

WAGO → I/O → SYSTEM 750

WAGO BACnet Configurator

for the Configuration of
WAGO BACnet/IP Controllers 750-830



Manual

Technical Description

Version 1.0.2

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Every conceivable measure has been taken to ensure the correctness and completeness of this documentation. However, as errors can never be fully excluded we would appreciate any information or ideas at any time.

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1 Important Comments

To ensure fast installation and start-up of the units described in this manual, we strongly recommend that the following information and explanations are carefully read and abided by.

1.1 Legal Principles

1.1.1 Copyright

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1.1.2 Personnel Qualification

The use of the product detailed in this manual is exclusively geared to specialists having qualifications in PLC programming, electrical specialists or persons instructed by electrical specialists who are also familiar with the valid standards. WAGO Kontakttechnik GmbH & Co. KG declines all liability resulting from improper action and damage to WAGO products and third party products due to non-observance of the information contained in this manual.

1.1.3 Intended Use

For each individual application, the components supplied are to work with a dedicated hardware and software configuration. Modifications are only permitted within the framework of the possibilities documented in the manuals. All other changes to the hardware and/or software and the non-conforming use of the components entail the exclusion of liability on part of WAGO Kontakttechnik GmbH & Co. KG.

Please direct any requirements pertaining to a modified and/or new hardware or software configuration directly to WAGO Kontakttechnik GmbH & Co. KG.

1.2 Symbols



Danger

Always abide by this information to protect persons from injury.



Warning

Always abide by this information to prevent damage to the device.



Attention

Marginal conditions must always be observed to ensure smooth operation.



ESD (Electrostatic Discharge)

Warning of damage to the components by electrostatic discharge. Observe the precautionary measure for handling components at risk.



Note

Routines or advice for efficient use of the device and software optimization.



More information

References on additional literature, manuals, data sheets and internet pages

1.3 Font Conventions

Font type	Indicates
<i>italic</i>	Names of path and files are displayed in italic, e.g.: <i>C:\programs\WAGO-IO-CHECK</i>
Menu	Menu options are displayed in bold, e.g.: Save
>	A greater-than sign between two names means the selection of a menu option from a menu, e.g.: File > New
Input	Designation of input or optional fields are displayed in bold, e.g.: Start of measurement range
“Value”	Input or selective values are displayed in inverted commas, e.g.: Enter the value “4 mA” under Start of measurement range .
[Button]	Button names in dialog boxes are displayed in bold in square brackets, e.g.: [Input]
[Key]	Names of keys on the keyboard are displayed in bold in square brackets, e.g.: [F5]

1.4 Scope

This manual describes the following components:

Components
BACnet Configurator for the Configuration of WAGO BACnet/IP Controllers 750-830

2 General

This chapter describes the system requirements and the installation of the BACnet Configurator as well as the BACnet Service for accessing BACnet/IP Networks.

Here, a BACnet/IP Network is a network consisting of one or more IP subnets containing BACnet devices.

2.1 System Requirements

Minimum system requirements:

Operating system	Windows 2000/XP/Vista
Memory	128 MB
Free hard disk storage	10 MB for the BACnet Configurator and 280 MB (x86) or 610 MB (x64) for the .NET 2.0 Framework
Monitor resolution	800 x 600 or greater
Drive	CD drive for installation of CD
Other	Installed network card, .NET 2.0 Framework (redistributable included in delivery), network cable or hub

2.2 Installation of the BACnet Configurator and Service

The BACnet Configurator is installed on a PC that is connected to a BACnet/IP network through a switch, hub or router.

The BACnet/IP Controller has two ports available – a serial 9-pole Sub-D port (RS232) and an RJ45 port. The BACnet/IP Controller is linked directly to the BACnet/IP Network through the RJ45 port. In addition to BACnet/IP, the Controller also supports the BACnet/PTP Protocol. The Controller can communicate with other PTP-capable devices through a modem connection in the RS232 interface (half router).



Additional Information

The WAGO BACnet Configurator is a component of the product "BACnet/IP Controller 750-830". You can download the software from the Internet site <http://www.wago.com> under Service → Downloads → BACnet Downloads.

1. Double click on the file "setup.exe" in the installation directory to start the installation.
2. Click on [Next] to start the next installation step (see Fig. 2-1).

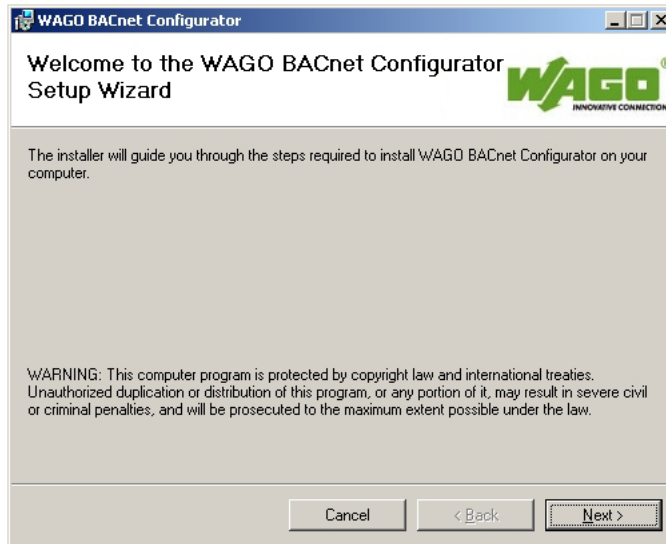


Fig. 2-1: Start installation

3. Read the terms of the license carefully and select [I Agree]. Start the next installation step by clicking on [Next] (see Fig. 2-2).

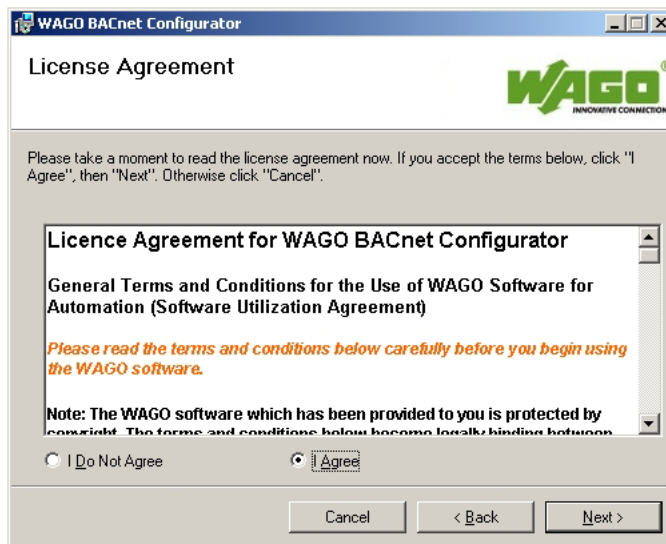


Fig. 2-2: Confirm the license agreement

4. Enter the path under which you would like to install the Configurator and choose whether the software is to be installed for every user ("Everyone") or only for yourself ("Just me") (see Fig. 2-3).

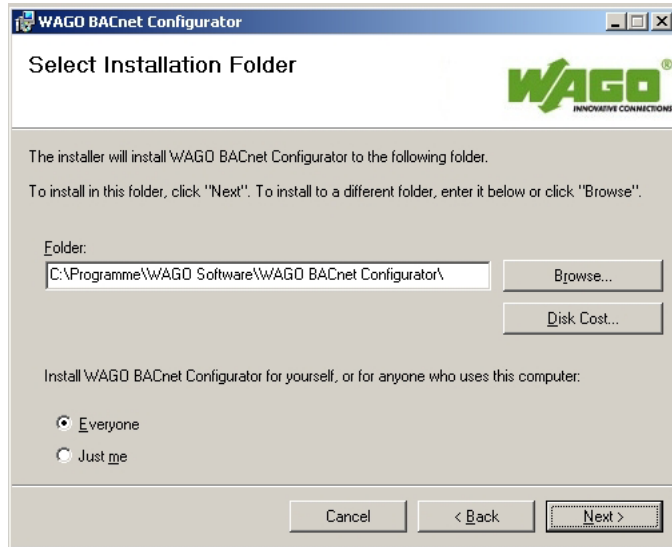


Fig. 2-3: Choose the installation location

5. Confirm further installation by clicking on [Next] (see Fig. 2-4).

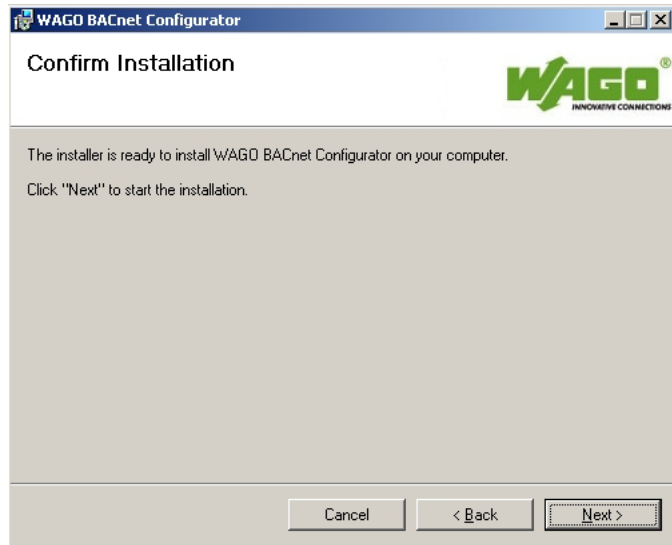


Fig. 2-4: Continue installation

The Configurator is installed (see Fig. 2-5).

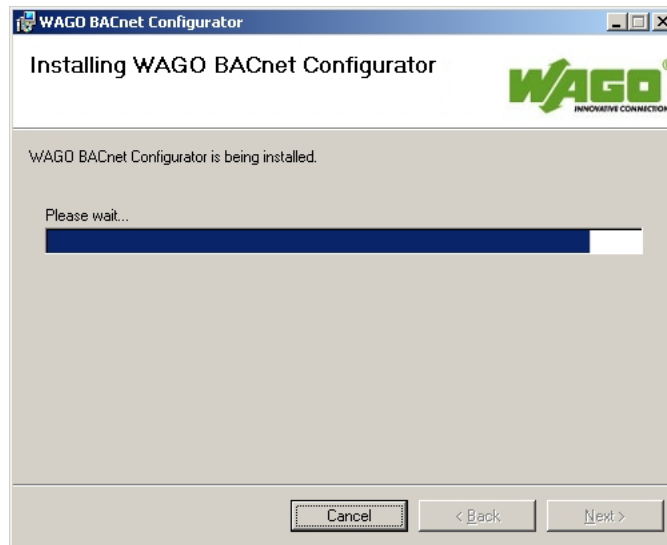


Fig. 2-5: Continue installation

In addition to the BACnet Configurator, a BACnet Service (BACstac) is automatically installed in the background. During the installation of the service, protocol drivers are inserted in every (!) existing network connection, providing access to a BACnet/IP Network for the BACnet Configurator.



Note

Searching for network participants and their configuration in the BACnet Configurator is not possible without installing BACstac.



Note

The service may be blocked during installation by a firewall. If necessary, accept the BACnet Service manually in the firewall rules since this never happens automatically.

If, in spite of this, the BACstac is not automatically installed, proceed as described in section 2.2.1 and install the BACstac manually.



Note

An active network connection is required to use the BACstac.

The properties of the installed BACnet Service are displayed in a new dialog window (see Fig. 2-6).

6. Click on [OK] to close the window and continue the installation.

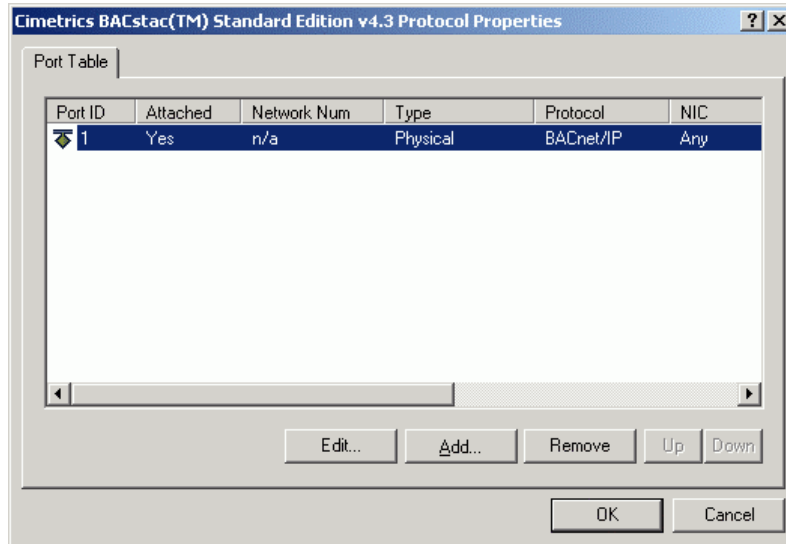


Fig. 2-6: Properties of the BACnet Service

7. Click in the installation window on [Close] to end the setup (see Fig. 2-7).

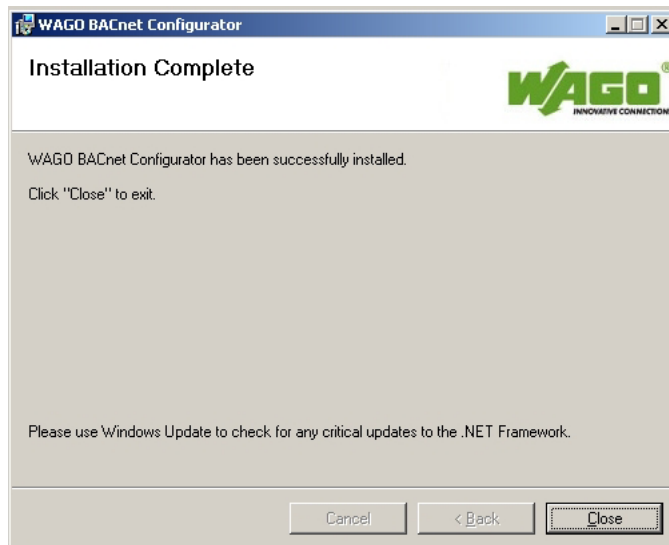


Fig. 2-7: End installation

The installation of the BACnet Configurator and BACnet Service is finished.

2.2.1 Manual Installation of the BACnet Service



Note

Only perform the following steps if the BACnet Service has not already been automatically installed.

If the service has been correctly installed, this will be indicated in the properties of the LAN connection (see Fig. 2-8).

An active firewall, for example, may be one reason for an unsuccessful installation.

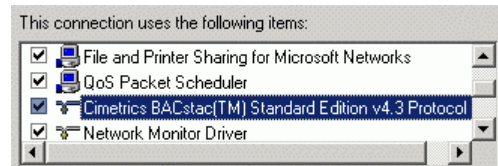


Fig. 2-8: Display of the installed BACnet Service

1. Open the network connections, e.g. using **System Control > Network Connections** and select **Properties** in the context menu of any (!) network connection (see Fig. 2-9).

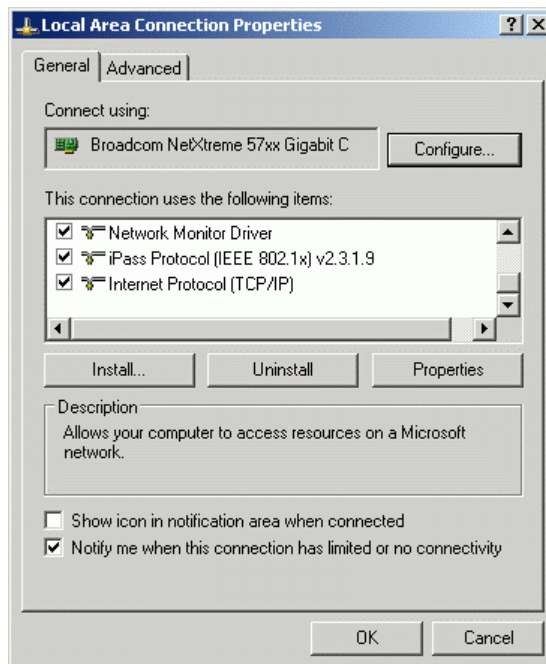


Fig. 2-9: Properties of the LAN connection

2. If the BACnet Service has not already been automatically installed, mark an entry, e.g. "Internet Protocol (TCP/IP)" and click on [**Install...**].

3. Select "Protocol" as the network component to be installed and click on [Add...] (see Fig. 2-10).

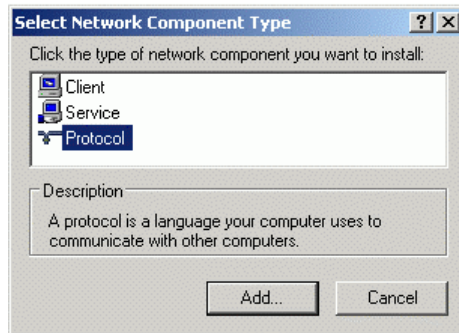


Fig. 2-10: Select Network Protocol

4. In the following window, click on [Have Disk...] to choose the installation file for the Service (see Fig. 2-11).

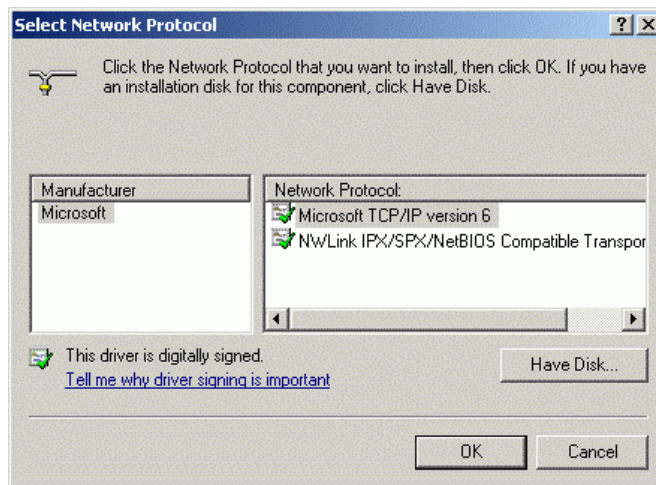


Fig. 2-11: Open installation file

5. Open the file "bacstac.inf" in the directory "Driver" of the installation directory (see Fig. 2-12).

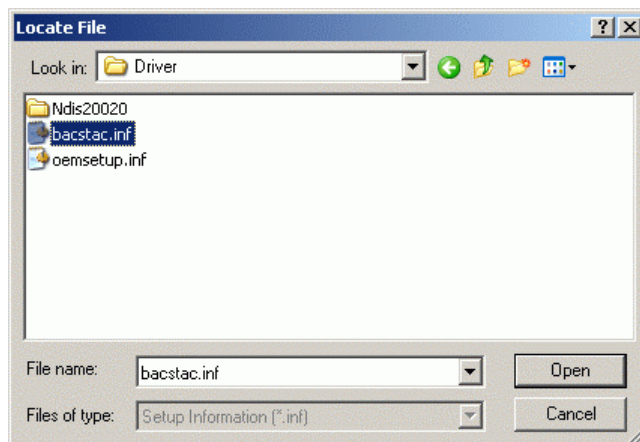


Fig. 2-12: Open installation file

6. Confirm the selected file with **[OK]** (see Fig. 2-13).

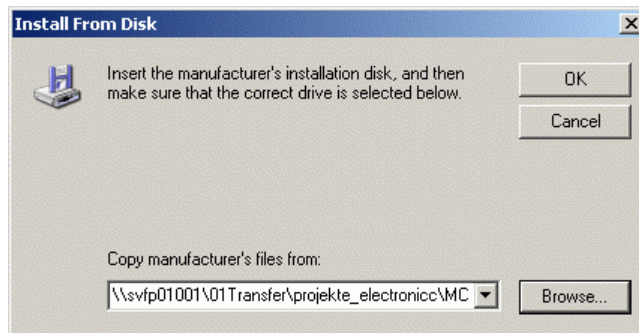


Fig. 2-13: Open installation file

7. Choose "Cimetrics BACstac™" and install it by clicking on **[OK]** (see Fig. 2-14).

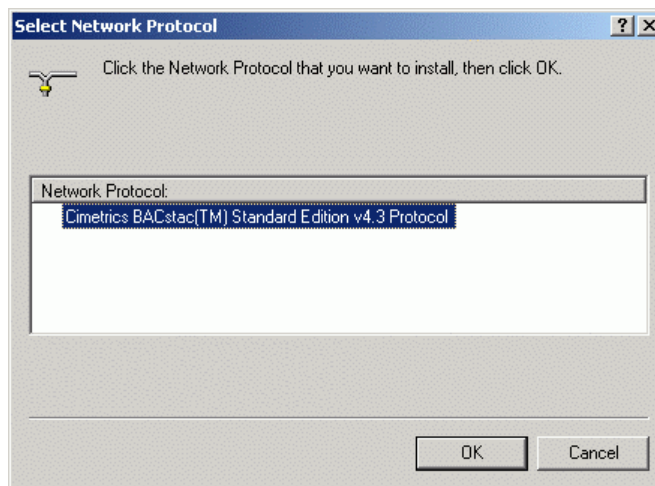


Fig. 2-14: Install BACnet Service

The properties of the installed BACnet Service are displayed in a new dialog window.

8. Click on **[Edit...]** to open the configuration of the BACnet Service (see Fig. 2-15).

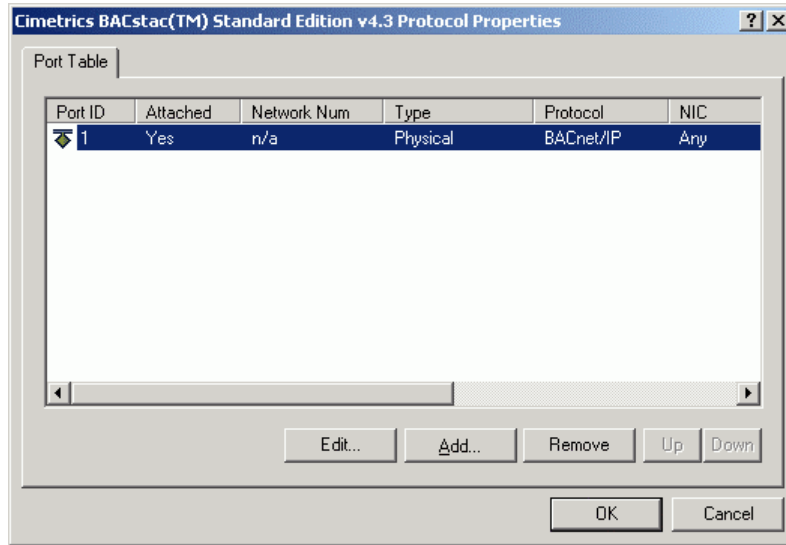


Fig. 2-15: Properties of the BACnet Service

9. In this dialog, you will configure BACnet access as needed (see Fig. 2-16).

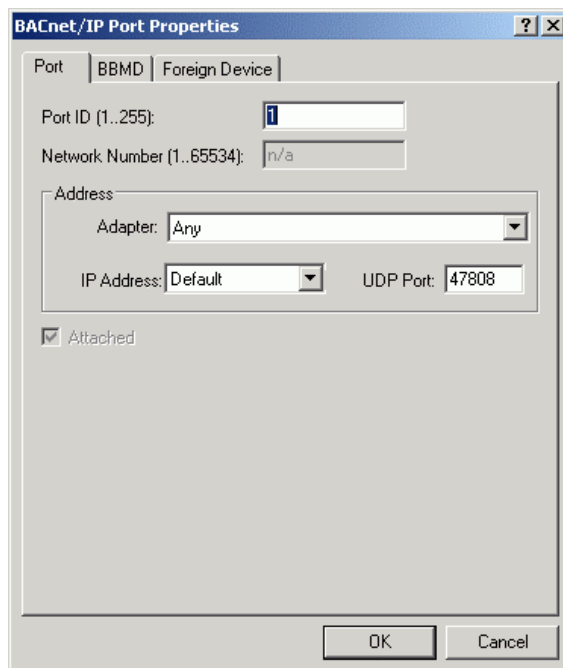


Fig. 2-16: Properties of the BACnet Service

10. Close the dialog by clicking **[OK]** to save changes or by clicking **[Cancel]** to close without saving.

In the network properties, you will see the successfully inserted BACnet Service "Cimetrics BACstac™" (see Fig. 2-17).

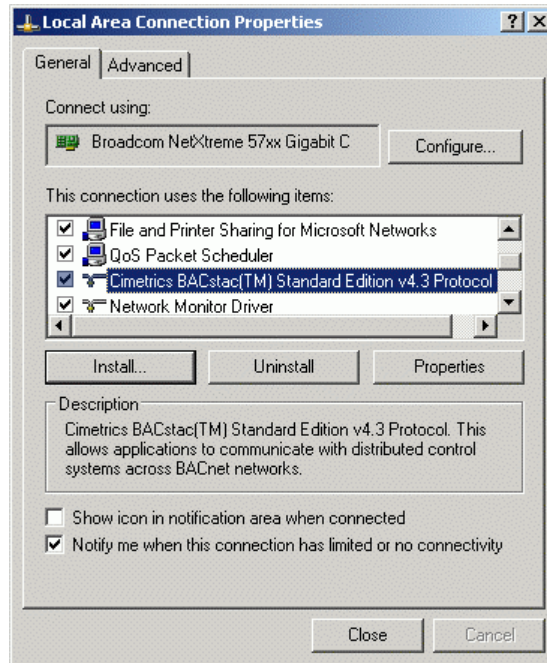


Fig. 2-17: Successful insertion of the BACnet Service

The installation of the BACnet Configurator and BACnet Service is finished.

3 The WAGO BACnet Configurator

The WAGO BACnet is an independent commissioning, configuration and management software. The tasks of the BACnet Configurator include, among other things, the logical structuring of the project and BACnet devices within a BACnet/IP network, the addressing of the controller, the configuration of the client and the server in each individual WAGO BACnet/IP controller as well as a value browser for viewing BACnet object properties.

3.1 Function

The central component of the BACnet Configurator is the database for managing BACnet devices. For BACnet/IP controllers from WAGO, all configuration information is stored in this database and can therefore be stored and restored at any time. The configuration information of a controller includes, among other things, the SYM_XML file that contains the program variables of the IEC application, and the so-called Override file that contains configuration data created by means of the BACnet Configurator.

BACnet devices and objects are displayed, on the one hand, in a flat, non-hierarchical network view and, on the other hand, in a structured view that can be freely configured by the user (Structured View). The Structured View allows the user to organize BACnet devices and objects according to logical aspects, such as their location or responsibility within a building.

Changes can be made online and/or offline, depending on the type of configuration data, i.e. with or without a connection between the BACnet/IP Controller and the PC on which the BACnet Configurator is installed. If, for example, devices in the BACnet/IP network are being sought, IP settings are being set or data is being backed up/restored, these changes are done online. Changes can be made to configurations of BACnet objects, Client Mappings (links between BACnet properties) and BACnet network settings (e.g. for BBMD, PTP, etc.) both online and offline. In offline changes, the new data are first saved in the database and can be downloaded at a later time into the desired devices.

In summary, the BACnet Configurator queries, monitors and alters current values of object properties. Supplemented by a whole series of BACnet services, the user can thus act on a BACnet/IP network.

3.1.1 BACnet Objects

According to the BACnet Standard, 25 different objects and 38 services are supported (Last update: BACnet Standard SSPC 135-2004). An object is structured in several object-specific properties. These properties are altered using services.

Objects can be created and configured and the default values of their properties can be changed in the BACnet Configurator. Three types of objects are differentiated:

1. BACnet objects defined by the IEC or SYM_XML file (SYM_XML objects)
2. Automatically installed BACnet objects that represent the inputs/outputs of the modules connected to the controller (native objects)
3. BACnet objects created by the BACnet Configurator (override objects)

Even if the BACnet Configurator recognizes and displays the origin of an object (SYM_XML, native, override), it presents all three types of objects in the same manner and allows a uniform handling of all types of objects.

3.1.1.1 Creation of BACnet Objects

The manual creation of objects or the import of a SYM_XML file (IEC) are not absolutely necessary for the controller to run. If the BACnet Configurator is started without any additional settings, configurations or imports, the controller creates objects that are available through the connected module constellation (native objects) in online mode.

The properties of the automatically created, native BACnet objects of the digital and analog inputs and outputs are given default values. The default values can be configured in the user interface. For the first boot up of the controller, default values saved in the firmware are used in the objects, e.g. "111" for the property "Limit_Enable" of the Analog-Input Object.

Other objects, in addition to the automatically installed objects, can also be created.

Objects that can be created with the BACnet Configurator:

BACnet Object	Description
ACCUMULATOR	Count value entry; counts incoming impulses
ANALOG_INPUT	Analog input; measures voltage or temperature, for instance
ANALOG_OUTPUT	Analog output; is used to position controllers, for instance
ANALOG_VALUE	Analog value; results from a calculation, for instance
AVERAGING	Statistical average and standard deviation; calculates the average and standard deviation of a referenced property

BACnet Object	Description
BINARY_INPUT	Binary input; measures whether a switch is switched on or off, for instance
BINARY_OUTPUT	Binary output; alternates between two states
BINARY_VALUE	Binary value; represents one of two possible states
CALENDAR	Calendar; contains data lists for creating days/times/etc. with special status (e.g. holidays)
COMMAND	Command; writes a predefined list of properties, one after the other
FILE	File; represents a file that can be read and/or written using BACnet services
GROUP	Group; used to group property values
LIFE_SAFETY_POINT	Safety point; encapsulates information on the status of a hazard report
LIFE_SAFETY_ZONE	Safety zone; summarizes safety points and/or additional safety zones
MULTISTATE_VALUE	Multistate value; represents one of several possible states
NOTIFICATION_CLASS	Notification class; assigns alarm and event reports to one or more recipients
PULSE_CONVERTER	Impulse converter; converts counted impulses into physical units.
SCHEDULE	Schedule; for establishing certain actions at predefined times
TREND_LOG	Trend log; records time- or event-based changes in property values

Objects that are not created using BACnet Configurator:

Object	Description
DEVICE	Device; represents the BACnet/IP Controller. There is only one device object that is automatically created by the controller.
LOOP	Control loop; represents a closed loop control (either P-, I-, D-, PI-, PD- or PID).



Note

The Loop Object is expected to be supported starting with software version 2 of the BACnet/IP Controller and the BACnet Configurator.



Note

A maximum of 1000 objects can be created in the 750-830 BACnet/IP Controller.

3.1.1.2 BACnet Instance Numbers

Each BACnet device within a BACnet network must possess a unique instance.

The instance number is the object instance number of the device's Device Object and can be read from the Object ID of the Device Object.

Object ID	
Object Type	Object Instance Number

The instance number is generated from the first (lowest value) 22 bits of the MAC address of the BACnet/IP controller:

MAC address of the controller: 00:30:DE:02:11:3F
22 bits (LSB) of the MAC address 00:30:DE:02:11:3F

$0x2113F_{\text{hex}} = 135487_{\text{dez}}$

The instance number of the BACnet/IP controller is 135487 in this case.

There is still the possibility of reconfiguring instance numbers. Automatic generation only affects the standard instance number without configuration.



Note

By changing the instance number of an object, all persistent property values of the respective object will be deleted. From that point, the configured values will be used. Persistent property values are those values which you have loaded into the controller using the "Commit_Value" function.



Additional Information

The name of a device that is still unconfigured is determined as follows by the controller and displayed in the BACnet Configurator: "Device_[MAC-Address]". By appending the MAC address along with the instance number, the device name can also be uniquely resolved as such in the network.

Example, "Device_0030de02113f".

3.1.2 BACnet Services

The following table shows which BACnet services are used by the functions of the WAGO BACnet Configurator.

Function	BACnet Service(s)
Searching the network using Scan-Dialog	<ul style="list-style-type: none"> • Who-Is • I-Am (received) • ReadProperty • ReadPropertyMultiple (only if "Scan Objects" is set)
<p>The existence of one or more found or fixed, entered devices from the pool Scan is tested.</p> <p>The search is conducted either manually, or automatically if the device is selected in the tree, added to the database or opened for configuration for the first time.</p>	<ul style="list-style-type: none"> • ReadProperty • ReadPropertyMultiple
Automatic device search ("Device Auto Discovery")	<ul style="list-style-type: none"> • Who-Is • I-Am (received) • ReadProperty
Online/offline monitor for devices	<ul style="list-style-type: none"> • Who-Is • I-Am (received) • ReadProperty
Monitor for property values	<ul style="list-style-type: none"> • ReadProperty
Writing of a property value	<ul style="list-style-type: none"> • WriteProperty
Restart of a device	<ul style="list-style-type: none"> • ReinitializeDevice (cold or warm start)
Time synchronization	<ul style="list-style-type: none"> • TimeSynchronization • UTCTimeSynchronization
Communication behavior of the device	<ul style="list-style-type: none"> • DeviceCommunicationControl
Commands to Life-Safety Object	<ul style="list-style-type: none"> • LifeSafetyOperation
BACnet file transfer	<ul style="list-style-type: none"> • ReadProperty • AtomicReadFile (if a file object is being read) • AtomicWriteFile (if a file object is being written)
BACnet backup and restoration	<ul style="list-style-type: none"> • ReadProperty • ReinitializeDevice (StartBackup, EndBackup, StartRestore, EndRestore, AbortRestore) • AtomicReadFile (during a backup) • AtomicWriteFile (during a restoration)

3.1.3 Configuration Files

The BACnet Configurator processes different configuration files:

- The **SYM_XML file** is created using the software *WAGO-I/O-PRO CAA*. The file contains, among other things, all BACnet-specific variables of the IEC application (IEC variables). In order to further process these IEC variables, the SYM_XML file is imported into the BACnet Configurator (either offline or online by uploading from an already configured device). IEC variables and BACnet objects defined by IEC variables can be configured and linked with BACnet object properties in the BACnet Configurator. An IEC variable can only be linked if it has not already been assigned permanently to a property by SYM_XML.

- The **Override File** contains all configuration information created with the BACnet Configurator, for example the previously described assignment of IEC variables to object properties, but also default values of properties and Client Mappings.
The name "Override" implies that the configuration information in this file has precedence over the standard configuration settings in the controller firmware.
Every Override File is an XML file according to Extensible-Markup-Language (XML) 1.0, Fourth Edition. Therefore, a large part of this description consists of XML element definitions. The Override File can be installed, processed and uploaded.

- The **WAGO Database XML** contains generic BACnet devices and WAGO BACnet devices. The SYM_XML file (if available) and the Override file (always present) are stored in the database for WAGO BACnet devices. All BACnet configuration information is included. Each external BACnet device is stored as a summary of its objects, properties and property values. The file format corresponds to the format of the Override file.

- The file **persistent.bin** is a configuration data memory for changes in runtime. Data that are transmitted ad hoc via "Commit Value" to the controller are saved here. The file is used by the Configurator and should not be manually altered.

The central configuration files, SYM_XML and Override, for all WAGO BACnet/IP controllers found in the database of the BACnet Configurator are saved. It is therefore possible to recover a configuration at any time.

3.1.4 Persistent and Configured Values

Values of object properties can be changed in two ways in the BACnet Configurator:

In the configuration area (display of configured values)

All settings for objects, properties and values are done here. Changes to properties of an object are marked with a symbol. The entire configuration is loaded into the controller.

In the runtime environment (display of life values)

Fast, convenient changing of one or more property values and direct loading into the controller. The data will be persistently stored.



Note

Properties that have been changed in the configuration area and marked as changed overwrite the persistent runtime values. Persistent values remain when downloading a configuration only if these values have not been changed in the configuration area.

An example of working with persistent and configured values can be found on page 94.

3.1.5 EDE Files

EDE files are used for exchanging BACnet device information between different manufacturers. The device information contains objects or default values for certain properties contained in the device, for instance.

EDE files can be created and imported by the BACnet Configurator. These are not (device) configuration files since not all information on an object is usually listed in an EDE file.



Additional Information

The definition of the EDE format can be found on the web site <http://www.big-eu.org/service/software.php>.

3.2 The Graphical User Interface

The graphical user interface of the WAGO BACnet Configurator is described in the following.

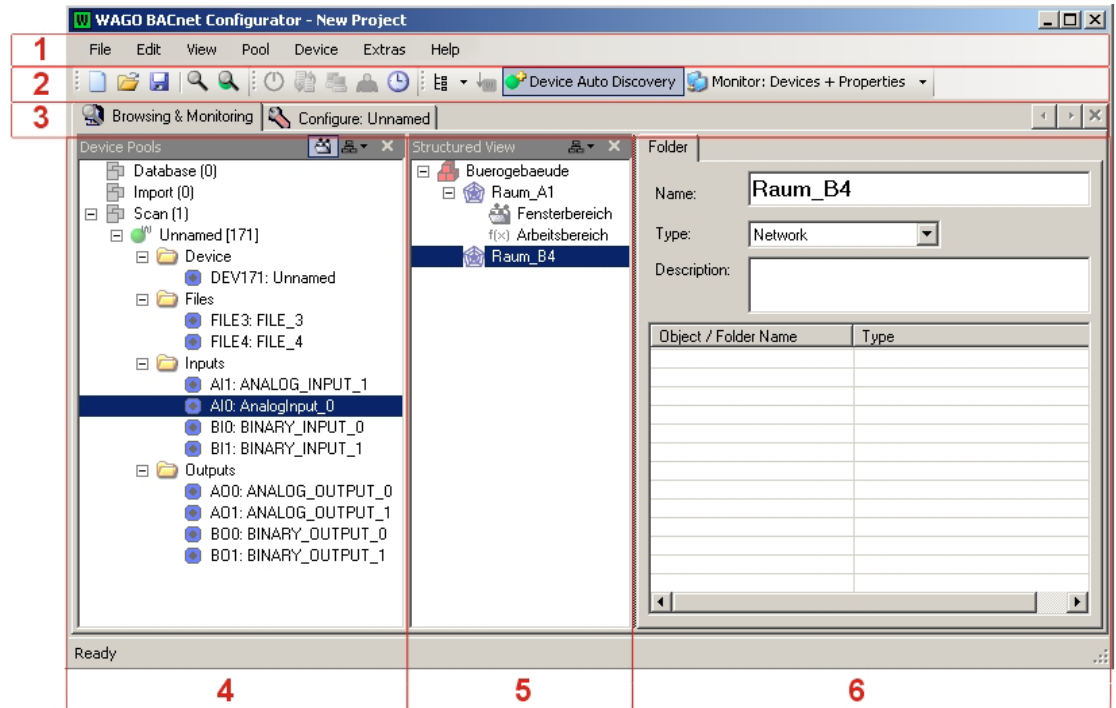


Fig. 3-1: Graphical User Interface

Legend:

- ① Menu bar (see section 3.2.1)
- ② Toolbar (see section 3.2.2)
- ③ Views (see section 3.2.3)
 - ④ Device Pools (see section 3.2.3.1)
 - ⑤ Structured View (see section 3.2.3.2)
- ⑥ Configuration area (see section 3.2.4)

3.2.1 Menu Bar

3.2.1.1 File

The menu item **File** is used to create, open, save and close projects.

Menu Item	Description
New Project	Create new project
Open Project...	Open existing project
Save Project	Save processed project
Save Project as...	Save processed project as
Exit	End program

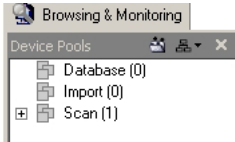



3.2.1.2 Edit

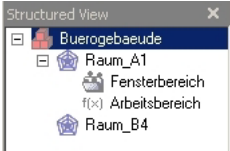

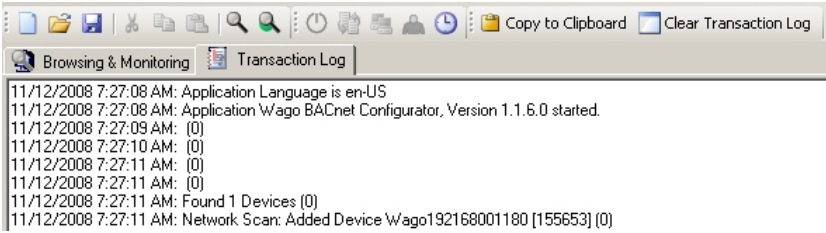
The menu item **Edit** is used to edit objects in the "Configure" rider.

Menu Item	Description
Cut	Cutting selected objects or object properties
Copy	Copying of selected objects or object properties
Paste	Insertion of selected objects or object properties

3.2.1.3 View

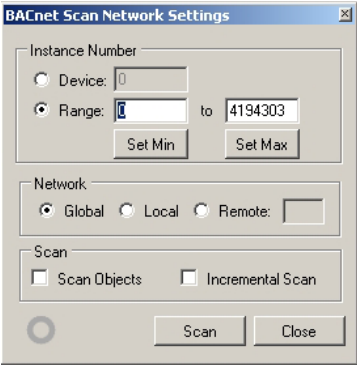
The menu item **View** is used to switch between different views.

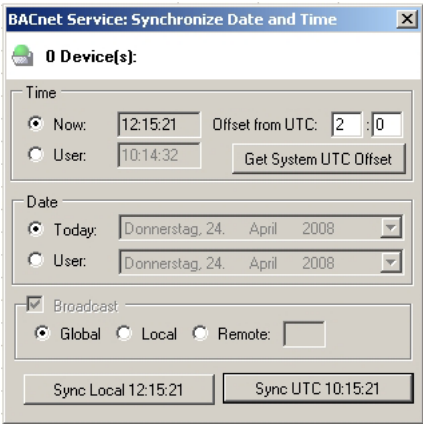
Menu Item	Description
BACnet Browser	<p>The BACnet Browser "Browsing & Monitoring" displays the riders "Device Pools" and "Structured View" on the left side and the configuration area on the right side. The riders "Browsing & Monitoring" and "Device Pools" are displayed when starting the BACnet Configurator as standard procedure (see Fig. 3-2).</p>  <p>Fig. 3-2: Riders "Browsing & Monitoring"</p> <ul style="list-style-type: none">  Switching between folder view and list view for objects of a device  Sorting of the devices in ascending or descending order in alphabetical order, according to online status, device or vendor ID.  Closing the Device Pools view

Menu Item	Description				
Structured View	<p>The Structured View represents a logical network construction in a tree structure of folders, subfolders and devices. It is opened by clicking on the "View" button in the toolbar.</p>  <p>Fig. 3-3: Structured View</p>  Closing the Structured View				
Transaction Log	<p>In the rider "Transaction Log", all actions since the start of the software are documented with a time stamp (see Fig. 3-4).</p>  <p>Fig. 3-4: Transaction Log</p> <table border="0"> <tr> <td data-bbox="614 1003 847 1037">[Copy to Clipboard]</td> <td data-bbox="922 1003 1377 1066">Copying of the content of the Transaction Log onto the clipboard</td> </tr> <tr> <td data-bbox="614 1081 895 1115">[Clear Transaction Log]</td> <td data-bbox="922 1081 1361 1115">Delete all entries in the Transaction Log</td> </tr> </table>	[Copy to Clipboard]	Copying of the content of the Transaction Log onto the clipboard	[Clear Transaction Log]	Delete all entries in the Transaction Log
[Copy to Clipboard]	Copying of the content of the Transaction Log onto the clipboard				
[Clear Transaction Log]	Delete all entries in the Transaction Log				

3.2.1.4 Pool

The menu item **Pool** is used to configure the three Device Pools (Scan, Import, Database). Depending on the selected pool, some of the sub-items are enabled or disabled.

Menu Item	Description
Scan...	<p>The Scan Dialog is non-modal and also remains open with a click in the main window. The dialog is used to search the network for BACnet devices. Found devices are displayed in the Scan pool.</p>  <p>Fig. 3-5: Search for BACnet devices</p> <p>Instance Number</p> <ul style="list-style-type: none"> └─Device Instance of a particular device └─Range Instance number of a range └─[Set Min] Lower limit of the instance numbers └─[Set Max] Upper limit of the instance numbers <p>Network</p> <ul style="list-style-type: none"> └─Global Sending of the request to all accessible subnetworks └─Local The request is only sent to the subnetwork to which the PC is connected └─Remote The request is sent to a network number 1-65534. <p>Scan</p> <ul style="list-style-type: none"> └─Scan Objects Querying of devices and objects └─Incremental Scan Adding new devices without discarding already scanned devices [Scan] Execution of the network search [Close] Closing the dialog - has no effect on the network search
Rescan All Devices...	Re-scan all devices from the Scan pool
Device Auto Discovery	Execute automatic device recognition and device search in the network immediately
Monitor All Devices	Automatic status query of all devices, if selected

Menu Item	Description																										
Services																											
<ul style="list-style-type: none"> └ Synchronize Time... 	<p>Opening a dialog for time synchronization of the devices</p> <p>In this dialog, the time offset in hours and minutes in relation to UTC time (Greenwich meridian), which is independent of summer (daylight savings) and winter (standard) time, is set.</p>  <p>Fig. 3-6: Synchronize time</p> <table border="1"> <thead> <tr> <th colspan="2">Time</th> </tr> </thead> <tbody> <tr> <td>└ Now</td> <td>System time of the PC</td> </tr> <tr> <td>└ User</td> <td>Freely adjustable time</td> </tr> <tr> <td>└ [Get System UTC Offset]</td> <td>Automatic calculation of the time offset</td> </tr> <tr> <th colspan="2">Date</th> </tr> <tr> <td>└ Today</td> <td>Locally set date</td> </tr> <tr> <td>└ User</td> <td>Date of another user</td> </tr> <tr> <th colspan="2">Broadcast</th> </tr> <tr> <td>└ Global</td> <td>Sending of the request to all accessible subnetworks</td> </tr> <tr> <td>└ Local</td> <td>The request is only sent to the subnetwork to which the PC is connected</td> </tr> <tr> <td>└ Remote</td> <td>Network number 1-65534</td> </tr> <tr> <td>[Sync Local _ : _ : _]</td> <td>Synchronizing of the device time with the PC time</td> </tr> <tr> <td>[Sync UTC _ : _ : _]</td> <td>Synchronizing of the device time with UTC time</td> </tr> </tbody> </table>	Time		└ Now	System time of the PC	└ User	Freely adjustable time	└ [Get System UTC Offset]	Automatic calculation of the time offset	Date		└ Today	Locally set date	└ User	Date of another user	Broadcast		└ Global	Sending of the request to all accessible subnetworks	└ Local	The request is only sent to the subnetwork to which the PC is connected	└ Remote	Network number 1-65534	[Sync Local _ : _ : _]	Synchronizing of the device time with the PC time	[Sync UTC _ : _ : _]	Synchronizing of the device time with UTC time
Time																											
└ Now	System time of the PC																										
└ User	Freely adjustable time																										
└ [Get System UTC Offset]	Automatic calculation of the time offset																										
Date																											
└ Today	Locally set date																										
└ User	Date of another user																										
Broadcast																											
└ Global	Sending of the request to all accessible subnetworks																										
└ Local	The request is only sent to the subnetwork to which the PC is connected																										
└ Remote	Network number 1-65534																										
[Sync Local _ : _ : _]	Synchronizing of the device time with the PC time																										
[Sync UTC _ : _ : _]	Synchronizing of the device time with UTC time																										
Add																											
<ul style="list-style-type: none"> └ Wago Device 	Adding of new WAGO BACnet/IP controllers, if the Database pool is chosen.																										

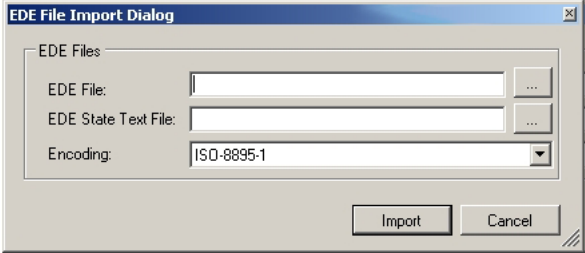
Menu Item	Description
Import	
└EDE...	<p>Importing of EDE files</p> <p>If EDE files are imported, the devices described in them are taken into the Import pool. From there, they can be taken into the database. When doing so, a device is first added to the database as a generic device because of the incomplete information in the EDE files. Generic devices added to the database can be converted to WAGO devices. Depending on the pool just selected, the menu items are enabled or disabled.</p> 
<p>EDE Files</p> <hr/> <p>└EDE File Importing of the EDE file "EDE File"; contains a list of all objects</p> <hr/> <p>└EDE State Text File Importing of the EDE file "EDE State Text File"; contains descriptions of states, e.g. "0/1" or "on/off" for digital values</p> <hr/> <p>└Encoding Selection of a character coding for EDE files: ISO-8895-1, ASCII or UTF8</p> <hr/> <p>[Import] Importing of the incorporated EDE files</p> <hr/> <p>[Cancel] Closing of the dialog</p>	
└Override...	Importing of an Override file (WAGO device configuration file in XML format)
└SYM_XML	Creation of a WAGO device in the Import Pool based on a SYM_XML file
└WAGO Database XML...	<p>Importing of the WAGO database</p> <p>Entries in the database can be exported and re-imported as WAGO BACnet Database XML. This possibility existed because import and export using the EDE format does not include all data.</p>

Fig. 3-7: Importing an EDE file

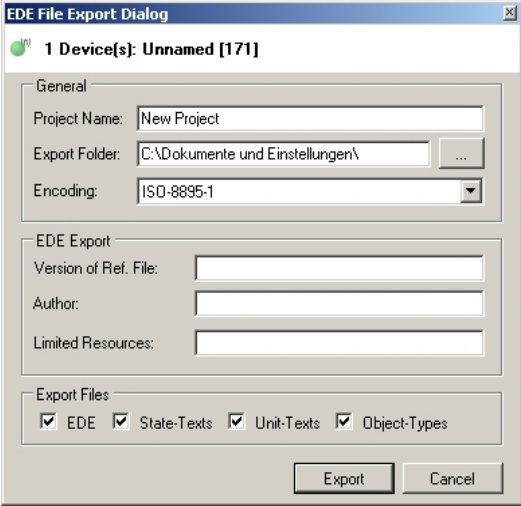

Menu Item	Description
Export	
<p>└─EDE...</p>	<p>Exporting as EDE file if devices are present in the database</p>  <p>General</p> <p>└─Project Name Name of the project</p> <p>└─Export Folder Folder in which the EDE files are stored</p> <p>└─Encoding ISO-8895-1, ASCII or UTF8 character format</p> <p>EDE Export</p> <p>└─Version of Ref. File Version of the project</p> <p>└─Author Author of the project</p> <p>└─Limited Resources Special limitations of the project that must be observed</p> <p>Export Files</p> <p>└─EDE Information on the project, contained objects, descriptions, values and references to the State Text and Unit file</p> <p>└─State-Texts Lists of states from State Text, Inactive Text and Active Text Properties of multistate or binary objects Example: on/off, open/close. Reference numbers included refer to the EDE file.</p> <p>└─Unit-Texts List of all BACnetEngineering Units and proprietary units of a project and the codes belonging to each of them</p> <p>└─Object-Types List of supported BACnet objects; EDE file refers to this file</p> <p> Additional Information See also the definition of the EDE format at http://www.big-eu.org/service/software.php</p>

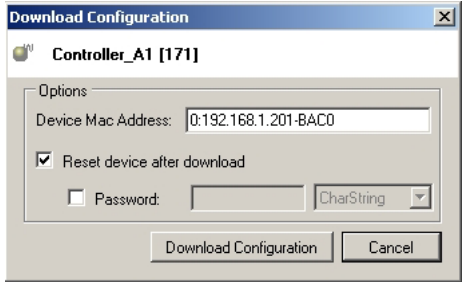
Fig. 3-8: Exporting an EDE file

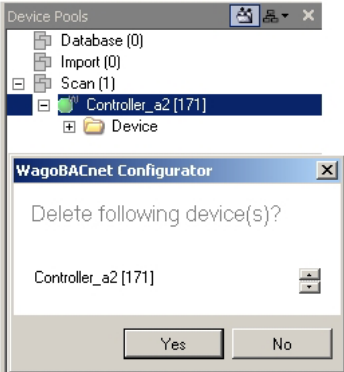
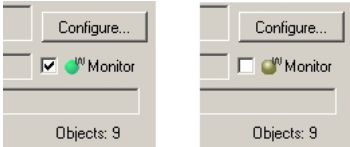
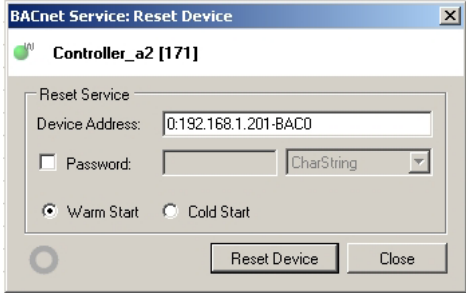
Menu Item	Description
	[Export] Exporting of EDE file(s) [Cancel] Abort settings
└WAGO Database XML..	Exporting of the WAGO Database to the selected folder
Remove All Devices...	Delete all devices from the selected pool

3.2.1.5 Device

The menu item **Device** is used to configure devices as well as to backup, recover, import and export configuration data.

Depending on which pool the device is selected from, some of the sub-items are enabled or disabled.

Menu Item	Description												
Close Configuration	Closing of the configuration for the selected device (only in the rider "Configure")												
Download Configuration	<p>Downloading of the configuration</p>  <p>Abb. 3-9: Downloading of the configuration</p> <table border="1"> <thead> <tr> <th colspan="2">Options</th> </tr> </thead> <tbody> <tr> <td>↳ Device Mac Address</td> <td>Network number followed by BACnet MAC address. The latter is an approximate IP address for BACnet/IP followed by a UDP Port Number (usually the symbolic value BAC0_{hex} or 47808_{dez}). For BACnet/MSTP, the BACnet MAC address is a number within the range 0-255. Example: 192.168.1.201-BACO</td> </tr> <tr> <td>↳ Reset device after download</td> <td>Triggering of a restart after downloading the configuration</td> </tr> <tr> <td>↳ Password</td> <td>If selected, entry of the password in the format CharString, ISO_8859_1_String, UCS_2_String</td> </tr> <tr> <td>[Download Configuration]</td> <td>Load current configuration to the controller (only in the rider "Browsing & Monitoring")</td> </tr> <tr> <td>[Cancel]</td> <td>Abort/closing of the dialog</td> </tr> </tbody> </table>	Options		↳ Device Mac Address	Network number followed by BACnet MAC address. The latter is an approximate IP address for BACnet/IP followed by a UDP Port Number (usually the symbolic value BAC0 _{hex} or 47808 _{dez}). For BACnet/MSTP, the BACnet MAC address is a number within the range 0-255. Example: 192.168.1.201-BACO	↳ Reset device after download	Triggering of a restart after downloading the configuration	↳ Password	If selected, entry of the password in the format CharString, ISO_8859_1_String, UCS_2_String	[Download Configuration]	Load current configuration to the controller (only in the rider "Browsing & Monitoring")	[Cancel]	Abort/closing of the dialog
Options													
↳ Device Mac Address	Network number followed by BACnet MAC address. The latter is an approximate IP address for BACnet/IP followed by a UDP Port Number (usually the symbolic value BAC0 _{hex} or 47808 _{dez}). For BACnet/MSTP, the BACnet MAC address is a number within the range 0-255. Example: 192.168.1.201-BACO												
↳ Reset device after download	Triggering of a restart after downloading the configuration												
↳ Password	If selected, entry of the password in the format CharString, ISO_8859_1_String, UCS_2_String												
[Download Configuration]	Load current configuration to the controller (only in the rider "Browsing & Monitoring")												
[Cancel]	Abort/closing of the dialog												

Menu Item	Description
Configure...	Opening of the configuration area for a previously selected device (only in the rider "Browsing & Monitoring")
Add/Store to Database	Storing the device in the database ("Add" when first entering the device, after that, "Store")
Rescan selected Device(s)	Rescanning of a device (object list and properties)
Remove...	<p>Removal of a selected device</p> <p>Several devices can be removed using multiple selection in the pool rider.</p>  <p>Fig. 3-10: Delete device</p>
Device Monitor	<p>Devices are monitored using "Device Monitor" (if set). Switching the monitor on and off can also be done in the configuration area of the device (see Fig. 3-11).</p>  <p>Fig. 3-11: Monitor devices</p>
Services	
Reset...	<p>Restarting of each of the enabled devices and entering of an optional password for the Reset command.</p>  <p>Fig. 3-12: Reset Device</p> <hr/> <p>Reset Service</p> <p>└─ Device Address BACnet MAC address of the device to be restarted</p>


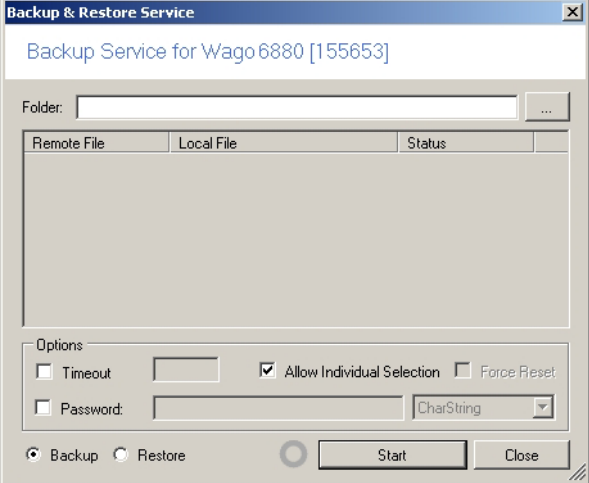
Menu Item	Description
	<p>└─Password If selected, entry of the password in the format CharString, ISO_8859_1_String, UCS_2_String</p> <hr/> <p>└─Warm/Cold Start Software reset</p> <hr/> <p>[Reset Device] Triggering of a restart</p> <hr/> <p>[Close] Closing of the dialog without a device restart</p> <hr/> <p> Note To reset the password, open the configuration, select the device in the tree to the left, choose the rider "IP Settings" and enter a new password under "Security". The new password is enabled after downloading and restarting.</p>
└─ Backup & Restore...	<p>Backup Creation of a backup copy of the configuration data of a selected device: Time stamp for testing new configurations, override, SYM_XML, persistent, NOVRAM, EEPROM and CoDeSys data (without WebVisu).</p> <p>Restore Restoration of the configuration data of the device just selected</p>  <p>Folder Selection of the source/target folder, depending on whether a backup or restoration is being performed</p> <hr/> <p>The remote and local file and the status of the backup/restoration appear in the display.</p>

Fig. 3-13: Backup and restoration

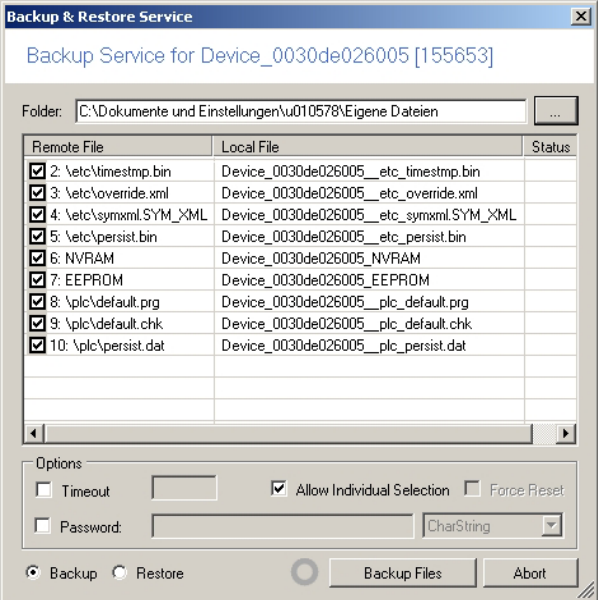
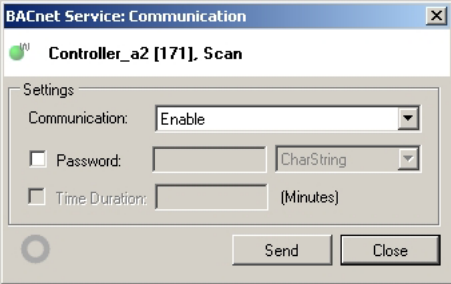

Menu Item	Description
	<p>Options</p> <p>└─Timeout Timeout (in seconds), which is written in the property "Backup_Failure_Timeout" as soon as Backup/Restore is executed. If the BACnet device receives no command belonging to a backup/restore procedure within this timeout, the device ends the backup/restore procedure.</p> <p>└─Password Password in the format CharString, ISO8859_1_String or UCS_2_String</p> <p>└─Allow Individual Selection Allows the selection of the file objects that can be backed up/restored (if checkbox set).</p> <p>└─Force Reset Restart of a device after a restoration</p> <p>Backup Saving device data</p> <p>Restore Restoration of device data</p> <p>[Start] Starting Backup or Restore</p>  <p>[Cancel] Closing of the dialog without changes</p>

Abb. 3-14: Backup files

Data is stored with a backup according to device name. If data is backed up, the Configurator searches for this exact name (caution in case of renaming). If data is transferred to another device using Restore, and "not found" is displayed under "Local File," double click on the respective line and select the files manually. Pay attention to corresponding types and the order of the files when doing this.

Menu Item	Description
<p>└─Communication...</p>	<p>Opening of a dialog for configuration of BACnet services for the selected device</p>  <p>Fig. 3-15: Service settings</p> <hr/> <p>Settings</p> <hr/> <p>└─Communication "Enable" (enabling of services), "Disable" (disabling of all services except for "Restart Device" and the communication service itself) and "Disable Initiation" (disabling of initialization)</p> <hr/> <p> Note Only those services that are used in the BACnet Configurator are affected by the settings. No other services supported by the controller are altered.</p> <hr/> <p>└─Password Entering of a password in the format CharString, ISO_8859_1_String or UCS_2_String (if checkbox set)</p> <hr/> <p>└─Time Duration Entering of the time, in minutes, for the disabling of services (only available if "Communication > Disable") is chosen</p> <hr/> <p>[Send] Updating of the service settings</p> <hr/> <p>[Close] Discarding of changes since the last backup; closing of the dialog</p>

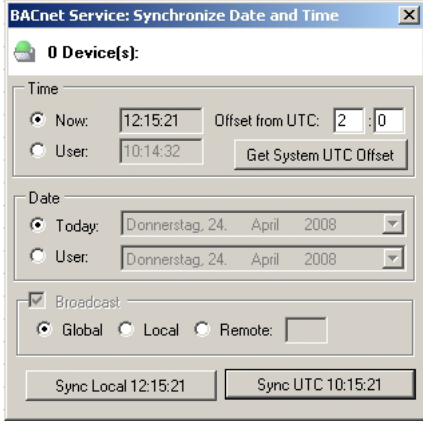
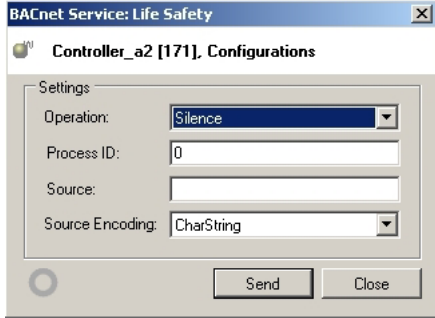
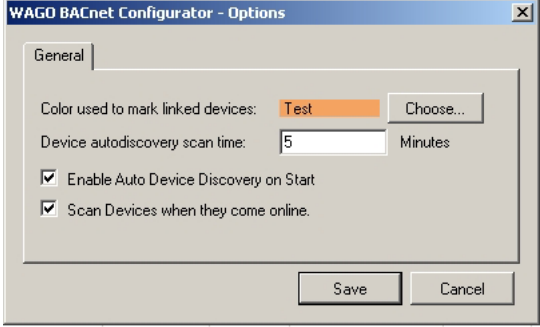
Menu Item	Description
<p>└─Synchronize Time...</p>	<p>Opening a dialog for time synchronization of the devices</p> <p>In this dialog, the time offset in hours and minutes in relation to UTC time (Greenwich meridian), which is independent of summer (daylight savings) and winter (standard) time, is set.</p>  <p>Time</p> <p>└─Now System time of the PC</p> <p>└─User Freely adjustable time</p> <p>└─ [Get System UTC Offset] Automatic calculation of the time offset</p> <p>Date</p> <p>└─Today Locally set date</p> <p>└─User Date of another user</p> <p>Broadcast</p> <p>└─Global Sending of the request to all accessible subnetworks</p> <p>└─Local The request is only sent to the subnetwork to which the PC is connected</p> <p>└─Remote Network number 1-65534</p> <p>[Sync Local _ : _ : _] Synchronizing of the device time with the PC time</p> <p>[Sync UTC _ : _ : _] Synchronization of the device time with UTC time</p>

Fig. 3-16: Synchronize time

Menu Item	Description
<ul style="list-style-type: none"> └ Life Safety Operation 	<p>The following dialog is displayed if a Life Safety Object has been added to a device and this was selected in the Device Pools with the mouse. The LifeSafetyOperation Service, along with other read/write services, takes a special position and can therefore be specially configured.</p>  <p>Fig. 3-17: Life Safety Operation</p> <p>Settings</p> <ul style="list-style-type: none"> └ Operation Settings of the alarm type: Silence, Silence Audible, Silence Visual, Reset, Reset Alarm, Reset Fault, Unsilence, Unsilence Audible, Unsilence Visible └ Process ID Entering of any chosen number in order to limit the response to this query by responses to other queries. └ Source Character string for the description of the user who is triggering the service └ Source Encoding Format for the entry "Source"; CharString, ISO8859_1_String or UCS_2_String [Send] Generation of a LifeSafetyOperation service, e.g. to switch off alarms [Close] Closing of the dialog
Import	
└ Upload SymXML from Device...	Load SYM_XML file from the device
└ SymXML from File...	Opening of a SYM_XML file
└ Remove SymXML	Deletion of a SYM_XML file
└ Upload Override from Device...	Load the Override file from the device
└ Load Override from File...	Opening of an Override file
└ Remove Override	Deletion of the Override file
Export	
└ EDE...	Exporting of the EDE file; as soon as devices are available in the database, they can be exported as EDE files.
└ SYM_XML...	Export SYM_XML file
└ Override...	Export Override file
└ WAGO Database XML	Export WAGO database

3.2.1.6 Extras

The menu item **Extras** contains general setting possibilities in the BACnet Configurator.

Menu Item	Description
Options...	<p>Opening of a new dialog for supplementary settings:</p>  <p>Fig. 3-18: Supplementary settings</p> <p>General</p> <p>└─[Choose...] Choosing of a color to mark a selected device within different pools</p> <p>└─Minutes The "Device autodiscovery scan time" refers to the function "Device Auto Discovery" (see section 3.2.2). It indicates the time interval, in minutes, for the automatic search of the network for new devices.</p> <p>└─Enable Auto Device Discovery on Start Choose this option to search for devices with every software start of the network.</p> <p>└─Scan Devices when they come online Devices and their configuration may have changed while offline. If this option is selected, devices that go from the offline to the online state will be rescanned.</p> <p>[Save] Backup of settings</p> <p>[Cancel] Abort/closing of the dialog</p>

3.2.1.7 Help

The menu item **Help** contains information on the BACnet Configurator itself.

Menu Item	Description
About	Display of the version and copyright information

3.2.2 Toolbar











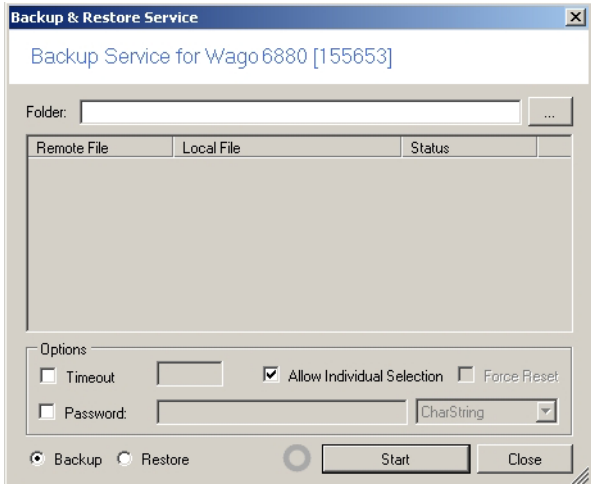
Symbol	Function	Description
	New Project	Creation of a new project
	Open Project	Opening of a window to select a project file
	Save	Saving of a project
	Cut	Cutting selected objects or object properties
	Copy	Copying of selected objects or object properties
	Paste	Insertion of selected objects or object properties
	BACnet Scan	Searching the network for BACnet devices and listing of these devices in the Scan pool
	Rescan Devices	Search object and property lists of the devices in the Scan pool again
	Reset	Restart of the selected device
	Backup & Restore	<p>Backup Creation of a backup copy of all configuration data of a selected device: Time stamp for testing new configurations, override, SYM_XML, persistent, NOVRAM, EEPROM and CoDeSys data (without WebVisu).</p> <p>Restore Restoration of the configuration data of the device just selected</p> 

Fig. 3-19: Backup and restoration

Folder Selection of the source/target folder, depending on whether a backup or restoration is being performed

The remote and local file and the status of the backup/restoration appear in the display.

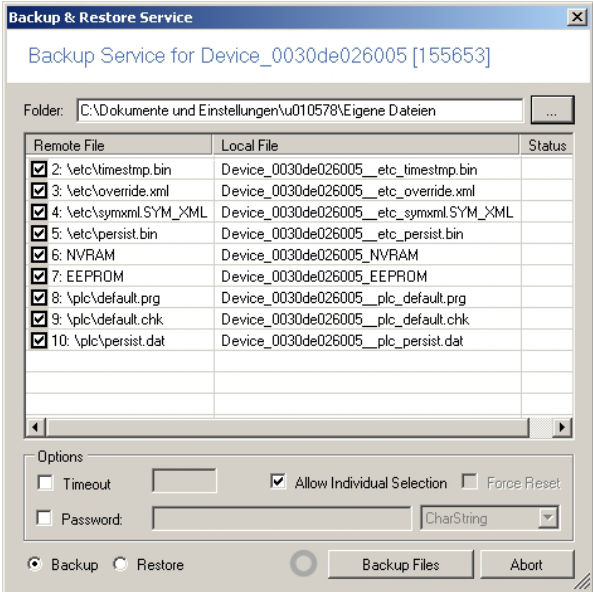

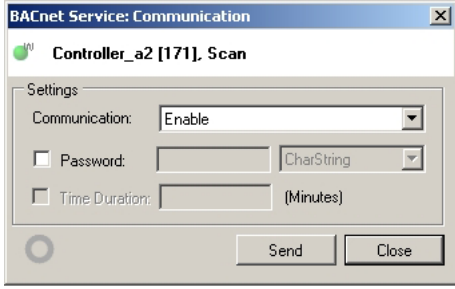


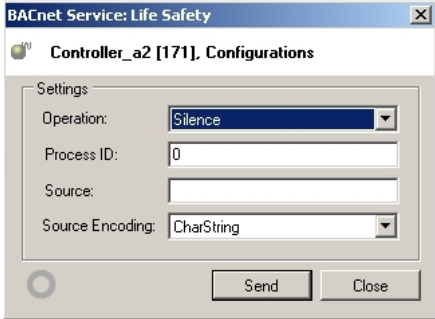

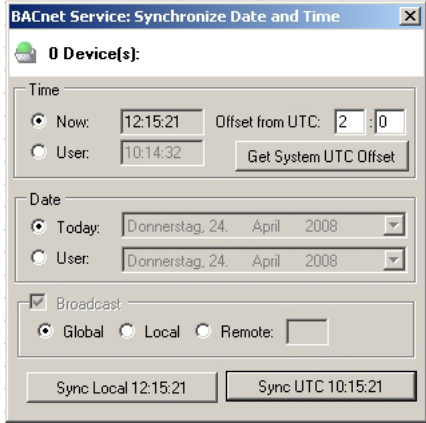
Symbol	Function	Description
		<p>Options</p> <p>└─Timeout Timeout (in seconds), which is written in the property "Backup_Failure_Timeout" as soon as backup/restore is executed. If the BACnet device receives no command belonging to a backup/restore procedure within this timeout, the device ends the backup/restore procedure.</p> <p>└─Password Password in the format CharString, ISO8859_1_String or UCS_2_String</p> <p>└─Allow Individual Selection Allows the selection of the file objects that can be backed up/restored (if checkbox set).</p> <p>└─Force Reset Restart of a device after a restoration</p> <p>Backup Saving device data</p> <p>Restore Restoration of device data</p> <p>[Start] Starting Backup or Restore</p>  <p>[Cancel] Closing of the dialog without changes</p>



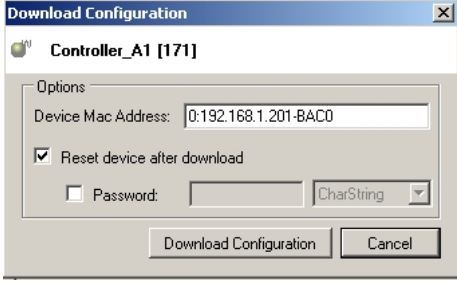

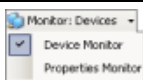
Abb. 3-20: Backup files

Data is stored with a backup according to device name. If data is backed up, the configurator searches for this exact name (caution in case of renaming). If data is transferred to another device using Restore, and "not found" is displayed under "Local File," double click on the respective line and select the files manually. Pay attention to corresponding types and the order of the files when doing this.



Symbol	Function	Description
	Communication...	<p>Opening of the dialog "Communication Service" for the selected device.</p>  <p>Fig. 3-21: Communication Service</p> <hr/> <p>Setting</p> <p>└─Communication "Enable" (enabling of services), "Disable" (disabling of all services except for "Restart Device" and the communication service itself) and "Disable Initiation" (disabling of initialization)</p> <hr/> <p> Note Only those services that are used in the BACnet Configurator are affected by the settings. No other services supported by the controller are altered.</p> <hr/> <p>└─Password Entering of a password in the format CharString, ISO_8859_1_String or UCS_2_String (if checkbox set)</p> <hr/> <p>[Send] Updating of the service settings</p> <hr/> <p>[Close] Discarding of changes since the last backup; closing of the dialog</p>

Symbol	Function	Description
	Life Safety Operation...	<p>The following dialog is displayed if a Life Safety Object has been added to a device and this was selected in the Device Pools with the mouse. The LifeSafetyOperation Service, along with other read/write services, takes a special position and can therefore be specially configured.</p>  <p>Fig. 3-22: Life Safety Operation</p> <hr/> <p>Settings</p> <ul style="list-style-type: none"> <li data-bbox="794 864 1390 1021"> └Operation Setting of the alarm types: Silence, Silence Audible, Silence Visual, Reset, Reset Alarm, Reset Fault, Unsilence, Unsilence Audible, Unsilence Visible <li data-bbox="794 1037 1390 1126"> └Process ID Any chosen number for limiting the response to this query by responses to other queries. <li data-bbox="794 1142 1390 1209"> └Source Character string for the description of the user who is triggering the service <li data-bbox="794 1225 1390 1314"> └Source Encoding Format for the entry "Source"; CharString, ISO8859_1_String or UCS_2_String <li data-bbox="794 1330 1390 1397"> [Send] Take over settings for the Life-Safety Object <li data-bbox="794 1413 1390 1435"> [Close] Closing of the dialog



Symbol	Function	Description																							
	Synchronize Time	<p>Opening a dialog for time synchronization of the devices. In this dialog, the time offset in hours and minutes in relation to UTC time (Greenwich meridian), which is independent of summer (daylight savings) and winter (standard) time, is set.</p>  <p>Fig. 3-23: Synchronize time</p> <table border="1"> <thead> <tr> <th colspan="2">Time</th> </tr> </thead> <tbody> <tr> <td><input checked="" type="radio"/> Now</td> <td>System time of the PC</td> </tr> <tr> <td><input type="radio"/> User</td> <td>Freely adjustable time</td> </tr> <tr> <td><input type="radio"/> [Get System UTC Offset]</td> <td>Automatic calculation of the time offset</td> </tr> <tr> <th colspan="2">Date</th> </tr> <tr> <td><input checked="" type="radio"/> Today</td> <td>Locally set date</td> </tr> <tr> <td><input type="radio"/> User</td> <td>Date of another user</td> </tr> <tr> <th colspan="2">Broadcast</th> </tr> <tr> <td><input checked="" type="radio"/> Global</td> <td>Sending of the request to all accessible subnetworks</td> </tr> <tr> <td><input type="radio"/> Local</td> <td>The request is only sent to the subnetwork to which the PC is connected</td> </tr> <tr> <td><input type="radio"/> Remote</td> <td>Network number 1-65534</td> </tr> <tr> <td><input 115="" 350="" 910="" 942"="" button"="" data-label="Page-Footer" type="button" value="Sync UTC _ : _ : _]</td> <td>Synchronization of the device time with UTC time</td> </tr> </tbody> </table> </td> </tr> </tbody> </table> </div> <div data-bbox="/> <p>WAGO-I/O-SYSTEM 759 WAGO BACnet Configurator</p> </td></tr></tbody></table>	Time		<input checked="" type="radio"/> Now	System time of the PC	<input type="radio"/> User	Freely adjustable time	<input type="radio"/> [Get System UTC Offset]	Automatic calculation of the time offset	Date		<input checked="" type="radio"/> Today	Locally set date	<input type="radio"/> User	Date of another user	Broadcast		<input checked="" type="radio"/> Global	Sending of the request to all accessible subnetworks	<input type="radio"/> Local	The request is only sent to the subnetwork to which the PC is connected	<input type="radio"/> Remote	Network number 1-65534	<input 115="" 350="" 910="" 942"="" button"="" data-label="Page-Footer" type="button" value="Sync UTC _ : _ : _]</td> <td>Synchronization of the device time with UTC time</td> </tr> </tbody> </table> </td> </tr> </tbody> </table> </div> <div data-bbox="/> <p>WAGO-I/O-SYSTEM 759 WAGO BACnet Configurator</p>
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Symbol	Function	Description												
	View	Choose between the views "Device Pools" and/or "Structured View"												
	Download Configuration	<p>Load current configuration to the controller (only in the rider "Browsing & Monitoring")</p>  <p>Abb. 3-24: Downloading of the configuration</p> <table border="1"> <thead> <tr> <th colspan="2">Options</th> </tr> </thead> <tbody> <tr> <td>—Device Mac Address</td> <td>Network number followed by BACnet MAC address. The latter is an approximate IP address for BACnet/IP followed by a UDP Port Number (usually the symbolic value BAC0_{hex} or 47808_{dez}). For BACnet/MSTP, the BACnet MAC address is a number within the range 0-255. Example: 192.168.1.201-BAC0</td> </tr> <tr> <td>—Reset device after download</td> <td>Triggering of a restart after downloading the configuration</td> </tr> <tr> <td>—Password</td> <td>If selected, entry of the password in the format CharString, ISO_8859_1_String, UCS_2_String</td> </tr> <tr> <td>[Download Configuration]</td> <td>Load current configuration to the controller (only in the rider "Browsing & Monitoring")</td> </tr> <tr> <td>[Cancel]</td> <td>Abort/closing of the dialog</td> </tr> </tbody> </table>	Options		— Device Mac Address	Network number followed by BACnet MAC address. The latter is an approximate IP address for BACnet/IP followed by a UDP Port Number (usually the symbolic value BAC0 _{hex} or 47808 _{dez}). For BACnet/MSTP, the BACnet MAC address is a number within the range 0-255. Example: 192.168.1.201-BAC0	— Reset device after download	Triggering of a restart after downloading the configuration	— Password	If selected, entry of the password in the format CharString, ISO_8859_1_String, UCS_2_String	[Download Configuration]	Load current configuration to the controller (only in the rider "Browsing & Monitoring")	[Cancel]	Abort/closing of the dialog
Options														
— Device Mac Address	Network number followed by BACnet MAC address. The latter is an approximate IP address for BACnet/IP followed by a UDP Port Number (usually the symbolic value BAC0 _{hex} or 47808 _{dez}). For BACnet/MSTP, the BACnet MAC address is a number within the range 0-255. Example: 192.168.1.201-BAC0													
— Reset device after download	Triggering of a restart after downloading the configuration													
— Password	If selected, entry of the password in the format CharString, ISO_8859_1_String, UCS_2_String													
[Download Configuration]	Load current configuration to the controller (only in the rider "Browsing & Monitoring")													
[Cancel]	Abort/closing of the dialog													
	Device Auto Discovery	<p>Switching on and off of the automatic device recognition</p> <p>If automatic device recognition is enabled, new devices are searched for in a cyclical manner. Found devices are added to the Scan pool. The cycle time for the search is determined under "Extras" > "Options" (only available in the rider "Browsing & Monitoring")</p>												
	Life Monitor	<p>Enabling and disabling of the Life-Monitor</p> <p>If Life-Monitor is enabled for properties, current property values of devices are read and displayed. The Life-Monitor for devices monitors whether a device is online or offline (only available in the rider "Browsing & Monitoring")</p>												

If "Transaction Log" is enabled, the following buttons are also displayed:

Symbol	Function	Description
 Copy to Clipboard	Copy to Clipboard	Copying of the Transaction-Log onto the clipboard
 Clear Transaction Log	Clear Transaction Log	Deletion of all entries in the Transaction Log

If the rider "Configure" is opened, the following buttons are also displayed:

Symbol	Function	Description
 IEC Mappings	IEC Mappings	Opening of the non-modal "IEC Mapping Editors" (see section 3.2.4.3.2)
 Client Mappings	Client Mappings	Opening of the non-modal "Client Mapping Editors" (see section 3.2.4.3.1)

3.2.3 Views

The two views "Device Pools" and "Structured View" on the left side display the devices, objects and logical structuring of the BACnet/IP network (see Fig. 3-25).

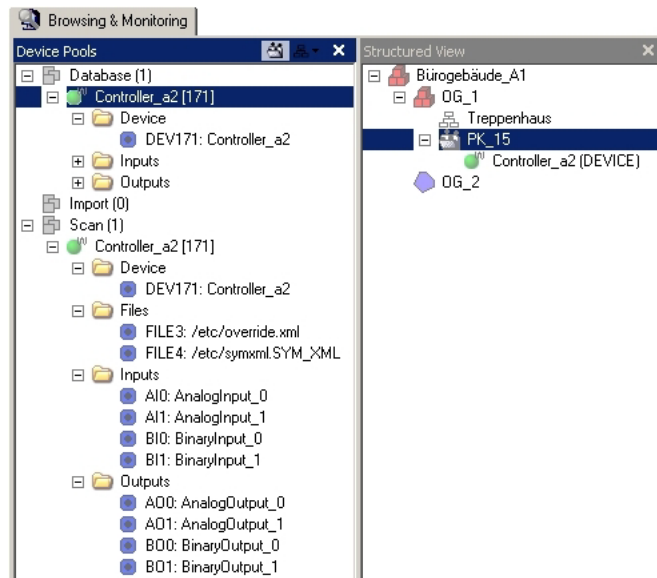


Fig. 3-25: Views

If only the "Device Pools" are displayed, select "Structured View" as well in the main menu or in the toolbar under "View" (see Fig. 3-26).

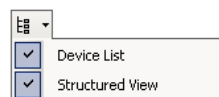


Fig. 3-26: Changing the view via the toolbar

The two views "Device Pools" and "Structured View" are explained in the following sections.

3.2.3.1 Device Pools

The Device Pools view displays the devices known to the BACnet Configurator in three different pools as a tree diagram (see Fig. 3-27).

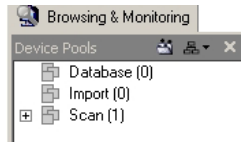


Fig. 3-27: Device Pools

The Device Pools are the central contact point for the use of the BACnet Configurator. Each pool fulfills a special task:

Database Pool

The Database pool is the core piece of the BACnet Configurator. It represents all configurations and devices that are locally stored. This pool is persistent - the data it contains therefore remain, even after backup and subsequent ending of the program. All other pools, on the other hand, are transitory; their content is lost when the program is ended.

For WAGO devices, changes or expansions of the configuration can be done offline and downloaded into the device. In devices from other manufacturers, no offline change is provided for; here, only a "snapshot", i.e. a momentary view of the device, is stored in the database.

Instance and device numbers of the devices in the Database pool must be unique. This is the prerequisite for a unique identification of the devices in BACnet networks (Identification).

Import Pool

The Import pool is used to import devices via EDE or WAGO database files. This pool, in contrast to the Scan and Database pools, has no limitation with regard to the uniqueness of the device instance numbers. No consistency tests are done since the Import pool is primarily intended for viewing device data. Imported devices are taken into the Database pool for further processing.

Scan Pool

Displays all devices that have been identified during a search of the network or by the automatic recognition of "Device Auto Discovery".

Regardless of which pool a device or object is selected from, detailed information is displayed on the right side in the configuration area (see section 3.2.4).

3.2.3.2 Structured View

The Structured View represents the logical network construction in a tree structure of folders, subfolders and devices.

New folders are added by right clicking on an existing entry and selecting **Add Folder** in the context menu (see Fig. 3-28). The new folder is created beneath the selected entry.

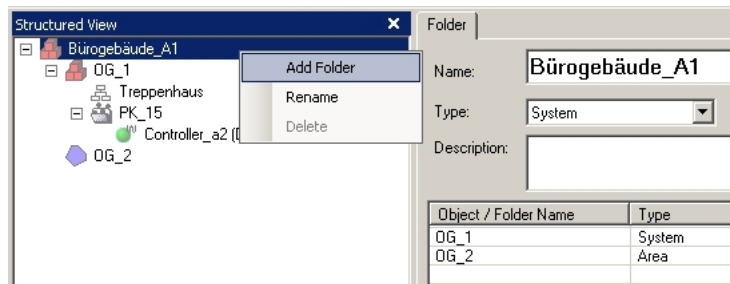


Fig. 3-28: Adding folders to the Structured View

The structure of the folders represents the typical construction of a building project (see Fig. 3-29). For instance, real estate, buildings, levels, and rooms all the way down to the devices can be mapped. The number of levels that can be used is unlimited.

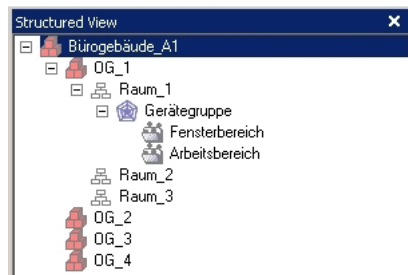


Fig. 3-29: Structured View Register

Devices can be selected from the Database pool and moved to the Structured View by holding the mouse button down (see Fig. 3-30). In this way, devices are logically assigned, e.g. certain controllers for a work area. The device is not deleted from the Database pool by arranging it in the Structured View.

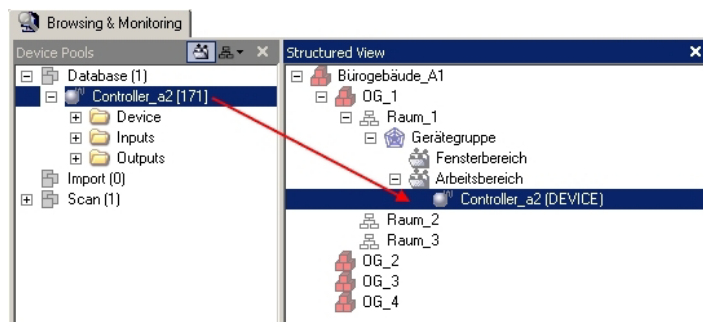


Fig. 3-30: Incorporating objects in the Structured View

In the configuration area, you can change the name of the selected element and assign a type and a description (see Fig. 3-31).

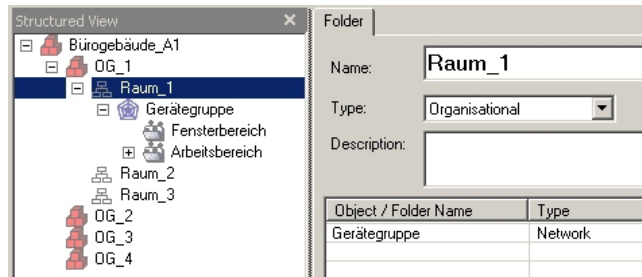


Fig. 3-31: Structured View Register

Pool	Description
Name	Name of the selected element in the Structured View
Type	Type of element (e.g. network, system, device, data point)
Description	Description of the element
Object/Folder Name	Name of the groups/elements in which the element is found
Type	Type of groups/elements in which the element is found

Different objects of different devices can be logically assigned. This assignment can be done multiple times in order to assign objects to different logical categories, if applicable. The Structured View is saved and loaded together with the project.



Additional Information

You can add devices or device objects from the Database pool to the Structured View. When you do this, the device object is treated like the device itself, i.e. adding the device object to the Structured View has the same effect as adding the device.

3.2.4 Configuration Area

In the configuration area, on the right side of the window, all configuration settings for WAGO BACnet/IP controllers can be undertaken (creation of objects, Client Mappings, etc.). The content of this area is dependent on whether the rider "Browsing & Monitoring" or "Configure" is opened. The rider "Browsing & Monitoring" is open by default, while the rider "Configure" is opened by right clicking on a device in the device pool.

In the view "Browsing & Monitoring", the function of the right side of the area depends on which pool the just enabled device is selected from:

- In the Import pool, values can be viewed but not changed. The values are also not changed when Life-Monitor is enabled.
- In the Scan and Database pools, whether the monitoring of properties is enabled or not must be identified.
 - disabled – values that were current at the time of adding/updating are displayed. The device concerned is indicated with a gray dot.
 - enabled – current property values are displayed
The device concerned is indicated with a green dot.

In the rider Configure, on the right side of the window, the configurations of the pools, devices and objects that you select in Device Pool or in the Structured View are displayed. If lists are displayed in the configuration area, you can go to the next deeper level by double clicking on an element of this list:

Example:

With a click on the Scan pool, the details of this pool and a list of the devices it contains are displayed on the right side. A double click on a device in the list then opens the device details with a list of the objects it contains. A double click on one of the objects opens the object configuration with a list of the object properties it contains.



Additional Information

In the rider "Configure", you can select several objects on the left in the tree. On the right, then, only the properties that are common to all the objects are still displayed. This then forms an "average" of all properties of the selected objects, and the property values can be easily set/alterd for several objects.

In the following, the configuration area in the rider "Browsing & Monitoring" is described in relation to the selection of different pools, devices and objects (see section 3.2.4.1 through 3.2.4.3). Inside the description of the devices, the rider "Configure" can be opened with other riders

(BBMD, IP settings, IEC variables - see sections 3.2.4.2.1 through 3.2.4.2.4). In the rider "Configure", additional information for the pools, devices and objects is sometimes displayed over against the rider "Browsing & Monitoring".

3.2.4.1 Pool

By default, three Device Pools are displayed: "Scan", "Import" and "Database". The numbers in the brackets behind the respective pool indicate the number of devices contained.

With a right click on a pool, a context menu for additional settings will open (see Fig.3-32). These correspond to the points in the main menu "Pool" (see section 3.2.1.4). Also, all files can be expanded/collapsed in by clicking on Expand/Collapse All.

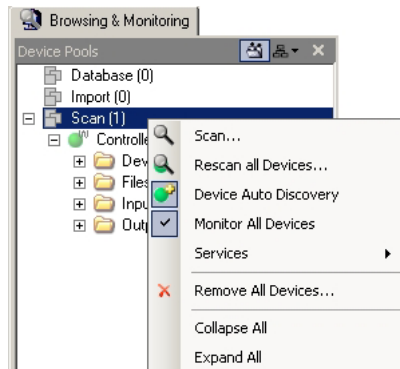


Fig.3-32: Pool context menu

When selecting a pool from the Device Pools, the configuration area for this pool opens on the right side (see Fig.3-33).

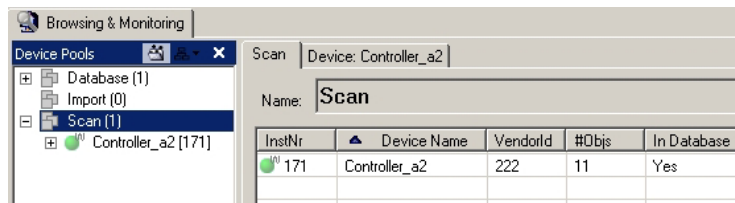


Fig.3-33: Configuration area of the pool

Menu Item	Description
Name	Display of the pool name: "Scan", "Import" or "Database"
List of devices contained	
└InstNr	Instance number of the device
└Device Name	Name of the devices within the pool
└VendorId	Manufacturer ID of the respective device
└#Objs	Number of objects in a device
└In Database	Indicates whether the device is present in the database
└BACnet MAC	Network number followed by BACnet MAC address. The latter is an approximate IP address for BACnet/IP followed by a UDP Port Number (usually the symbolic value BAC0 _{hex} or 47808 _{dez}). For BACnet/MSTP, the BACnet MAC address is a number within the range 0-255. Example: 192.168.1.20-BACO

Click with the right mouse button on a device in the list and a context menu will open that contains the points from the main menu "Device" (see section 3.2.1.5).

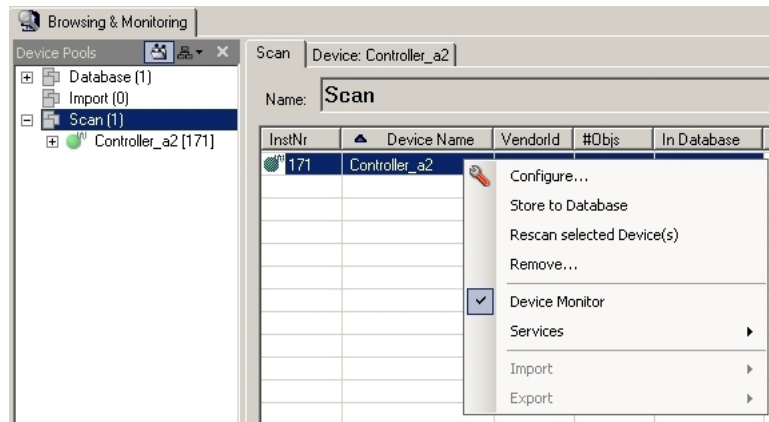


Fig.3-34: Context menu of the device

3.2.4.2 Device

One level below the pools, the devices are displayed.

The number in the brackets behind the respective device is the instance number of the device.

When a device in the pools Scan, Import or Database is selected, a rider with additional details opens on the right side.

The name, instance number, MAC address and description of the device as well as an overview of the objects it contains are displayed (see Fig. 3-35).

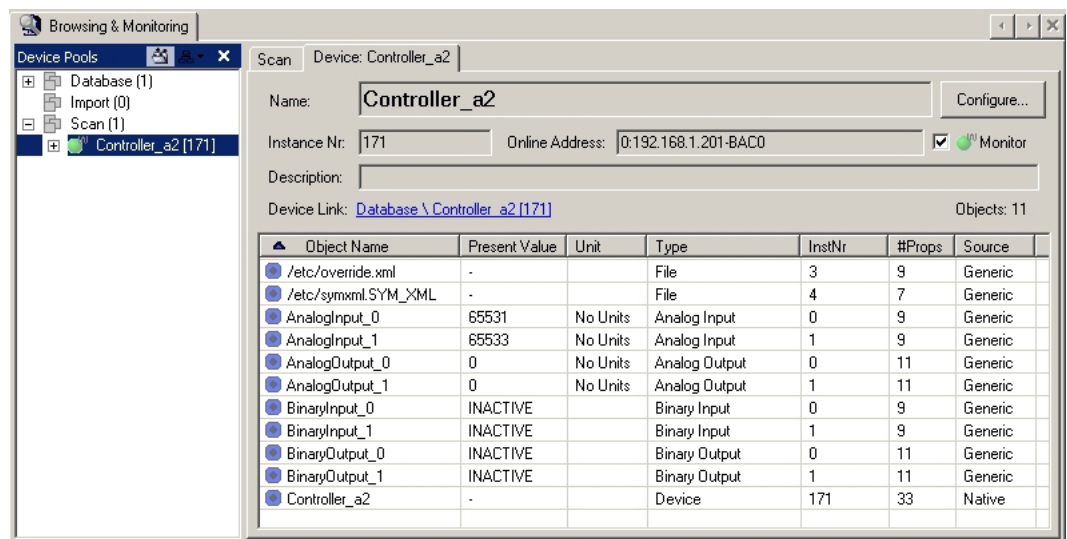



Fig. 3-35: Configuration area of the device

Menu Item	Description
Name	Name of the device
Instance Nr	Instance number of the device object by which the device is represented
Online Address	Network number followed by BACnet MAC address. The latter is an approximate IP address for BACnet/IP followed by a UDP Port Number (usually the symbolic value BAC0 _{hex} or 47808 _{dez}). For BACnet/MSTP, the BACnet MAC address is a number within the range 0-255.
Configure...	Opening of the device configuration (see section 3.2.4.2.1)
Monitor	Enabled monitoring when the checkbox is checked; otherwise, disabled
Description	Description of the device
Device Link	Clickable link that exists whenever a configuration is opened for the device. Clicking on the link causes a change over to the configuration.
List of objects contained	
└─Object Name	Name of the object, which can be freely chosen
└─Present Value	Current value of the object

Menu Item	Description
└Unit	The physical unit of the value of the Present_Value property of the analog object (value of the "Units" property)
└Type	Type of object, e.g. Device, Schedule, Analog Input
└InstNr	<p>Instance number of the object assigned in the native operation of the system, which can otherwise be freely chosen Together with the object type, it identifies an object uniquely; in the case of the Device Object, the device is also uniquely identified.</p> <hr/> <div style="display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px; text-align: center;">  </div> <div> <p>Note By changing the instance number of an object, all persistent property values of the respective object will be deleted. From that point, the configured values will be used. Persistent property values are those values which you have loaded into the controller using the "Commit_Value" function.</p> </div> </div>
└#Props	Number of object properties
└Source	Generic, native or SYM_XML-defined object

By clicking on the button [**Configure**], the rider "Configure" for the selected device opens. This rider is also opened if **Configure** is chosen in the context menu of the device.

Inside the "Configure" rider, on the right side, four additional riders are displayed that are described in more detail in the following sections:

- Device (see section 3.2.4.2.1)
- BBMD (see section 3.2.4.2.2)
- IP Settings (see section 3.2.4.2.3)
- IEC Variables (see section 3.2.4.2.4)

3.2.4.2.1 Configuration of "Device"

In the rider "Device", the device to be configured is displayed on the left and the device information on the right (see Fig. 3-36).

In contrast to the view of the device in the rider "Browsing & Monitoring" (see Fig. 3-35), additional information on the configuration and an import opportunity for the Override and SYM_XML files are displayed.

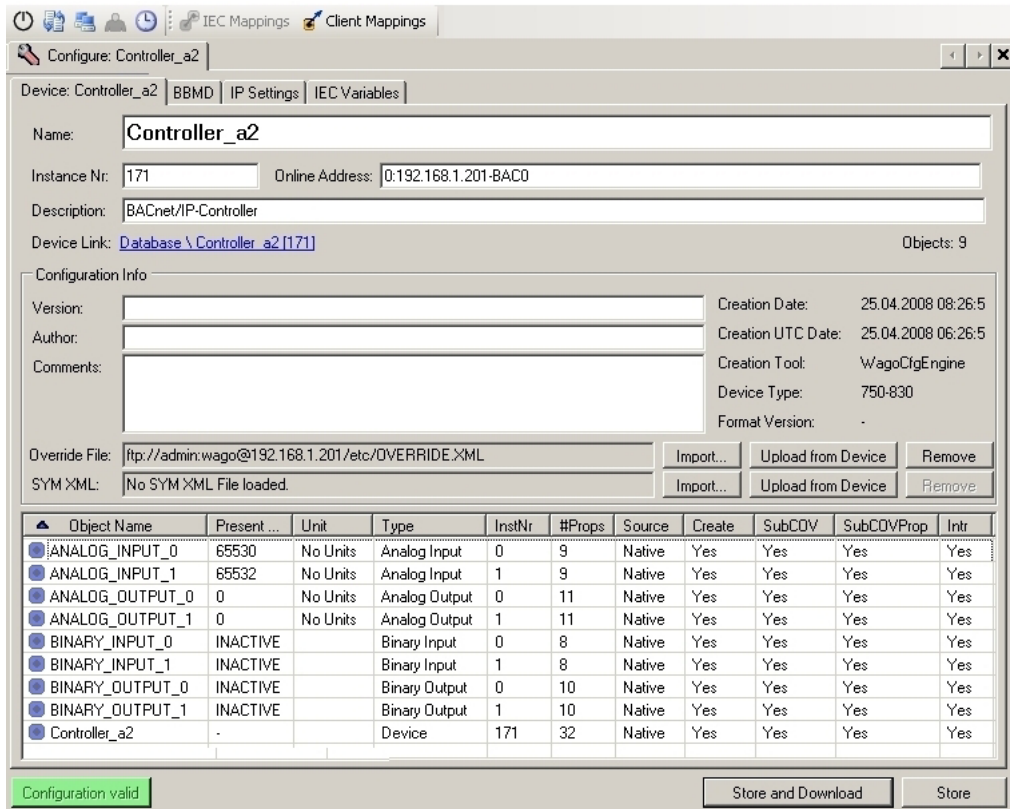


Fig. 3-36: Configuration of "Device", "Configure" view

Menu Item	Description
Name	Name of the device
Instance Nr	Instance number of the device object by which the device is represented
Online Address	Network number followed by BACnet MAC address. The latter is an approximate IP address for BACnet/IP followed by a UDP Port Number (usually the symbolic value BAC0 _{hex} or 47808 _{dez}). For BACnet/MSTP, the BACnet MAC address is a number within the range 0-255. Example: 192.168.1.20-BACO
Description	Description of the device
Device Link	Clickable link which, when clicked, refers either to the database entry (if present) or the Scan entry of the device, depending on where the device is located.

Menu Item	Description
Configuration Info	
└Version	Version of the configuration
└Author	Author
└Comments	Comment
└Creation Date	Creation date in the format 01.07.2007 00:00:00
└Creation UTC Date	UTC creation date in the format 01.07.2007 00:00:00
└Creation Tool	Creation tool
└Device Type	Device type (model identification "750-830"); is filed in the Device Object in a similar manner as for the property "Model_Name".
└Format Version	Format version of the Override file
Override File	[Import...] Opening of a file browser for selecting an Override file
	[Upload from Device] Loading of an Override file from the device
	[Remove] Deletion of the Override file being used
SYM_XML	[Import...] Opening of a file browser to select a SYM_XML file
	[Upload from Device] Loading of a SYM_XML file from the device
	[Remove] Deletion of the SYM_XML file being used
List of objects contained	
└Object Name	Name of the object, which can be freely chosen
└Present Value	Current value of the object
└Unit	The physical unit of the value of the Present_Value property of the analog object (value of the "Units" property)
└Type	Type of object, e.g. Device, Schedule, Analog Input
└InstNr	Instance number of the object; assigned in the native operation of the system, which can otherwise be freely chosen; together with the object type, it identifies an object uniquely; in the case of the Device Object, the device is also uniquely identified.
└#Props	Number of object properties
└Source	Generic, native or SYM_XML-defined object
└Create	This flag indicates whether the object has been created or not. It is primarily intended to prevent the creation of native objects. By default, all objects are created.
└SubCOV	This flag indicates whether the object accepts COV subscriptions for the Present_Value (by default and recommendation "Yes").
└SubCOVProp	This flag indicates whether the object accepts COV subscriptions for any properties of an object (by default, yes). Recommendation: if there is a lack of resources in the controller, set this flag to "No".
└Intr	This flag indicates whether the object supports alarming (Intrinsic Reporting).

By right clicking on the device, you will obtain a context menu with the possibility of adding objects via **Add Object** (see Fig. 3-37), or to delete them via **Delete Object(s)**.

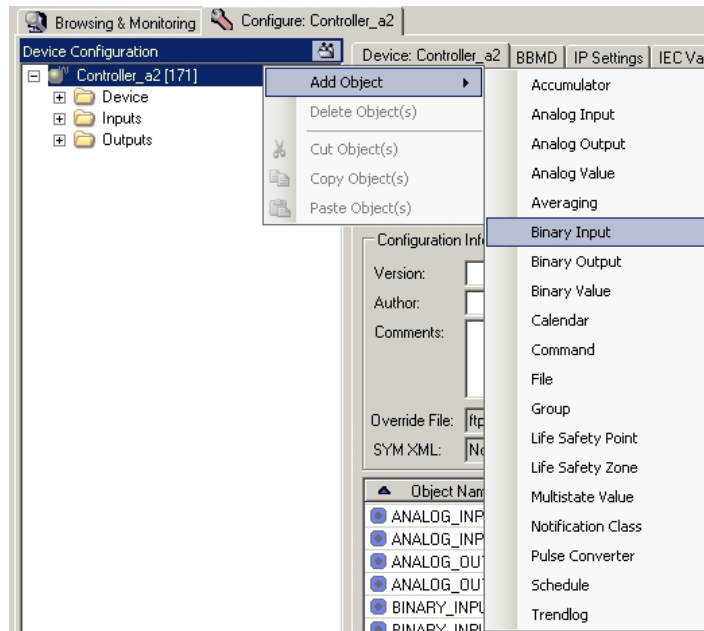


Fig. 3-37: Object context menu

As soon as you have selected the device with the mouse, a new register, "Object: <Object name>" for object configuration is displayed (see Section 3.2.4.3).

3.2.4.2.2 Configuration of "BBMD"

In the rider "BBMD", the BACnet Broadcast Management Device is parameterized. A BBMD enables the sending of BACnet Broadcast Reports over IP routers to other networks. Each of the networks to which the broadcasts are forwarded and from which broadcasts are received must also have a BBMD.

BBMDs also forward broadcasts to external devices, so-called Foreign Devices (FD). FDs are BACnet devices external to the network that report directly to a BBMD in order to receive broadcasts (see Fig. 3-38).

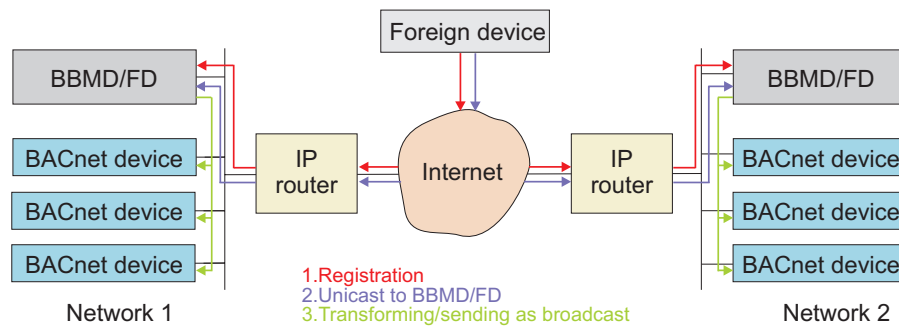


Fig. 3-38: Broadcast via BBMD

You can permit the logging on of FDs to a controller by selecting **Allow Foreign Devices** or block foreign devices by disabling the checkbox.

Each BBMD has a Broadcast Distribution Table (BDT) containing the BACnet MAC addresses of BBMDs to which the broadcasts are forwarded. You can edit the BDT (see Fig. 3-39).



Note

For correct operation of the BBMD in IP subnets, be sure to enter your own device (broadcast mask 255.255.255.255) into the Broadcast Distribution Table (BDT). Therefore, a BDT with active BBMD always contains at least two entries: the own BBMD with an own IP address and the BBMD of the other network.

BBMD functions that are only related to external devices (on the local IP net) are also available without entering the own device.

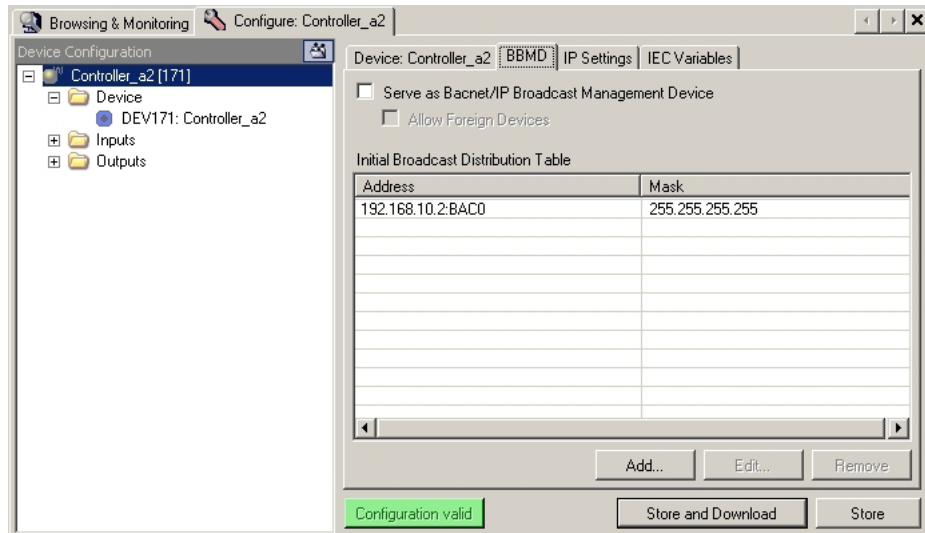

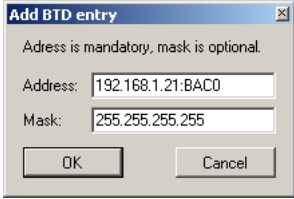


Fig. 3-39: Configuration of "BBMD"

The following points can be adjusted if **Serve as BACnet/IP Broadcast Management Device** is selected.

Menu Item	Description
Serve as BACnet/IP Broadcast Management Device	Enables/disables BBMD functionality. Prerequisite for all settings in this rider.
Allow Foreign Devices	Choose whenever foreign devices are to be allowed in the network to communicate with the selected device
List of BBMDs	
Address	BACnet MAC address of a BBMD (IP address + UPD Port Number)
Mask	<p>If directed broadcasts are used, "Mask" designates the subnet mask of the network to which the broadcast is sent. Otherwise, 255.255.255.255 is used. In this case, a broadcast request is sent to the BBMD from which the sending of the actual broadcast then takes place.</p> <p>If "directed broadcasts" (one hop forwarding) are used, "mask" designates the broadcast mask to be used.</p> <p>If unicasts are used (two-hop forwarding), broadcast mask 255.255.255.255 must be entered. In this case, a broadcast request is sent by the device via unicast to the BBMD from which the sending of the actual broadcast then takes place.</p>
	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">  </div> <div> <p>Note "Directed broadcasts" are usually not possible since these are often blocked by IP routers. It is therefore recommended that you use two-hop forwarding and set broadcast mask 255.255.255.255.</p> </div> </div>

Menu Item	Description								
[Add...]	<p>Adding a BBMD (see Fig. 3-40)</p>  <p>Fig. 3-40: Adding a BBMD</p> <table border="1" data-bbox="667 555 1321 748"> <tr> <td>Address</td> <td>Entering the IP address (necessary)</td> </tr> <tr> <td>Mask</td> <td>Entering the net mask (optional)</td> </tr> <tr> <td>[OK]</td> <td>Incorporation of the BBMD in the BDT</td> </tr> <tr> <td>[Cancel]</td> <td>Abort/closing of the dialog</td> </tr> </table>	Address	Entering the IP address (necessary)	Mask	Entering the net mask (optional)	[OK]	Incorporation of the BBMD in the BDT	[Cancel]	Abort/closing of the dialog
Address	Entering the IP address (necessary)								
Mask	Entering the net mask (optional)								
[OK]	Incorporation of the BBMD in the BDT								
[Cancel]	Abort/closing of the dialog								
[Edit]	Alteration of certain entries.								
[Remove]	Deletion of the BBMD Selection of several entries by holding down the shift key.								

[Add], [Edit] and [Remove] can also be reached through the context menu.

3.2.4.2.3 Configuration of "IP Settings"

In this rider, system-specific settings for IP and security settings are undertaken. The controller first runs with standard settings that can be called up in the web-based management system of the controller. Changes to IP settings in the BACnet Configurator are enabled as soon as **[Store and Download]** is clicked and the BACnet device is restarted.

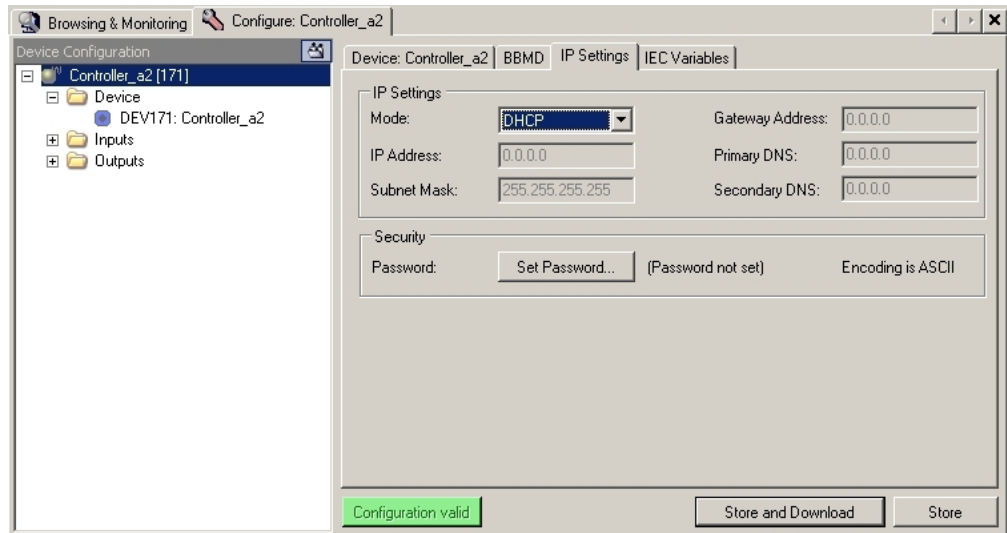


Fig. 3-41: Configuration of "IP Settings"


Menu Item	Description
IP Settings	
└─Mode	DHCP or static; If no value is set, the controller runs with the parameters set in the firmware.
└─IP Address	IP address of the device
└─Subnet Mask	Subnet mask of the device
└─Gateway Address	Gateway address of the device
└─Primary DNS	First Domain Name System
└─Secondary DNS	Second Domain Name System
Security	
└─Password	<p>Password for changing the configuration All access restrictions in the BACnet Configurator use the same password. By default, no password is set.</p> <p>[Set Password...] Opening of a dialog for assigning a password (see Fig. 3-42)</p>  <p>The dialog box 'Enter new Password' has a title bar with a close button. It contains the text 'Only ASCII characters are accepted as password.' Below this are two input fields labeled 'Password:' and 'Repeat:'. At the bottom are 'Save' and 'Cancel' buttons.</p>

Fig. 3-42: Setting a password

Menu Item	Description
	Password Entering a password
	Repeat Repeating the password
	[Save] Saving the password
	[Cancel] Cancellation of the password assignment

3.2.4.2.4 Configuration of "IEC Variables"

In this rider, the BACnet Configurator lists all IEC variables known from a SYM_XML file (see Fig. 3-43).

A SYM_XML file is created using the software WAGO-I/O-PRO CAA.

1. In the WAGO-I/O-PRO CAA software under **Project\Options** select the category **Symbol Configuration**.
2. Place a check mark in the control field **Generate XML symbol table**.
3. Click on the button [**Configure symbol file...**].
4. Place a check mark in the check box **Issue object variables**.

Once these options have been activated, an SYM_XML file will be generated automatically with project variables when a project is compiled.



Note

If the WAGO-I/O-PRO CAA software is in simulation mode, no SYM_XML file can be created.

The created SYM_XML file is imported in the BACnet Configurator along with the IEC variables. Here, two types of variables are differentiated.

1. IEC variables that are permanently linked with a property of a BACnet object as per SYM_XML: These variables cannot be linked to anything else.
2. IEC variables that are not assigned to any object property by the SYM_XML: These variables can be assigned to properties in objects with the BACnet Configurator. In this case, an IEC variable can be mapped directly onto a BACnet property.

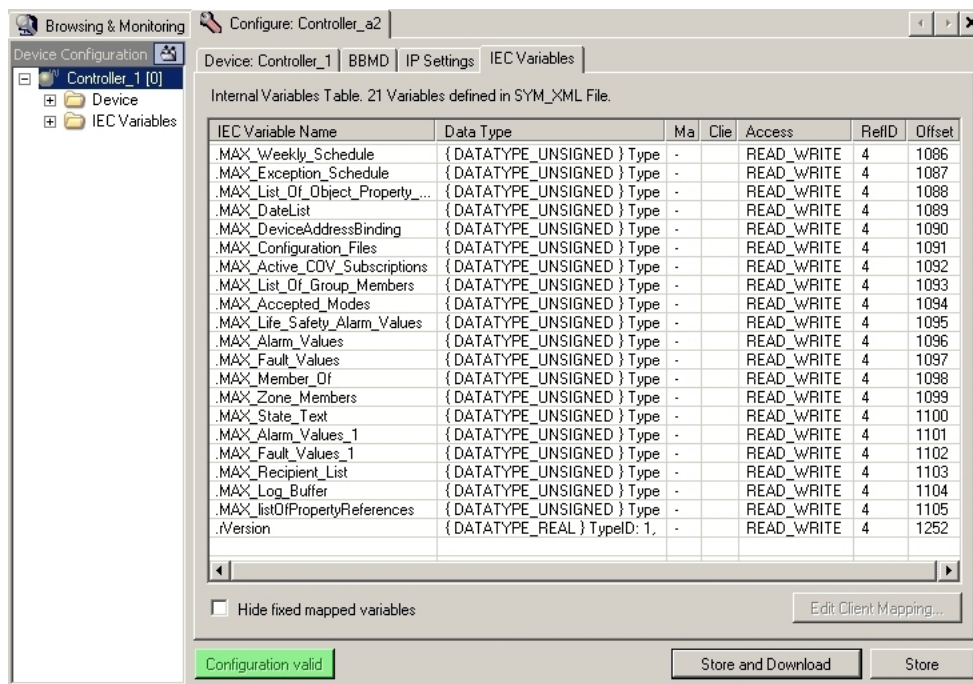
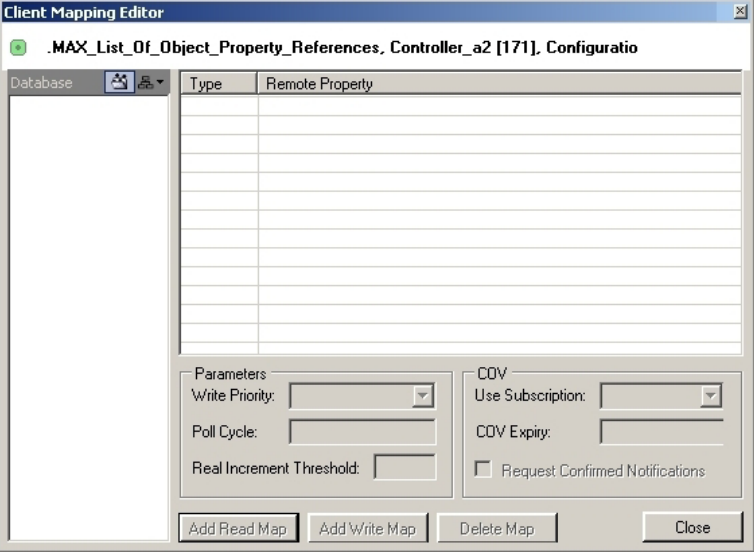


Fig. 3-43: Configuration of "IEC Variables"

Menu Item	Description
IEC Variable Name	Name of the IEC variable
Data Type	Data type of the IEC variable
Mappable	IEC variable can be linked with BACnet property - Yes/No
Mapped to Property	BACnet property is linked with the one IEC variable
Client Mappings	BACnet property is linked with the one other BACnet property
Access	Access mode
RefID	Values from the SYM_XML file;
Offset	Location of the 61131-variables in the firmware
Hide fixed mapped variables	Masking/unmasking of fixed mapped, no longer linkable variables

Menu Item	Description
[Edit Client Mapping...]	<p>Opening of a non-modal dialog through which BACnet properties can be assigned to other BACnet properties. Those properties on which the already active IEC variable can be mapped or on which it is mapped are displayed.</p>  <p>Fig. 3-44: Client Mapping Editor</p> <p>The description of this dialog can be found in section 3.2.4.3.1, "Client Mappings".</p>

The Client Mapping Editor can also be reached through the context menu.

3.2.4.2.5 Storing and Downloading a Valid Configuration

The configuration area at bottom left indicates if the configuration you want to store is valid.



Fig. 3-45: Warnings are present (left), configuration is valid (right)

If warnings are present, click on the [**_ Warnings...**] button to display the warnings (see Fig. 3-46).

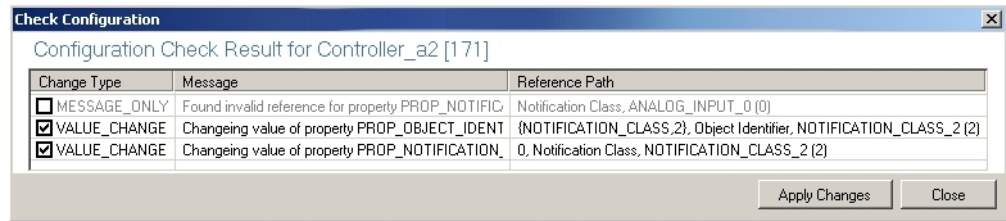


Fig. 3-46: Displaying warnings

If you want to accept the relevant changes despite warning, place a check mark in the checkbox prior to warning. Remove the check mark if you don't want to make the relevant change. In this case, the property is reset to a valid value.

Menu Item	Description
[Apply Changes]	Accept the changes (if checkbox set) or reset the change (if checkbox not set)
[Close]	Closing the dialog

At bottom right in the configuration area the buttons [Store and Download] and [Store] are shown (see Fig. 3-47).



Fig. 3-47: Storing and downloading settings

Menu Item	Description
[Store and Download]	Accepting the changes; adding the configuration of the device(s) to the database if not yet present in the database; downloading the new configuration to the device
[Store]	Accepting changes; adding the configuration of the device(s) to the database if not yet present in the database

The buttons [**_ Warnings...**], [**Configuration Valid**], [**Store and Download**] and [**Store**] refer to the entire configuration, i.e. to all settings in the rider "Device", "BBMD", "IP Settings" and "IEC Variables".

3.2.4.3 Object

Following the description of the pool and device configuration, this section describes the configuration area for objects.

Objects are arranged in the "Device Pools" one level below the devices and are managed in their own folders depending on the type of object (for example, an Analog Input Object in the "Inputs" folder). The number in the brackets behind the respective object is the instance number of the object.

By right clicking on an object in both Scan pool and **Rescan Object(s)**, the selected object is imported again. Several objects can be selected and scanned by holding the control key down.

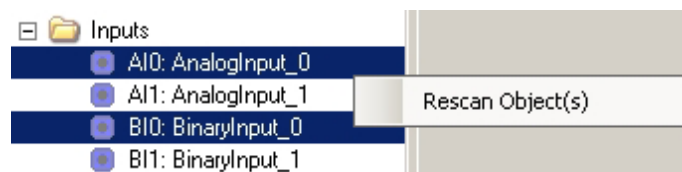


Fig. 3-48: Scanning again one or several objects in Scan pool

If you click on an object in the Device Pool, a new "Object<Object Name>" register with a list of all associated object properties opens in the configuration area to the right. The following symbols are displayed before the property names and values.






-  The property required for the respective object by the BACnet Standard
-  Optional object properties
-  Optional sub-element of a property is activated (can be changed by clicking on symbol)
-  Optional sub-element is activated (can be changed by clicking on symbol)
-  Enabled monitoring

Fig. 3-49: Symbols for required/optional properties and monitoring

The configuration area of the graphic interface varies, depending on the rider selection of "Configure" or "Browsing & Monitoring" (cf. Fig. 3-50 and Fig. 3-51).

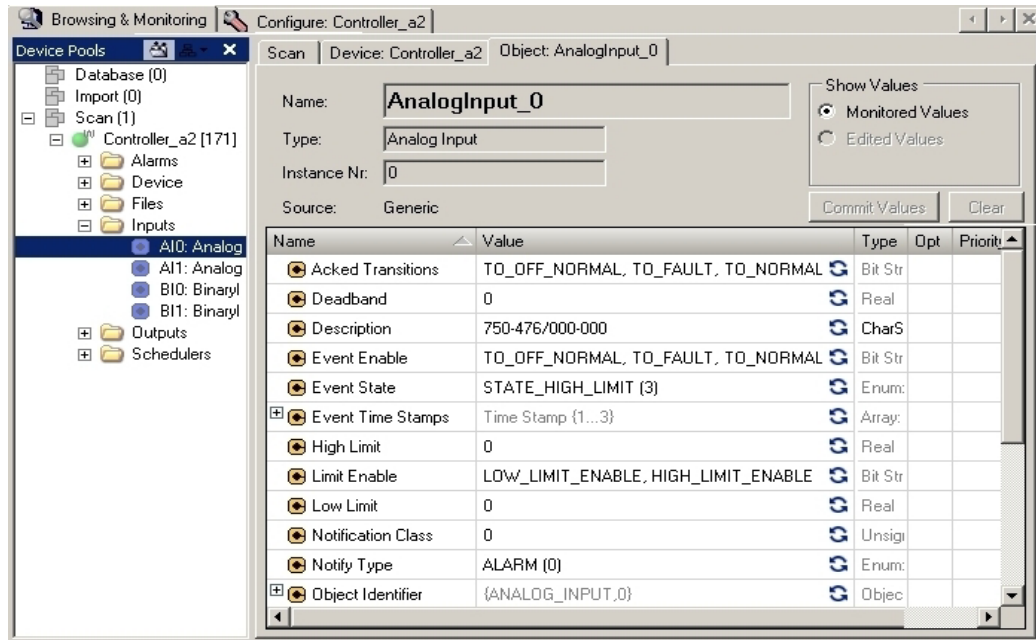





Fig. 3-50: Configuration of "Object", view in the rider "Browsing & Monitoring"

Object view in the rider "Browsing & Monitoring":

Menu Item	Description
Name	Name of the object
Type	Type of the object
Instance Nr	Instance number of the object
HW Inst Nr	The hardware instance number indicates the sequence of input/output channels for analog and digital input/output objects (display for input/output objects in both "Browsing & Monitoring" rider's database pool and "Configure" rider)
Source	Type of the object (native, SYM_XML, Override, generic)
Show Values	
└─ Monitored Values	Display of current values
└─ Edited Values	Display of altered values
└─ Database Values	Display of values that are saved in the database (Display in database pool, rider "Browsing & Monitoring")
[Commit Values]	Transmission of altered values to the controller Changed properties are highlighted in color:
	green Property has been successfully changed and transmitted
	yellow Changed property has not been transmitted yet (monitor mode)
	orange Changed property has not been transmitted yet (editing mode)
	red Change has failed
	blue Present_Value

Menu Item	Description
	 <p>Note With the "Commit Values" function, you can change the BACnet object property values quickly and load them into the controller without configuration during runtime. The values will be persistently stored in the flash memory and overwrite existing configuration values.</p> <p>Requirements for value changes using "Commit Values": Access to the object property is permitted (identified by the symbol  in the "Configure" rider)</p> <p>You can delete persistent values again in three different ways:</p> <ol style="list-style-type: none"> 1. Delete the object containing the persistent data and load your configuration into the controller without this object. Then create a new object with standard values. 2. Change the object instance number and load your configuration into the controller. From that point, all property values of this object are assumed from your configuration ("Configure" rider). 3. Change the specific object property values in the "Configure" rider and download the configuration into the controller. From that point, these values (identified by the symbol  in the "Configure" rider) will be taken over from your configuration.
[Clear]	Cancels changes and deletes colored markings
List of object properties	
└Name	Name of the property
└Value	Value of the property
└Type	BACnet data type of the property
└Opt	There are required and optional fields for structured data types. An icon in this column indicates whether the optional field is available. By clicking on the icon, you can alternate between the states "Field is available" and "Field is not available".
└Priority	Display of the write priority
└Status	Display of the transmission status

When selecting **Configure** in the context menu of a device, the rider "Configure:<Device Name>" opens. If you click on a device in the tree, the configuration area containing additional options (cf. Fig. 3-50 with Fig. 3-51) opens on the right side.

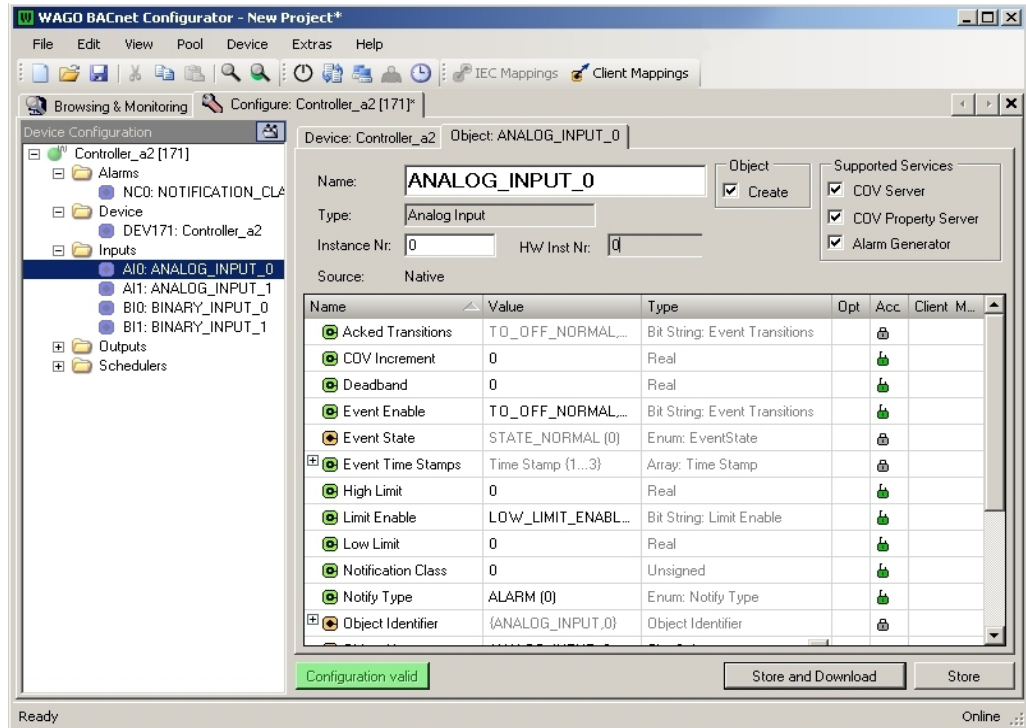









Fig. 3-51: Configuration of "Object", view in the rider "Configure"

Additional options in the rider "Configure"

Menu Item	Description
Object	
└─Create	This flag indicates whether the object has been created or not. It is primarily intended to prevent the creation of native objects. By default, all objects are created.
Supported Services	
└─COV Server	Indicates whether the object accepts COV subscriptions for the Present_Value (by default and recommendation: select)
└─COV Property Server	Indicates whether the object accepts COV subscriptions for any properties of an object (by default, "Yes")
└─Alarm Generator	Enabling/disabling of object alarming ("Intrinsic Reporting")
List of object properties	
└─Acc	<p>Display of the possibility of access ("Access") to properties via a lock symbol:</p> <hr/> <p> Access allowed (can be changed by clicking on symbol)</p> <hr/> <p> No access allowed (can be changed by clicking on symbol)</p> <hr/> <p> Access allowed; cannot be changed since required by BACnet Standard</p> <hr/> <p> No access allowed; cannot be changed since required by BACnet Standard</p>
└─Mod	<p>In this column, an arrow symbol is used to indicate whether a standard value/default value has changed ("Modified").</p> <hr/> <p> The property has been changed or been newly added (green).</p> <hr/> <p> Note If the arrow is set, the values from the configuration are used and will over-write the runtime values that were transferred using "Commit Values." If no arrow is set, the runtime values for the corresponding property are also retained after the configuration is written. By clicking on the green arrow symbol, all the changes are reset and the arrow symbol is deleted. From that point, the values transferred to runtime using "Commit Values" are used.</p> <hr/> <p> The property has been changed but cannot be reset (gray)</p>
└─Internal Mappings	Display of the IEC variable on which the property is mapped. Clicking on a field in the column "Internal Mappings" opens the "IEC Mapping Editor".
└─Client Mappings	Indicates whether there is a "Client Mapping" for the given variable or not. Clicking on a field in the column "Client Mappings" opens the "Client Mapping Editor".

Right clicking on the list of object properties will give you a context menu (see Fig. 3-52).

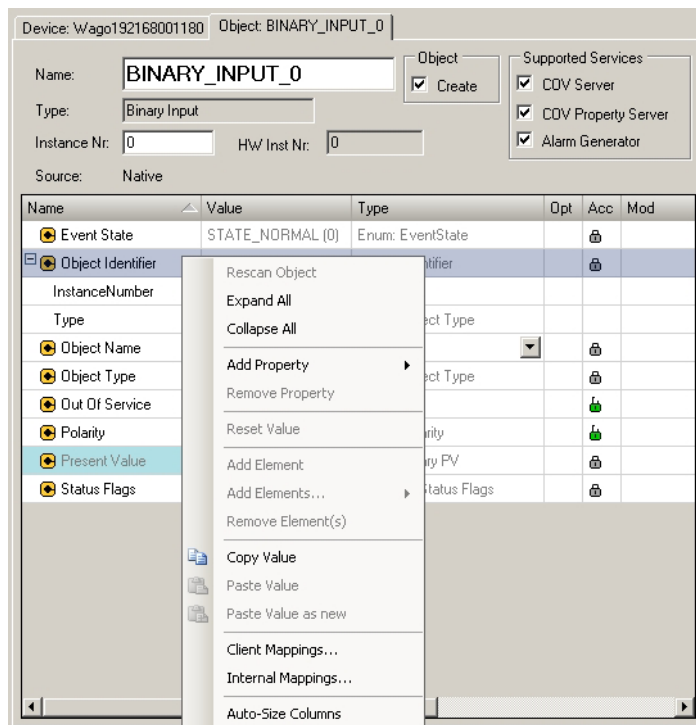


Fig. 3-52: Properties context menu

The context menu will give you the following selection possibilities:

Menu Item	Description
Rescan Object	Updating the object
Expand All	Expansion of all folders
Collapse All	Collapse of all folders
Add Property	Addition of a valid object property
Remove Property	Removal of an optional property
Reset Value	Resetting of a property value to the default value
Add Element	Addition of an element or field if the property is a field or a list
Add Elements...	Insertion of several elements; otherwise, like "Add Element"
Remove Element(s)	Removal of an element
Copy Value	Copying of a property value
Paste Value	Insertion (replacement) of a property value
Paste Value as new	Add a new list element with the copied value (e.g. with the property "Data List" of the Calendar Object)
Client Mappings...	Opening of the "Client Mapping Editors" (see Section 3.2.4.3.1)
Internal Mappings...	Opening of the "IEC Mapping Editors" (see Section 3.2.4.3.2)
Auto-Size Column Widths	Automatic setting of the optimal column width

3.2.4.3.1 Client Mapping

Client Mappings are mappings/links of one property or variable to a property in another (or, if desired, to the same) device.

Both IEC variables and BACnet properties of objects of a device can be linked in the BACnet Configurator with the BACnet properties of objects of other devices. These links can be configured.

- "Read Maps" on a device A (client) read values of BACnet properties in another device B (server) and writes these values in IEC variables or BACnet properties in device A; reading of the value can therefore take place at regular, definable time intervals or only with a change in value. Reading the value with each change in value (COV - Change Of Value) functions via a subscription mechanism (COV Subscription) and must be supported by device B. In this case, subscriptions are renewed at time intervals that can be set.
- "Write Maps" on a device A sends values of BACnet properties or IEC variables to BACnet properties in another device B.

For REAL values, an optional, minimum increment can be established by which the absolute value of the value must change before a value change is forwarded.

The Client Mapping Editor is not modal and indicates editable configurations of associated Client Mappings for just enabled properties.

You can find an example for the creation of Client Mappings in section 4.3, "Creating a Client Mapping".

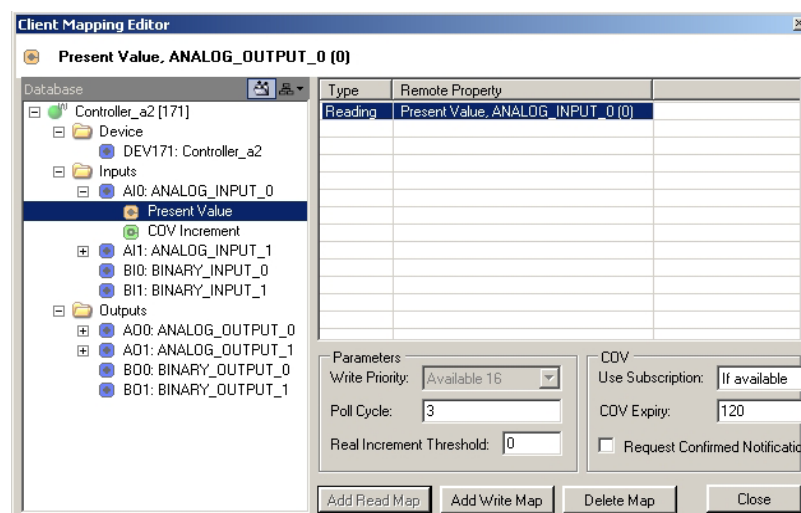


Fig. 3-53: Client Mapping Editor

Menu Item	Description
List of available links	
└Type	Type of link, reading or writing
└Remote Property	Remote property linked with the local property via Client Mapping
Parameters	
└Write Priority	Setting the write priority
└Poll Cycle	Setting of the time interval for requests if no COV is supported (in seconds)
└Real Increment Threshold	For real-valued properties, the value by which the property value must change so that it is updated
COV	
└Use Subscriptions	Use of transmission during value change (Change of Value) – "If available", "Never" or "Always"
└COV Expiry	Time in seconds after which a subscription to changes of value in a remote property expires Such subscriptions are set up and managed by the BACnet services SubscribeCOV or SubscribeCOVProperty.
└Request Confirmed Notifications	COV notifications can be either "confirmed" (recipient confirms receipt to the sender) or "unconfirmed" (without notification to the sender). If the sender receives no confirmation for "confirmed" notifications, it usually resends the report one or more times until it receives a confirmation of receipt.
[Add Read Map]	The controller that has just been configured executes read access of the remote property.
[Add Write Map]	The controller that has just been configured executes write access of the remote property.
[Delete Map]	Deletion of selected link
[Close]	Closing of the dialog

3.2.4.3.2 Internal Mapping (IEC Mapping)

Internal Mapping is understood as the assignment of BACnet properties to IEC variables that are not BACnet properties. You can also carry out this assignment later with any IEC variables.

You import the SYM_XML file inside the rider "Configure:<device name>" (cf. Fig. 3-36). There is no provision for adding a variable here. However, you can assign variables that are not assigned to any property in the SYM_XML file.

You can find an example of the creation of Internal Mappings in section 4.4, Creation of Internal Mappings.

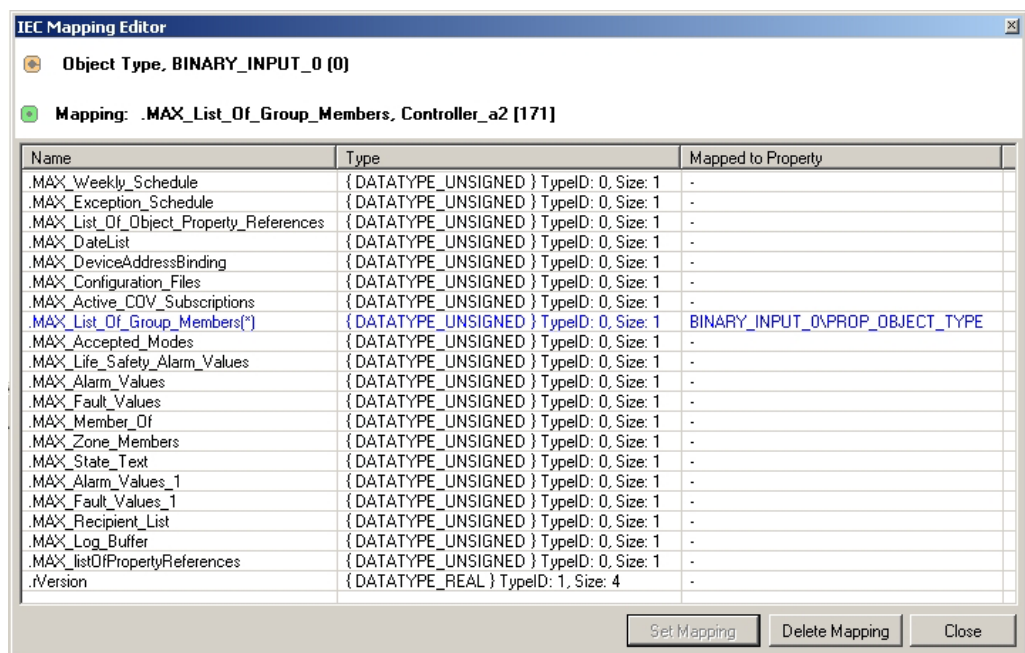


Fig. 3-54: Internal Mapping in the IEC Mapping Editor

Menu Item	Description
Name	Name of the IEC variable (from the SYM_XML file)
Type	Data type of the IEC variable (from the SYM_XML file)
Mapped to Property	Name of the BACnet property with which the IEC variable is linked
[Set Mapping]	Creation of a link
[Delete Mapping]	Deletion of a link
[Close]	Closing of the dialog

3.3 Online and Offline Status

The BACnet Configurator has two main modes for the configuration of a WAGO BACnet/IP Controller 750-830:

- Online configuration mode (with the controller connected to a BACnet/IP network)
- Offline configuration mode

In both modes, the following actions can be carried out:

- Importing the SYM_XML
Note: If an SYM_XML file is imported in the online mode for a controller, then this has precedence over every other SYM_XML file of the controller
- Importing/exporting the Override file
Note: If an Override file is imported in the online mode for a controller, then this has precedence over every other Override of the controller
- Importing/exporting of BACnet EDE files
- Processing of native, SYM_XML- and Override-defined BACnet objects:
 - Addition and removal of Override-defined objects.
 - Addition, changing and removal of optional properties
 - Enabling/disabling of "Intrinsic Reporting"
 - Enabling and disabling of the reporting of changes in value (SubscribeCOV and SubscribeCOVProperty service)
- Editing of Client Mapping (between BACnet properties)
- Editing of Internal Mapping (between IEC variables and BACnet properties) insofar as IEC variables are not already permanently linked with a property via SYM_XML.

In the online configuration mode, you can also carry out the following actions:

- Downloading of the configuration files SYM_XML and Override
- Uploading of the configuration files into a BACnet device using backup and restoration procedures
- Carry out a search for BACnet devices and their objects which are present in the network
- Reading and writing of property values for each BACnet device in the BACnet/IP network.

- Backup and restoration for all BACnet devices that support these procedures
- Restarting of BACnet devices in the BACnet/IP network
- Enabling/disabling of BACnet communication between BACnet devices in the BACnet/IP network
- Synchronization of the time of BACnet devices in the BACnet/IP network
- Creation of the services for Life-Safety-Point and Life-Safety-Zone objects in BACnet devices in the BACnet/IP network
- Addition and deletion of list entries in Recipient_List properties of the Notification-Class objects in BACnet devices located in the BACnet/IP network

3.4 Software Deinstallation

1. Click on the entry **Software** under **Start > Settings > System Control**.
2. Choose the entry "WAGO BACnet Configurator" and click on the button **[Remove]**.

4 Example Configuration

In the following, some configuration possibilities are described, for example the search for devices in the network, the editing of found devices and objects, the loading of the configuration to a BACnet/IP controller or the creation of a Client Mapping and Internal Mapping.

4.1 Configuring New Devices

Link the WAGO BACnet/IP controller to your network. The controller has a default IP address through DHCP.

Configure the device with the BACnet Configurator:

1. Open the BACnet Configurator.

As long as the button **Device Auto Discovery** is enabled (highlighted in color), new devices are searched for at regular intervals and the list in the Scan pool is updated (see Fig. 4-1).



Fig. 4-1: Automatic device search disabled (left) or enabled (right)

You can change the interval for the search through **Extras > Options**.

The progress bar at the lower right shows you the status of the search. As an alternative, you can conduct the network scan using the button "Scan BACnet" (magnifier).

A newly found device is presented with its standard values and standard instance number in the "Scan" pool.

2. Click on the "+" in front of the device in the "Scan" pool.

Below the device, different folders are displayed (see Fig. 4-2). The folder "Device" contains the Device Object of the device. The folders "Inputs" and "Outputs" are created for the modules connected to the device, which are represented by native objects. Even more folders are possible, such as "Files" for SYM_XML and Override files.

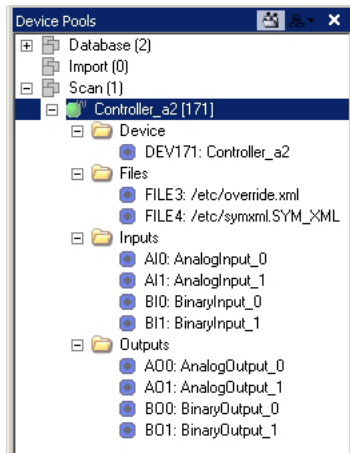


Fig. 4-2: Device with its objects

3. Choose **Configure** in the context menu of the device to configure the device. As an alternative, choose **Device > Configure** in the main menu or use the button **[Configure]** to the right in the window (see Fig. 4-3).

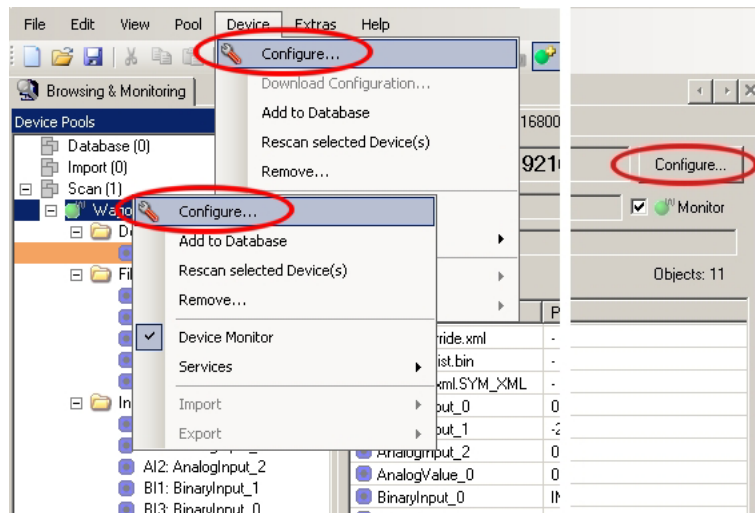


Fig. 4-3: Three possibilities for configuring a device

The configuration area with the rider "Configure:<Unnamed>" is opened. Any available configuration data from the device is uploaded and displayed.

Add two objects to the device:

4. Click with the right mouse button on the Device Object and select **Add Object > Schedule** and **Add Object > Calendar** in the context menu.

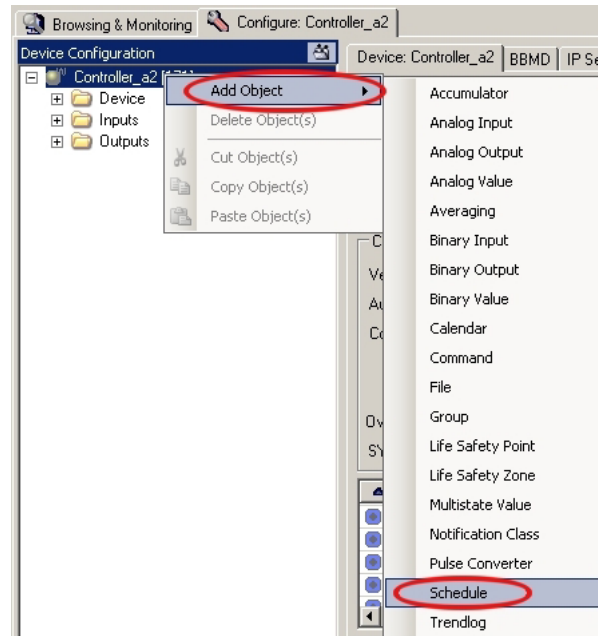


Fig. 4-4: Add objects using the context menu

You need the Calendar Object to be able to indicate exception dates for certain actions in later steps.

5. Also choose the Alarm-Server Object using **Add Object > Notification Class** to generate alarms with some of the native objects below.

The three objects are added to the list and can continue to be configured (see Fig. 4-5).

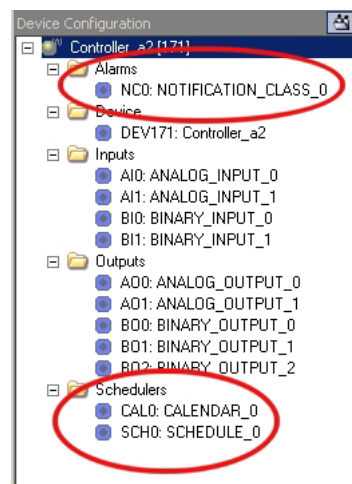


Fig. 4-5: Newly created objects

6. Select the Schedule object in the tree to the left or in the object list to the right; this will open the detail view of the object in the configuration area.

The Schedule object contains, by default, a weekly programmable schedule "Weekly Schedule", but no exception rules for the "Exception Schedule" yet, which is used for holidays, for example.

7. Click with the right mouse button on the list of object properties and choose **Add Property > Exception Schedule** in the context menu (see Fig. 4-6).

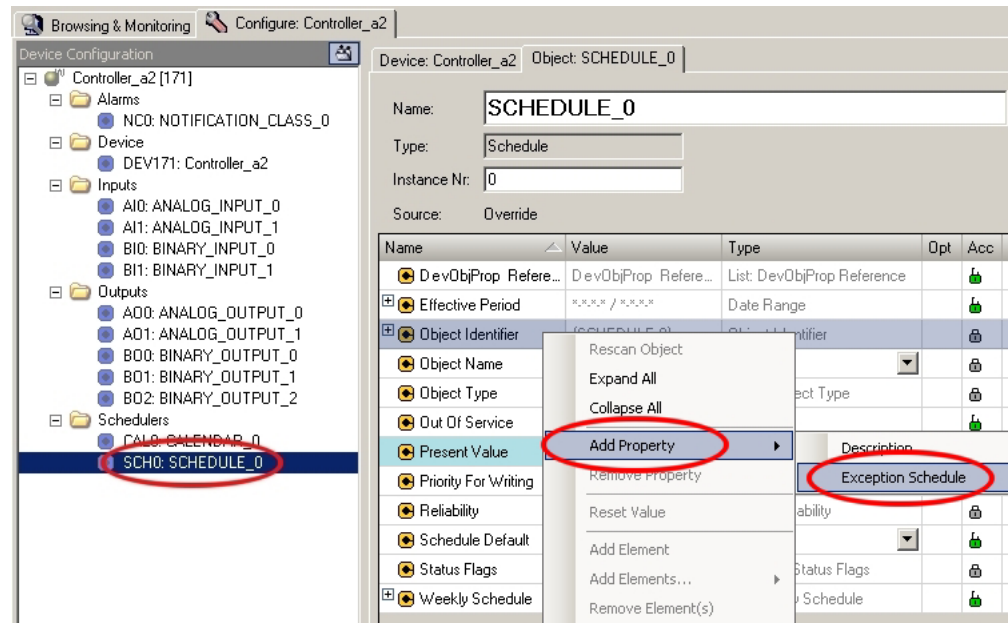


Fig. 4-6: Adding properties

8. Also add a description using **Add Property > Description**.

The newly added properties can be further configured.

9. Click with the right mouse button on **Exception Schedule** and choose **Add Element**.

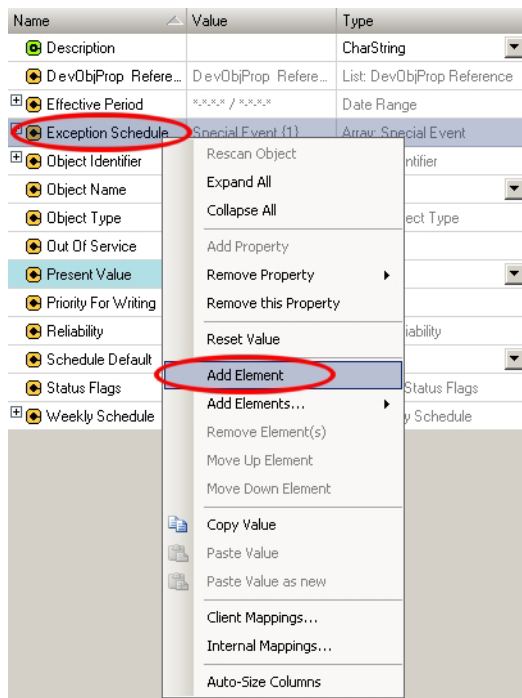


Fig. 4-7: Adding elements

A new element "[1]" is displayed below the "Exception Schedule".

Exception Schedule	Special Event {1}	Array: Special Event
[1]	*.*.* / Time Value {} / 1	Special Event
EventPriority	1	Unsigned
ListOfTimeValues	Time Value {}	List: Time Value
Period	*.*.*	CalendarEntry
Value	*.*.*	E_DATE

Fig. 4-8: New element

10. Holidays will serve as the exception rule in relation to the calendar in this example. To this end, choose the type "Calendar Reference" under **Period**.

Exception Schedule	Special Event {1}	Array: Special Event
[1]	{CALENDAR,0} / Time Val.	Special Event
EventPriority	1	Unsigned
ListOfTimeValues	Time Value {}	List: Time Value
Period	{CALENDAR,0}	CalendarReference
InstanceNumber	0	Unsigned
Type	CALENDAR {6}	Enum: Object Type

Fig. 4-9: Defining the calendar

11. Confirm your entry with Enter.

Below "Period", additional points are displayed: "InstanceNumber" and "Type".

12. Under **Type** choose the desired calendar, e.g. "CALENDAR (6)" and "0" as the **InstanceNumber**.

Exception Schedule	Special Event {1}	Array: Special Event
[1]	{CALENDAR,0} / Time Val.	Special Event
EventPriority	1	Unsigned
ListOfTimeValues	Time Value {}	List: Time Value
Period	{CALENDAR,0}	CalendarReference
InstanceNumber	0	Unsigned
Type	CALENDAR (6)	Enum: Object Type
Object Identifier	{SCHEDULE,0}	Object Identifier

Fig. 4-10: Changing entries in elements

In the "ListOfTimeValues", enter the exception times:

13. Right click on **ListOfTimeValues** and choose **AddElement** in the context menu.

Name	Value	Type
Description		CharString
DevObjProp Reference	DevObjProp Reference	List: DevObjProp Reference
Effective Period	*.*.* / *.*.*	Date Range
Exception Schedule	Special Event {1}	Array: Special Event
[1]	{CALENDAR,0} / Ti.	Special Event
EventPriority	1	Unsigned
ListOfTimeValues	Time Value {}	List: Time Value
Period	{CALENDAR,0}	CalendarReference
InstanceNumber		Unsigned
Type		Enum: Object Type
Object Identifier		Object Identifier
Object Name		Object Name
Object Type		Object Type
Out Of Service		Boolean
Present Value		Boolean
Priority For Writing		Boolean
Reliability		Reliability
Schedule Default		Boolean
Status Flags		Status Flags
Weekly Schedule		Weekly Schedule

Fig. 4-11: Changing entries in elements

A new element "[1]" is displayed below the "ListOfTimeValues".

Assign certain values to certain times for the exception times in the calendar:

14. Next, enter "Real" under **Type** and then the value "10" under **Value**.

Exception Schedule	Special Event {1}	Array: Special Event
[1]	{CALENDAR,0} / Time Val.	Special Event
EventPriority	1	Unsigned
ListOfTimeValues	Time Value {1}	List: Time Value
[1]	00:00:00.00 / 10	Time Value
Value	10	Real
Time	00:00:00.00	Time

Fig. 4-12: Entering values in the calendar

15. **"Time"** is used to set the time at which the exception is to apply, for example "00:10:00:00" in order to define a switching point at 0:10.



Note

If you want to define day-to-day switching times, then 00:00:00:00 must be defined as extra switching point.

Example: Switching on the light at 20:15 in the evening, switching off the light at 7:30 in the morning on the next day:

On [1] Monday 20:15:00:00
 On [2] Tuesday 00:00:00:00
 Off [2] Tuesday 07:30:00:00

16. Using **EventPriority** enter the priority of the exception rule, e.g. "1" for a low priority.

In the "Weekly Schedule", enter certain values as the event for starting an action for each weekday. Seven schedules, from Monday [1] through Sunday [7], can be created per week. Here, you enter the values in the same way as for the exception rule "Exception Schedule" (see point 14 and 15).

To enter holidays, add elements in the date list in the Calendar object:

17. Choose the **Calendar** Object in the tree to the left.

18. Click with the right mouse button on the property **Data List** and add an entry "[1]" using **Add Element** (see Fig. 4-13).

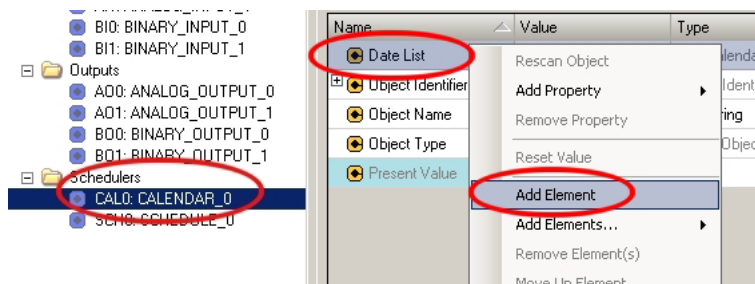


Fig. 4-13: Adding holidays

Tip: To create several entries at the same time, click on **Add Elements** and select the desired number of new elements in the display (see Fig. 4-14).

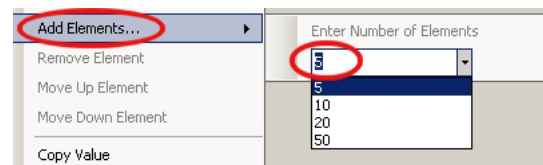


Fig. 4-14: Adding several new elements

19. Click on the entry "[1]" and enter the date "2008-12-24-3" as the value and "E_DATE" as the **Type** (see Fig. 4-15).

Format of the date:
 YYYY-MM-DD-W

wherein the last number represents the day of the week (1 – Monday through 7 – Sunday)

For each field, "*" may be used as a wildcard, e.g. 2008-12-*-* for all days in December 2008. As an alternative, an editor can also be used, which you can open by clicking in the data field and on the button [...].

Name	Value	Type
☺ Date List	Calendar Entry {1}	List: Calendar Entry
[1]	2008-12-24-3	E_DATE

Fig. 4-15: Entering an exception date

You have now defined exception rules, schedules and holidays in order to trigger particular switching time actions.

To generate alarms as shown below, use the already added notification class object as well as the alarm generators, which generate the alarms. Analog-Input Objects are used as alarm generators, for instance:

The alarms are sent to those recipients whom you define using the Notification Class Object:

20. Select the **Notification Class** Object in the tree to the left.
21. Click with the right mouse button on **Recipient List** and select **Add Element(s)** to add new recipients to the recipient list for the object's alarms (see Fig. 4-16).

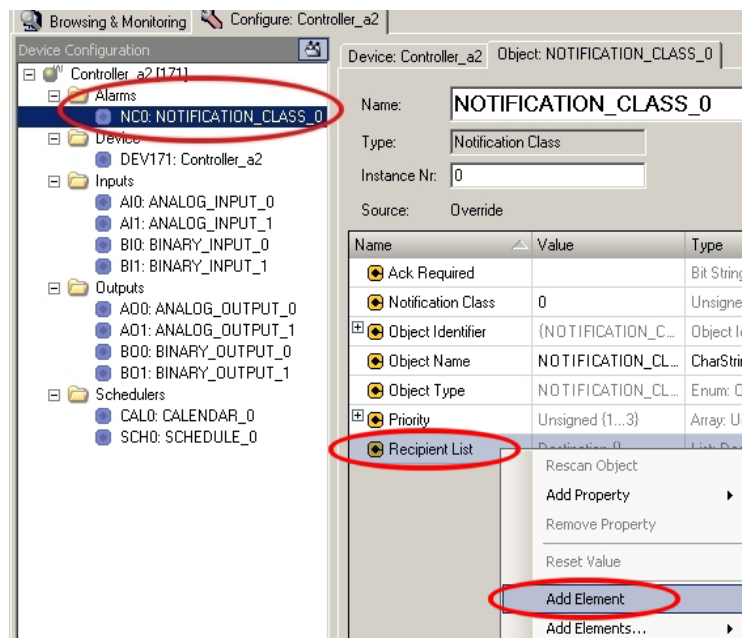


Fig. 4-16: Entering new recipients for alarms

A sub-element "[1]" is inserted. It represents a new recipient, which is further configured (see Fig. 4-17).

Recipient List	Destination (1)	List: Destination
[1]	{ANALOG_INPUT_0} -> 0	Destination
Transitions		Bit String: Event Transitions
IssueConfirmedNotif...	<input type="checkbox"/>	Bool
ProcessIdentifier	0	Unsigned
Recipient	{ANALOG_INPUT_0}	ObjectIdentifier
InstanceNumber	0	Unsigned
Type	ANALOG_INPUT (0)	Enum: Object Type
ToTime	00:00:00.00	Time
FromTime	00:00:00.00	Time
ValidDays		Bit String: Days Of Week

Fig. 4-17: Configuring new recipients

Note: Usually, recipients enter themselves through the network.

Now, configure the alarm generator (e.g., analog input object):

22. Click on **Analog Input** to the left in the tree.

23. Select **Add Property > Notification Class** in the context menu of an object property to add the property "Notification Class" to the object (see Fig. 4-18).

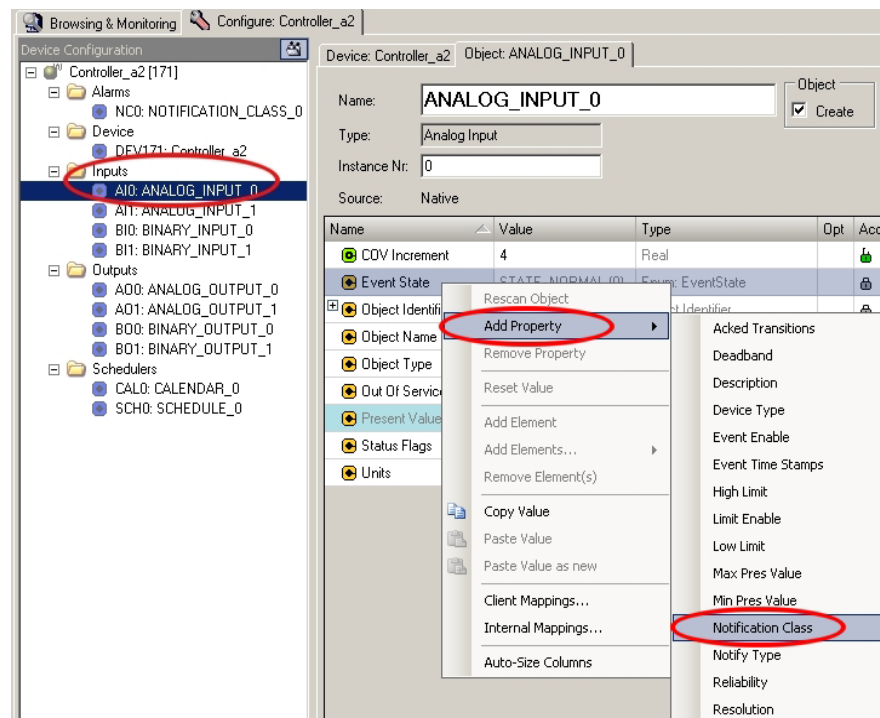


Fig. 4-18: Adding the property "Notification Class" to the Analog Input Object

The property "Notification Class" automatically expands the object to include all properties that are necessary for alarm generation. These properties are indicated with a green symbol since these are optional properties (see Fig. 4-19).

Name	Value	Type	Opt	Acc
<input checked="" type="checkbox"/> Acked Transitions	TO_OFF_NORMAL, TO_F...	Bit String: Event Transitions		<input type="lock"/>
<input checked="" type="checkbox"/> CDV Increment	0	Real		<input checked="" type="green"/>
<input checked="" type="checkbox"/> Deadband	0	Real		<input checked="" type="green"/>
<input checked="" type="checkbox"/> Event Enable	TO_OFF_NORMAL, TO_F...	Bit String: Event Transitions		<input checked="" type="green"/>
<input checked="" type="checkbox"/> Event State	STATE_NORMAL (0)	Enum: EventState		<input type="lock"/>
<input checked="" type="checkbox"/> Event Time Stamps	Time Stamp {1...3}	Array: Time Stamp		<input type="lock"/>
<input checked="" type="checkbox"/> High Limit	0	Real		<input checked="" type="green"/>
<input checked="" type="checkbox"/> Limit Enable	LOW_LIMIT_ENABLE, HI...	Bit String: Limit Enable		<input checked="" type="green"/>
<input checked="" type="checkbox"/> Low Limit	0	Real		<input checked="" type="green"/>
<input checked="" type="checkbox"/> Notification Class	0	Unsigned		<input checked="" type="green"/>
<input checked="" type="checkbox"/> Notify Type	ALARM (0)	Enum: Notify Type		<input checked="" type="green"/>
<input checked="" type="checkbox"/> Object Identifier	{ANALOG_INPUT_0}	Object Identifier		<input checked="" type="green"/>
<input checked="" type="checkbox"/> Object Name	ANALOG_INPUT_0	CharString		<input checked="" type="green"/>
<input checked="" type="checkbox"/> Object Type	ANALOG_INPUT (0)	Enum: Object Type		<input checked="" type="green"/>
<input checked="" type="checkbox"/> Out Of Service	<input type="checkbox"/>	Bool		<input checked="" type="green"/>
<input checked="" type="checkbox"/> Present Value	65530	Real		<input type="lock"/>
<input checked="" type="checkbox"/> Status Flags		Bit String: Status Flags		<input type="lock"/>
<input checked="" type="checkbox"/> Time Delay	0	Unsigned		<input checked="" type="green"/>
<input checked="" type="checkbox"/> Units	NO_UNITS (95)	Enum: Engineering Units		<input checked="" type="green"/>

Fig. 4-19: New properties when adding the property "Notification Class"

The alarm generation is configured via the added properties.

These settings are also possible online if an Alarm Client writes the properties. In this example, however, you are determining static values for the time being:

24. Enable the entry "HIGH_LIMIT_ENABLE" under **Limit Enable** and disable the entry "LOW_LIMIT_ALARM". With this action, only upper limits are allowed (see Fig. 4-20).

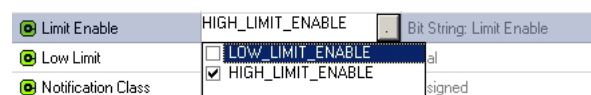


Fig. 4-20: Enabling and disabling the properties

25. Enter the value "100" under **High Limit** as the upper limit.



Fig. 4-21: Entering values

All input and output objects can function as alarm generators if the property "Notification Class" is added. Alarms that are triggered in the Input and Output Object are sent to the recipient list in the Notification Class Object.

26. Click on the button **[Store and Download]** to apply the configuration and store it in the memory.

A dialog in which the device is displayed is opened, and you configuration is loaded to this device. The device address is made up of the network number, the IP address and the BACnet MAC address together, each separated by a colon (see Fig. 4-22).

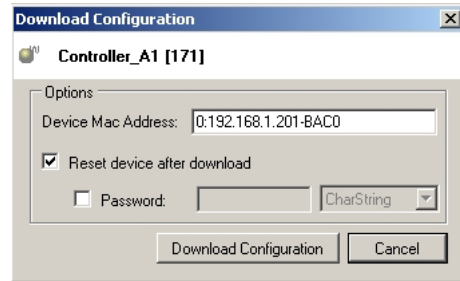


Fig. 4-22: Uploading the configuration

27. Enable **Reset device after download** and enter a password (if necessary) to restart the device after downloading the configuration.

28. Click on **[Download Configuration]**.

Check whether the configuration was successful:

29. Change over to the rider "Browsing & Monitoring".

30. Click on **Rescan Device** in the context menu of the configured device (Scan pool) to read in only this device again (see Fig. 4-23).

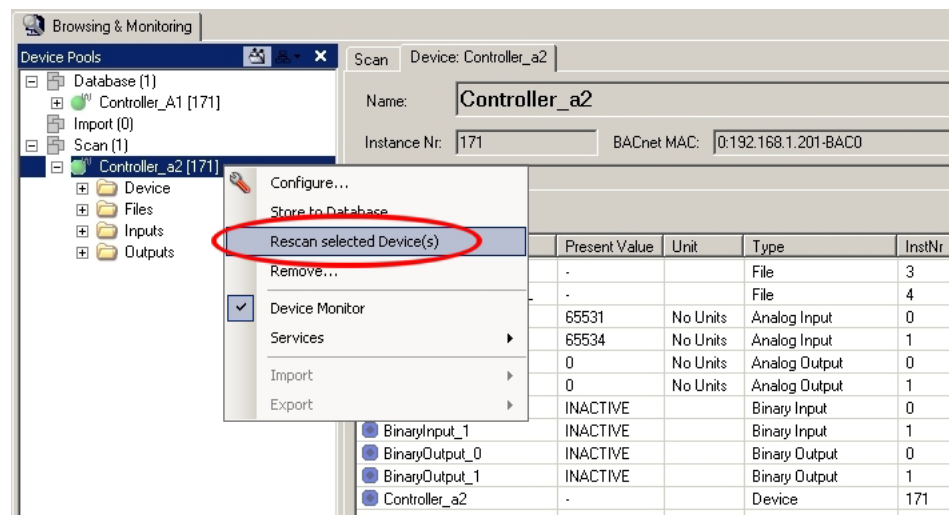


Fig. 4-23: Updating the device via "Rescan device"

The view is updated. Under the configured device, you will see additional folders, such as "Schedules" and "Alarms", in which the objects "Calendar", "Schedule" and "Notification Class" that you have previously configured are contained (see Fig. 4-24).

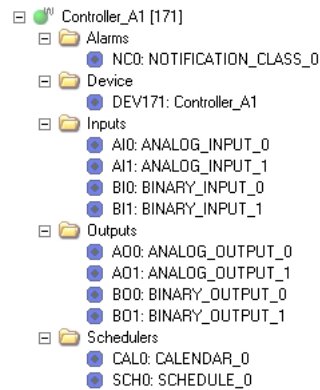


Fig. 4-24: New folders for "Schedules" and "Alarms"

In the Analog Input Object, which you have configured to an alarm generator, you will see all the properties necessary for alarm generation in the configuration mode.

If "Monitoring" is enabled, you will have a current view of the data in the rider "Browsing & Monitoring". Live values that you can change during the runtime are displayed. In the rider "Configure", on the other hand, the values are static and are not updated.

Now change one of the live values and transmit this directly to the controller:

31. Click on the configured device to the left in the tree.
32. Click on **Analog Input_0** in the folder **Inputs**.
33. Enter a new value "500" for the property **High Limit**, which you configured under point 25.
34. Using [**Commit Values**], transmit the value directly to the controller.

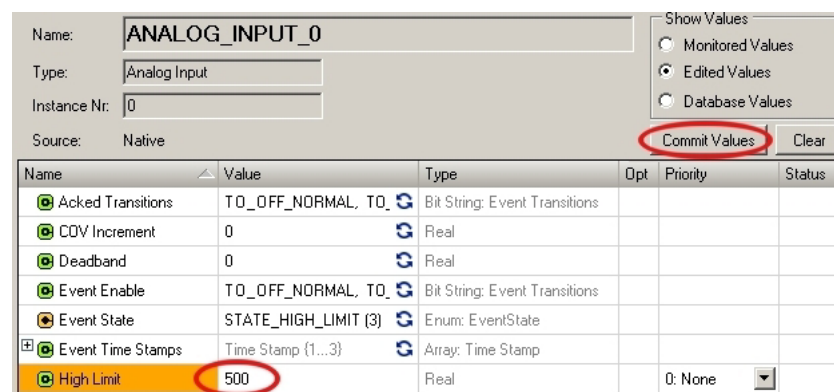


Fig. 4-25: Transmitting values directly via "Commit Value"

If the write process is successful, the property is marked in green and the "Write Status" is set to "OK" (see Fig. 4-26).

High Limit	500	Real	Ok
------------	-----	------	----

Fig. 4-26: Successful value transmission

If the write operation fails, an error message is displayed under "Write Status". The property is marked with red.

It is possible to change several values and transmit them together.

35. Set **Time Delay** to "10" and **Deadband** to "10".

Both "Time Delay" and "Deadband" are then highlighted in orange.

36. Transmit both value changes together via [Commit Value].

After the transmission, both are marked in green and have the status "OK". In this way, for example, data from other manufacturers that cannot be stored in the database can also be easily changed (see Fig. 4-28).

Name	Value	Type	Opt	Priority	Status
Acked Transitions	TO_OFF_NORMAL, TO_	Bit String: Event Transitions			
COV Increment	0	Real			
Deadband	10	Real		0: None	
Event Enable	TO_OFF_NORMAL, TO_	Bit String: Event Transitions			
Event State	STATE_HIGH_LIMIT (3)	Enum: EventState			
Event Time Stamps	Time Stamp (1...3)	Array: Time Stamp			
High Limit	500	Real			Ok
Limit Enable	HIGH_LIMIT_ENABLE	Bit String: Limit Enable			
Low Limit	0	Real			
Notification Class	0	Unsigned			
Notify Type	ALARM (0)	Enum: Notify Type			
Object Identifier	{ANALOG_INPUT_0}	Object Identifier			
Object Name	AnalogInput_0	CharString			
Object Type	ANALOG_INPUT (0)	Enum: Object Type			
Out Of Service	<input type="checkbox"/>	Bool			
Present Value	65533	Real			
Status Flags	IN_ALARM	Bit String: Status Flags			
Time Delay	10	Unsigned		0: None	
Units	NO_UNITS (95)	Enum: Engineering Units			

Fig. 4-27: Transmission of several values



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Configuring New Devices

Name	Value	Type	Opt	Priority	Status
Acked Transitions	TO_OFF_NORMAL, TO_	Bit String: Event Transitions			
CDV Increment	0	Real			
Deadband	10	Real			Ok
Event Enable	TO_OFF_NORMAL, TO_	Bit String: Event Transitions			
Event State	STATE_HIGH_LIMIT (3)	Enum: EventState			
Event Time Stamps	Time Stamp (1...3)	Array: Time Stamp			
High Limit	500	Real			
Limit Enable	HIGH_LIMIT_ENABLE	Bit String: Limit Enable			
Low Limit	0	Real			
Notification Class	0	Unsigned			
Notify Type	ALARM (0)	Enum: Notify Type			
Object Identifier	{ANALOG_INPUT_0}	Object Identifier			
Object Name	AnalogInput_0	CharString			
Object Type	ANALOG_INPUT (0)	Enum: Object Type			
Out Of Service	<input type="checkbox"/>	Bool			
Present Value	65532	Real			
Status Flags	IN_ALARM	Bit String: Status Flags			
Time Delay	10	Unsigned			Ok
Units	NO_UNITS (95)	Enum: Engineering Units			

Fig. 4-28: Several values successfully transferred, status OK

4.2 Working with Persistent and Configured Values




Object property values are stored differently depending on the type of change:

- 1. Change made to the runtime in the "Browsing & Monitoring" rider**
 Existing property values are changed here, transferred in the controller to the runtime using **[Commit Values]** and persistently saved there. Changes to the runtime are only possible if access to this property is permitted in the "Configure" rider ( symbol).
- 2. Configuration performed in the "Configure" rider**
 Objects and their properties are created, changed or deleted here. Changed properties are identified with an arrow symbol . These values are loaded into the controller using **[Store and Download]** and will overwrite existing persistent data. Unconfigured standard values (without arrow symbol) will not overwrite the persistent values.






In the following, the interplay between persistent and configured values is explained by three property values of the Analog Value Object.

1. Open the **"Configure" rider**.

Consider the following properties of the standard configuration as examples:

Name	Value	Acc	Mod
COV Increment	0		
Deadband	0		
Low Limit	0		

2. Change two of the values and click on one of the lock symbols in the "Acc" column. This will lock this value from being changed in the runtime.

Name	Value	Acc	Mod
COV Increment	10		
Deadband	20		
Low Limit	0		

Changed values ("Value") or permitted/blocked access ("Acc") are identified as modified in the "Mod" column with an arrow.

3. Click on the button **[Store and Download]** to download the configuration and store it in the controller.
4. Change over to the **"Browsing & Monitoring" rider**.

- Click with the right mouse button in the "Scan" pool on the device with the changed values and select "**Rescan selected Device(s)**" in the context menu.

The following life values from the previous configuration are displayed:

Name	Value
COV Increment	10
Deadband	20
Low Limit	0

- Change the life values of the properties:

Name	Value
COV Increment	100
Deadband	200
Low Limit	300






- Click on the [**Commit Values**] button to transfer the values to the runtime into the controller.

The changes for "Deadband" and "Low Limit" are taken over. "COV Increment" is not changed since you have blocked this property in the "Configure" rider (red lock):

Name	Value
COV Increment	10
Deadband	200
Low Limit	300

- Change in the "**Configure**" rider.

You are shown the last configuration:

Name	Value	Acc	Mod
COV Increment	10		
Deadband	20		
Low Limit	0		

- Download this configuration again using [**Store and Download**] into your controller.

10. Change over to the "**Browsing & Monitoring**" rider.
11. Click with the right mouse button in the "Scan" pool on the device with the changed values and select "**Rescan selected Device(s)**" in the context menu.

The values for "COV Increment" and "Deadband" were taken over from the configuration. The value for "Low Limit" was not changed in the configuration (no arrow symbol). For this reason, the persistent value that was transferred to the runtime using "Commit Values" is shown here:

Name	Value
COV Increment	10
Deadband	20
Low Limit	300

4.3 Creating a Client Mapping

1. Open the rider "Configure".
2. Choose an object in the "Inputs" folder, e.g. **Analog Output 0**.
3. Right click on a property and choose **Client Mappings...** (see Fig. 4-29).

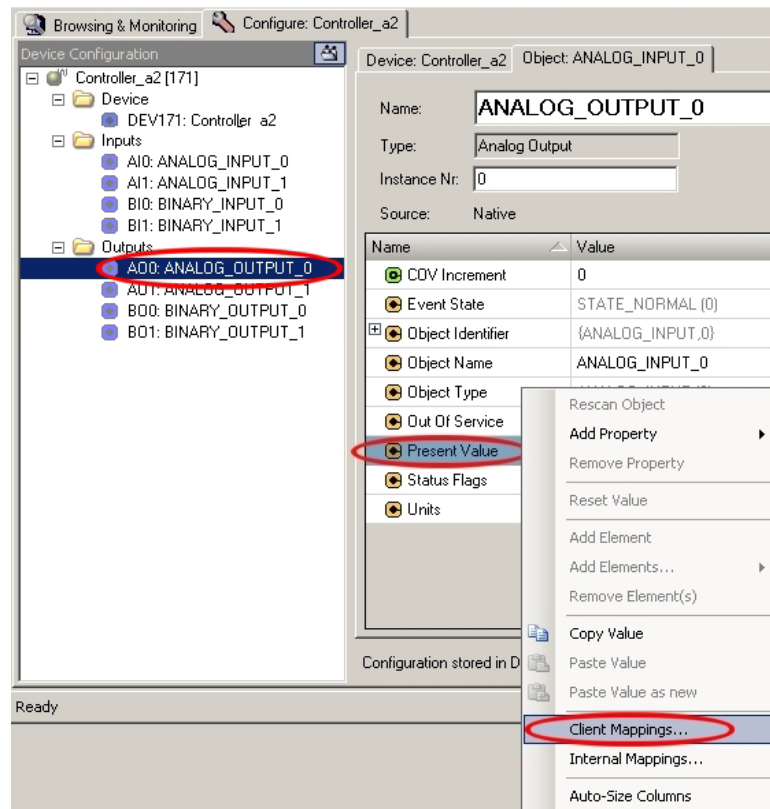


Fig. 4-29: Opening the Client Mapping Editor

The Client Mapping Editor is opened in a non-modal dialog.

4. Select the object **Analog Output** to the left and the property **Present Value** to the right in the main window.

The Client Mapping Editor indicates the existing linkable properties for the currently selected property in the main window.

Now, the property "Present Value" of the "Analog Input" of a local device is supposed to be read and written to the "Present Value" of the local object "Analog Output":

5. Choose a device in the Client Mapping Editor.

6. Select the object **Analog Input** underneath the device and the property **Present Value** below that (see Fig. 4-30).
7. Now link the **Present Value** of the selected **Analog Input Object** in the Editor with the **Present Value** of the local **Analog Output Object** selected in the main window by clicking on **[Add Read Map]** (see Fig. 4-30).

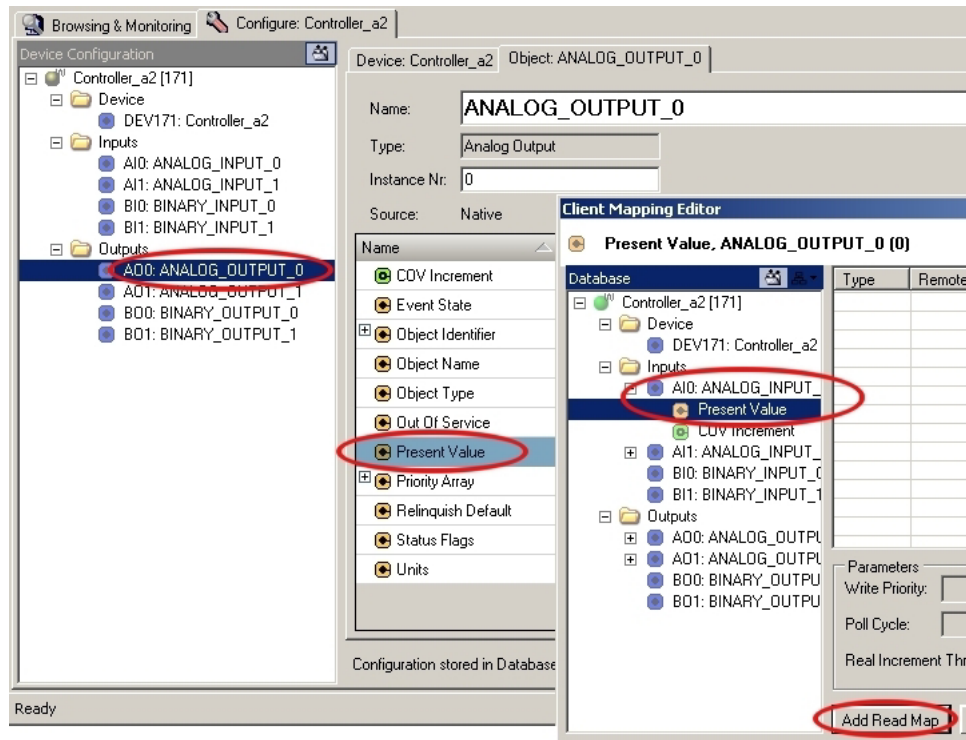


Fig. 4-30: Non-modal Client Mapping Editor

The link is displayed in the dialog to the right (see Fig. 4-31).

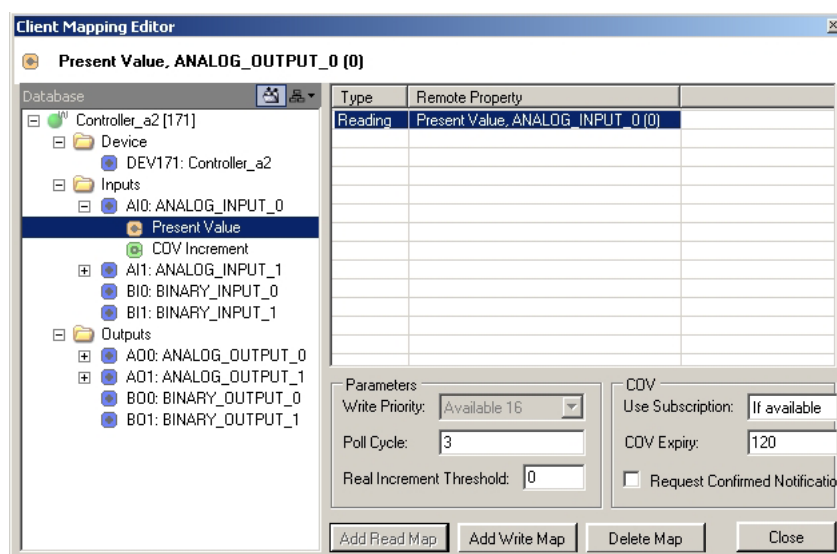


Fig. 4-31: Successful linking in the Client Mapping Editor

The created link is further parameterized

8. Choose the setting "If available" under **Use Subscription**.

With this setting, only changes in value are transmitted (COV). If no COV is possible, values are transmitted by "Polling". The time interval for polling is established using the "Poll Cycle":

9. Select a **Poll Cycle** of 3 seconds, for example.
10. Then click on **[Close]** and close the Editor.
11. Click on **[Store and Download]** to store the Client Mapping and load it to the controller or continue with the configuration.

4.4 Creating an Internal Mapping

In the following, you will create links between BACnet properties and IEC variables.

1. Open the rider "Configure".
2. Choose the device in the tree to the left.
3. In the configuration area, click beside the input field **SYM_XML** on the button **[Import]** (see Fig. 4-32).

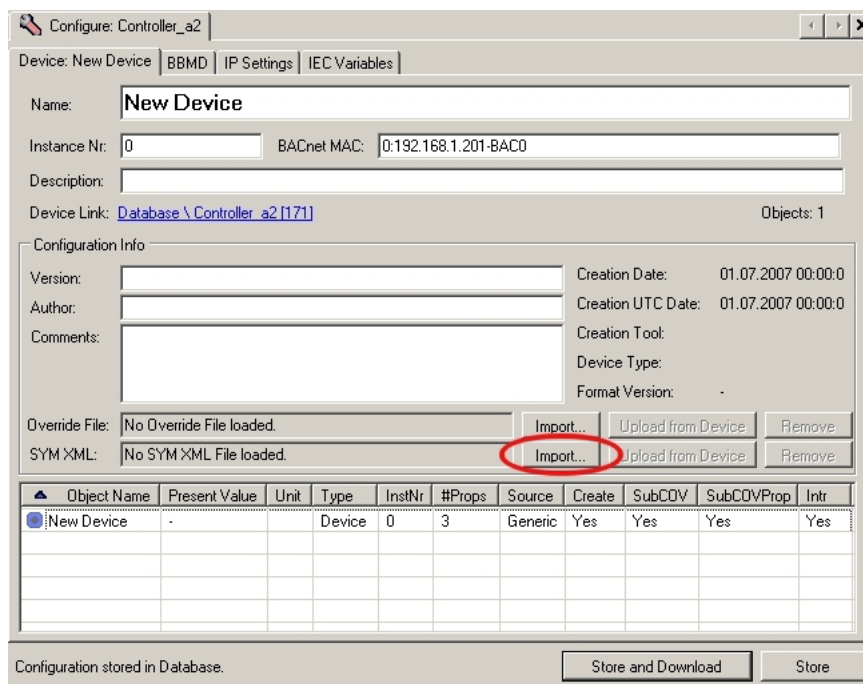


Fig. 4-32: Importing a SYM_XML file

4. Open the SYM_XML file.

Below the device, the new objects that are defined in the SYM_XML file are displayed in a folder labeled "IEC Variables" (see Fig. 4-33).

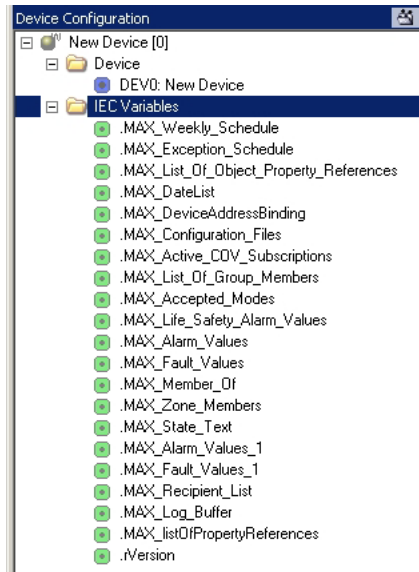


Fig. 4-33: Importing a SYM_XML file

5. Click on the device to the left in the tree.

On the right side, four new riders will open: „Device“, „IEC Variables“, „BBMD“ and „IP Settings“.

6. Click on the rider "IEC Variables"

You will see all IEC variables of the SYM_XML file. In the SYM_XML file, whole objects are also defined. Variables that belong to these objects and are therefore already linked can no longer be bound with other properties using the BACnet Configurator.

BACnet properties that are not permanently bound with IEC variables in the SYM_XML file can be linked, however.

7. Click with the right mouse button on an IEC variable that can be linked (Mappable: "Yes") and click on the button **[IEC Mappings]** in the toolbar.

A non-modal dialog is opened.

8. In the tree of the main window, click on **Analog Output** and select, for example, the property **Out of Service**.

The IEC Mapping Editor displays a selection of IEC variables that can be bound to the selected property.

- By using **[Set Mapping]**, link **Out of Service** of the **Analog Output Object** with a selected IEC variable of the IEC Mapping Editor (see Fig. 4-34).

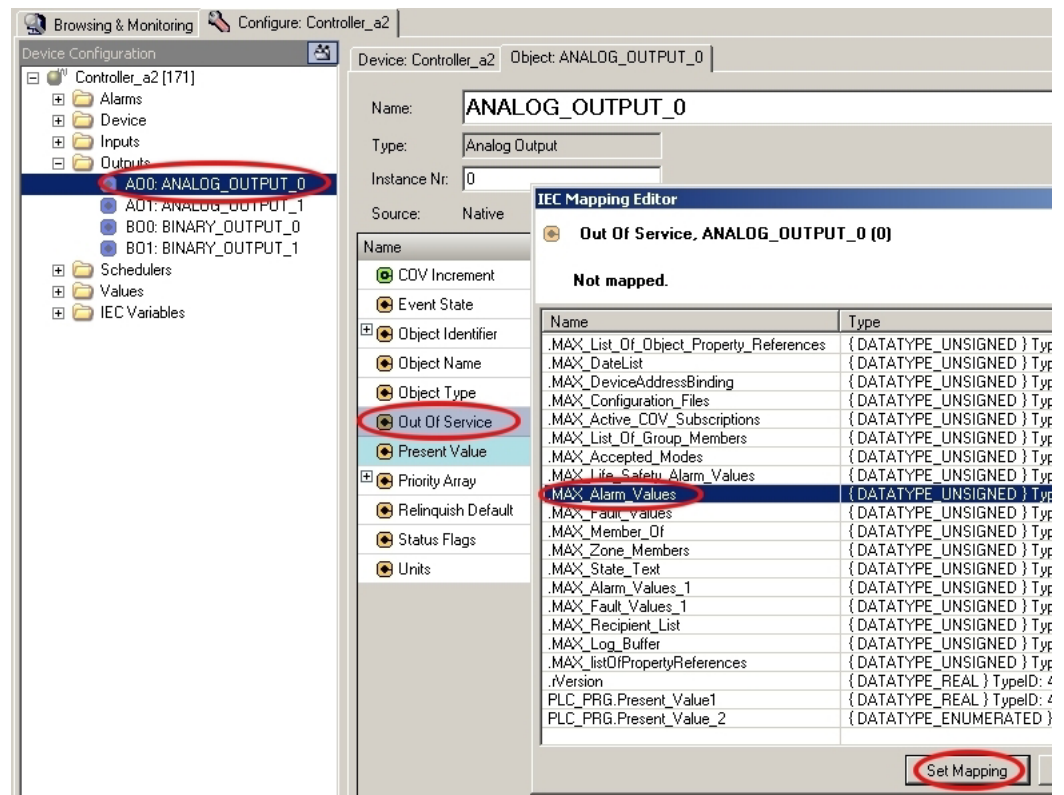


Fig. 4-34: Internal Mapping

The bound property is displayed behind the IEC variable under "Mapped to Property".

- Click on the device to the left in the tree and on the rider "IEC Variables".

The BACnet property ("Out of Service") bound to the IEC variable ("Max_Alarm_Values") is displayed again under "Mapped to Property". (siehe Abb. 4-35).

IEC Variable Name	Data Type	Mapable	Mapped to Property
.MAX_Active_COV_Sub...	{ DATATYPE_...	Yes	-
.MAX_Alarm_Values	{ DATATYPE_...	Yes	ANALOG_OUTPUT_0\PROP_OUT_OF_SERVICE
.MAX_Alarm_Values_1	{ DATATYPE_...	Yes	-

Abb. 4-35: Internal Mapping successful

- Click on **[Store and Download]** to store the Client Mapping and load it to the controller or continue with the configuration.

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