PRODUKT

Air handling with focus on LCC

BACnet/IP

| POL908 / POL6XX | POL908 / POL6XX | POL908 / POL6XX |
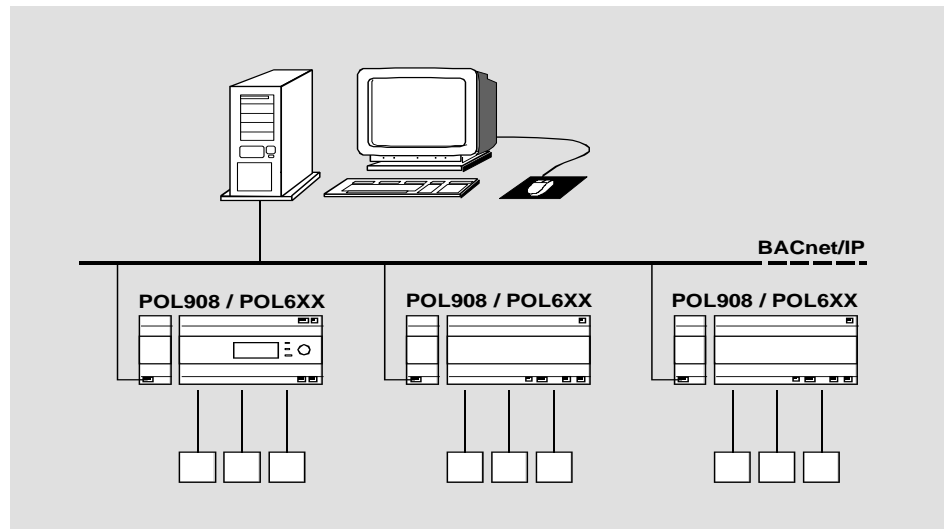
Climatix™
BACnet/IP communication with
POL908.00
Integration guide

BACnet/IP communication with POL908.00

Table of contents

CB1J3962en/IV2019-01-25

1 About this document

1.1 Revision history

Version	Date	Changes	Section	Pages
	26.03.2010	First edition		
	15.09.2010	Minor enhancements		
	14.02.2014	Product version VVS 9.0		
	17.07.2014	Update for VVS10, BACnet client and object handling		
	07.10.2015	Minor enhancements		
	25.01.2019	Security enhancements (firewall, access to webpage)		

1.2 Before you start

Validity

This document applies to the following product:

Name	Type (ASN)	Short name
BACnet/IP communication module	POL908.00/STD	BACnet/IP module

Product versions

Description and functional scope of the products are based on the Climatix Valid Version Set 10.0 or higher and application based on Siemens standard.

Target audience

This document is intended for the following audience:
- BACnet system integrators
- Measuring and control engineering staff
- Sales and commissioning staff

Prerequisites

The above target audience:
- Has general professional knowledge on planning and commissioning HVAC technology measuring and control solutions.
- Has basic knowledge of BACnet.
- Has the additional reference addresses documentation for the specific product.

1.3 Reference documents

Further information

The following documents contain additional information on the products described in this manual:

Document	Order no.
Data sheet "Communication module BACnet/IP"	CB1Q3933en
Basic documentation "BACnet communication modules"	CB1P3933en
Basic documentation "BACnet PICS"	CB1P3939en
BACnet objects "BACnet/IP communication with POL908.00" Note! Uniqe documentation for each application.	CB1Y3963en
Basic documentation "Climatix AHU application" Note! Uniqe documentation for each application.	CB1P3977en

1.4   Document conventions

Symbols used

Below is an overview of all symbols used in this document denoting risks or important information:

⚠ This symbol draws your attention to special safety notes and warnings. Failing to observe these notes may result in injury and/or serious damages.

🛑 This symbol denotes special information that, when failed to observe, may result in faulty functionality *or loss of data*.

ℹ️ Notes with this symbol provide important information that requires appropriate attention.

💡 This symbol marks passages containing tips and tricks.

Abbreviations

The following abbreviations are used in text and illustrations:

Abbreviation	Meaning
BACnet	**B**uilding **A**utomation and **C**ontrol **N**etwork
BSP	**B**oard **S**upport **P**ackage (operating system)
Climatix	Controller family with common tools
Gateway	A device for transfer data between different kind of networks
HMI	**H**uman **M**achine **I**nterface, e.g Operator unit
HVAC	**H**eating, **V**entilating, **A**ir **C**onditioning
MS	**M**anagement **S**tation
SELV	**S**afety **E**xtra-**L**ow **V**oltage
TCP/IP	**T**ransmission **C**ontrol **P**rotocol, e.g. Ethernet/Internet
VVS	**V**alid **V**ersion **S**et

1.5   Important information on safety

Field of application

Use BACnet communication only for control and monitoring.

Intended use

Trouble-free and safe product operation of the above products presupposes transport, storage, mounting, installation, and commissioning as intended as well as careful operation.

Electrical installation

⚠ Fuses, switches, wiring and grounding must comply with local safety regulations for electrical installations.

Wiring

⚠ When wiring, strictly separate AC 230 V mains voltage from AC 24 V safety extra-low voltage (SELV) to protect against electrical shock!

Commissioning and maintenance

Only qualified staff trained accordingly may prepare for use, commission, and maintain BACnet communication modules.

Password

⚠ Users are requested to change default password settings to reduce vulnerability.

Maintenance

Maintenance of Climatix controller and BACnet communication modules generally only means regular cleaning. We recommend removing dust and dirt from system components installed in the control panels during standard service.

Faults

⚠ Only authorized staff may diagnose and correct faults and recommission the plant. This applies to working within the panel as well (e.g. testing or changing fuses).

Storage and transport

Refer to the environmental conditions specified in the respective data sheets for storage and transport.
If in doubt, contact your supplier.

Disposal

Devices contain electrical and electronic components; do not dispose of them in household garbage.
Observe all local and applicable laws.

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1.6   Trademarks and copyrights

Trademarks, legal owners

The table below lists the third-party trademarks used in this document and their legal owners. The use of trademarks is subject to international and domestic provisions of the law.

Trademarks	Legal owner
BACnet	American National Standard (ANSI/ASHRAE 135-1995)

All product names listed in the table are registered (®) or not registered (™) trademarks of the owner listed in the table. We forgo the labeling (e.g. using the symbols ® and ™) of trademarks for the purposes of legibility based on the reference in this section.

Copyright

This document may be duplicated and distributed only with the express permission of Siemens, and may be passed on only to authorized persons or companies with the required technical knowledge.

1.7   Quality assurance

Document contents

These documents were prepared with great care.
- The contents of all documents are checked at regular intervals.
- All necessary corrections are included in subsequent versions.
- Documents are automatically amended as a consequence of modifications and corrections to the products described.

Please make sure that you are aware of the latest document revision date.

1.8   Document use/ request to the reader

Request to the reader

Before using our products, it is important that you read the documents supplied with or ordered at the same time as the products (equipment, applications, tools etc.) carefully and in full.
We assume that persons using our products and documents are authorized and trained appropriately and have the technical knowledge required to use our products as intended.
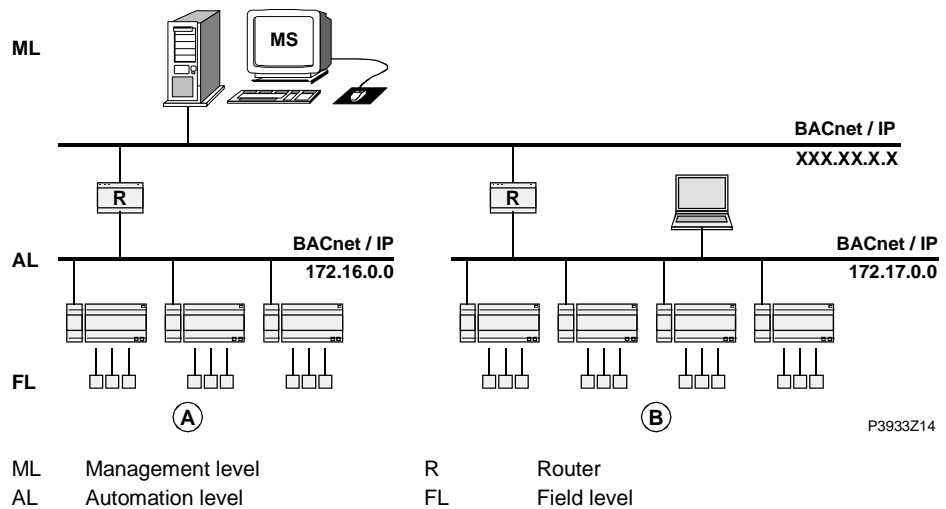
Exemption from liability

Siemens assumes no liability to the extent allowed under the law for any losses resulting from a failure to comply with the aforementioned points or for the improper compliance of the same.

2 BACnet/IP overview

2.1 Networks and addressing

BACnet/IP networks

A BACnet/IP network consists of one or more IP subnets (IP domains) assigned the **same** BACnet network number.

ML	Management level	R	Router
AL	Automation level	FL	Field level

Learning objectives of this section

This section discusses BACnet/IP networks, and necessary measures for several subnets in particular. The individual topics are:

- Broadcasts and BBMDs (BACnet Broadcast Management Devices).
- Broadcast Distribution Table (BDT).
- Foreign Devices (FDs), e.g. management stations present on another IP subnet. A foreign device logs in to a defined BBMD for receiving broadcasts. The login is accepted without special login mechanisms. Login must be repeated at specific intervals.
  Note: The foreign device must be predefined in the BACnet module settings.

Broadcasts and BBMDs

BACnet often uses broadcasts for communication. In contrast to unicasts, they are intended for all network members.
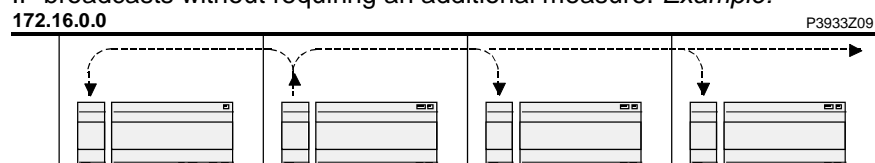This must be considered when engineering IP subnets. BACnet uses the "BACnet Broadcast Management Device" (BBMD) as showed below.
There are two procedures to distribute broadcasts:

- "**Two**-hop forwarding" is standard.
- "**One**-hop forwarding" can be used if IP routers are configured to distribute broadcasts to remote subnets.

One IP subnet

Broadcast messages from a device (e.g. 172.16.255.255:0xBAC0) in BACnet/IP networks consisting of only **one** IP subnet are sent to all other subnet members as IP broadcasts without requiring an additional measure. *Example:*

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Several IP subnets: BBMDs required

If a BACnet/IP networks comprises several subnets, additional mechanisms are necessary to distribute broadcasts. Because routers used to connect subnets do not allow for broadcasts.
BACnet thus offers the "BACnet Broadcast Management Device" (BBMD) as a solution. This is not a separate product but rather an additional function of BACnet devices.
BBMDs transmit broadcasts to all other BBMDs on the BACnet network, thus distributing broadcasts across the corresponding subnets.
Example:
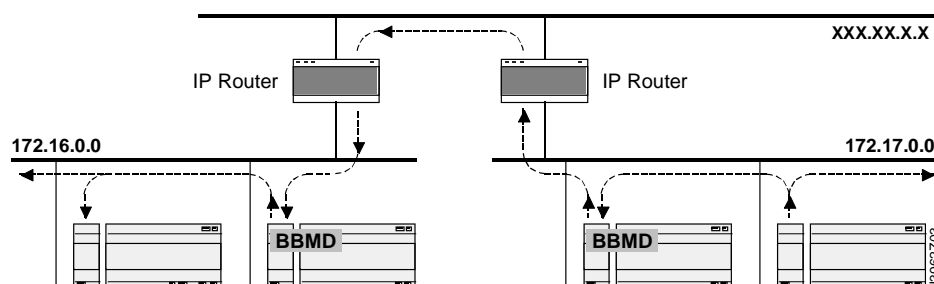
Broadcast Distribution Table (BDT)

All BBMDs in a BACnet network must be configured using by means of a "Broadcast Distribution Table" (BDT). The BDT table must be the same for all BBMDs. A BDT contains the following entries:
– IP address
– UDP port
– Broadcast Distribution Mask (BDM)

More information

For more detailed information on BACnet/IP networks see documentation: CB1P3933en "Climatix BACnet communication modules POL904, POL908".

2.2 BACnet/IP limits

DHCP rules

Automatic assignment of DHCP may have an undesired effect on the system. Remember the following:

Item	Rules
BBMDs	DHCP may **never** be used together with "BACnet Broadcast Management Devices" (BBMDs), as the IP addresses of the "Broadcast Distribution Table" (BDT) are configured as static addresses and cannot change during operation. Max 10 devices (Subnets) can be added in the BBMD Table.
Alarm recipient	In BACnet, alarm recipients are entered with their "Device Object Identifier" or their BACnet address. The IP address is part of the BACnet address and may not be changed for the alarm recipient. For this reason, option "Device Object Identifier" must always be used.
Access rights	If access rights are assigned based on IP address (e.g. for firewalls), the address must be static.
IP version	The BACnet standard currently supports only IP Version 4, i.e. only IP devices with 32 bit address that can be operated as BACnet/IP device. The BACnet protocol does not work with 128-bit addresses of IPv6.

2.3   Climatix BACnet server functionality

Supported standard   The POL908 supports BACnet standard **B-BC** (BACnet Building Controller).

Limits for objects and COV subscriptions

Item	Number
Active BACnet objects	max. 300
Simultaneous COV subscriptions	max. 50
COVs on BACnet (Buffer could be full and events could be lost. Error message in logfile)	max. 5 per sec

Object types supported   The BACnet/IP module supports the following BACnet standard object types:

Object type	Supported	Can be created dynamically	Can be deleted dynamically
Accumulator	☒	☐	☐
Analog Input	☒	☐	☐
Analog Output	☒	☐	☐
Analog Value	☒	☐	☐
Binary Input	☒	☐	☐
Binary Output	☒	☐	☐
Binary Value	☒	☐	☐
Calendar	☒	☐	☐
Character String Value	☒	☐	☐
DateTime Pattern Value	☒	☐	☐
Device	☒	☐	☐
Event Enrollment	☒	☒	☒
File	☒	☐	☐
Loop	☐	☐	☐
Multi-State Input	☒	☐	☐
Multi-State Output	☒	☐	☐
Multi-State Value	☒	☐	☐
Notification Class	☒	☐	☐
Positive Integer Value	☒	☐	☐
Schedule	☒	☐	☐
Trend Log	☒	☒	☒

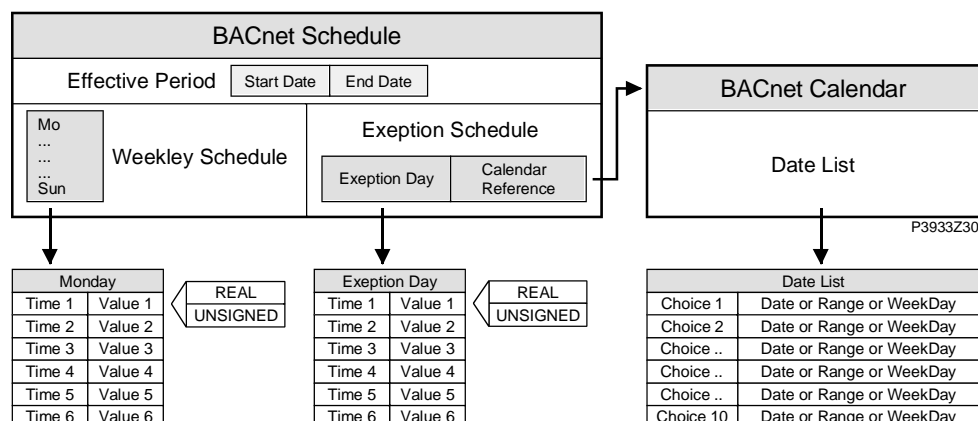**Description**   See the following basic document for a detailed description of the individual object types:

CB1P3939en

"BACnet Protocol Implementation Conformance Statement (PICS)"

BACnet server functionality, *continued*

Schedule and CalendarSchedule and Calendar

The figure shows the Climatix schedule concept for BACnet:

P3933Z30

Explanations (figure)

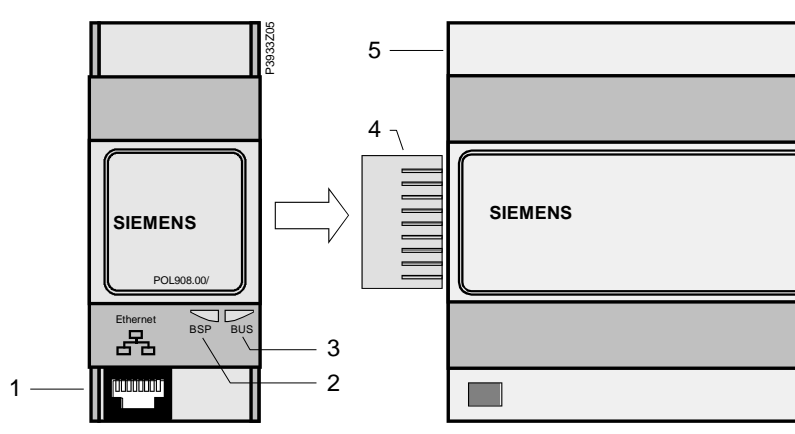The elements and functions in the figure are:

Element	Function
BACnet Schedule	BACnet object "Schedule" defines a weekday and exception day program as well as an actual time period during which the schedule is active.
Weekly Schedule	Each day – from Monday to Sunday as well as the exception day – allows for six different entries "Time/Value". Value REAL(FLOAT), DIGITAL, or UNSIGNED (multistate) depends on the Climatix object connected to the program.
Exception Schedule	Climatix only offers one exception day. It refers to the BACnet Calendar object. The exception day is defined like any day of the weekly schedule. The BACnet calendar then determines when the exception day is active. It takes priority over the weekly schedule.
BACnet Calendar Exception	The BACnet "Calendar" object is a list with "Date" **or** "Range" **or** "WeekNDay" (weekday) entries. The exception day of a related schedule is active when the entry is selected via the BACnet calendar.
BACnet Calendar Off	*The BACnet "Calendar" object is a list with "Date" **or** "Range" **or** "WeekNDay" (weekday) entries. The plant is set to off when the entry is selected via the BACnet calendar.*
Date	*Date* defines a start date. The present value is active for this date. – *Example 1:* *,07/04/25 (April 25, 2007). – *Example 2:* Sun,*/04/25 (each 25th of April, provided it is a Sunday).
Range	Date range defining start and end date. The present value is active for this range. Entry format: Same as for *Date*.
WeekDay	This entry allows for selecting a special day as exception day. Entry format: Week of month (number), day (name), month. – *Example 1:* 02/Mo/Mar (second Monday in March, every year). – *Example 2:* */Tu/* (every Tuesday).

3 Commission instructions

3.1 BACnet/IP module, elements

Design

The figure shows the Climatix BACnet/IP module POL908.00/STD. It is connected to the Climatix controller via the internal communication extension bus. This is done via plug connection on the left side of the controller.

Elements and connections

The elements and connections in the figure are:

Pos.	Element / Connection
1	Ethernet interface 10/100 Mbit (IEEE 802.3U), RJ45 plug, 8-pin.
2	Status display "BSP" (Board Support Package).
3	Status display "BUS" (bus connections / bus traffic o.k.).
4	Plug connection "Communication extension bus".
5	Climatix controller POL6XX.

Status LEDs

The status LEDs "BSP" and "BUS" can light red, green and yellow during operation.

"BSP" LED

This LED informs on the status of the "Board Support Package" (BSP). Color and flashing frequency of the LED:

Color	Flashing frequency	Meaning / Mode
Red / Green	1 s "on" / 1 s "off"	BSP upgrade mode.
Green	Steady "on"	BSP operating and communication with controller working.
Yellow	Steady "on"	BSP operating, but no communication with controller.
Red	Flashing at 2Hz	BSP error (software error).
Red	Steady "on"	Hardware fault.

"BUS" LED

This LED shows the status of external communication with the bus, not to the controller. Color and flashing frequency of the LED:

Color	Flashing frequency	Meaning / Mode
Green	Steady "on"	Ready for communication. The BACnet server is started. Does not indicate active communication.
Red	Steady "on"	BACnet server down or no link to the TCP/IP network.
Yellow	Steady "on"	Startup. The LED stays yellow until the module receives an IP Address, therefore a link must be established.

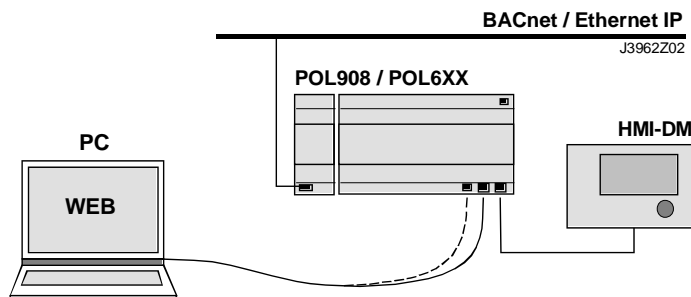ℹ️ Power supply is outside the allowed range if both LEDs are dark.

3.2 Connect BACnet/IP module

ℹ️ Prerequisites for connecting and configuring:
Working application loaded and started in the Climatix controller.

Devices involved

The Climatix controller and the BACnet/IP communication module are involved in this action:

Tools needed

Tools needed for connecting and configuring:
– Operator unit (HMI).
– PC with web browser.

Connect BACnet/IP module

Proceed as follows to connect the BACnet/IP module to the bus:

Step	Action
1	Controller **OFF**.
2	Connect BACnet/IP module to the controller via plug connection.
3	Connect the TCP/IP bus cable to the module.
4	Controller **ON**: → The module starts / initialization begins. → As soon as the two LEDs "BSP" and "BUS" are steady green, communication with the controller and bus (BACnet) is active. *Caution!* The controller must be reset a second time to update HMI; prior to parameterization

Next: Configure BACnet/IP module

Next job is to configure the BACnet/IP module. There are two possible tools for configuring:

Configure via …	Job	Section
Operator unit (HMI) or controller's web page	TCP/IP and BACnet settings → preferred tool → TCP/IP settings for the controller must be set up before configuration via webpage	3.3
Module's web page	BACnet settings → alternative tool	3.4
	BBMD settings → only tool	3.5

Connect BACnet/IP module, *continued*

Firmware v11.xx New firmware (BSP11.xx) for the POL908 BACnet module is default set to a higher security. That means that the webserver is deactivated and the firewall is activated.

Firewall When the firewall is active it is not possible to ping the module or extract the EDE-files from the BACnet module.
BACnet functionality works as before.

Webserver When the Webserver is passive it is not possible to access the BACnet modules webpage and configure it.

Versions from v3.50 for AHU or v3.26 for EHP can access the firewall and the webserver from the HMI.
Follow these steps to disable the firewall and activate webserver.
Note! This will set the module to low security.

Step	Action
1	Go to **Module[x] BACnet IP >** *Note! [x] is the position of the connected communication module. This is only information used when more than one module is connected.*
2	Select **Enable FireWall** and set **Active** to **Passive**
3	Select **Enable Webserver** and set **Passive** to **Active**
4	Do a **Restart**

Versions before v3.48 for AHU or v3.24 for EHP needs to either be upgraded to v3.50 for AHU or v3.26 for EHP or requires a file to disable the firewall and activate the webserver.
Follow this link to get access to the files required to disable the firewall and activate the webserver.
https://ivprodukt.docfactory.com/#!kb/topic:Settings_for_communication_BACnet_module_via_SD-card

To upgrade the unit to v3.50 or later for AHU or v3.26 or later for EHP please contact IV Produkts control system support for help.

3.3 Configure module via HMI

Basic settings / parameters

Use the operator unit (HMI) to enter BACnet basic settings.

Actual values, status and main settings is showed in the main page of the module, Special settings are made in the sub page "Advanced settings".

Parameters	Explanation
State	Current status of the communication module
Comm failure	Active = Communications error
Bacnet settings:	
Device name	BACnet device name
Device ID	BACnet device ID
Port	BACnet port (UDP port), normally 0xBAC0 = 47808
Description lang	Language for the description field in EDE file and the description property on BACnet. The same texts as in the HMI are used.
Alarm device ID1-2	Fix recipient device 1-2 *(1-3 via Web)*
Advanced	Go to Advanced settings -> see below
TCP/IP settings:	
WINS name	WINS name on the TCP/IP network.
Link	Active = Connected to Ethernet
DHCP	DHCP active/passive. Passive = Fixed IP address
Enable FireWall	Disable to ping the BACnet module
Enable Webserver	Activate to get access to the BACnet module webserver
IP	Module IP address. Actual and given on separate lines
Mask	Module mask. Actual and given on separate lines
Gateway	Module gateway. Actual and given on separate lines
General:	
Software version	Module BSP version.
Advanced settings	Advanced options. Normally not needed to change.
Eng. Unit support	Change dimensions to the imperial system.
Unicode	Use of Unicode for string-properties. Passive (Default) = ANSI/UTF-8; Active = UCS-2.
SecurityLevel	Set security level for BACnet.
Alarm server ID	Internal Alarm server ID for BACnet **(1)**
Communication *Comm mapping (Language)*	*Determines the objectnames, "Mapping", used for all BACnet objects. Normally "Mapping1" (16384) that is the same as COM1.* **Normally hidden!**
Use default	Reset communication module parameterization to default setting
Reset required !!:	When done, restart controller here, or using this command by first go back one or two pages with **ESC**, to **BACnet IP** or **Comm module overview**.
Module	Com module type (name)
Device ID	Module type
Diagnostic	A string containing HW serial number and production date
Trace	Show if log files are available for export

Configure module via HMI, *cont.*

Procedure	Proceed as follows to configure the BACnet/IP module step by step:

Step	Action
1	Log in to HMIusing the password for level 4 (Service), default 2000.
2	Go to **Module[x] BACnet IP** > *Note! [x] is the position of the connected communication module. This is only information used when more than one module is connected.*
3	Select **Device name**: The Device name must be unique within the BACnet network. The last part in the default name is taking from the mac address of the module and is therefore always unique.
4	Select **Device ID**: The Device ID must be unique within the BACnet network. The default ID is always unique.
6	Select **Description lang:** Language for the description field in EDE file and the description property on BACnet. The same texts as in the HMI are used.
7	Select **Alarm device IDs**: Alarm recipients can be entered to have a fast update of all alarms. Enter the BACnet device ID of the alarm recipient/client.
-	**TCP/IP settings** The TCP/IP settings must be set up via HMI to be able to connect to the web interface where BACnet and BBMD settings also can be done.
8	Select functionality for **DHCP**: Active means that the IP address is given from a DHCP server on the network. Passive means that a fixed IP address will be used as the settings described below. Fixed IP address must be used if using BBMD.
9	Optional safety option: Select **Enable Firewall:** Active means that it is not possible to ping the module or export EDE files. Passive means that it is possible to ping and export EDE files.
10	Optional safety option: Select **Enable Webserver:** Passive means that it is not possible to access the modules web page. Active means that it is possible to access the modules web page.
11	Select **IP**, **Mask** and **Gateway**: The given IP settings for the module are used for a fixed IP address and are only active if the DHCP parameter is set to Passive. *Note:* – End a line with #. Never use a "space" at the end. These settings are not the same as the TCP/IP settings for the controller if a controller with inbuilt TCP/IP is used.
12	Select **Write settings**: Set Write settings to Active. This must be done after any new change of IP, Mask or Gateway settings.
13	Select **Reset required !!**: When done, restart controller using this command, either here or by first go back one page with **ESC**, to **Comm module overview**.

Configure module via HMI, *cont.*

See further instructions how to set up BBMD if this must be used.

As a matter of principle, the controller must be restarted with "Reset required !!" or power off/on the controller after changing any settings to assume the data.

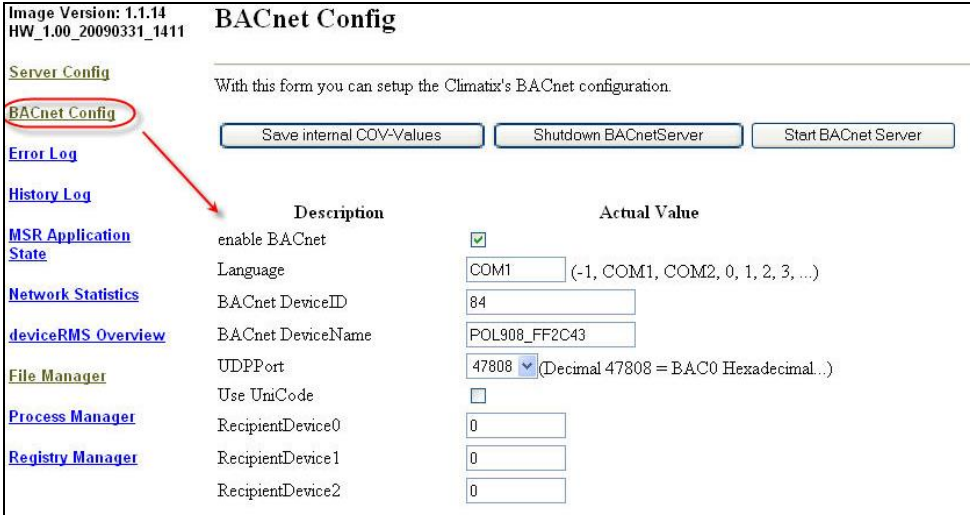Other setting than described above are only options and should normally not be changed.

BACnet/IP communication with POL908.00

3.4 Configure module on web page

Two tasks

We differentiate between the following tasks:
1. Enter basic settings – if not done via operator unit (HMI).
   See this section.
2. Enter BBMD settings (incl. any foreign devices).
   See section 3.5.

BACnet Config menu

The basic settings are entered via the **BACnet Config** menu:

P3933O04

Basic settings

Proceed as follows to enter the basic settings:

Step	Action
1	Enter the IP address or WINS name in the browser to open the module's web page.
2	Select the checkbox for **enable BACnet**.
-	Language should normally be COM1 (16384). Same as Comm mapping
3	Select **Device ID**: The Device ID must be unique within the BACnet network. The default ID is always unique.
4	Select **Device name**: The Device name must be unique within the BACnet network. The last part in the default name is taking from the mac address of the module and is therefore always unique
5	Select **UDP Port**: The default UDP port for BACnet is hexadecimal BAC0 (decimal 47808). The Port can only be set up as decimal conversion (47808-47823). BAC0=47808; BAC1=47809…BACF=47823
-	Use of Unicode for string-properties. Passive (Default) = ANSI/UTF-8; Active = UCS-2.
6	Select **Recipient devices**: Up to three fixed alarm recipients can be entered to have a fast update of all alarms. Enter the BACnet device ID of the alarm recipient/client
7	Press the **Save all values** button.

Any changes on the BACnet Configuration Page need a restart of the BACnet server by **Shutdown** and **Start** the BACnet server again.

3.5 Configure BBMDs

BBMD settings

You must define and parameterize "BACnet Broadcast Management Devices" (BBMDs) if a BACnet/IP network comprises several subnets. This allows for broadcasts via routers to all network members.

ℹ️ BBMD settings can only be done via web server.

Application example without foreign device

The following network with two subnets only contains servers (controllers) and to set connected clients (PCs). All members can communicate with each other if one BBMD is defined per subnet. Max 10 Subnets can be added in the BBMD Table.
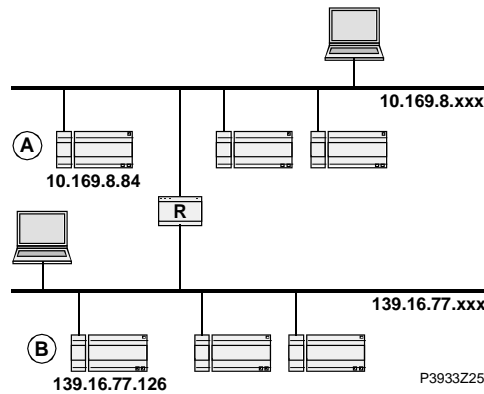
"BBMD Settings" window

The web page for the corresponding controller offers the BBMD Settings window to parameterize BBMDs (here: Controller A):

Make sure **webserver** is active according to chapter 3.2.

Configure BBMDs, *continued*

Settings

The window offers the following options:

Element	Description
Enable BBMD	Select BBMD function for this controller.
Update BBMD	Assume settings and refresh display.
FDT present	Checkbox: Foreign Device Table yes / no Text field: Max. number of entries (possible foreign devices).
Update FDT	Assume settings and refresh display.
Two-Hop Forwarding	Select two-hop forwarding.
Update Two Hops	Assume settings and refresh display.
IP Address	IP address for the partner BBMD on other subnet, e.g. for the above case: – Partner for controller "**A**": **139.16.77.126** – Partner for controller "**B**": **10.169.8.84**
UDP Port	Same as in the basic BACnet settings.
Update	Assume settings and refresh display.
New	IP address for BBMD server in a third subnet. *Important:* Enter the setting for all three BACnet servers!

Configure BBMDs, *continued*

Application example with foreign device

The following topology contains:
- Two BBMDs "A" and "B".
- One foreign device "C" (MS / BACnet client).

P3933Z26
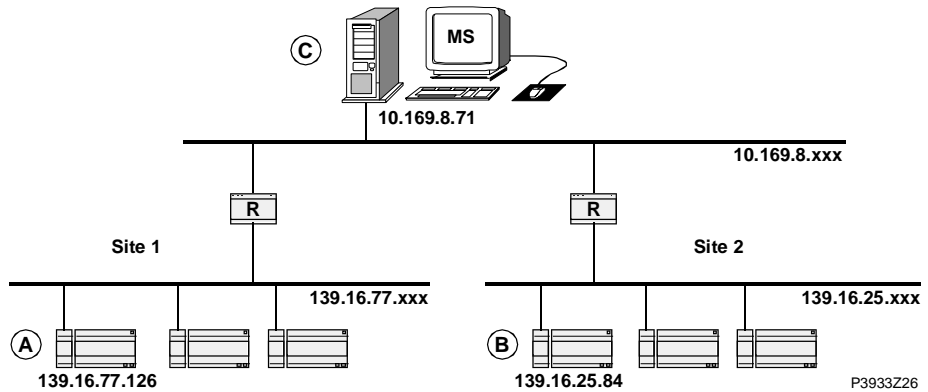
Settings for controller "A"

Enter the settings again via window "BBMD Settings" for the respective controller:

Make sure **webserver** is active according to chapter 3.2.

P3933O06

We recommend that every settings is restored to ensure the security to the BACnet. Do the previous steps in reverse order.

Explanations

Differences to the application example without foreign device on the previous page:
1. Checkbox **FDT present** is selected.
2. Text field **Max. Entries** contains "**1**" (for MS "C").

Settings for controller "B"

Same settings as for controller "A", but with the following difference:
The **IP Address** is **139.16.77.126**

Other setting than describe above are only options and should normally not be changed

Any changes on the BACnet Configuration Page needs a restart of the BACnet server by Shutdown and Start the BACnet server again.

FD settings in BACnet client (C)

Enter the IP addresses of the BBMDs, i.e. for controllers "A" or "B".

After commissioning

Change the default password. A secure password:
– is comprised of letters, numbers and special characters,
– is at least 20 characters long, and
– does not include a name or words from dictionaries or similar like "OZW"

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4 Integration

4.1 General

Climatix can be integrated to any BACnet client that supports BACnet/IP. Special care must be taken to the BACnet standard and what object types and properties that are supported both on the Climatix and the client side.

Climatix can also, at the same time, be used as a client. This means that some of the objects either can receive or send data from/to other BACnet devices (BACnet Servers).

4.2 BACnet objects

Use the right document for actual application

All available BACnet objects are found in a separate document and are specific for the actual application. All different applications, and in some cases also application versions, have different BACnet objects. The specific document for the actual application must be used to see what BACnet objects are available.

i The actual application name and version can be found using the HMI. In some cases it is also good to check the BSP versions for controller and BACnet module. Latest BSP version for BACnet module should always be used.

Check actual versions

Proceed as follows to see the actual application name and BSP versions:

1. Log in to HMI using the password for level 4 (Service), default 2000.
2. Select **Mainmenu > System overview > Versions >**

Parameter	Explanation / Example
+Application info	
Application manufacturer/name	e.g. Siemens
Application name/date	e.g. STD_AHU_vX.XX
+BSP version	Controller operating system.
Comm module 1	Communication module 1 operating system
Comm module 2	Communication module 2 operating system
Comm module 3	Communication module 3 operating system

Check actual versions (Alternative)

Older application versions could have another HMI structure and same information is found in a different place.

1. Select **Mainmenu > System overview > Application info >**

2. Select **Mainmenu > System overview > Versions > BSP version**

i All present BACnet objects for the specific unit are found in the EDE files.
See next chapter how to export the EDE files.

4.3   Export EDE files

What are EDE files?

EDE = "Engineering Data Exchange" is the format recommended by the BACnet Interest Group Europe to exchange data between BACnet server and BACnet client.

EDE Export files containing information on the BACnet objects are required for offline integration in a management station if it does not support online integration.

The EDE files are created by the BACnet server at every start of the server.
It is needed to download and import new files if there is any change in controller configuration that adds new BACnet objects, or change in BACnet settings.
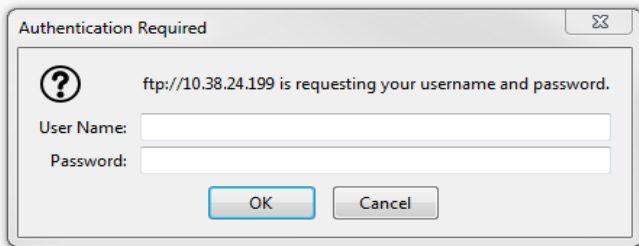
Procedure for export

<u>We recommend that a BACnet browser is used to export BACnet objects.</u>

If desirable the files can be exported via ftp client or ftp via web browser.

Following example shows export via Mozilla Firefox:

Make sure **firewall** is disabled and **webserver** is activated according to chapter 3.2.

Step	Action
1	Open the menu for the module in the browser (Mozilla Firefox is recommended, if other web browsers is used security settings for the web browser may block access): **IP address** of the module.
2	Insert the correct information in the pop up window. **Authentication Required** ftp://10.38.24.199 is requesting your username and password. User Name: Password: OK Cancel User Name: ADMIN Password:SBTAdmin!
3	Go to **Server Config** and verify that checkbox FTP is selected and press Update. **Server enabling and port configuration** Server Running Port Climatix ☐ 4242 Auth.: ●●●● HTTP ☑ 80 FTP ☑ 21 firewall must be disabled NetBios ☑ Will only set firewall rules. Does not disable service itself. Firewall ☐ Update
4	Do a restart in the controller.
5	Open **ftp** for the module in the browser (Mozilla Firefox): **ftp://IP address** of the module.
6	Go to Temp and save the two files selected in the screenshot below. The EDE file V2 contains more information and could normally be used for most clients instead of the normal EDE file.

BACnet/IP communication with POL908.00

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Export EDE files, *continued*

P3933O09
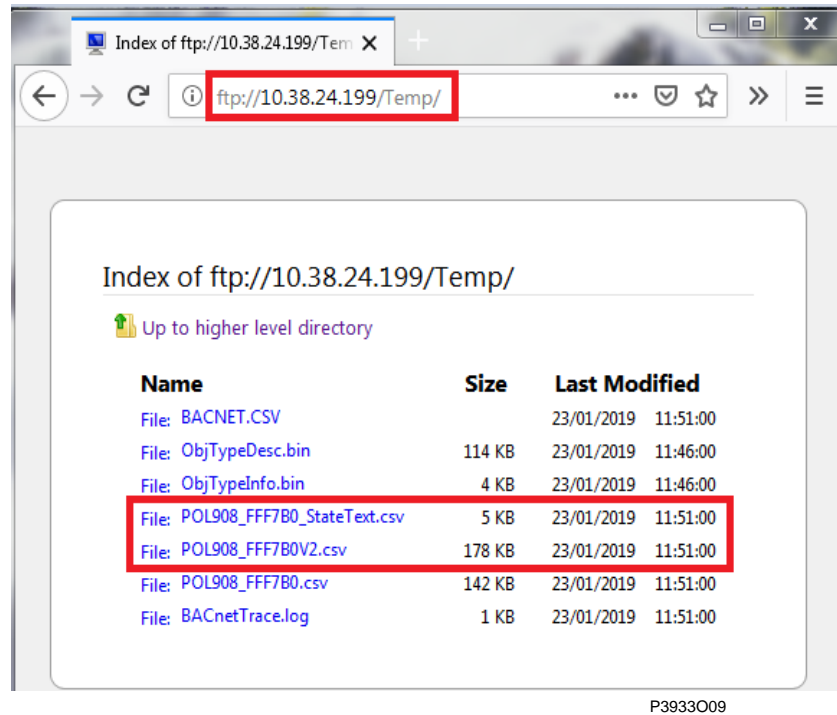
The EDE files are then used for offline integration, but could also be opened in Excel to view what BACnet objects are present.

After exporting the EDE file we recommend that every settings for firewall/webserver is restored to ensure the security to the BACnet. Do the previous steps in reverse order.

Normally either the object name or the object instance can be used as a BACnet reference.

4.4 BACnet object handling

Alarm handling

Alarms of a BACnet client are normally presented by a notification class and handled differently from those in the local Climatix controller:
– On BACnet, each objects in alarm is acknowledged and reset as well as transitioned from "ToNormal", "ToOffNormal", and "ToFault".
– The local Climatix controller do not support this transition, but rather only transitions to "ToNormal". This is done via general acknowledgement for all objects, not for each individual object in alarm.

ℹ️ The behavior described above means that acknowledgement and reset in BACnet does not impact pending/unhandled alarms in the local Climatix controller. Acknowledgement in BACnet is only information that the alarm has been identified.

Workaround

The following workaround is needed to reset a BACnet alarm:
An additional BACnet object "MultiStateValue" named "AckAlmPls" or similar is used for general acknowledgement in the local Climatix controller.

PresentValue, StatusFlags and EventState properties

The PresentValue is just showing the current value of an object.
The StatusFlags or the EventState could be used to see the current state.
There are three different states: Normal, OffNormal and Fault.

A PresentValue must maintain a specific value or below/above a limit for a minimum period of time, specified by an Alarm delay, before any alarm occurs and the object is in an OffNormal state.
The Fault state will be active if the PresentValue is not reliable or not valid.

The EventState shows the current state as Normal, OffNormal or Fault.

The StatusFlags has four flags: InAlarm, Fault, Overridden and OutOfService.
The first flag, InAlarm, indicates that the object is in an alarm state. This means an OffNormal or Fault state is active.

Multistate objects

BACnet does not use the value 0 for Multistate objects. All Multistate objects start with 1 (e.g. 1=Off, 2=Step1, 3=Step2…). 0 is represented as NULL.
Climatix may use Multistate objects even if there are only 2 states (e.g. Off/On).

Write to Present Values and behavior of OutOfService

The property OutOfService needs to be set to "Active" to write to a Present Value.

Set point objects must always be set OutOfService, never set it to passive.

Note! Setting a physical input to OutOfService disables the present value from the connected sensor or detector etc, but could be used to write to any object in the controller, e.g. send a value from one controller to the Climatix controller.

Outputs should not be set to OutOfService, here is instead a Priority array used, see next page.
If an output is set to OutOfService is the Physical value disabled from the priority array and keeping the last valid value.

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Some applications are detecting if any IO is set OutOfService and indicate by a LED on the HMI and/or an alarm.

Priority array definition

For outputs are the PresentValue used together with a priority array (level 1-16 where 1 has highest priority). Each priority level could be deactivated and only active levels counts. The result for the PresentValue is coming from the active level with highest priority. A deactivated level is presented as "NULL" on BACnet.

A level could be activated by writing any value to the PresentValue with the specific priority or deactivated by writing a special command called NULL, also with the specific priority.

Example writing with Priority 8 (Manual control):
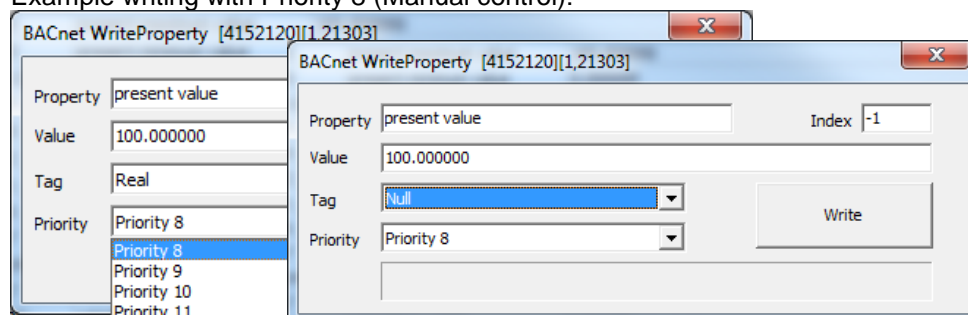
Some levels are used by the *application* and could not be overwritten via BACnet.

Climatix standard priority levels for outputs according to the following table:

Priority level	Usage	Remarks
1	*Service, configuration*	*Output always 0*
2	Not used	(Force without protection)
3	Not used	
4	*Alarm or force*	*Output always 0*
5	*Force*	*Output according to settings*
6	*Min runtime*	*Output keeps the last state for set time*
7	Not used	(Manual without notification)
8	Manual control	Output according to selected value
9	*Room unit*	
10	*Set back manual control to Not active (NULL)*	
11	Not used	
12	Not used	
13	Not used	
14	**Communication control**	**Preferred for overwriting via BACnet**
15	*Normal control*	*From application*
16	*Time switch program*	*Default value*

Preferred priority to use for writing values to the output, via BACnet is Priority 14, but other "Not used" priorities may be used with care.

Some applications are detecting if Priority level 8 is active and indicate by a LED on the HMI and/or an alarm.
Priority 10 could in some application be used to set back Priority 8 to NULL.

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4.5 BACnet client

Introduction

Some objects can receive (Read) or send (Write) data from/to other remote BACnet devices (BACnet Servers) on the network.
Example: Climatix controller reads outdoor temperature from another device.

The binding to the remote BACnet device is done by a file called BACNET.CSV or BACNET.UCF. This file must contain a uniqe internal connection name for each used object and also the uniqe IDs of the remote device, object and property. The BACNET.CSV file is related to the specific project network and the needed binding and are uploaded, at commisioning time, to each BACnet module or Climatix controller. It needs therefore to be separated backuped after commisioning.

Prerequisite

For integration, the BACnet device ID of the server (Remote BACnet device) and the object information must be known. This information is listed e.g. in the object list of the remote BACnet server. The client requires the information to know where to look for the BACnet objects to be integrated. Only PresentValues are supported.
– BACnet Device ID
– BACnet Object Instance ID
– BACnet Object Type (AnalogInput etc)

The needed connection name, for the specific binding, is found in the object description for the actual application.

Inputs needs to be set up to recieive values from communication by the Value selector for each IO, this could be done with the HMI by enter the detailed pages for each input, see basic documentation for each application.

Behaviors of the Value Selector:

Range	Function
	Select valid input value for the application:
– Hardware	– Value on hardware input.
– Comm	– Value from communications.
– And.	– The input is 1, if the value on the hardware input and the value from communications = 1. Alarm triggers, if one of the two values is invalid.
– Or	– The input is 1, if the value on the hardware input or the value from communications = 1. Alarm triggers, if one of the two values is invalid.
– Average	– Average from the values on hardware input and from communications. Alarm triggers, if one of the two values is invalid.
– Minimum	– Lowest value from the values on hardware input and from communications. Alarm triggers, if one of the two values is invalid
– Maximum	– Highest value from the values on hardware input and from communications. Alarm triggers, if one of the two values is invalid
– PreferedHW	– Value on hardware input has priority: If the value from the hardware changes to invalid, then the value from communications is taken. If the latter is also invalid, an alarm is triggered.
– PrefComm	– Value from communications has priority: If the value from communications changes to invalid, then the value from the hardware is taken. If the latter is also invalid, an alarm is triggered.

Procedure	Proceed as follows to set up the BACnet Client binding step by step:

Step	Action
1	Find out needed information noted in Prerequisite and prepare inputs by the Value selector.
2	Create a new Excel file called BACNET.CSV with the file format Unicode-text (*.txt). Or modify any available template. If UCF format is used must the default header be available in the file.
3	Enter the needed information in column A. One binding on each row. Use the following syntax:

Connection name,Device ID,Object type,Object Instance,,Flag,[Prio]

Connection name	Unique identifier of the client connection used for the specific Climatix application
Device ID	BACnet DeviceID of the remote device
Object type	BACnet ObjectType of the remote object (AI,AO,AV,BI,BO,BV,MI,MO,MV)
Object Instance	BACnet ObjectInstance ID of the remote object
Flag *Note! There must be two comma before the Flag*	Only one of the following flags R,W,C,U are at the same time allowed W = time: Write the present value to a remote object on ValueChange with Heartbeat time. (Default = 60, 0 is not allowed) R = time: Read the present value of a remote object within the defined polling time. (Default = 60, 0 is not allowed) C = time: Use a confirmed COV subscription for updating from the remote object. Time = Resubscriptiontime (Default = 300, 0 is not allowed) U = time: Use an unconfirmed COV subscription for updating from the remote object. Time = Resubscriptiontime (Default = 300, 0 is not allowed)
Prio [Optional]	Defines the priority for writing (1...16) (default = 8)

Example:
CmnTOaR,50473,AI,1112,,C=300
AuxOutputW,50473,BO,22045,,W=60,8
Other options such as Gain and Offset could be given if needed but are not described here.

BACnet Client, *continued*
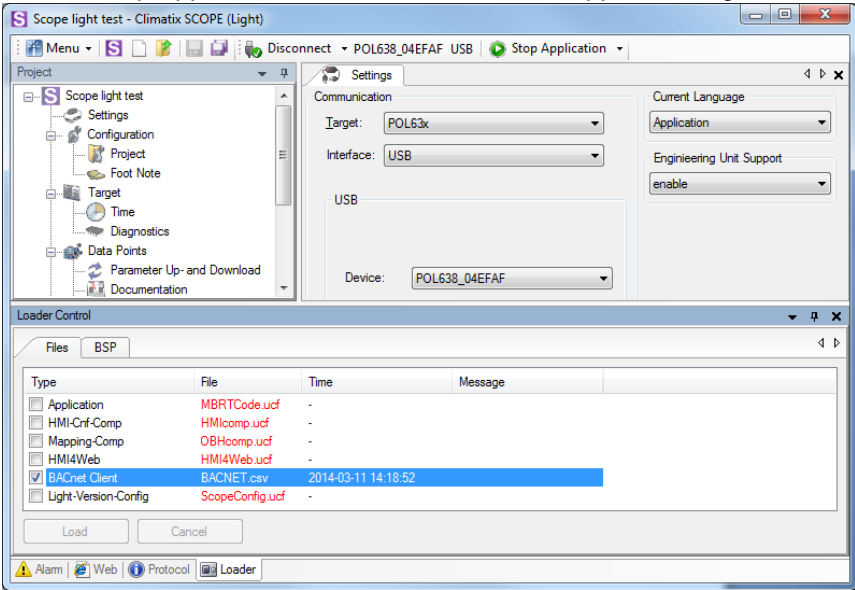
-	Example BACNET.CSV file (Read Outdoor temperature):

A1	▼	f_x	CmnTOaR,50473,AI,1112,,C=300

	A	B	C	D	E	F	G
1	CmnTOaR,50473,AI,1112,,C=300					Outside temperature	

– Connection name = CmnTOaR (See Climatix object description)
– Remote BACnet Device ID = 50473
– Remote BACnet Object Instance ID = 1112
– Remote BACnet Object Type = AI
– Flag = Confirmed COV subscription

	Step	Action
Procedure, *cont.*	4	Upload the BACNET.CSV file to the controller by Scope Light or direct to the BACnet module by FTP. Upload by SD card is only supported with the BACNET.UCF file.
	4A	Scope Light: 1. Create a new project and copy the BACNET.CSV file to the Output folder of the new Scope project. 2. Connect to the controller and go to the Loader sheet. 3. Mark the BACnet Client checkbox. 4. Stop Application, Load the file and Start Application again.
	4B	FTP direct to the BACnet module: 1. Open any FTP tool and connect to the BACnet module. 2. Open the IPSM folder on the module and copy the BACNET.CSV file. 3. Restart the BACnet module via the Server config webpage or by restart the whole controller.
	4C	SD card on the controller: 1. Copy the BACNET.UCF (Any name can be used) to the root of an empty SD card 2. Initialize an upgrade by the "Service pin" or software upgrade 3. Wait until BSP LED stop flashing Red/Green and restart the controller
	5	Backup your project specific BACNET.CSV or UCF file in case of upgrading later.

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5 Other information

5.1 Troubleshooting, tips

General

There are a few general things to be observed:

Subject	Measure
Versions	Check the actual application version, controller BSP and communication module BSP version before call any support.
Change settings	As a matter of principle, the controller must be restarted with "Reset required !!" or power off/on the controller after changing any settings in order the data are accepted.
Default setting	Use the "Use default" parameter to go back to default setting of the communication module, reset the controller, and do the parameterization again.

TCP/IP network

Observe the following for TCP/IP network design and structure:
- Check that the DHCP parameter is set to "Passive" if fixed IP address should be used.
- Try to ping the controller if the communication is not working. If the ping fails something is wrong in the network or the IP settings, if the firmware are v11.22 or higher check that the firewall is deactivated.
- Check that the defined UDP port, e.g. BAC0, is open in the firewall.
- Use the character # at the end of all IP settings. Never use a "space" at the end.

BACnet does not work

Check the following if BACnet does not work:
- Does the BACnet server run in the Process Manager (web)?
  File "BACnetApp.exe" must be visible.
- Do the EDE files exist?
  Otherwise, start the BACnet server on the BACnet page.
- Are both LEDs on the module green?
- What are the status for State and Conm failure, in the HMI?
- Use an unique BACnet Device name
- Use an unique Device ID less than 3000000
- Use default (active) under BACnet advanced settings to reset module to default settings and do the parameterization again.

Restart BACnet server via web browser

Any changes of the BACnet Configuration need a restart of the BACnet server. This can be done remotely by a normal web browser. Enter the IP address of the BACnet module and **Shutdown** and **Start** the BACnet server again on the BACnet config web page.

Device Name and ID unique?

Make sure both Device Name and the Device ID are unique within the BACnet network.

Multistate objects

BACnet multistate objects do not use value "0". They always start at "1".

OutOfService

Set point objects must always be set *OutOfService*, never set it to passive.
Outputs should not be set *OutOfService*.

Alarms

Use the *StatusFlag* "InAlarm" or the *EventState* to check if any object is alarming, in case of not using the Notification classes. *PresentValue* is, for example, only showing the value of a Digital Input and could go on or go off/on several times before any alarm occurs due to long alarm delay etc.

Troubleshooting, tips, *continued*

BBMDs required?

BBMD must be used if BACnet client and BACnet server are located in different subnets.
Use command "tracert" to check this.

Example (result):

Tracert shows all stations used to forward the signal to another segment.

BBMD rules

Apply the following rules when using "BACnet Broadcast Management Devices" (BBMDs):

- No BBMD is needed if a BACnet/IP network consists of only one IP subnet. An existing BBMD does not cause any problems, however.
- A BBMD must be defined for each subnet if a BACnet network comprises more than one IP subnet.
- BBMDs are grouped by BACnet/IP networks. Communication between BBMDs of different BACnet networks is **not** possible!
- Normally, "two-hop distribution" is used because it works with all IP routers without needing additional configuration.

BDT properties

The BDT is configured as static table during commissioning. It is not updated dynamically.
The maximum size of the table depends on the product used (or its BBMD). This information is available in the respective data sheet under PICS.

Firewall/Webserver

New firmware BSP11.xx or higher for the POL908 BACnet module is default set to a higher security. That means that the webserver is deactivated and the firewall is activated.

Note! When the firewall is active it is not possible to ping the module.
BACnet functionality works as before.

For information see chapter 3.2.

5.2 FAQ on TCP/IP

TCPI/UDP ports

Port number	Type	Used for …
21		FTP
23	UDP	Telnet/Ping
80		Web
4242	TCP	Scope, RemoteOPC TCP/IP
47808	UDP	BAC0
47809	UDP	BAC1
47823	UDP	BACF

IP address

The IP address is assigned either dynamically via the DHCP server or set manually via HMI as follows:

Step	Action
1	Set parameter DHCP to **Passive**.
2	Change **IP address**.
3	Confirm by setting **Write settings** to **Active**.
4	Restart controller.

MAC address and WINS name

The MAC address is the topmost number of the sticker on the communication module POL909. It always follows the same form: "00 A0 03 FF XX XX XX", where XX XX XX is a continuous number.
Example: 00 A0 03 FF 2C 9D

The WINS name is generated from the prefix POL909_ and XX XX XX (i.e. the last six digits of the MAC address).
Example: POL909_FF2C9D

You can also find the WINS name in the configuration settings in the HMI.

Web server

Use the WINS address or IP address to successfully connect to the web server.
Example: "http://POL909_XX XX XX" or "http://192.168.0.10"

The web server uses TCP port 80 for communication.
Make sure webserver is activated according to chapter 3.2

FTP server

Use the same address as for the web server, but replace
"**http://**" by "**ftp://ADMIN@**" to successfully connect to the FTP server.
Example: "ftp://ADMIN@POL909_FF2C40"

The following setting must be selected in the Internet Explorer:
Tools > **Internet Options** > **Use Passive FTP**
(for compatibility with firewalls and DSL modem).
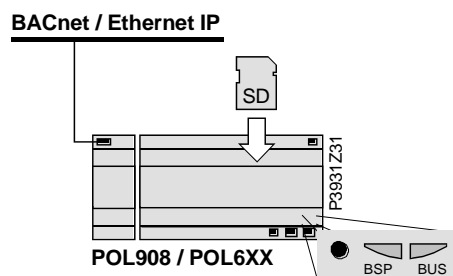Make sure FTP is activated according to chapter 3.2

Password

User name: ADMIN
Password: SBTAdmin!

5.3 Upgrade application or BSP via SD card

Situation
The Climatix POL6XX controller and/or the BACnet/IP module POL908 can in special cases be upgraded with new software. Direct upgrade from VVS8 to VVS10 is not possible.

BACnet / Ethernet IP

Prerequisite
To upgrade the following items are needed:
- SD card
- Application- and/or BSP files from the actual manufacturer

File	Used for…
POL908V2….Vxx.ucf	BACnet/IP Communcation module, POL908, BSP
POL63x_BSP_Vxx.ucf	Controller, POL63x, BSP *
MBRTCode.ucf	Controller, POL63x, Application *
OBHcomp.ucf	Controller, POL63x, Communication mappings
HMIcomp.ucf	Controller, HMI structure
HMI4Web.ucf	Controller, HMI4WEB structure
ScopeConfig.ucf	Scope Light
BACNET.CSV	*Project specific BACnet client mapping*
BACNET.UCF	*Project specific BACnet client mapping for SD card*

⚠ * These files may set all settings in the controller to default!

ℹ All settings can be saved to the SD card before the upgrade and then loaded again after the upgrade.

Upgrade procedure
The upgrade procedure and how to save/load all settings are not described in this manual. Contact your manufacturer to get instructions and necessary files.

⚠ Project specific files for BACnet Client, BACNET.CSV or BACNET.UCF, must be uploaded again after upgrade (If used). These files are normally not handled by your manufacturer. Make sure to have a copy before any upgrade.

IV PRODUKT

Air handling with the focus on LCC

IV Produkt AB, Box 3130, SE-350 43 Växjö, Sweden
Phone: +46 470-75 88 00 • Fax: +46 470-75 88 76
info@ivprodukt.se • www.ivprodukt.se