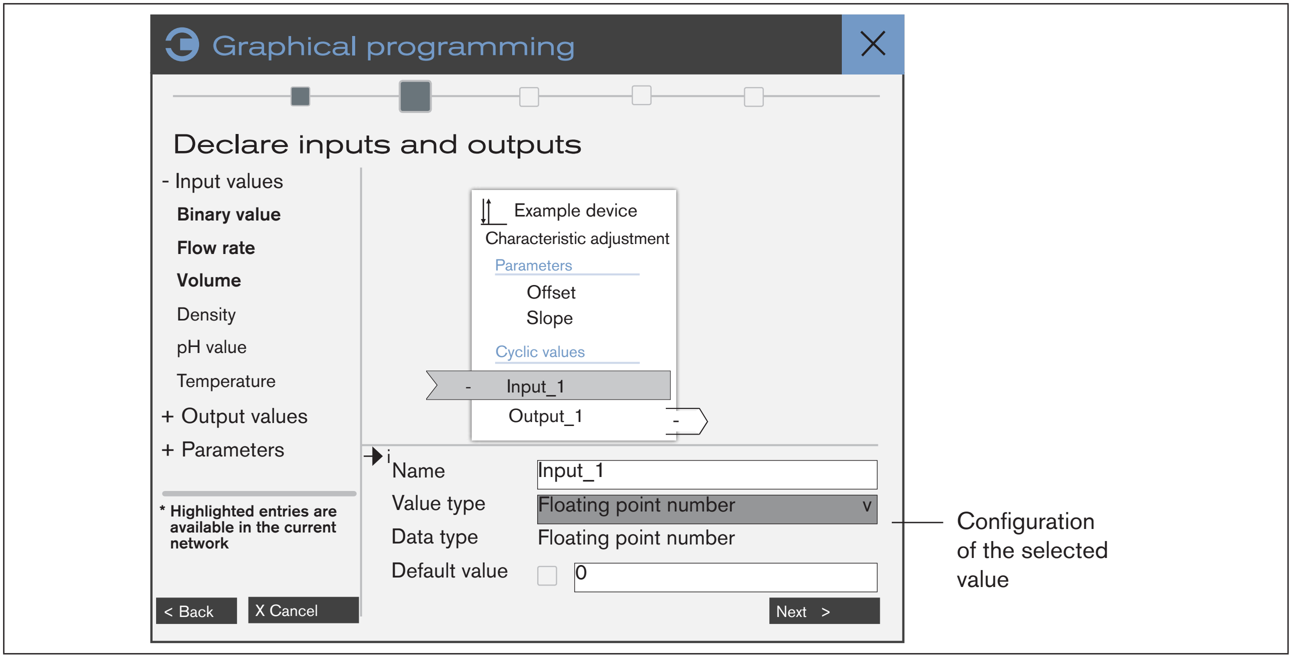
> **!** Value types available in the büS network are highlighted.

→ Add inputs and outputs or parameters using drag-and-drop or by double-clicking.
Right-clicking allows several values of the same unit to be added.

> **!** Inputs and outputs are linked to other values (see “6.9”), parameters are available only within the function and are adjusted in the application area (see “6.10”).

→ Add or adjust all required values.

→ Click **Next.**



Graphical programming

Declare inputs and outputs

- Input values
  - **Binary value**
  - **Flow rate**
  - **Volume**
  - Density
  - pH value
  - Temperature
- + Output values
- + Parameters

* Highlighted entries are available in the current network

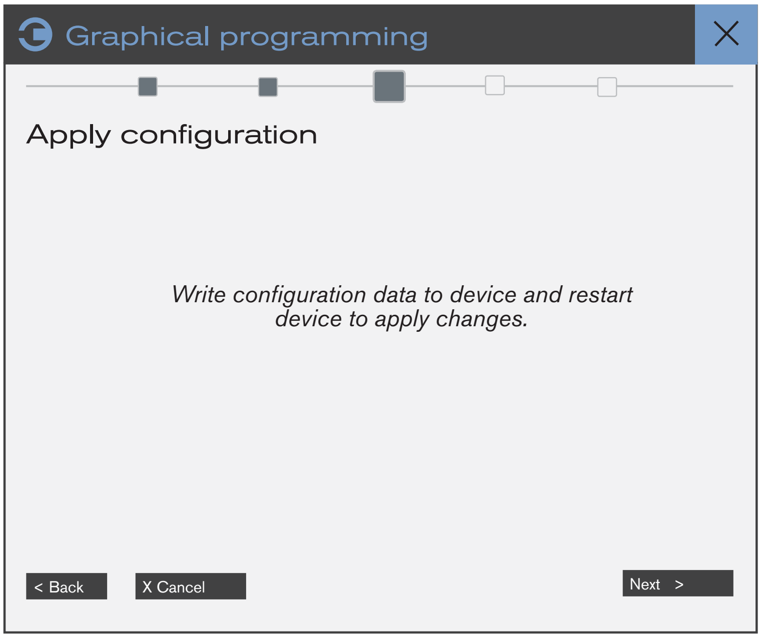
Example device
Characteristic adjustment
Parameters
Offset
Slope
Cyclic values
Input_1
Output_1

Name	Input_1
Value type	Floating point number
Data type	Floating point number
Default value	☐ 0

Figure 10: Adding inputs and outputs

Icon	Function or description (example values)
≣	Parameter
o→	Output value
→i	Input value
Standard ∨	Drop-down list
Input_2	Text field

6.6 Applying configuration


Graphical programming
< Back
X Cancel
Next >

Apply configuration

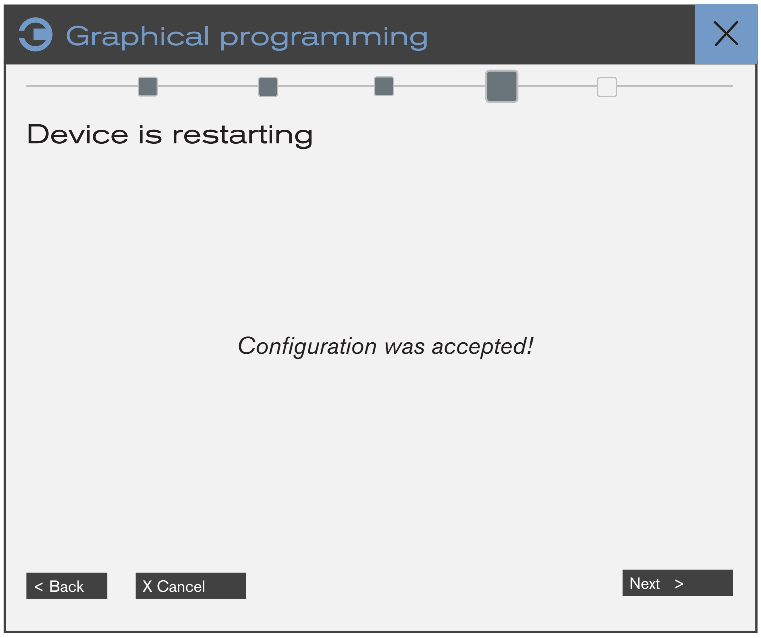
Write configuration data to device and restart device to apply changes.

Figure 11: Applying configuration

→ Click **Next.**
By confirming this page, the configuration implemented in the previous steps is transferred to the device. The device is restarting.

✓ Device is restarting.

6.7 Concluding configuration of values


Graphical programming
< Back
X Cancel
Next >

Device is restarting

Configuration was accepted!

Figure 12: Restart device

✓ Configuration was accepted.

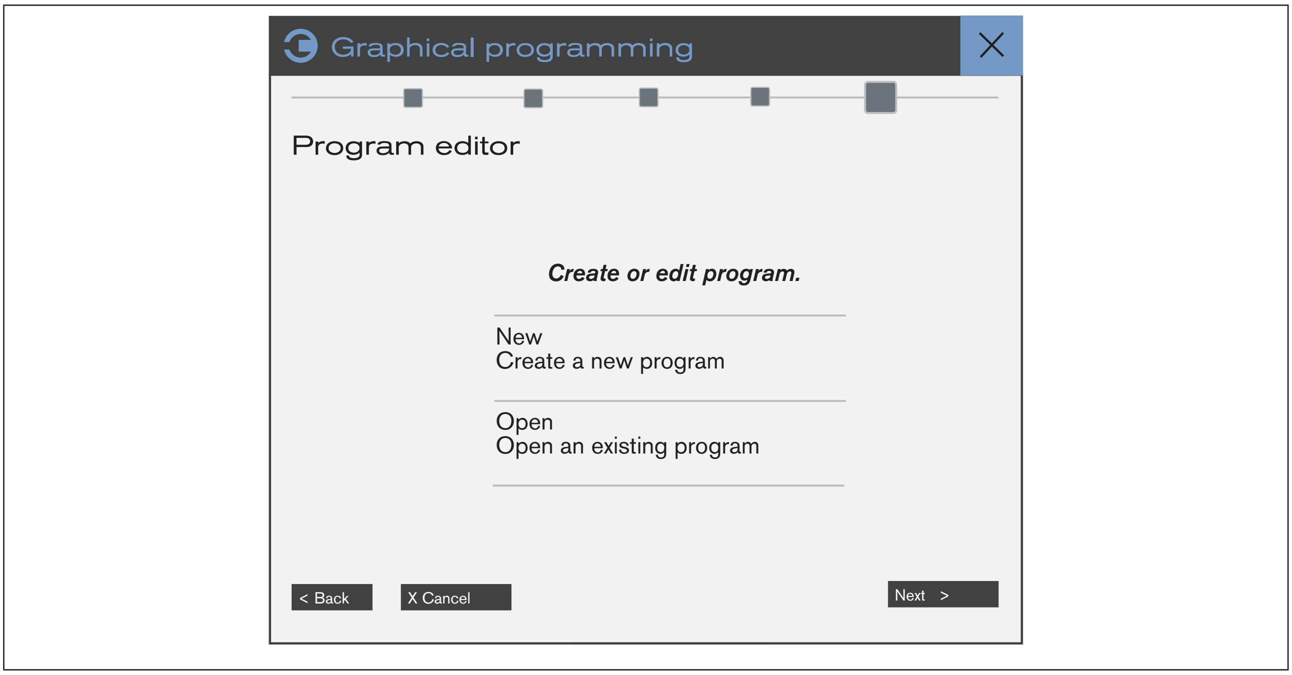
When the device has been restarted, you can continue with the configuration.

→ Click **Next.**

6.8 Program editor

The program editor is a graphical programming system. In the program editor, programming, simulation, test and start-up are connected in a tool. Special blocks allow the online monitoring of signals and signal characteristics. Programming can be data flow oriented in a function block diagram or control flow oriented as a flow chart.

The exact description of the program editor can be found in the online help instructions which are in the program editor in the menu bar under **?** ----► **Index**.



Create or edit program.

New
Create a new program

Open
Open an existing program

Figure 13: Creating or editing program

→ Click **New** and save project in a folder.

✓ Program editor starts.

6.8.1 Example: Characteristic adjustment

Characteristics are adjusted in this example.

→ Select required blocks from the library and drag into the program area using drag-and-drop.

→ When positioning, select the data type **FLOAT** from the list, as the inputs and outputs in chapter "6.5" have this data type.

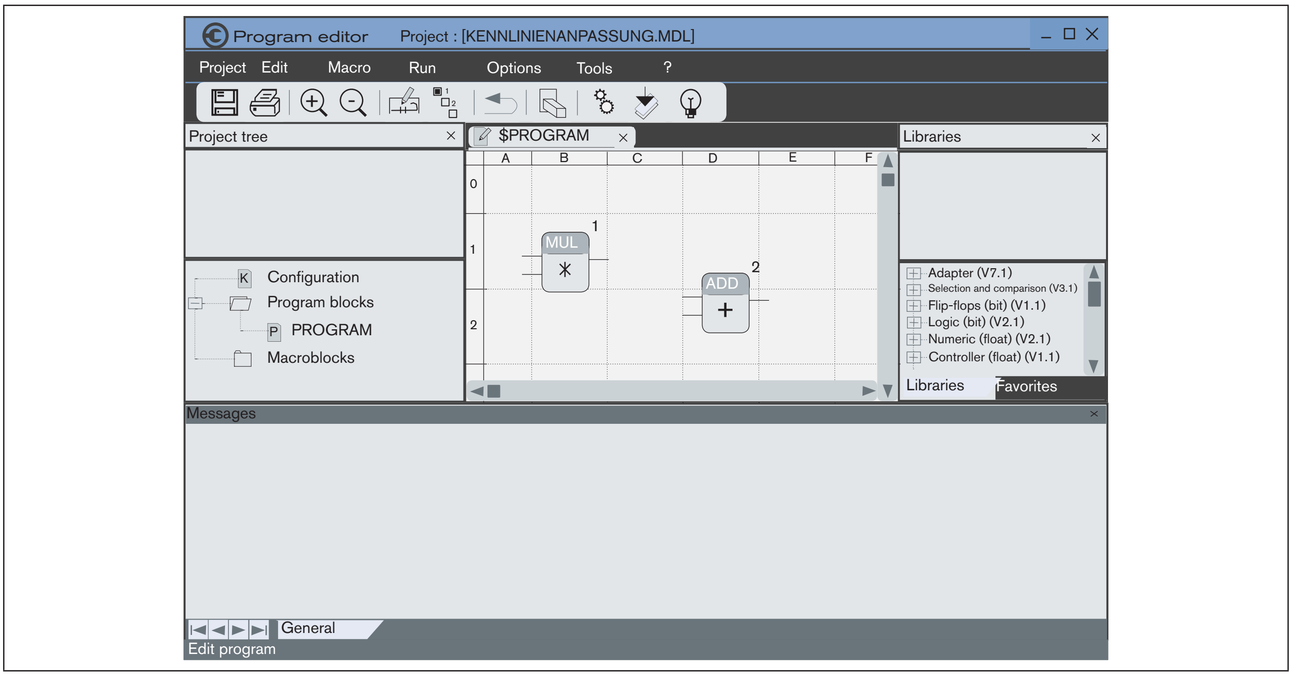

Program editor
Project : [KENNLINIENANPASSUNG.MDL]
Project
Edit
Macro
Run
Options
Tools
?
Project tree
$PROGRAM
Libraries
A
B
C
D
E
F
0
1
2
MUL
1
ADD
2
Configuration
Program blocks
PROGRAM
Macroblocks
Adapter (V7.1)
Selection and comparison (V3.1)
Flip-flops (bit) (V1.1)
Logic (bit) (V2.1)
Numeric (float) (V2.1)
Controller (float) (V1.1)
Libraries
Favorites
Messages
General
Edit program

Figure 14: Program editor

→ Connect blocks by clicking on the output and the input.

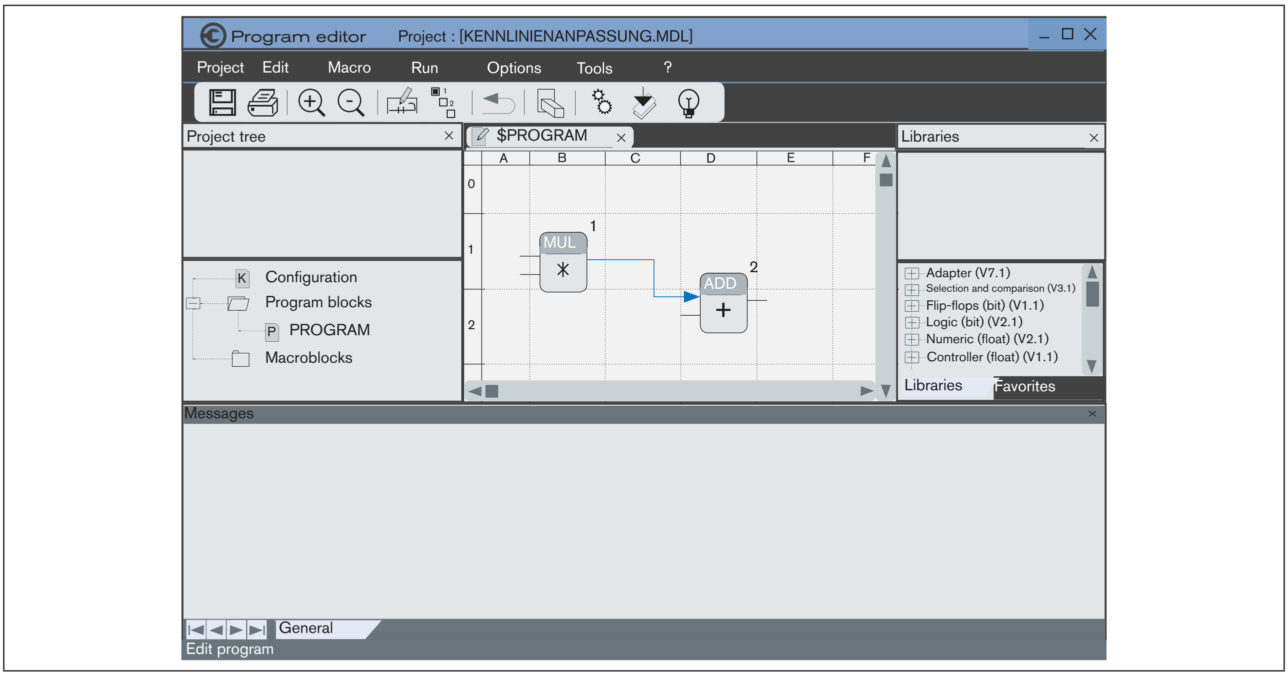
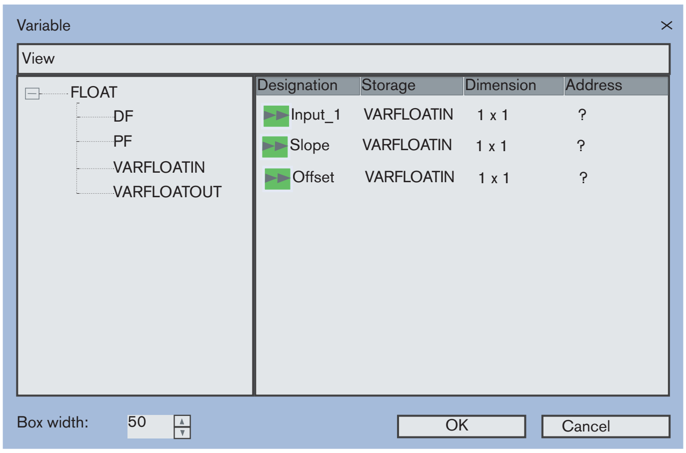

Program editor
Project : [KENNLINIENANPASSUNG.MDL]
Project
Edit
Macro
Run
Options
Tools
?
Project tree
$PROGRAM
Libraries
A
B
C
D
E
F
0
1
2
MUL
1
ADD
2
Configuration
Program blocks
PROGRAM
Macroblocks
Adapter (V7.1)
Selection and comparison (V3.1)
Flip-flops (bit) (V1.1)
Logic (bit) (V2.1)
Numeric (float) (V2.1)
Controller (float) (V1.1)
Libraries
Favorites
Messages
General
Edit program

Figure 15: Connecting the blocks

→ Assign inputs and outputs (variables):
Using the right mouse button, click the block connection and select **Assign variable** from the list.
Variables with matching type are available for selection.

→ Select variable and confirm with **OK**.


Variable
View
FLOAT
DF
PF
VARFLOATIN
VARFLOATOUT
Box width:
50
OK
Cancel

Designation	Storage	Dimension	Address
Input_1	VARFLOATIN	1 x 1	?
Slope	VARFLOATIN	1 x 1	?
Offset	VARFLOATIN	1 x 1	?

Figure 16: Assigning variable

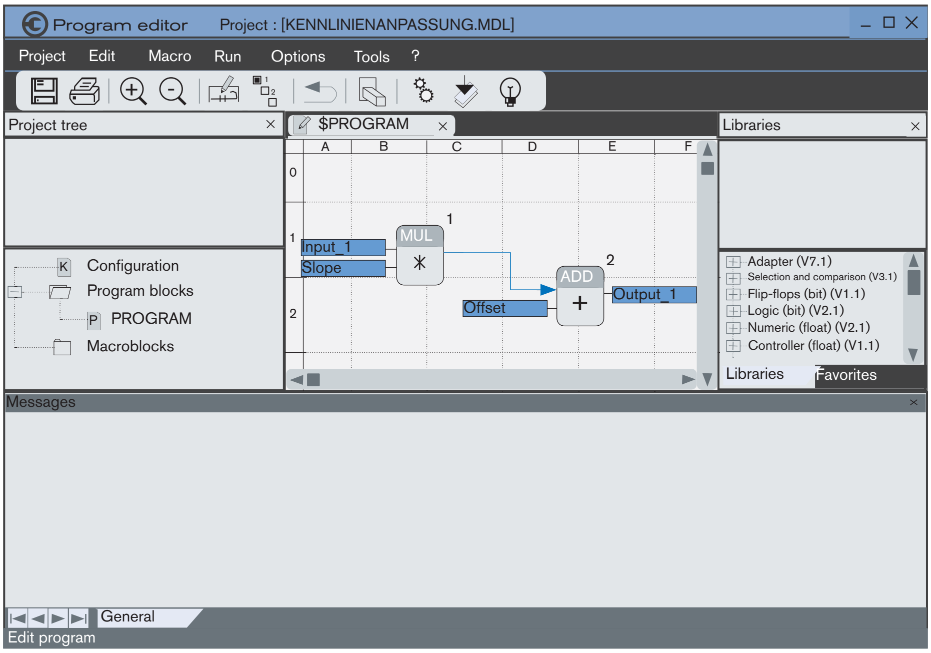

Program editor
Project : [KENNLINIENANPASSUNG.MDL]
Project
Edit
Macro
Run
Options
Tools
?
Project tree
$PROGRAM
Libraries
A
B
C
D
E
F
0
1
2
Input_1
Slope
MUL
1
Offset
ADD
2
Output_1
Configuration
Program blocks
PROGRAM
Macroblocks
Adapter (V7.1)
Selection and comparison (V3.1)
Flip-flops (bit) (V1.1)
Logic (bit) (V2.1)
Numeric (float) (V2.1)
Controller (float) (V1.1)
Libraries
Favorites
Messages
General
Edit program

Figure 17: Blocks with assigned variables

→ Select ⤓ download symbol on the tool bar.

→ Confirm with **OK**.

✔ Program is transferred to the device. The function starts as soon as all inputs consume a value, see "6.9 büS network configuration".

6.8.2 Important information

Connecting the blocks to different data types

2 blocks with different data types cannot be directly connected to each other. The block **Converter** is available in the library for this purpose.

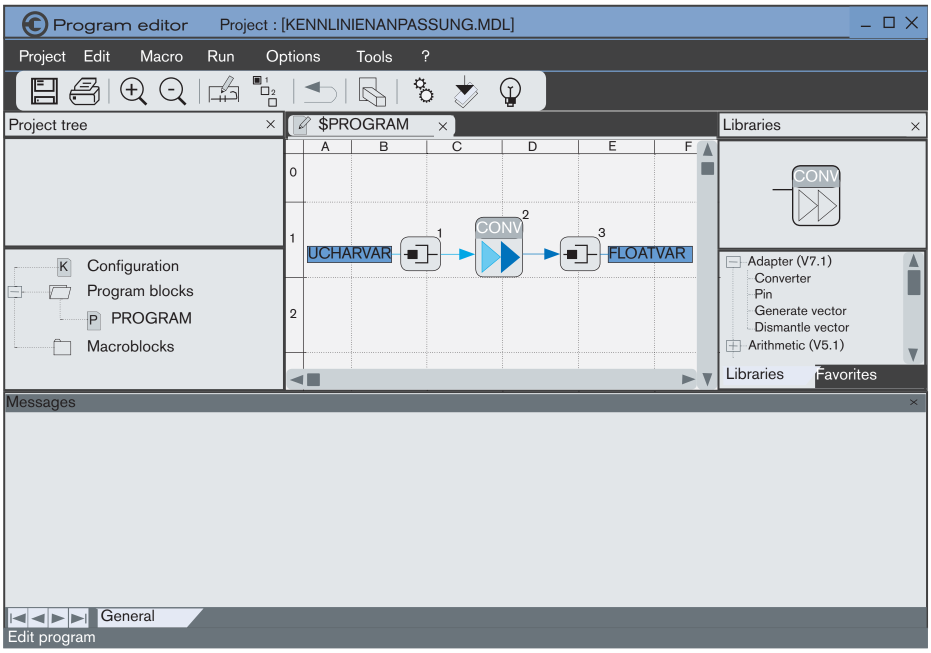
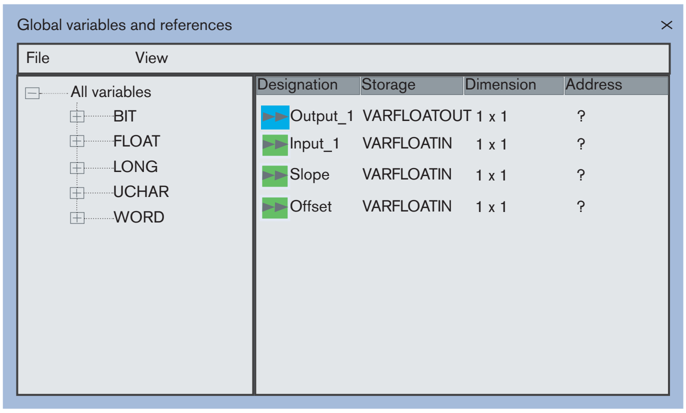

Program editor
Project : [KENNLINIENANPASSUNG.MDL]
Project
Edit
Macro
Run
Options
Tools
?
Project tree
Configuration
Program blocks
PROGRAM
Macroblocks
$PROGRAM
A
B
C
D
E
F
0
1
2
UCHARVAR
1
CONV
2
3
FLOATVAR
Libraries
CONV
Adapter (V7.1)
Converter
Pin
Generate vector
Dismantle vector
Arithmetic (V5.1)
Libraries
Favorites
Messages
General
Edit program

Figure 18: Converting blocks

Explaining the menu **Tools** on the menu bar of the program editor

The most important commands of the program editor are on the tool bar and menu bar. 2 selection options are available under the menu **Tools**:

- **Tools** ----► **Global Variables**.
  The window Global Variables provides an overview of all inputs and outputs as well as parameters which are shown in chapter "6.5". Variables can be synchronized by clicking on the command.


Global variables and references
File
View
All variables
BIT
FLOAT
LONG
UCHAR
WORD

Designation	Storage	Dimension	Address
Output_1	VARFLOATOUT	1 x 1	?
Input_1	VARFLOATIN	1 x 1	?
Slope	VARFLOATIN	1 x 1	?
Offset	VARFLOATIN	1 x 1	?

Figure 19: Global variables and references

- **Tools** ----► **Update the I/O variables**.
  If the inputs and outputs as well as parameters shown in chapter "6.5" do not match those in the Global Variables window, they can be synchronized by clicking on the command.

Editing a program: Online and Offline operating state

→ Click Online/Offline symbol on the tool bar. Online operating state starts.

The program cannot be edited in the Online operating state.

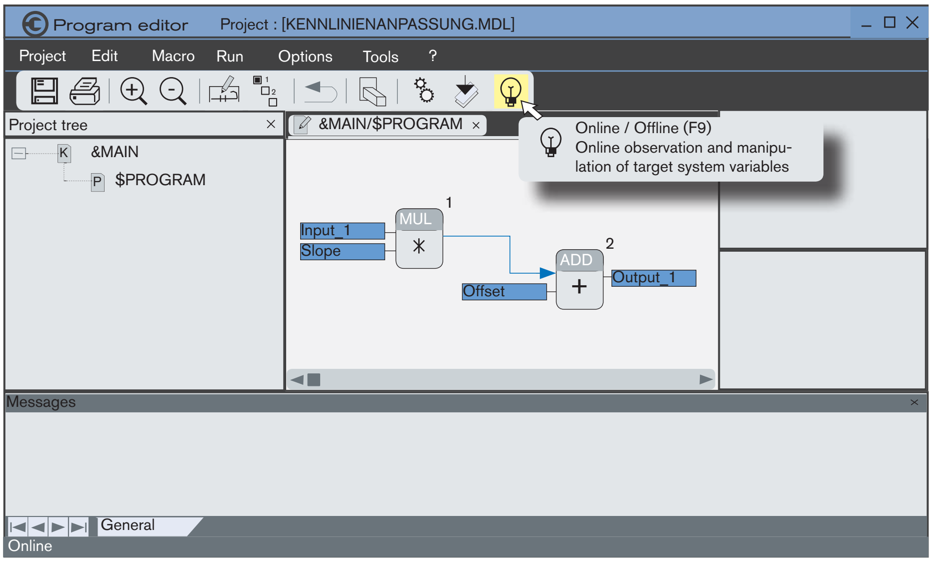

Program editor
Project : [KENNLINIENANPASSUNG.MDL]
Project
Edit
Macro
Run
Options
Tools
?
Project tree
&MAIN
$PROGRAM
&MAIN/$PROGRAM
Online / Offline (F9)
Online observation and manipulation of target system variables
1
Input_1
Slope
MUL
2
ADD
Offset
Output_1
Messages
General
Online

Figure 20: Online operating state

→ Press Online/Offline symbol or F9.

→ Using the right mouse button, click on **$PROGRAM** and select **Edit**.

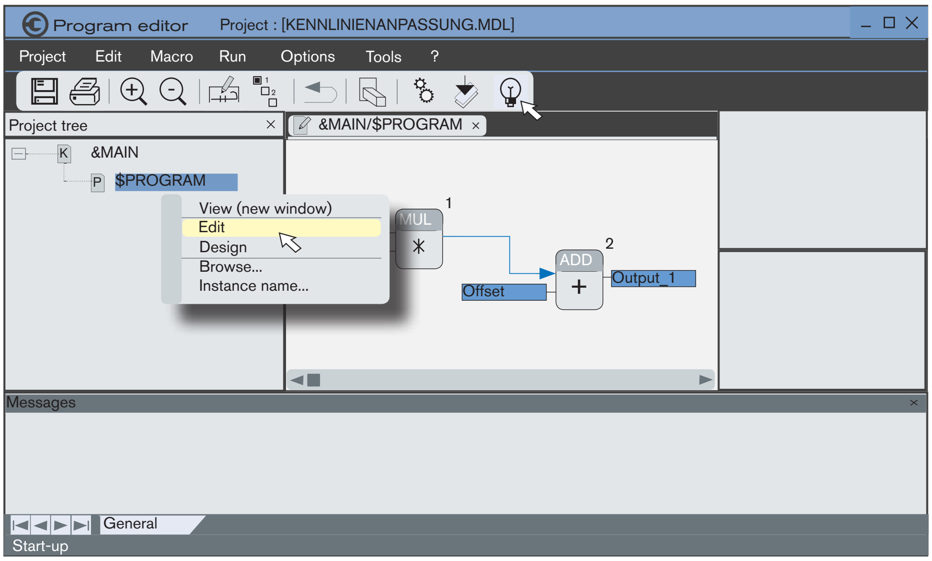

Program editor
Project : [KENNLINIENANPASSUNG.MDL]
Project
Edit
Macro
Run
Options
Tools
?
Project tree
&MAIN
$PROGRAM
&MAIN/$PROGRAM
View (new window)
Edit
Design
Browse...
Instance name...
1
MUL
2
ADD
Offset
Output_1
Messages
General
Start-up

Figure 21: Changing to Offline operating state

✔ Program can be edited again.

6.9 büS network configuration

→ Connect Bürkert büS stick to büS network.

→ Connect büS stick to the PC.

→ Start Bürkert-Communicator.

→ Add interface: Select symbol ⊞ from tool bar.

→ Select interface in the navigation area.

→ Select register card **büS-Map**.

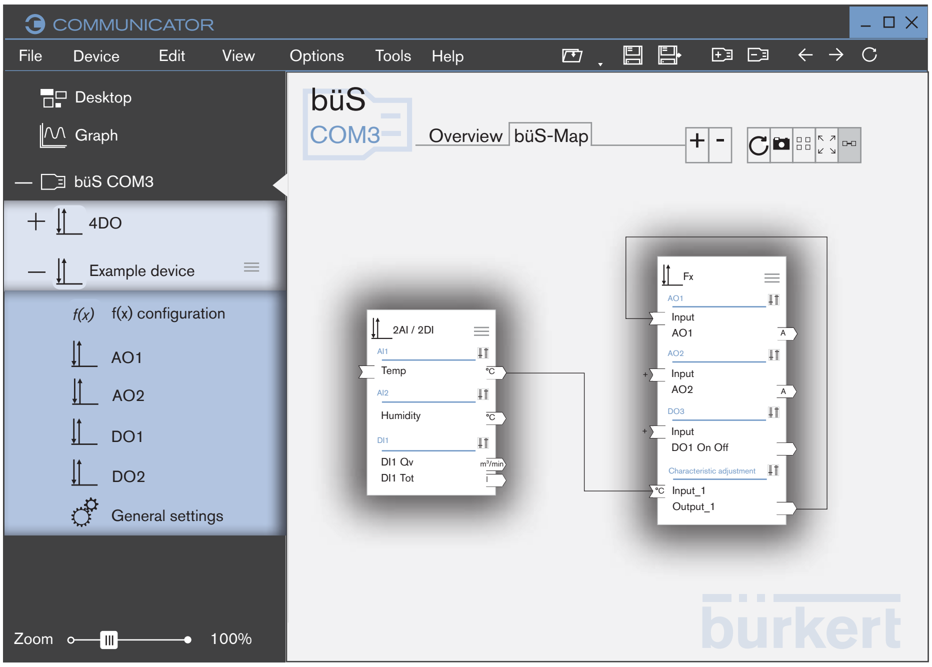

COMMUNICATOR
File
Device
Edit
View
Options
Tools
Help
Desktop
Graph
büS COM3
4DO
Example device
f(x) configuration
AO1
AO2
DO1
DO2
General settings
Zoom
100%
büS
COM3
Overview
büS-Map
+
-
2AI / 2DI
AI1
Temp
°C
AI2
Humidity
°C
DI1
DI1 Qv
m³/min
DI1 Tot
l
Fx
AO1
Input
AO1
A
AO2
Input
AO2
A
DO3
Input
DO1 On Off
Characteristic adjustment
°C
Input_1
Output_1
bürkert

Figure 22: büS-Map

→ Using drag-and-drop, link the inputs and outputs.
Dashed line connections do not establish an active connection between devices.
When the mouse is moved over a connection, the compatible connection points are highlighted in blue.

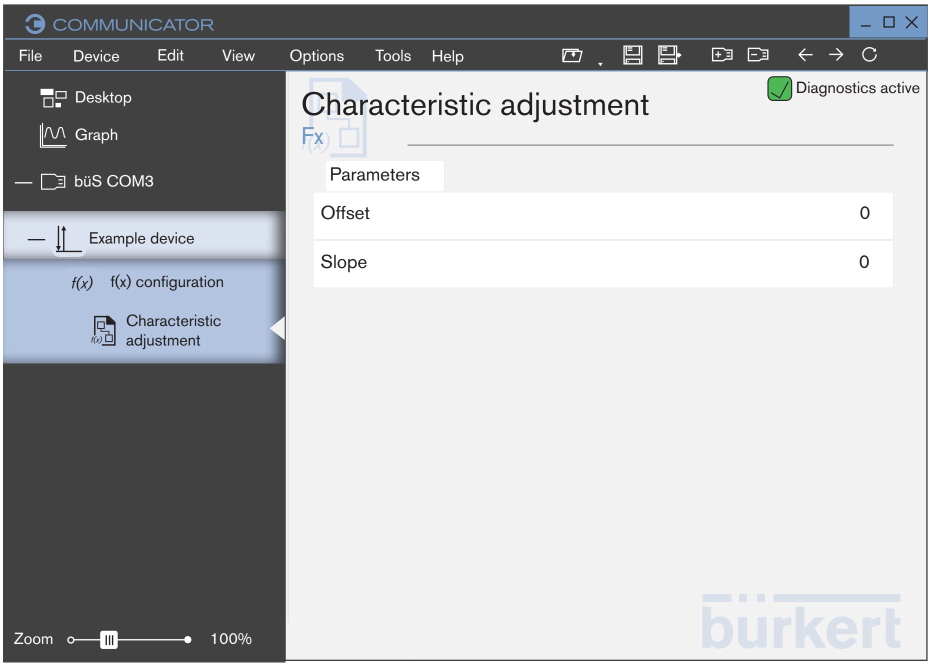
→ Click **Apply changes**.

✓ All configured devices are restarted.

Further information on the büS-Map can be found in the operating instructions for the Bürkert-Communicator.

6.10 Adjusting parameters

All parameters of the function are displayed and can be adjusted by clicking on the new function in the navigation area.


COMMUNICATOR
File
Device
Edit
View
Options
Tools
Help
Desktop
Graph
büS COM3
Example device
f(x) configuration
Characteristic adjustment
Zoom
100%
Diagnostics active
Characteristic adjustment
Parameters
bürkert

Offset	0
Slope	0

Figure 23: Adjusting parameters

→ Select function (in the example: characteristic adjustment) in the **Navigation area**.

✔ Parameters are displayed in the application area.

→ Click on the required parameters and adjust.

→ Confirm with **Apply**.

7 ERROR MESSAGES

7.1 Display of the device status

The device status is represented according to NAMUR NE 107. If several device statuses exist simultaneously, the device status with the highest priority is displayed. The priority is determined by the severity of the deviation from standard operation.

Status display in accordance with NAMUR NE 107		Description	Meaning
Color	red	Failure, error or malfunction	The measured value is invalid due to a malfunction in the device or on its peripheral equipment
	orange	Function check	Work is being carried out on the device; the measured value is therefore not currently valid
	yellow	Out of specification	Ambient conditions or process conditions for the device are outside the specified area. Internal device diagnostics point to problems in the device or the process properties
	blue	Maintenance required	The device is in measuring mode, however a function is briefly restricted
	green	Diagnostics active	Device is operating perfectly. Status changes are indicated in different colors. Messages are transmitted via a message list and any connected fieldbus
	white	Diagnostics inactive	Device is switched on. Statuses are not displayed. Messages are not listed in the message list or transmitted via any connected fieldbus

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8 ADDITIONAL INFORMATION

8.1 Licenses

The program editor is a graphical programming system in which the selected blocks allow online monitoring of signals. When the program editor has started, a mask appears with information on all available blocks.

> ! Number of blocks in the program editor for the free version is restricted to 10 blocks. Additional licenses are added by the user.

- License key, order number 567 713

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bürkert
FLUID CONTROL SYSTEMS

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