

# SIEMENS



## Climatix™ Controllers POL4XX Basic documentation

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# 1 Cyber security disclaimer

Products, solutions and services from Siemens include security functions to ensure the secure operation of building automation and control, fire safety, security management, and physical security systems. The security functions on these products, solutions and services are important components of a comprehensive security concept.

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<http://www.siemens.com/cert/en/cert-security-advisories.htm>

## 2 About this document

### 2.1 Before you start

#### Document validity

This document covers the following Climatix POL4XX standard product lines (refer to  section 3.2).

Product no. (ASN)	Description
POL422.50	Climatix 4XX programmable controller
POL423.50	Climatix 4XX programmable controller
POL424.50	Climatix 4XX programmable controller
POL425.50	Climatix 4XX programmable controller
POL426.50	Climatix 4XX programmable controller, M-Bus
POL421.70	Climatix 4XX programmable controller with Inbuilt HMI
POL422.70	Climatix 4XX programmable controller with Inbuilt HMI
POL424.70	Climatix 4XX programmable controller with Inbuilt HMI

#### Product versions

The descriptions and functionality of the products are based on Climatix Valid Version Set 10.0 or higher.

#### Target readers

This document is intended for the following readers:

- Instrumentation and control engineering personnel of OEM companies
- Sales and commissioning personnel of OEM companies
- Siemens sales and support personnel
- System integrators (for basic overview)

#### Use

This document assists target readers to ...

- design instrumentation and control solutions using the Climatix controllers.
- create offers for instrumentation and control solutions using the Climatix controllers.
- engineer and commission ventilation and air conditioning plants equipped with Climatix controllers.

#### Prerequisites

It is assumed that the above target readers have general technical knowledge of engineering and commissioning HVAC instrumentation and control solutions.



This document provides information related to development tools.

### 2.2 Reference documents

Product	Document type	Document no.
Climatix controller 4XX	Data sheet	CB1Q3973en
Climatix controller 423.50/425.50/426.50	Data sheet	CB1Q3998en
Climatix controller 4XX for AHU application	Basic documentation	CE1P3991en
	Overview	CB1A3973en
Climatix controller 421.70/422.70/424.70	Basic documentation	A6V10421226_en--_a
	Data sheet	A6V10421228_en--_a
Climatix controller 63X	Data sheet	CB1Q3230en
Climatix controller 68X	Data sheet	CB1Q3903en
Climatix HMI-DM, POL895	Basic documentation	CB1P3916en
Climatix HMI-TM, POL871	Basic documentation	CB1P3917en
	Data sheet	CB1N3917en

Product	Document type	Document no.
Climatix HMI-LED, POL831	Basic documentation	CB1P3946en
	Data sheet	CB1Q3946en
Climatix HMI-SG, POL822	Data sheet	CB2N3261en

## 2.3 Typographical conventions

### Symbols used

The following symbols are used in this document to indicate warnings and notes:



This symbol draws your attention to special **safety notes** and **warnings**. Ignoring such notes can lead to personal injury and/or major damage to property.



This symbol precedes the notes that must be observed in order to prevent malfunctions or data loss.



Notes with this symbol provide important information requiring appropriate attention.



Paragraphs with this symbol provide tips.

### Abbreviations

The following abbreviations are used in text and illustrations:




Abbreviation	Explanation
AHU	<b>A</b> ir <b>H</b> andling <b>U</b> nit
BACS	<b>B</b> uilding <b>A</b> utomation and <b>C</b> ontrol <b>S</b> ystem
BSP	<b>B</b> oard <b>S</b> upport <b>P</b> ackage (operating system)
DC	<b>D</b> irect <b>C</b> urrent
DPSU	<b>D</b> ecentralized <b>P</b> ower <b>S</b> upply <b>U</b> nit
EEV	<b>E</b> lectronic <b>E</b> xpansion <b>V</b> alve
HMI	<b>H</b> uman <b>M</b> achine <b>I</b> nterface (operation unit)
HMI-LED	Climatix <b>L</b> ED HMI POL831.25
HMI-DM	Climatix <b>D</b> ot <b>M</b> atrix HMI POL895.51
HMI-TM	Climatix <b>T</b> ext <b>M</b> atrix HMI POL871.71 / POL871.72
HMI-SG	Climatix <b>S</b> egmented HMI POL822.60 / POL822.70
HVAC	<b>H</b> eating, <b>V</b> entilating, <b>A</b> ir <b>C</b> onditioning
M-Bus	<b>M</b> eter <b>B</b> us
MS	<b>M</b> anagement <b>S</b> tation
MSTP	<b>M</b> ulti- <b>S</b> ervice <b>T</b> ransfer <b>P</b> latform
PSU	<b>P</b> ower <b>S</b> upply <b>U</b> nit
RU	<b>R</b> oom <b>U</b> nit (POL822.6060 / POL822.70)
SELV	<b>S</b> afety <b>E</b> xtra- <b>L</b> ow <b>V</b> oltage
OP	<b>O</b> perator <b>P</b> anel
VSD	<b>V</b> ariable <b>S</b> peed <b>D</b> rives

### Products and Tools

Name	Explanation
Climatix	Controller family with common tools
SAPRO	SAPRO programming tool
SCOPE	SCOPE commissioning and service tool

## 2.4 Important safety notes

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<b>Field of use</b>	The Climatix controllers provide control and monitoring functions for ventilation, air conditioning and refrigeration plants plus district heating and biomass boiler plants.
<b>Correct use</b>	The prerequisites for safe, trouble-free operation of the products mentioned above are correct transport, storage, installation and commissioning, as well as careful operation.
<b>Electrical installation</b>	 Fuses, switches, wiring and grounding must comply with local safety regulations for electrical installations.
<b>Wiring</b>	 AC 115/230 V mains voltage must be strictly segregated from AC 24 V safety extra-low voltage (SELV) when wiring the system to protect against electric shock hazard.
<b>Commissioning and maintenance</b>	The Climatix products must be prepared for use and commissioned by qualified personnel with appropriate training.
<b>Maintenance</b>	The Climatix controllers are maintenance-free, apart from cleaning at regular intervals. Dust and dirt should be removed from system parts in the control panel during normal service visits.
<b>Faults</b>	 Only authorized personnel are permitted to perform diagnostics, to correct faults and restart the plant. This also applies to work carried out on the control panel (e.g. safety checks or replacing fuses).
<b>Storage and transport</b>	Always observe the limits for storage and transport specified in the relevant Data Sheets.  If there are any questions, please contact your supplier.
<b>Disposal</b>	The products contain electrical and electronic components and must not be disposed of as domestic waste.  The relevant national legal regulations must be complied with and the products must be disposed of via the appropriate channels. Local and currently valid legislation must be observed.

## 2.5 Trademarks and copyright

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**Trademarks** The trademarks used in this document are listed together with their legal owners in the following table. The use of these trademarks is subject to international and national statutory provisions.

Trademarks	Legal owner
KNX <sup>®</sup>	Konnex Association, B – 1831 Brussels-Diegem Belgium <a href="http://www.knx.org/">http://www.knx.org/</a>
Modbus <sup>®</sup>	The Modbus Organization, Hopkinton, MA, USA

All the product names listed are registered trademarks (<sup>®</sup>) of their respective owners, as listed in the table. The trademarks are not indicated elsewhere in the text beyond this section to facilitate reading (e.g. by use of symbols such as <sup>®</sup>).

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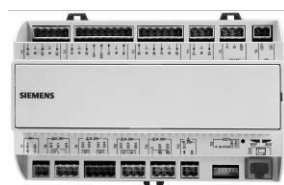


# 3 Summary

## 3.1 Product range

The following table and pictures show the Climatix range of devices.

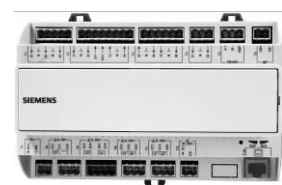
Unit type	Description	Product no. (ASN)
Programmable controller	Programmable refrigeration controller	POL422.50
	Programmable controller for heat pumps	POL423.50
	Programmable ventilation controller	POL424.50
	Programmable controller for district heating and biomass boilers	POL425.50
	Programmable controller for district heating with M-Bus	POL426.50
	Programmable controllers with Inbuilt HMI for air handling units, rooftop units, chillers and heat pumps.	POL421.70 POL422.70 POL424.70
Operation units	HMI-DM	POL895.51
	HMI-SG (ventilation)	POL822.60
	HMI-SG (heating)	POL822.70
	HMI-LED	POL831.25
	HMI-TM	POL871.71 POL871.72



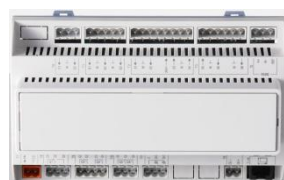
POL422.50



POL423.50



POL424.50



POL425.50



POL426.50



POL421.70



POL422.70



POL424.70



POL895.51



POL822.60



POL822.70



POL831.25



POL871.71/POL871.72

**Focus of applications**

- AHUs
- Roof top units
- Chillers
- Heat pumps
- Close control air conditioning
- Shelters
- District heating
- Biomass boilers

**Common features**

- Standard controller
- Power supply AC 24 V or DC 24 V
- On-board power supply for active sensors
- Real-time clock buffered for at least 4 hours
- Local service connector for user interface (RJ45) and PC tools (USB)
- On-board Modbus RTU or BACnet MSTP over RS485
- Process bus for network functionality (based on KNX protocol)

## 3.2 Controllers

### Individual features

The Climatix standard controller are equipped with the inputs/outputs and the sensor power supplies, which are required for their field of application. Therefore, the following features vary depending on type:

- I/O mix and nature of inputs and outputs
- Sensor power supply
- User and service interfaces

### I/O mix

The inputs/outputs provided and the respective labeling on the housing are as follows:

421	422	423	424	425	426	Labeling	Signal type
3	3	–	–	–	–	B1..3	Analog inputs NTC 10k
–	–	–	3	–	–	B1..3	Analog inputs LG-Ni1000/Pt1000
–	–	3	–	3	3	B1..3	Analog inputs NTC 10k/1k
1	1	1	1	–	1	DL1	Digital inputs, galvanically isolated, for AC 115/230 V
2	2	2	2	2	2	D1..2	Digital inputs for potential-free contacts
3	3	–	3	–	–	X6..8	
2	2	–	–	–	–	X1..2	Inputs, <b>configurable</b> via software as: <ul style="list-style-type: none"> <li>- Analog inputs for NTC 10k sensors</li> <li>- Analog inputs DC 0...5 V (for ratiometric sensors)</li> <li>- Analog inputs for DC 0...10 V</li> <li>- Digital inputs 0/1 (binary) for potential-free contacts</li> </ul>
–	–	–	2	–	–	X1..2	Inputs, <b>configurable</b> via software as: <ul style="list-style-type: none"> <li>- Analog inputs for LG-Ni1000 or Pt1000 sensors</li> <li>- Analog inputs DC 0...5 V (for ratiometric sensors)</li> <li>- Analog inputs for DC 0...10 V</li> <li>- Digital inputs 0/1 (binary) for potential-free contacts</li> </ul>
–	–	2	–	2	2	X1..2	Configurable inputs NTC 10k/1k, Pt1000, LG-Ni1000, DI, DC 0...10 V
–	–	2	–	1	2	X6..7	
3	3	–	3	–	–	X3..5	Analog outputs DC 0...10 V or DC 24 V output current 25 mA
1	1	1	1	1	1	Q1	Relay outputs for AC 24...230 V, NO/NC contact, SPDT
4	4	4	4	4	4	Q3..6	Relay outputs for AC 24...230 V, NO contact
2	–	–	2	–	–	Q7..8	
–	2	2	–	2	2	DO1..2	Triac outputs AC 24...230 V, 0.5 A
–	–	3	–	3	3	X3..5	Configurable outputs DC 0...10 V or PWM
–	–	1	–	1	1	X8	DI high speed
21	21	21	21	19	21		<b>Total number of I/Os</b>
1	1	1	–	–	–	EEV	Stepper motor drive

## Controllers *(cont'd)*

### Sensor power supplies

The sensor power supplies provided and the labeling assigned accordingly on the housing are as follows:

4XX	Labeling	Signal type
1	24 V	DC 24 V power supply terminals
1*	5 V	DC 5 V power supply terminals

### Note:

\* Not available with POL425.50/STD and POL426.50/STD

### User and service interfaces

The user and service interfaces provided and the labeling assigned accordingly on the housing are as follows:

4XX	Labeling	Signal type
1	T-HI	Tool interface/USB on RJ45 connector

### Communication interfaces

The communication interfaces and the assigned labeling on the housing are as follows:

421	422	423	424	425	426	Labeling	Signal type
–	1	1	1	1	1	PB	Process bus base on KNX TP1
1	1	(1)	1	(1)	(1)	RS485	Modbus RTU
(1)	(1)	(1)	(1)	(1)	(1)		BACnet MSTP (for POL42X.50 and POL42X.70 BSP v10.22 or later)
–	–	–	–	–	1	MB	M-Bus

# Controllers *(cont'd)*

## Range overview I/O table

The table below lists all inputs/outputs of the various Climatix controllers:

Hardware I/Os		POL421.	POL422.	POL423.	POL424.	POL425.	POL426.
		X0	X0	50	X0	50	50
Analog inputs	B1 (NTC 10k)	√	√	√		√	√
	B1 (Ni/Pt1000)				√		
	B1 (NTC 1k)			√		√	√
	B2 (NTC 10k)	√	√	√		√	√
	B2 (Ni/Pt1000)				√		
	B2 (NTC 1k)			√		√	√
	B3 (NTC 10k)	√	√	√		√	√
	B3 (Ni/Pt1000)				√		
Configurable inputs	B3 (NTC 1k)			√		√	√
	X1 (NTC 10k / DC 0...10 V / DI)	√	√	√		√	√
	X1 (LG-Ni1000 / Pt1000 / DC 0...10 V / DI)			√	√	√	√
	X2 (NTC 10k / DC 0...10 V / DI)	√	√	√		√	√
	X2 (LG-Ni1000 / Pt1000 / DC 0...10 V / DI)			√	√	√	√
	X6 (LG-Ni1000 / Pt1000 / DC 0...10 V / DI / NTC10k)			√		√	√
	X7 (LG-Ni1000 / Pt1000 / DC 0...10 V / DI / NTC10k)			√			√
Digital inputs	X6, X7 (DI)	√	√		√		
	X8 (DI, pulse measurement)	√	√		√		
	X8 (fast binary input)			√		√	√
	D1 (binary)	√	√	√	√	√	√
	D2 (binary)	√	√	√	√	√	√
	DL1 (active AC 115...230 V)	√	√	√	√		√
Configurable outputs	X3 (DC 0...10 V / DC 24 V DO)	√	√		√		
	X3 (DC 0...10 V / PWM)			√		√	√
	X4 (DC 0...10 V / DC 24 V DO)	√	√		√		
	X4 (DC 0...10 V / PWM)			√		√	√
	X5 (DC 0...10 V / DC 24 V DO)	√	√		√		
	X5 (DC 0...10 V / PWM)			√		√	√
Digital outputs	Q1 (relay output)	√	√	√	√	√	√
	Q3 (relay output)	√	√	√	√	√	√
	Q4 (relay output)	√	√	√	√	√	√
	Q5 (relay output)	√	√	√	√	√	√
	Q6 (relay output)	√	√	√	√	√	√
	Q7 (relay output)	√			√		
	Q8 (relay output)	√			√		
	DO1 (triac output)		√	√		√	√
DO2 (triac output)		√	√		√	√	
Interfaces	SD card interface	√ <sup>1)</sup>	√	√	√	√	√
	Process bus interface		√	√	√	√	√
	Modbus RTU interface	(√)	(√)	(√)	(√)	(√)	(√)
	BACnet MSTP interface	(√) <sup>2)</sup>	(√) <sup>2)</sup>	(√) <sup>3)</sup>	(√) <sup>2)</sup>	(√) <sup>3)</sup>	(√) <sup>3)</sup>
	EEV (stepper motor drive/PWM)	√	√	√			
	M-Bus						√

<sup>1)</sup> POL421.70 is provided with a SD card reader.

<sup>2)</sup> BSP version 10.50 or higher. <sup>3)</sup> BSP version 10.22 or higher.

### 3.3 User interfaces

---

#### Inbuilt HMI for POL42X.70/STD

The following picture shows the Inbuilt HMI of the Climatix range:



#### Key features

Key features of the Inbuilt HMI:

- 6 predefined keys and icons that can be organized for ease of operation
- User-friendly segmented LCD interface with blue backlight
- 5-digit character display (Max. 20 characters scroll display)
- User-friendly menu structure
- Special icons for HVAC plants
- Programmable attributes for icons through Climatix tools
- Grouped parameters for convenient index
- Time scheduler supported

#### Dot matrix HMI POL895.51/STD

The following picture shows the HMI-DM of the Climatix range:



#### Key features

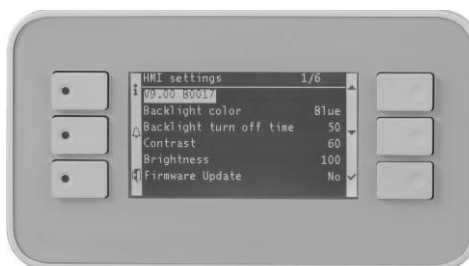
Key features of the HMI-DM:

- Screen resolution: 96 x 208 dots
- 8-line display with configurable blue and white backlight
- Programmable menu with easy-to-understand structure
- Key ALARM and INFO with LED indicators
- Definable user password for every access level
- Support of several languages and Unicode fonts
- Support of online trend and time scheduler function
- Panel or wall mounting
- Direct connection to Climatix controller via user interface port (RJ45 cable)
- Powered by controller via process bus or local HMI connection
- Firmware can be updated via USB interface

## User interfaces (cont'd)

### HMI-TM POL871.71/871.72

The following picture shows the HMI-TM of the Climatix range:



#### Key features

Key features of the HMI-TM:

- Extended operating choices and IP level for outdoor use
- High screen resolution: 128 x 240 dots
- 6 keys for ease of operation
- Key ALARM, INFO and ESC with LED indicators
- Definable user password for every access level
- Several languages supported
- HMI local settings supported
- Data point access
- Online trend, time scheduler and iconic mode function
- Panel or magnetic mounting, hand-held operation
- Powered by controller via local HMI connection
- Firmware can be updated via Climatix controller (SD card support required)

### HMI-LED POL831.25/XXX

The following picture shows the HMI-LED of the Climatix range:



#### Key features

Key features of the HMI-LED:

- 4-digit LED display
- User-friendly icons, keys and labels
- Easy-to-understand symbols for end user
- Access to predefined parameters
- Alarm list and alarm history review
- Powered by Climatix controller

### Room unit POL822.60/XXX and POL822.70/STD

The following picture shows the room unit of the Climatix range:



#### Key features

Key features of the room unit:

- Acquisition of room temperature
- Buttons to adjust the room temperature setpoint, operating mode, fan control, louver control and time settings

- LCD for room temperature, time of day, fan speed, weekday, operating and energy modes
- Password-protected service mode to edit predefined control parameters
- 2-wire interface to the controller via the Climatix process bus (KNX based)
- Semi-flush mounting for all European recessed conduit boxes
- Access to the controller's time scheduler (POL822.60/XXX and POL822.70/STD only)

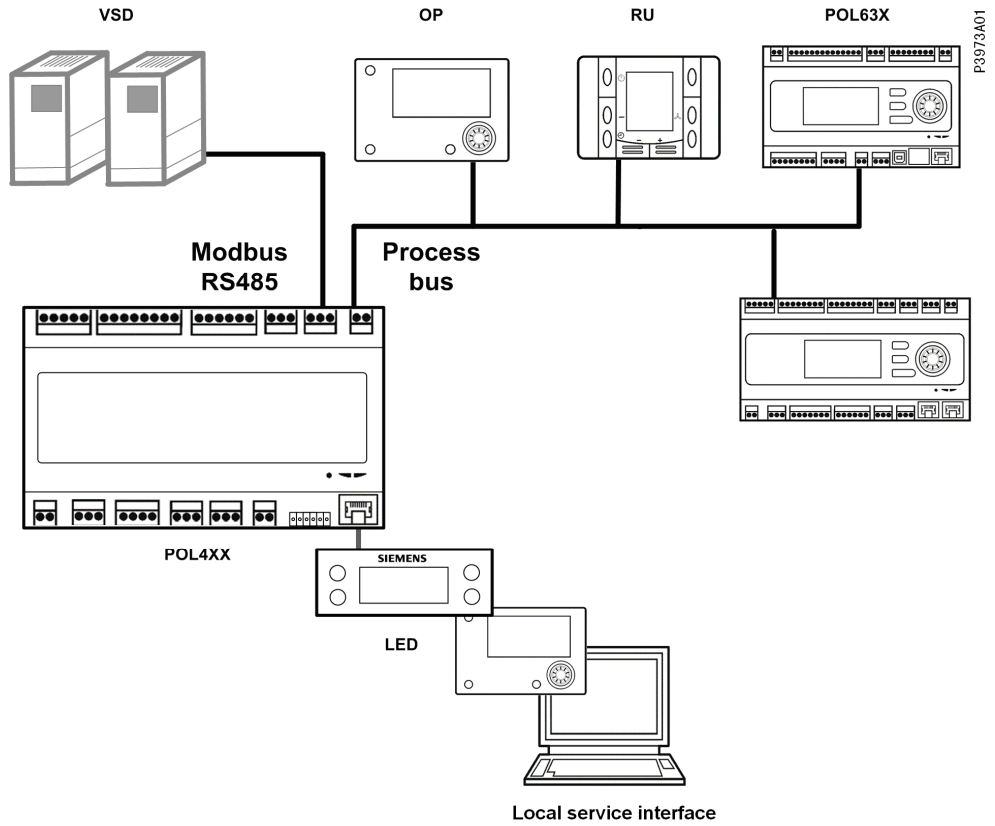


# 4 System topologies

## General options

The general system topology used with both Climatix controller lines is illustrated below. The POL422.XX controller is used in the example.

## Communication concept



<b>POL4XX</b>	Climatix controller	<b>OP</b>	Operator panel
<b>POL63X</b>	Climatix controller	<b>RU</b>	Room unit
<b>POL68X</b>	Climatix controller	<b>LED</b>	HMI-LED
		<b>VSD</b>	Variable speed drives

## Explanation

The communication channels provide a variety of topologies:

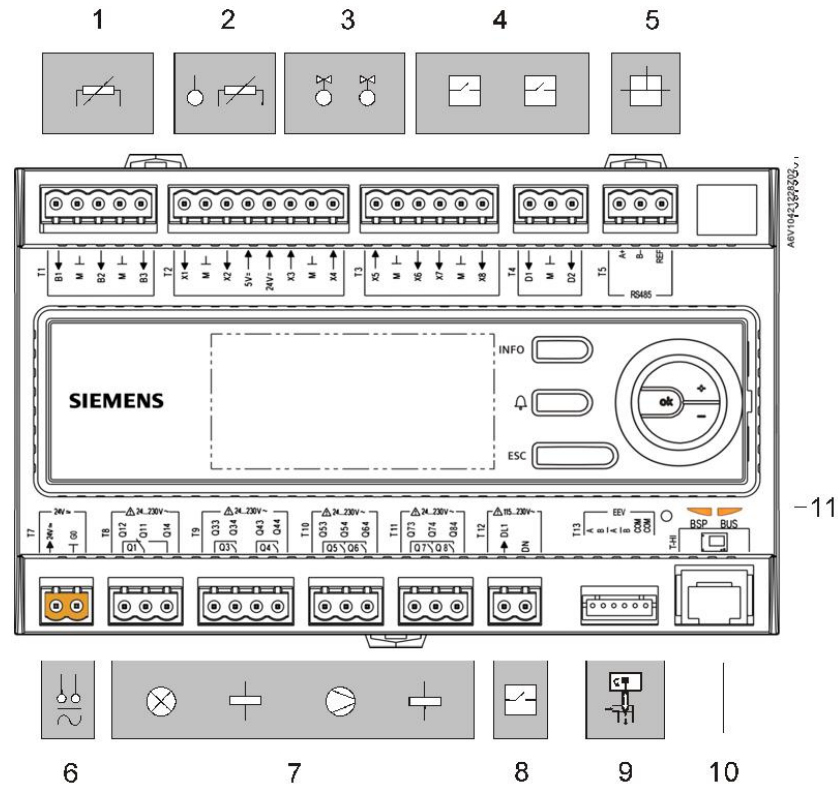
Item	Explanation
Local service interface	This interface is used to connect with HMIs for commissioning and service plus user operation. It is also employed to connect the PC development tool SAPRO and the PC commissioning tool SCOPE.
RS485 for Modbus RTU or BACnet MSTP (POL42X.50/42X.70 BSP v10.22 or later)	The RS485 port is intended to be used to control other devices (Siemens or 3 <sup>rd</sup> -party) which are necessary in the application, such as variable speed drives, soft starters, or special turbine compressors. The controller plays typically the master role in this Modbus network.
Process bus	The process bus is used to connect the Climatix controller to other controllers and network HMIs. This bus is based on KNX technology and used to exchange process information across different devices and HMIs.
M-Bus (POL426.50 only)	The M-Bus is a new European standard for remote reading of heat meters and is also suited for use with all other types of consumption meters and various sensors and actuators.

# 5 Controllers

## 5.1 Controller POL421.70

### Elements and connections

The following illustration shows a fully equipped POL421.70 controller.



### Explanation

Elements and peripheral devices shown in the above illustration:

Position	Labeling	Elements/peripheral devices (examples)
1	B1...B3	3 analog inputs NTC: For sensors NTC 10k
2	X1, X2 +24 V +5 V	2 configurable inputs: For NTC 10k, DC 0...10 V, and DI
		Sensor power supplies DC 24 V (for ratiometric sensors)
3	X3...X5	Sensor power supplies DC 5 V (for ratiometric sensors)
		3 configurable outputs: For DC 0...10 V analog output/ DC 0/24 V digital output
4	X6...X8 D1, D2	5 digital inputs with sampling voltage DC 24 V: For signaling elements with potential-free contacts
5	A+, B-, REF	RS485 interface: For applications with Modbus RTU or BACnet MSTP (BSP v10.22 or higher) communication protocol
6	G0, 24 V	AC/DC 24 V power supply
7	Q1 Q3...Q8	7 relay outputs for AC 24...230 V: - Q1, NO/NC contacts - Q3...Q8, NO contacts
8	DL1	1 digital input, galvanically isolated: For signaling elements with voltage signal AC 115...230 V
9	EEV	Unipolar stepper motor driver
10	T-HI	Local service interface for HMI (RS485) and tool (USB)
11	BSP, BUS	Status displays for BSP and BUS status

### Note:

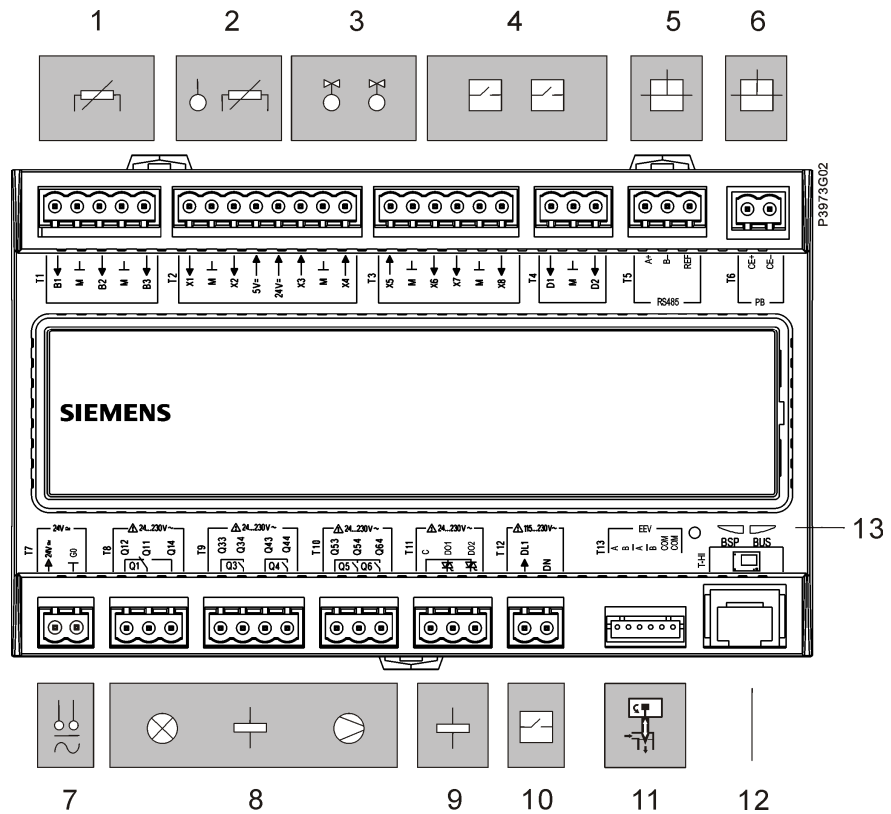
POL421.70 is provided with a SD card reader.

## 5.2 Controller POL422.XX

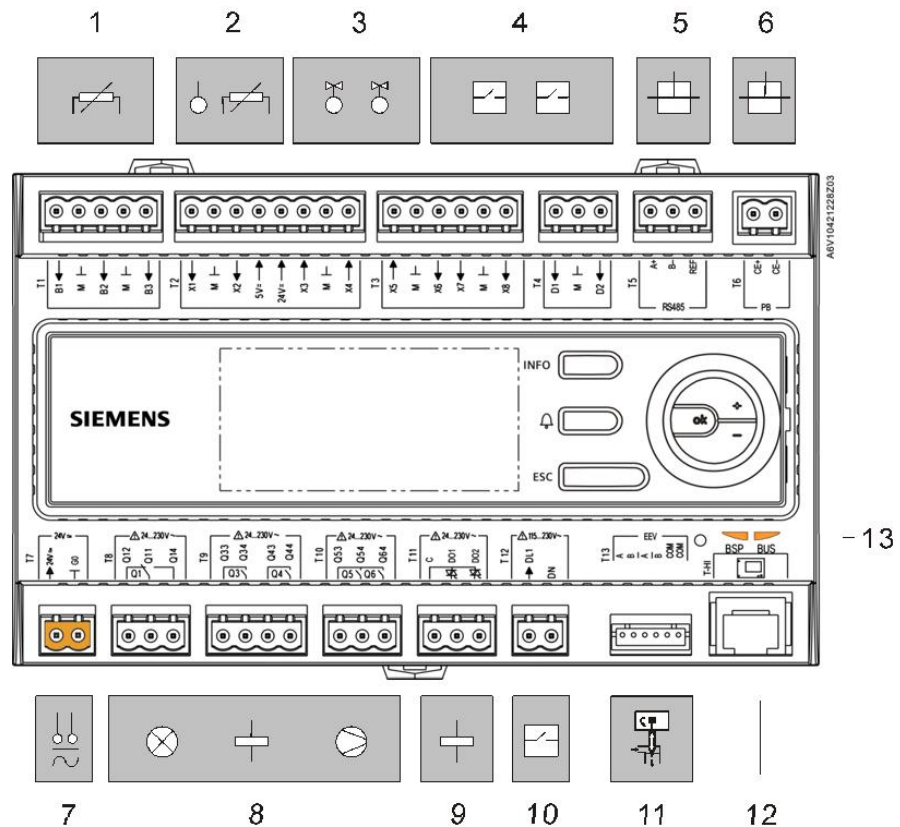
### Elements and connections

The following illustration shows a fully equipped controller:

- POL422.50



The following illustration shows a fully equipped POL422.70 controller.



## Explanation

Elements and peripheral devices shown in the above illustration:

Position	Labeling	Elements/peripheral devices (examples)
1	B1...B3	3 analog inputs NTC: For sensors NTC 10k
2	X1, X2	2 configurable inputs: For NTC 10k, DC 0...10 V and DI
	+24V	Sensor power supplies DC 24 V (for ratiometric sensors)
	+5V	Sensor power supplies DC 5 V (for ratiometric sensors)
3	X3...X5	3 configurable outputs: For DC 0...10 V analog output/ DC 0/24 V digital output
4	X6...X8 D1, D2	5 digital inputs with sampling voltage DC 24 V: For signaling elements with potential-free contacts
5	A+, B-, REF	RS485 interface: For applications with Modbus RTU or BACnet MSTP (BSP v10.22 or later) communication protocol
6	CE-, CE+	Process bus (PB) interface
7	G0, 24 V	AC/DC 24 V power supply Consumption Max. 40 VA
8	Q1	5 relay outputs for AC 24...230 V: - Q1, NO/NC contacts
	Q3...Q6	- Q3...Q6, NO contacts
9	DO1, DO2	2 triac outputs/AC 24...230 V: For lamps, relays, switching valves, etc.
10	DL1	1 digital input, galvanically isolated: For signaling elements with voltage signal AC 115...230 V
11	EEV	Unipolar stepper motor driver
12	T-HI	Local service interface for HMI (RS485) and tool (USB)
13	BSP, BUS	Status displays for BSP and BUS status

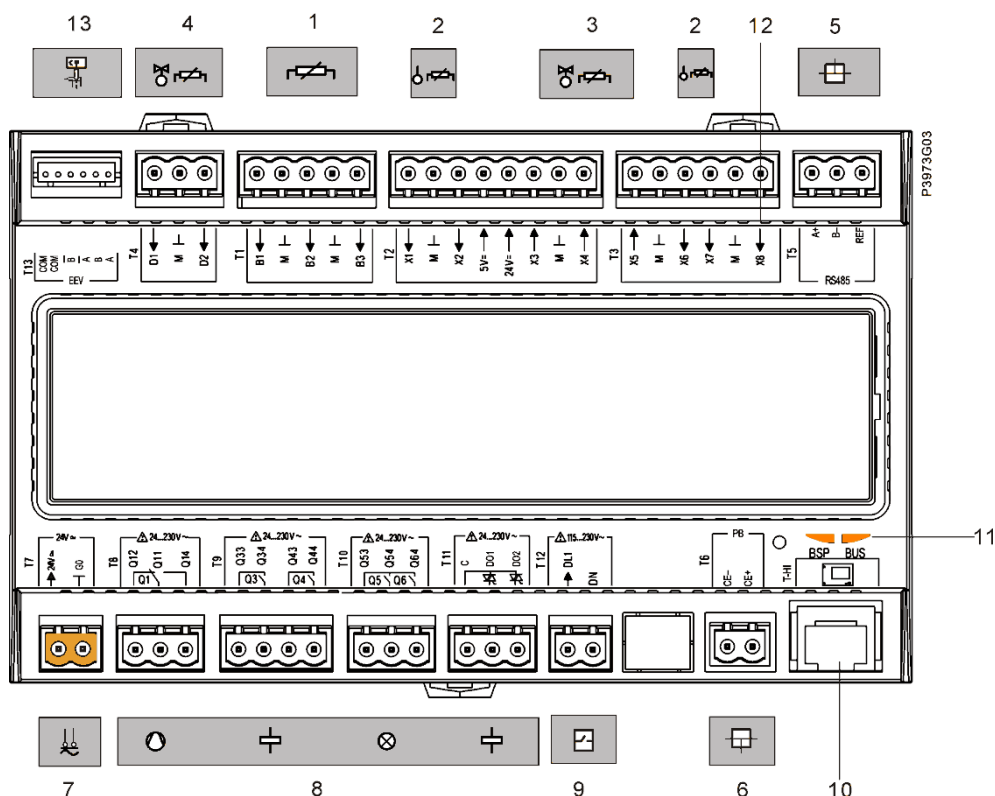
### Note:

POL422.50 and POL422.70 are provided with an SD card reader.

## 5.3 Controller POL423.50

### Elements and connections

The following illustration shows a fully equipped POL423.50 controller.



### Explanation

Elements and peripheral devices shown in the above illustration:

Position	Labeling	Elements/peripheral devices (examples)
1	B1...B3	3 analog inputs: For sensors NTC 10k or NTC 1k
2	X1, X2, X6, X7	4 configurable inputs: For NTC 10k, LG-Ni1000, Pt1000, DC 0...5/0...10 V, potential-free DI
		+24V Sensor power supplies DC 24 V (for active sensors)
		+5V Sensor power supplies DC 5 V (for ratiometric sensors)
3	X3...X5	3 configurable outputs: For DC 0...10 V analog output/PWM
4	D1, D2	2 digital inputs with sampling voltage DC 24 V: For signaling elements with potential-free contacts
5	A+, B-, REF	RS485 interface: For applications with Modbus RTU or BACnet MSTP communication protocol
6	CE-, CE+	Process bus (PB) interface
7	G0, 24 V	AC/DC 24 V power supply
8	Q1 Q3...Q6 DO1, DO2	5 relay and 2 triac outputs for AC 24...230 V:
		- Q1, NO/NC contacts
		- Q3...Q6, NO contacts - Triac output
9	DL1	1 digital input, galvanically isolated: For signaling elements with voltage signal AC 115...230 V
10	T-HI	Local service interface for HMI (RS485) and tool (USB)
11	BSP, BUS	Status displays for BSP and BUS status
12	X8	Binary/high speed
13	EEV	Unipolar stepper motor driver

### Note:

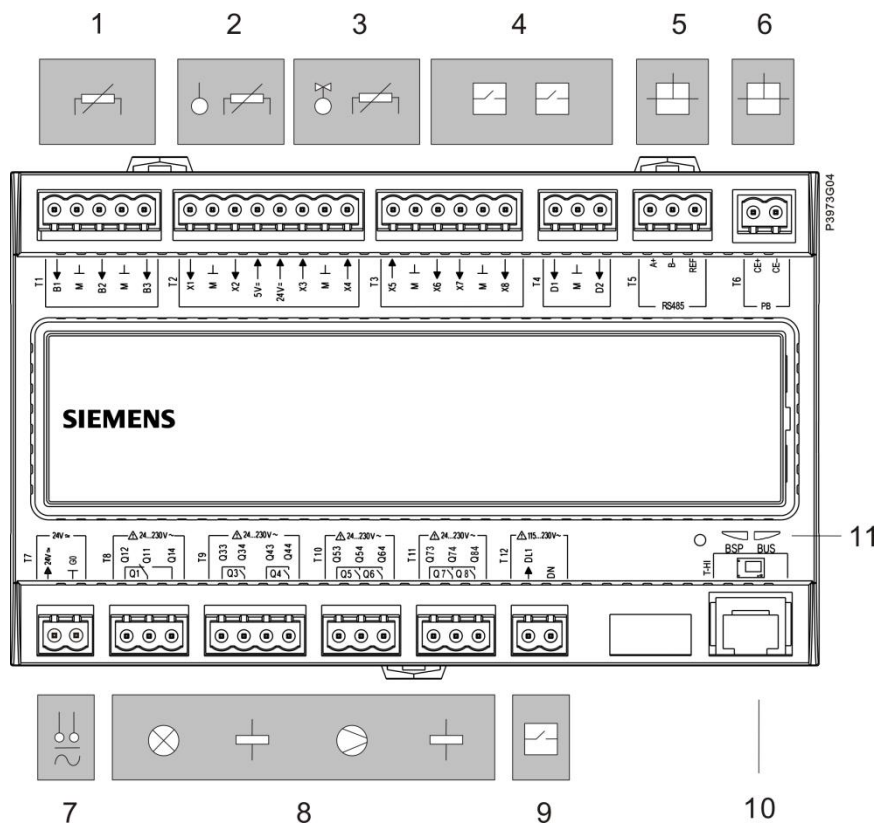
POL423.50 is provided with an SD card reader.

## 5.4 Controller POL424.XX

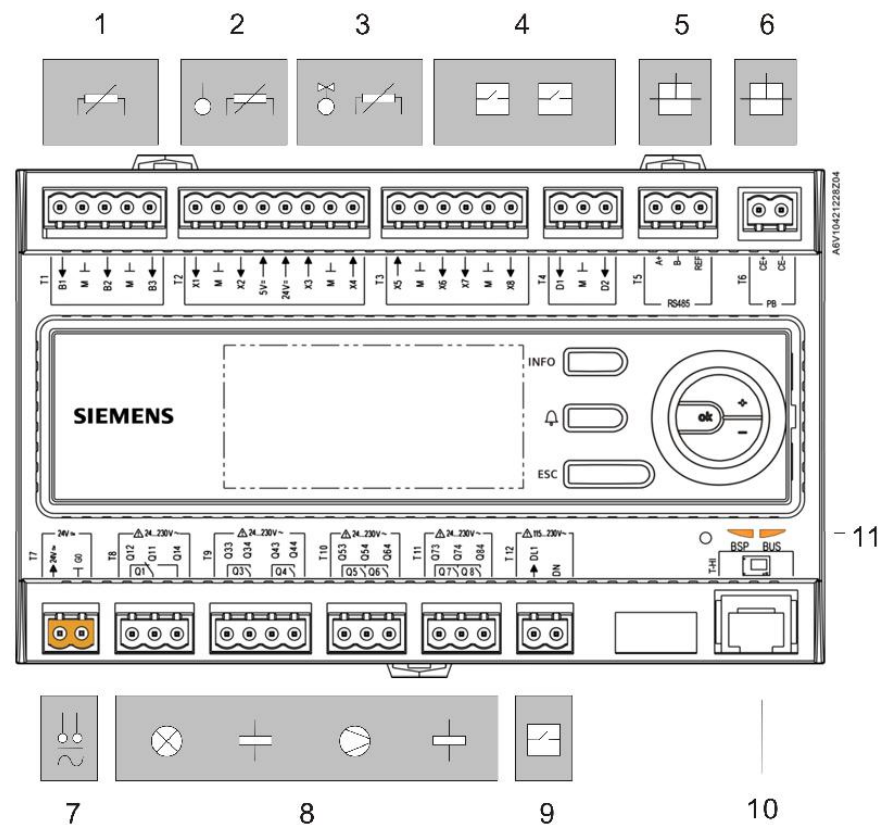
### Elements and connections

The following illustration shows a fully equipped controller:

- POL424.50



The following illustration shows a fully equipped POL424.70 controller.



## Explanation

Elements and peripheral devices shown in the above illustration:

Position	Labeling	Elements/peripheral devices (examples)
1	B1...B3	3 analog inputs: For sensors LG-Ni1000 and Pt1000
2	X1, X2	2 configurable inputs: For LG-Ni1000, Pt1000, DC 0...10 V, potential-free DI
	+24V	Sensor power supplies DC 24 V (for active sensors)
	+5V	Sensor power supplies DC 5 V (for ratiometric sensors)
3	X3...X5	3 configurable outputs: For DC 0...10 V analog output/DC 0/24 V digital output
4	X6...X8 D1, D2	5 digital inputs with sampling voltage DC 24 V: For signaling elements with potential-free contacts
5	A+, B-	RS485 interface: For applications with Modbus RTU or BACnet MSTP (BSP V10.22 or higher) communication protocol
6	CE-, CE+	Process bus (PB) interface
7	G0, 24 V	AC/DC 24 V power supply
8	Q1	7 relay outputs for AC 24...230 V:
	Q3...Q8	- Q1, NO/NC contacts - Q3...Q8, NO contacts
9	DL1	1 digital inputs, galvanically isolated: For signaling elements with voltage signal AC 115...230 V
10	T-HI	Local service interface for HMI (RS485) and tool (USB)
11	BSP, BUS	Status displays for BSP and BUS status

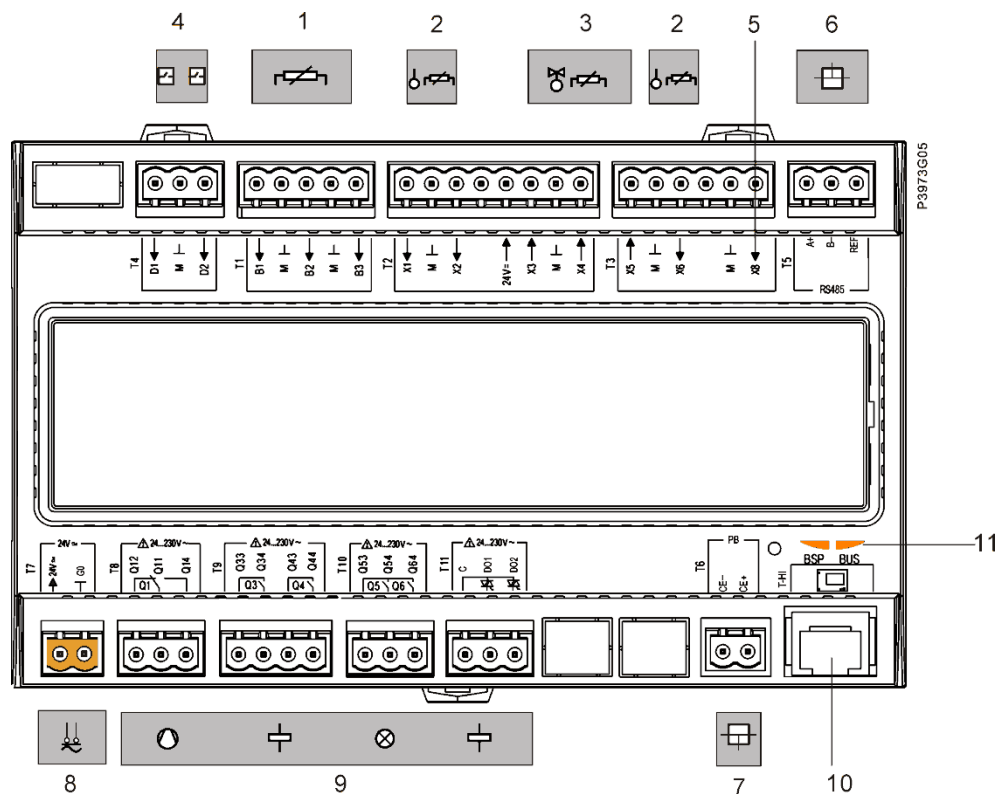
### Note:

POL424.50 and POL 424.70 are provided with an SD card reader.

## 5.5 Controller POL425.50

### Elements and connections

The following illustration shows a fully equipped POL425.50 controller.



### Explanation

Elements and peripheral devices shown in the above illustration:

Position	Labeling	Elements/peripheral devices (examples)
1	B1...B3	3 analog inputs: For sensors NTC 10k or NTC 1k
2	X1, X2 (T2), X6 (T3)	3 configurable inputs: For LG-Ni1000, Pt1000, DC 0...5/0...10 V, NTC 10k, potential-free DI
	+24V	Sensor power supplies DC 24 V (for active sensors)
3	X3...X5	3 configurable outputs: For DC 0...10 V analog output / PWM
4	D1, D2	2 digital inputs with sampling voltage DC 24 V: For signaling elements with potential-free contacts
5	X8	Binary/ fast input for flow sensor
6	A+, B- REF	RS485 interface: For applications with Modbus RTU or BACnet MSTP communication protocol
7	CE-, CE+	Process bus (PB) interface
8	G0, 24 V	AC/DC 24 V power supply
9	Q1 Q3...Q6 DO1, DO2	5 relay and 2 triac outputs for AC 24...230 V: - Q1, NO/NC contacts - Q3...Q6, NO contacts - Triac output
10	T-HI	Local service interface for HMI (RS485) and tool (USB)
11	BSP, BUS	Status displays for BSP and BUS status

### Note:

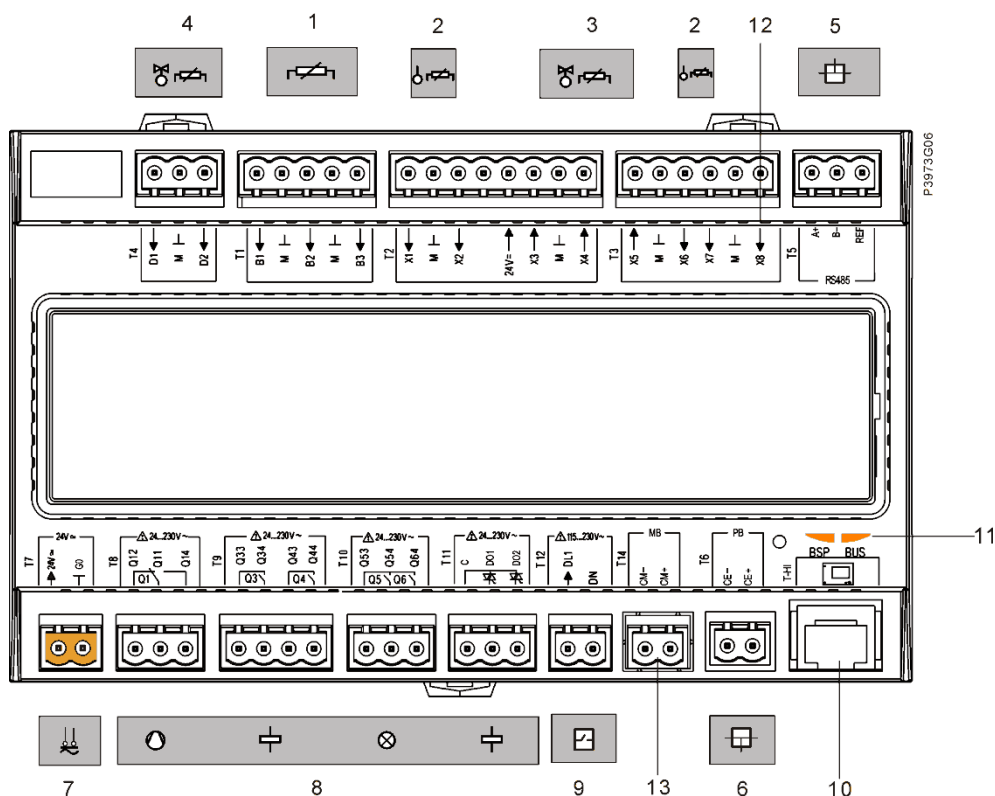
POL425.50 is provided with an SD card reader.



## 5.6 Controller POL426.50

### Elements and connections

The following illustration shows a fully equipped POL426.50 controller.



### Explanation

The Elements and peripheral devices shown in the above illustration:

Position	Labeling	Elements/peripheral devices (examples)
1	B1...B3	3 analog inputs: For sensors NTC 10k/1k
2	X1, X2, X6, X7 +24V	4 configurable inputs: For NTC 10k, LG-Ni1000, Pt1000, DC 0...5/0...10 V, potential-free DI Sensor power supplies DC 24 V (for active sensors)
3	X3...X5	3 configurable outputs: For DC 0...10 V analog output/PWM
4	D1, D2	2 digital inputs with sampling voltage DC 24 V: For signaling elements with potential-free contacts
5	A+, B- REF	RS485 interface: For applications with Modbus RTU or BACnet MSTP communication protocol
6	CE-, CE+	Process bus (PB) interface
7	G0, 24 V	AC/DC 24 V power supply
8	Q1 Q3...Q6 DO1, DO2	5 relay and 2 triac outputs for AC 24...230 V: - Q1, NO/NC contacts - Q3...Q6, NO contacts: - Triac output
9	DL1	1 digital inputs, galvanically isolated: For signaling elements with voltage signal AC 115...230 V
10	T-HI	Local service interface for HMI (RS485) and tool (USB)
11	BSP, BUS	Status displays for BSP and BUS status
12	X8	Binary/fast input for flow sensor
13	CM-, CM+	M-Bus

### Note:

POL426.50 is provided with an SD card reader.

## 6 Connect inputs/outputs

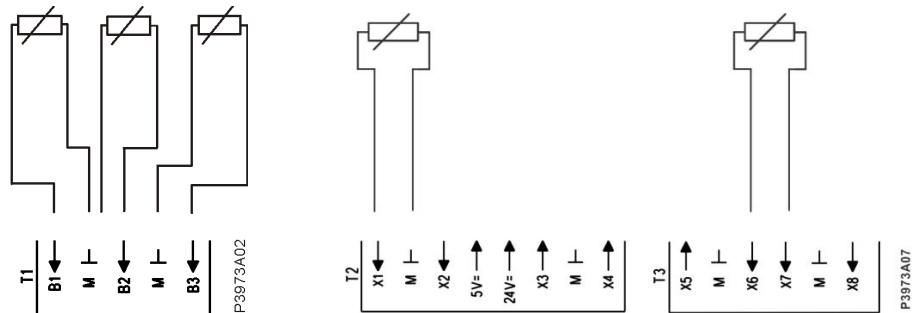
### 6.1 Analog inputs for NTC 10k / NTC 1k / Ni1000 / Pt1000

#### Use

The analog inputs are used to connect with the passive temperature sensors: NTC 10k, NTC 1k, or Ni1000/Pt1000.

#### Terminal assignment/ connection example

The following illustration shows the position and identification of the analog inputs on the housing of Climatix devices:



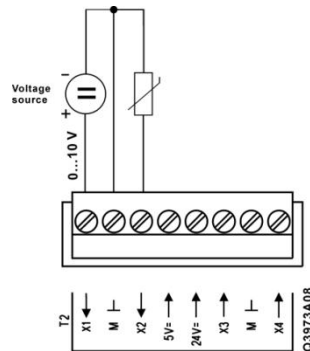
### 6.2 Analog inputs for DC 0...10V/DC 5V

#### Use

The configurable input of POL4XX controller can be used as analog inputs for DC 0...10 V or DC 5 V signals.

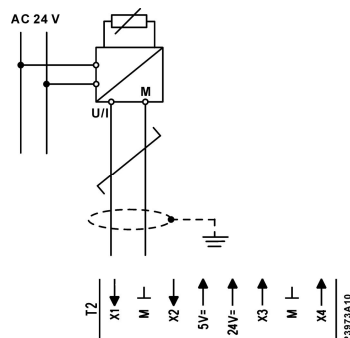
#### Connection diagram, passive sensors DC 0...10 V

The following illustration shows the connection of passive sensors to the POL4XX controllers:



#### Connection diagram, active sensors DC 0...10 V

The following illustration shows the wiring of active sensors (measured value transmitters) with external AC 24 V power supply, connected to a POL4XX controller:



A DC 0...10 V sensor, 4-wire connection

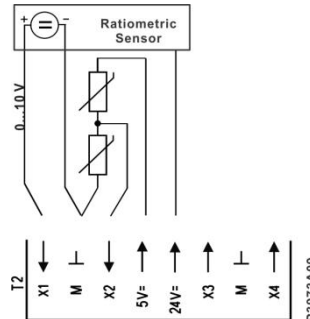


The AC 24 V power supply for the Climatix controller and measured value transmitters can be connected to the same AC 24 V transformer if the grounding concept for both devices (controllers and sensors) is the same.

The ground is connected to earth for the Climatix 4XX controllers and is of the same potential for all M terminals.

**Connection diagram,  
active sensors powered  
by DC 5 V or DC 24 V**

The following illustration shows the wiring of a ratiometric sensor powered by DC 5 V or DC 24 V:



Ratiometric pressure sensor, 3-wire connection

The position of sensor power supply optimizes cable preparation layout (3 wires are close to each other), which also improves the immunity to radiated interference to the power supply and input signals.

### 6.3 Digital inputs for potential-free contacts

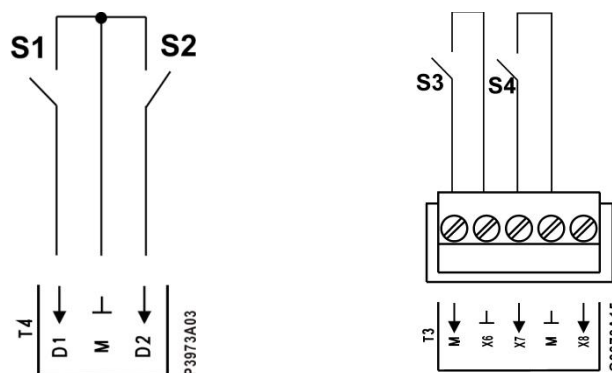
**Use**

The digital inputs for binary signals from potential-free contacts are used for the following purposes:

- Polling switch states (e.g. pressure switches, motor thermal protection, remotely installed acknowledgement buttons, voltage monitoring devices, etc.)
- Pulse counting

**Terminal assignment/  
connection example**

The following illustration shows the position and identification of the digital inputs on the housing of Climatix devices as well as a connection example with 2 contacts:



D1, D2, X6, X7, Input signals  
M Measuring neutral (reference voltage G0) for the input signals



Only potential-free contacts can be connected.

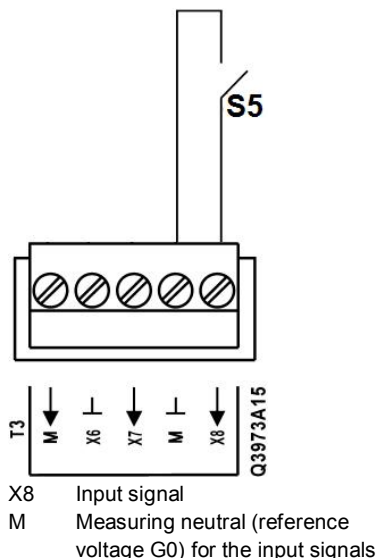
## 6.4 Digital inputs for high speed DI

### Use

The high speed digital input is used for fan speed control.

### Terminal assignment/ connection example

The following illustration of the position and identification of the digital input on the housing of Climatix devices as well as a connection example:



## 6.5 Active digital inputs for AC 115...230 V

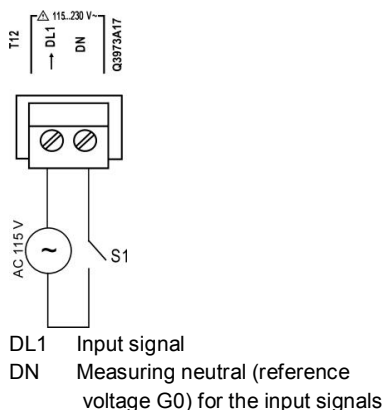
### Use

The digital input DL1 for binary signal AC 115...230 V is galvanically isolated. It is especially useful for:

- Handling high pressure switches via a hardware safe mode – in addition to the normal software mode (Refer to Application example: Compressor safety)
- Any other similar application

### Terminal assignment/ connection example

The following illustration the position and identification of the digital input DL1 on the housing of Climatix devices as well as a connection example:



### Application example: Compressor safety

In an emergency, digital input AC 115...230 V shuts down the compressor via hardware including:

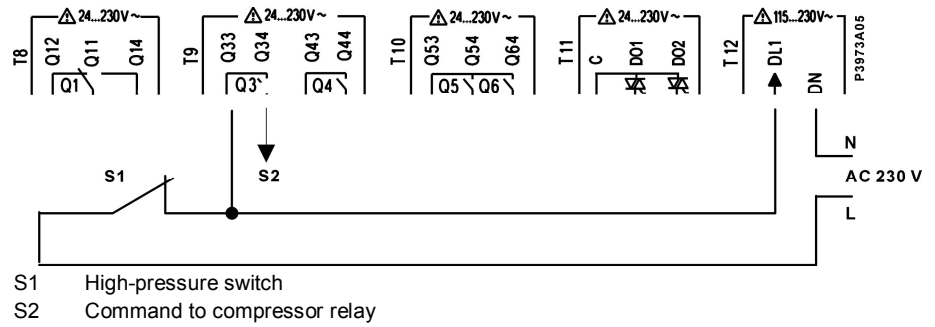
- High-pressure contact opens
- Voltage monitoring triggers an alarm



The controller detects such events quickly via the digital inputs DL1 (delay 100 ms).

## Connection example

The following illustration shows an example of the high-pressure function:



## Explanation

The high-pressure function runs as follows:

When...	Then...
S1 opens	<ul style="list-style-type: none"> <li>- The compressor relay is no longer energized, so that the compressor shuts down regardless of the control action</li> <li>- The controller detects the open status of S1 on DL1 and drops relay Q3, thereby deactivating the command to the compressor relay</li> </ul>
S1 closes again	<ul style="list-style-type: none"> <li>- The controller logic keeps the compressor off in accordance with the programmed functionality of the application</li> </ul>



Refer to section 6.8 for an example of multiple compressors.

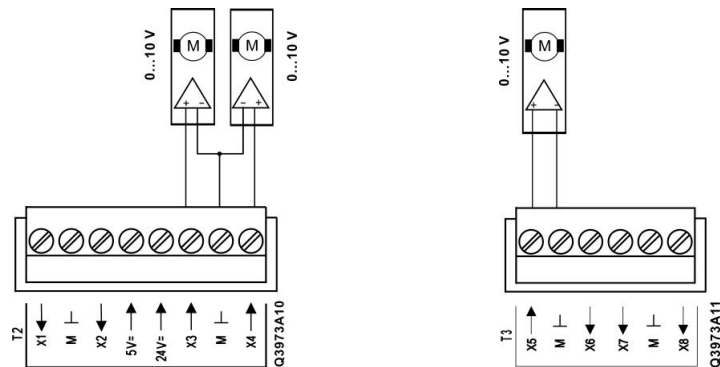
## 6.6 Analog DC 0...10 V / PWM outputs

### Use

The configurable outputs of a POL4XX controller can be configured to output a DC 0...10 V analog or PWM signal.

### Terminal assignment/ connection example

The following illustration shows the position and identification of the configurable outputs on the housing of a POL4XX controller:



Xx Output signals

M Measuring neutral (reference ground G0) for the input/output signals



Free wheel diode for inductive loads is integrated.



EMC measures:

- Use shielded cables as signal cables. Connect each analog output to a twisted pair.
- The shielding must be connected to a shielded bus through the largest possible surface area in front of the Climatix device.

## 6.7 Digital DC 24 V outputs

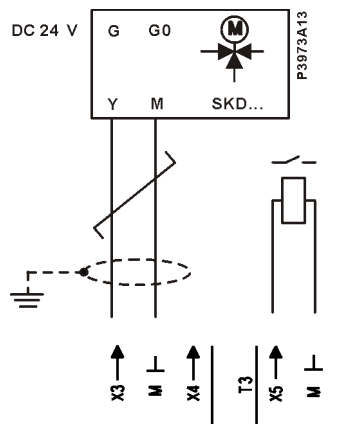
### Use

The configurable outputs of a POL4XX controller can be configured to output a DC 24 V signal.

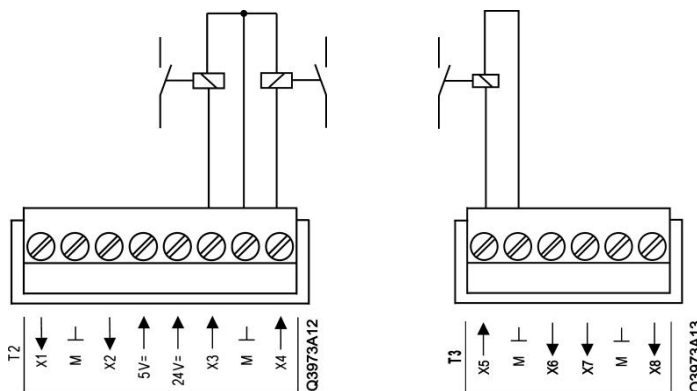
### Terminal assignment/ connection example

The following illustration shows the position and identification of the configurable outputs on the housing of a POL4XX controller:

DC output for  
external load



DC output for  
off-board load



Xx Output signals

M Measuring neutral (reference ground G0) for the input/output signals



Free wheel diode for inductive loads is integrated.



EMC measures:

- Use shielded cables as signal cables.
- The shielding must be connected to a shielded bus through the largest possible surface area in front of the Climatix device

## 6.8 Relay outputs

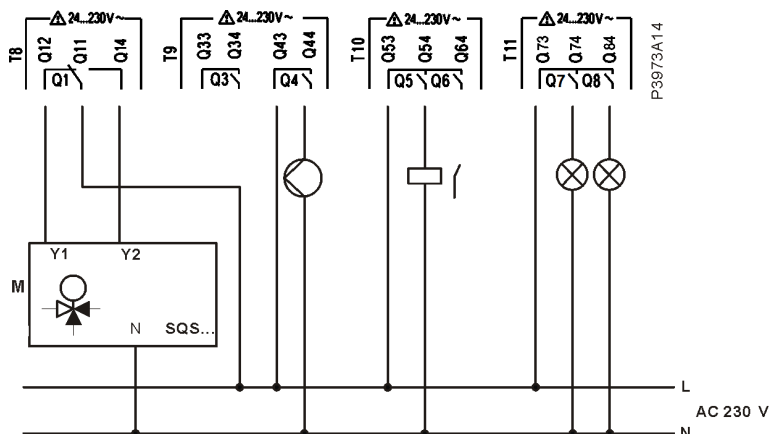
### Use

The relay outputs are used to connect to control elements and indicators, such as:

- motors
- valves actuators
- pumps
- electric air heaters
- lamps

### Terminal assignment/ connection example

The following illustration shows the position and identification of relay outputs Q.. on the housing of Climatix devices as well as connection examples for several field devices on POL4XX controllers. The controller used in the example is the POL424.XX.



The relays are combined in one or several groups depending on the device (the example above has 2 groups).



Do not mix SELV / PELV and line voltage on the same terminal.



Any suppressor circuit, interference suppression and etc. must be provided externally per the application.



Use external protection for inductive load. The switching circuits must be externally fused (<6.3 A).



AC 115/230 V cabling must have double insulation against cables carrying safety extra-low voltage (SELV). The cables must be fixed by strain reliefs.

## Relay outputs (cont'd)

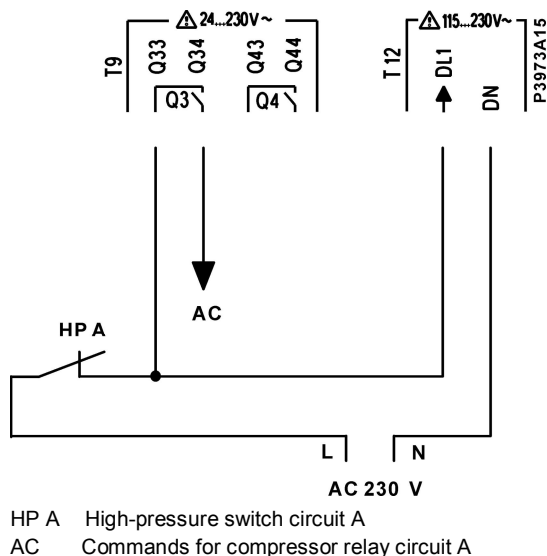
### Application example: Compressor safety

In this example, the relay outputs of the POL42X controller work together with the digital input DL1 to ensure compressor safety should certain events occur, such as:

- high-pressure switch cuts out
- voltage monitoring responds

### Connection example

One compressor per circuit can be protected on the hardware side against certain status change of digital input. Here is an example:



### Explanation

Digital input DL1 for AC 115...230 V can ensure hardware shutdown of the compressors via hardware per refrigeration circuit, whenever a high-pressure event occurs on one of the circuits. The function runs as follows:

When...	Then...
HP X opens	<ul style="list-style-type: none"> <li>- All compressor relays connected to this high-pressure switch drop out</li> <li>- The controller on the corresponding digital input DL1 detects the open status for this high-pressure switch HP. Depending on the programmed functionality, the assigned controller relays Q.. drop out and the commands for the compressor relays are deactivated</li> </ul>
HP X closes again	<ul style="list-style-type: none"> <li>- The controller logic keeps the compressor off in accordance with the programmed functionalities of the application</li> </ul>



Refer to [📖](#) section 6.5 for application example on compressor safety.



## 6.9 Triac outputs

### Use

The triac outputs are used to control digital outputs that switch frequently, when the normal relay life cycle does not suffice for the application, such as:

- the control of digital scroll compressors unload valves (e.g. switching every 20 seconds)
- the control of a 3-position valve (e.g. switching every minute)
- flashing warning lights

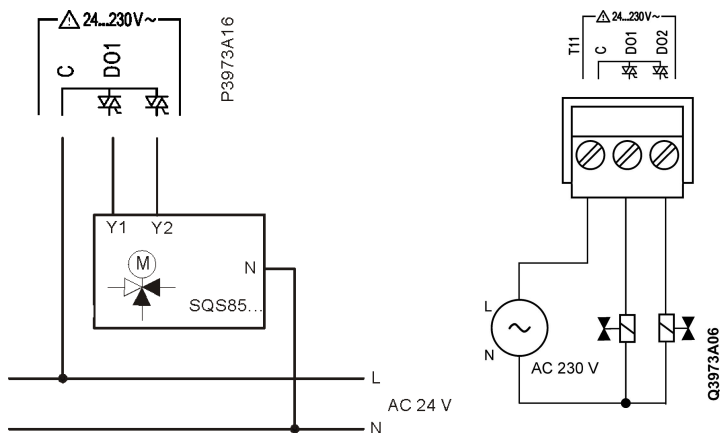
Normal relays can also be connected to triac outputs within the rated values for voltage and current. In this case, switching off the device is synchronized with the zero-crossing for the current on the load.

### Terminal assignment/ Connection example



**Do not mix SELV / PELV and line voltage on the same terminal.**

**Use external protection for inductive load.**



The triac outputs switch on at zero-crossing of voltage and switch off at zero-crossing of current.

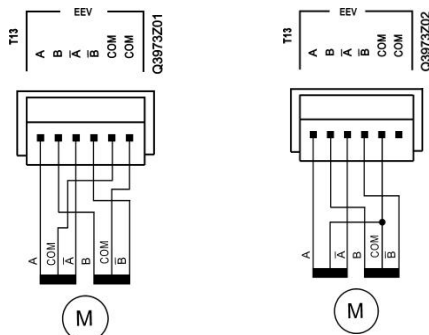
## 6.10 EEV interface (stepper motor drive/PWM)

### Use

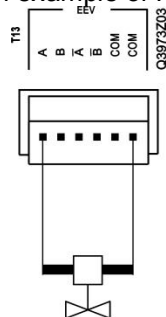
The unipolar motor outputs are used for unipolar stepper motors in full step mode or PWM output.

### Terminal assignment/ connection example

The following illustration shows examples of the position and identification of the unipolar motor output connection:



The following illustration shows an example of PWM output connection:



### Explanation

A unipolar stepper motor has 2 windings per pole pair, one for each direction of the magnetic field. Since in this arrangement a magnetic pole can be reversed without switching the direction of current in one winding, the commutation circuit can be made very simple (e.g. using a single transistor for each winding).

### Note:

Only channel A supports PWM output.

# 7 Communication ports

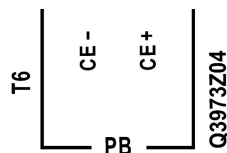
## 7.1 Climatix process bus

### Brief description

The Climatix process bus is based on KNX technology and exchanges process information across different devices and HMIs.

### Terminal assignment

The following illustration shows the position and identification of the terminals on the housing of Climatix controllers. The POL422.50 controller is used in the example.



### Technical data

Technical data of process bus:

Transmission medium (bus cable)	Twisted pair
Baud rate	9.6 kbps (default value)
Bus line polarity	CE+, CE- ( <b>not</b> interchangeable)
Bus terminating resistor	Not required

### Communication signal

The communication signal (information) is transferred symmetrically, i.e. as the difference in voltage between the 2 bus lines (and not as a voltage difference to earth potential). The sign preceding the voltage between CE+ and CE- determines signal values 0 and 1.

### Process bus cable

Cable type	2-wire, stranded (one wire pair) or 2 x 2-wire, stranded or spiral quad
Wire diameter	Min. 0.8 mm, Max. 1.0 mm
Wave resistance (ideal value)	120 Ω at 100 kHz
Line resistance	20 Ω/km to Max. 75 Ω/km
Capacity, bus line to bus line	Max. 100 pF/m at 800 Hz Higher value requires shorter cable line length accordingly
Shielding	Not required/not recommended. Climatix devices do not have a connection for bus cable shielding.

### Bus power supply

Bus power supply is DC 28 V, 45 mA via Climatix device with DPSU.



For detailed information about the Climatix process bus, refer to [📖](#) section 8.

## 7.2 Modbus RS485

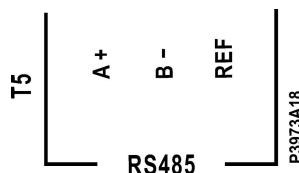
### Features

The Climatix controller RS485 interface supports the Modbus RTU communications protocol to connect Modbus devices (examples):

- Control drives via variable speed drives (master mode)
- Exchange of information with a monitoring system (slave mode)

### Terminal assignment

The following illustration shows the position and identification of the terminals on the housing of Climatix controllers. The POL422.50 controller is used in the example.



### Technical data

RS485 (EIA-485) Modbus RTU protocol	Master or slave mode
Bus terminals	A+, B-, REF
Bus connection/electronics	<b>Not</b> galvanic isolated
Bus cable	Twisted pair, shielded if length > 3 m
Bus baud rate	600, 2400, 9600, 19200, 38400
Bus termination	None



It is essential to use a network termination on each end of the RS485 network, which matches the cable's impedance to prevent signal reflections and corrupting the data on RS485 network.



The Climatix POL4XX controllers offer software configurable polarization at the RS485 port. Bus polarization can be enabled or disabled.



Only one POL4XX controller on the RS485 network needs to provide polarization. The polarization on the POL4XX controller can be enabled or disabled via the SCOPE tool or operation unit (see HMI-TM for an example). It is recommended to enable the polarization on the master controller.

### Modbus function codes supported by Climatix

The following common Modbus function codes are supported by Climatix controllers for Modbus communications:

Code	Description
01	Read coil status
02	Read input status
03	Read holding registers
04	Read input registers
05	Force single coil
06	Preset single register
15	Force multiple coils
16	Preset multiple registers

### Cable guide

Refer to the following guidance when selecting RS485 cables:

- Use 2-wire twisted pair cable with shielding
- Select the right cable diameter to ensure maximum cable length.  
Example: AWG24 at 9600 bps could reach 1,000 m
- Class 5 cable: Maximum length is 600 m

### Examples

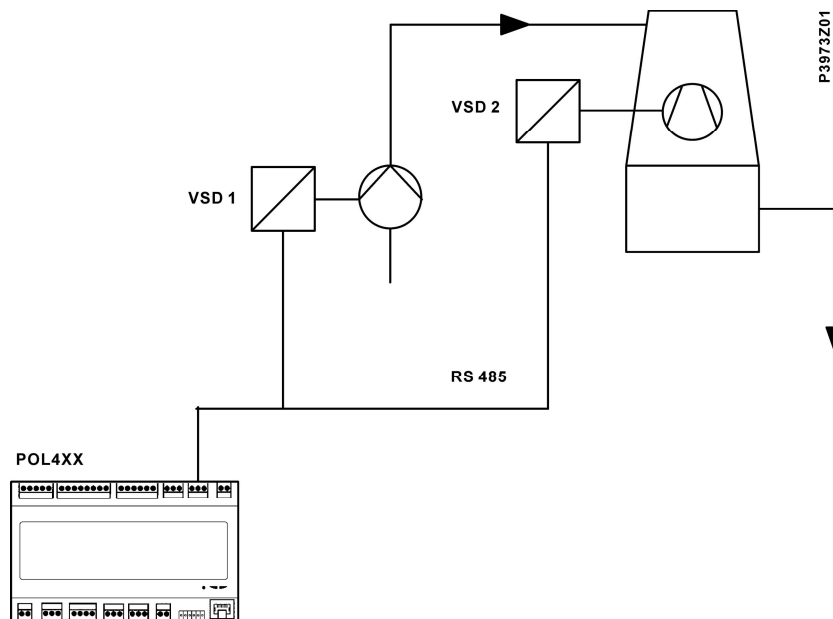
The following pages describe 2 application examples:

- Master mode
- Slave mode

### Master mode

In this example, the Climatix controller POL4XX (Modbus master) controls and monitors a water-cooled screw chiller via variable speed drives VSD 1 and VSD 2:

- VSD1 controls the condenser pump
- VSD2 controls the cooling tower fan



POL 4XX Climatix controller  
VSD.. Variable speed drives

### Brief functional description

In the above example, the condenser pump switches on or off depending on the chiller status and its variable speed drive is modulated while the chiller is running at different capacity loads to optimize the refrigeration cycle.

The cooling tower fan is started or stopped based on the condenser water temperature, and its variable speed drive is modulated according to the external air temperature conditions.

### Advantage of the Modbus solution

A conventional variable speed drive commanded via an analog signal (e.g. DC 0...10 V) can only control the current speed.

The Modbus solution, however, can provide improved feedback on operation (alarms, diagnostics and troubleshooting) and startup configuration, in addition to improved speed control.

### Limitations

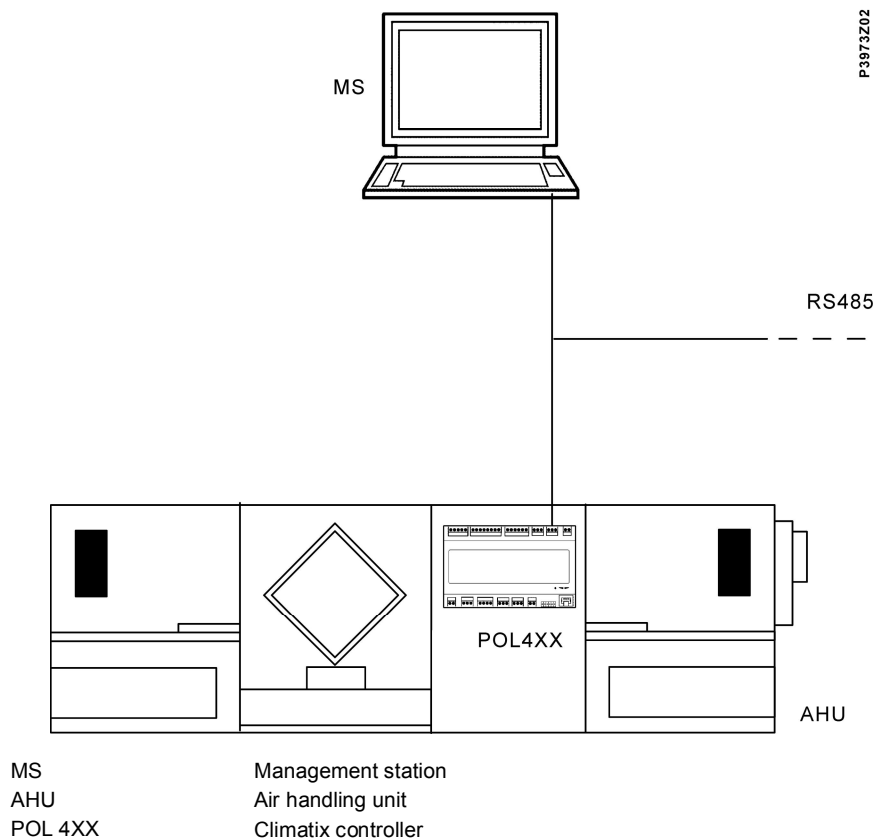
Observe these limitations when using the Modbus RS485 master:

- Up to 31 slaves are supported
- On the controller side, the application software defines the limits on the number of requested registers per slave

## Modbus RS485 (cont'd)

### Slave mode example

This example illustrates how to integrate the Climatix controller as a slave into a simple BACS to monitor and control the AHU:



### Explanation

Here, the Climatix 4XX controller acts as Modbus slave and controls the AHU. The management station (master) polls the slave to fetch information on actual values, such as setpoints, sensor measurements or even alarms to monitor operation of the AHU.

The management station can change certain setpoints or settings to optimize the unit.

### Binding method for slave mode

Although Climatix can integrate Modbus mapping for the device into the SAPRO program, Climatix may instead use a mapping table to map Climatix objects to Modbus registers.

Advantages of using a mapping table: The functionality of the AHU (application) can be programmed and tested independently.

Modbus can be mapped in a second step. As a result, users can separate application from communication without reworking and retesting the application. Only mapped data points are visible over Modbus.

### Limitations

Observe the limitations for object handler mapping when using the Modbus RS485 slave:

BSP version	Coil register	State register	Holding register	Input register	Active mapping points
VVS8	C1 to C2000	S1 to S2000	H1 to H125	I1 to I125	Max. 250
VVS9	C1 to C2000	S1 to S2000	H1 to H1000	I1 to I1000	Max. 2000
VVS10	C1 to C2000	S1 to S2000	H1 to H1000	I1 to I1000	Max. 2000

## 7.3 BACnet MSTP over RS485

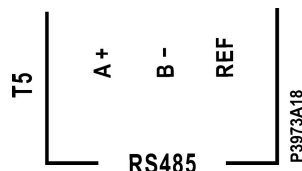
### Features

The Climatix POL4XX controller use the RS485 interface to support the BACnet MSTP communications protocol to connect with BACnet MSTP clients:

- Exchange information with a monitoring system

### Terminal assignment

The following illustration shows the position and identification of the terminals on the housing of Climatix controllers. The POL422.50 and POL424.50 controller (BSP version 10.50 or later) is used in the example.

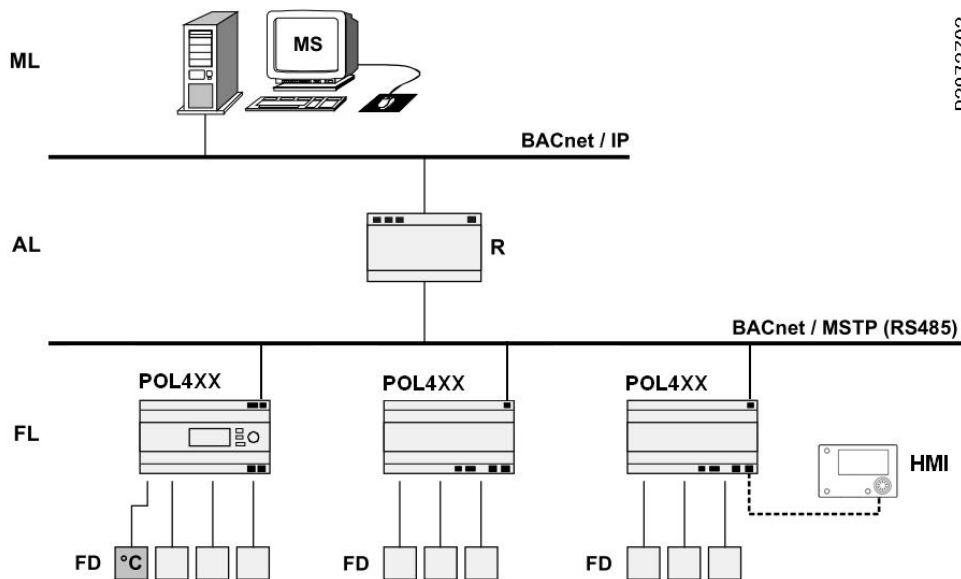


### Technical data

RS485 (EIA-485)	(see chapter 6.2 on page 36)
Bus terminals	A+, B-, REF
Bus connection/electronics	<b>Not</b> galvanic isolated
Bus cable	Twisted pair, shielded if length>3 m
Max. number of BACnet objects	150 objects
Functionality	Only server functionality
Profile	B-ASC, no time scheduling functionality

### Example: BACnet MSTP

The following illustration shows a simple example of integrating the Climatix controllers in a BACnet MSTP network:



ML	Management level	R	MSTP/IP router
AL	Automation level	FL / FD	Field level/field devices

P3973Z03

## BACnet MSTP over RS485 *(cont'd)*

---

### Explanation

The following table lists the devices and functions of the above illustration:

Device	Designation/functions
POL4XX	BACnet MS/TP communication for POL42X.50 or POL42X.70: - Conversion of data point values of Climatix controllers to BACnet objects
HMI	Operation and parameterization unit HMI-DM, type POL895.XX: - Setting the most important BACnet parameters such as Device-ID and BACnet Device Name - Operation of Climatix controllers
R	BACnet MSTP/IP router (e.g. Siemens PXG3.M)
MS	Management station: - Reading and writing integrated (mapped) controller data points (BACnet objects)



## 7.4 Local service interface

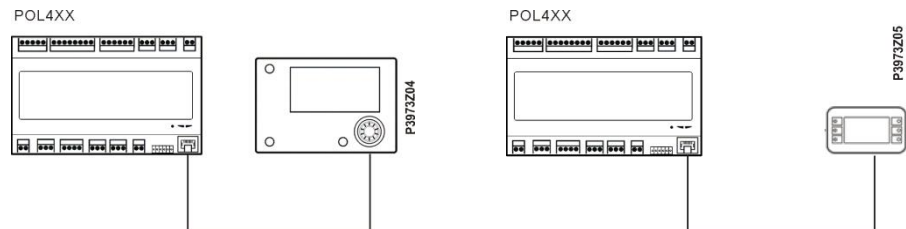
### Connectable devices

The local service interface can be connected to the following devices:

- User interface HMI-DM or HMI-TM
- PC tools such as SCOPE
- Modbus RS485 (non-insulated)

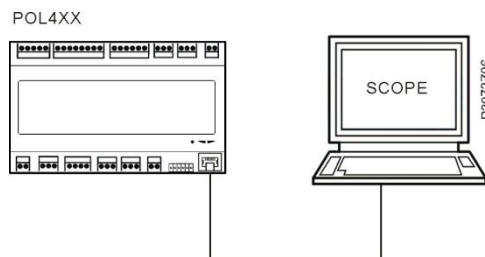
### Connecting HMI-DM or HMI-TM

The connection to user interface HMI-DM (POL895.51) or HMI-TM (POL871) is as follows:



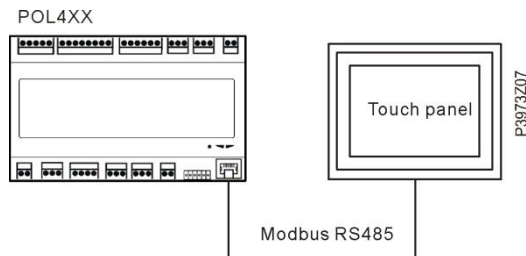
### Connecting PC tools

The connection to PC tools such as SCOPE, PC USB port and cable type POL0C2.40/STD is as follows:



### Connecting touch panel

POL4XX can be connected with touch panels using Modbus over RS485 as follows:

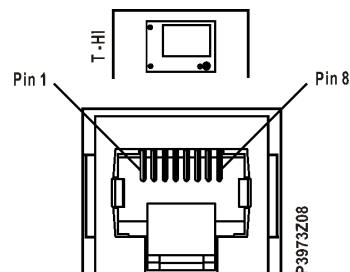


### Limitations

The maximum length of unshielded cable is 3 m. For information about shielded cable, refer to [📖](#) section 7.2.

### Cable connection

The top view of RJ45 jack (8 pins) is as follows:



## Local service interface *(cont'd)*

---

Pin-out for  
RJ45-connector

Pin	Signal
1	USB device, D+
2	USB device, D-
3	RS485, A+
4	Ground
5	Select 2
6	RS485, B-
7	Select 1
8	DC 24 V (output)

**Note:**

Maximum current at DC 24 V is 100 mA.

## 7.5 M-Bus

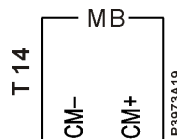


M-Bus is only available for Climatix POL426.50\*.

\* Supporting up to 3 slaves

### Terminal assignment

The following illustration shows the position and identification of the terminals on the housing of Climatix POL426.50 controllers:



### M-Bus (T14)

POL426.50/STD controller	M-Bus master
Bus connection terminals	CM+, CM- (interchangeable)
Bus cable	2-wire, telephone cable (JYStY N*2*0.8mm)
Bus connection/electronics	Not galvanically isolated
Bus voltage	DC 28 V (short-circuit-proof)
Bus length	Max. 50 m
Number of bus devices (stand. load 1.5 mA)	Max. 3
Cable types, bus topology, bus termination	Refer to M-Bus norm DIN EN 13757
Baud rate	300, 2400

### Data points

Data points read from the M-Bus slave devices are:

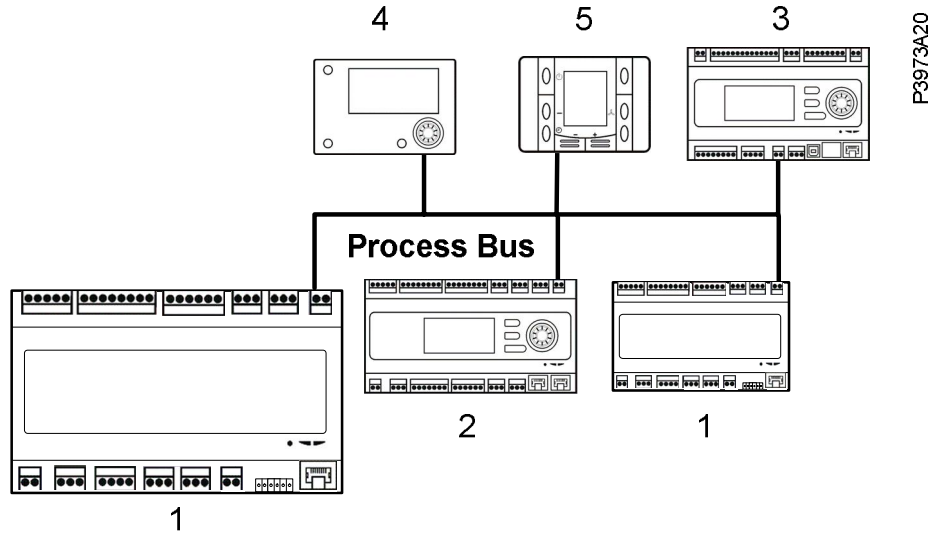
- Power
- Flow
- Flow temperature
- Return temperature
- Cumulated energy
- Cumulated volume

# 8 Climatix process bus

## 8.1 Application overview

### Application

The process bus connects Climatix controllers to other Climatix controllers and network HMIs:



1	Controllers POL4XX	4	Dot matrix HMI POL895.51/POL871
2	Controllers POL687	5	Room unit POL822.60 or POL822.70
3	Controllers POL63X		

### Brief description

The bus is based on KNX technology and exchanges process information across different devices and HMIs.

### Devices with process bus

The Climatix devices listed below have a process bus connection:

- Programmable controllers: POL687.XX, POL687.7X, POL635.XX, POL636.XX, POL638.XX, POL422.50, POL424.50, POL423.50, POL425.50 and POL426.50
- Controllers with Inbuilt-HMI: POL42X.70
- HMI: POL895.51, POL871.71 or POL871.72
- Room units: POL822.60 or POL822.70

## 8.2 Process bus description

### Abstract

The main characteristics of the Climatix process bus is as follows:

- Based on KNX TP1 technology and allowing Climatix devices to communicate with each other with some restrictions, even communicating with 3<sup>rd</sup>-party products (interworking)
- The basic version of the process bus comprises a cable with one stranded wire pair
- Area/line couplers (use Siemens products, with KNX LTE-Mode support)

### Transmission medium

The process bus sends the following data using TP (twisted pair, stranded wire pair) as the transmission medium:

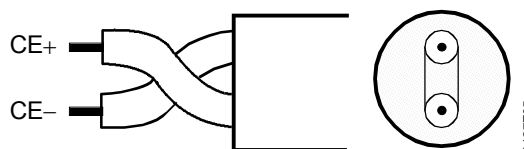
- Configuration data and operator entries
- Fault and acknowledgement messages
- Process values and history data

### Process bus cable

The basic version of the process bus is the same as KNX-TP1 bus, and comprises a cable with one stranded wire pair and a jacket.

### Bus lines

The bus is connected via CE+ (red) and CE- (black).



### Bus cable selection

For selection of the bus cable, refer to the respective KNX technical documents. Recommended bus cables and associated specification are as follows:

Cable (n = 1 or 2)	Specification
YCYM n x 2 x 0.8	Fixed installation Dry, humid, wet rooms Surface-mounted, flush mounted, in pipes Installation outdoors (do not expose to sunlight)
J-Y (St) Y n x 2 x 0.8	Fixed installation Indoors only Surface mounted, in pipes
J-H (St) H n x 2 x 0.8	Halogen-free conductor, laid separately
A-2Y (L) 2Y n x 2 x 0.8	Outdoor cabling
A-2YF (L) 2Y n x 2 x 0.8	Outdoor cabling Body cavity filling: petroleum jelly

### Bus cable shielding

Users can use bus cables without shielding on plants with Climatix devices. Shielded cables are recommended (but not mandatory).

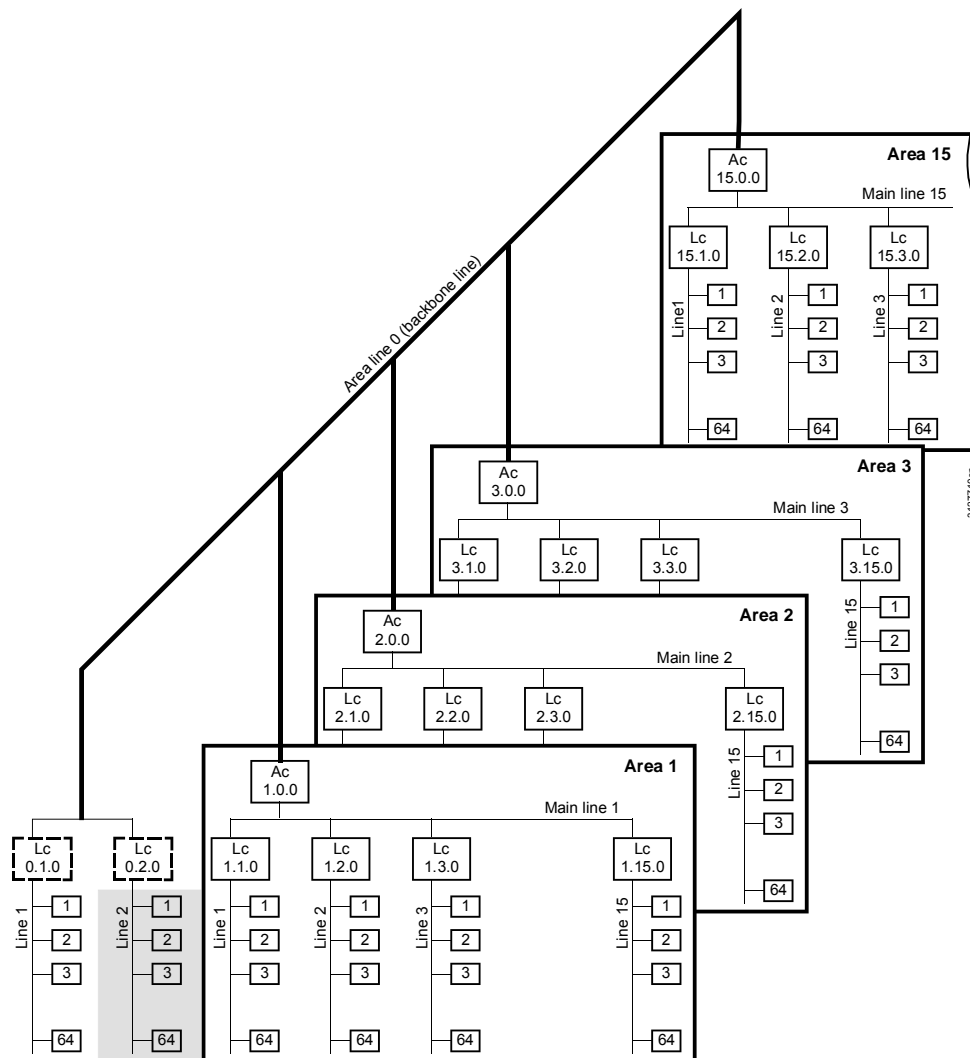
Shielded cables should be used if interference is expected on the KNX bus.

## Process bus description *(cont'd)*

### KNX network

A complete process bus network is comprised of 3 tiers. Area line 0 represents the network backbone.

15 main lines branch off from the area line via area couplers Ac (area 1...15), and 15 lines (line 1...line 15) branch off from each main line via line couplers Lc.



### Notes:

- The Climatix devices with process bus connections are also referred to as bus devices with network address
- In the illustration above, the devices are arranged on a 3-tier process bus network, with the factory-set area/line address 0.2 on the Climatix devices (corresponding to the grayed area)
- The network structure (due to the given area/line address 0.2) is limited to area 0, line 2 without area and line couplers (thus to one line)

## Process bus description *(cont'd)*

---

### Addressing, network address

The network address is composed of area, line, and device address (A.L.D), even if no area and line couplers are used.

The network address reflects the bus device's unique position on a process bus network and is unique within the related network.

Area and line coupler addressing must be laid out during engineering in accordance with the network structure.

### 64 bus devices on one line

Up to 64 bus devices can be installed on one line (area line 0 and main lines 1...15).

### Power supply unit PSU

PSUs provide "central bus power supply". Commercially available PSUs (for KNX) feature power outputs of **160 mA**, **320 mA** and **640 mA**.

### Note:

DC 29 V voltage for the bus supply requires a voltage source **with choke**.



Calculate power consumption of process bus devices to determine the PSU for the bus power supply.

Several power supply units featuring different power outputs may be required on a complex process bus network depending on the bus topology and the number of bus devices (per line).

### Area and line couplers

Complex, large networks require area and line couplers for 2 reasons:

- KNX network comprises more than 64 bus devices
- Permissible network size is exceeded without couplers

A network with area and line couplers allows for establishing "communication islands" to keep any cross-area or cross-line data traffic to a minimum.

### Siemens area/ line coupler

Ordering: 5WG1 140-1AB13



Comply with local regulations on **lightning protection** and equipotent bonding.

Consider complex **overvoltage protection** measures covering bus devices and supply and signal lines (e.g. for outdoor sensors) based on the probability of exposure to lightning or overvoltage.

### Installation notes

Comply with the instructions on the following pages for project engineering and installation.

### Bus cables



Local regulations on **insulation against mains voltage** (SELV as per EN 60730) apply if the bus cable is laid in parallel to lines from a 3-phase network (3 x AC 400 V).

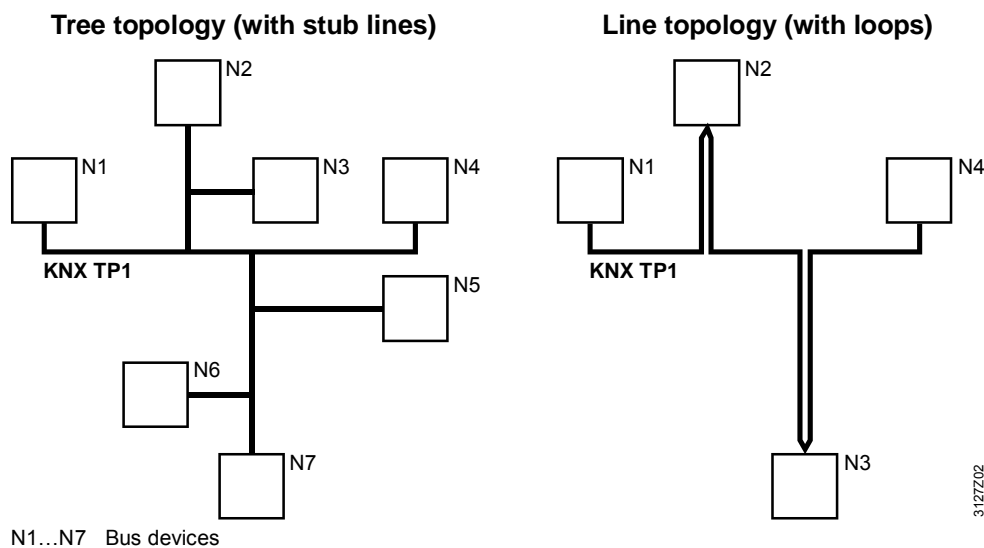
### Bus topologies

Permissible bus topologies are tree, line, and star topologies, which can be mixed as needed. Ring topologies, however, are not allowed.

# Process bus description *(cont'd)*

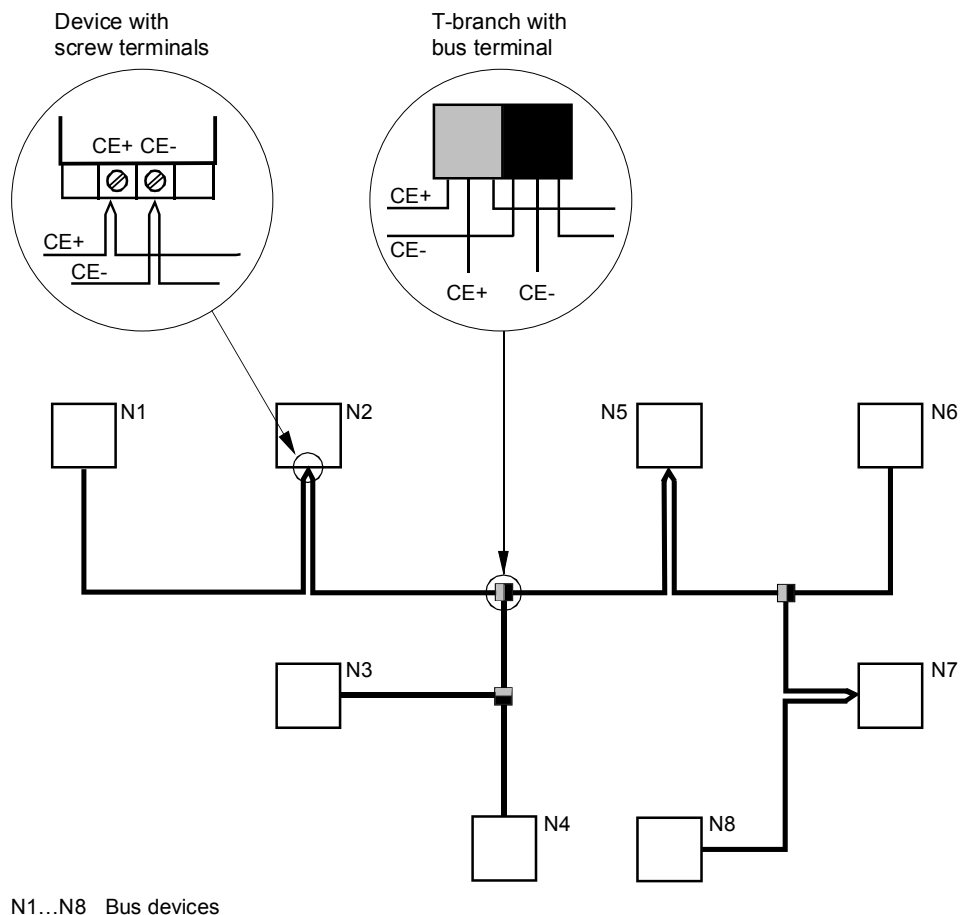
## Advantageous: Tree topology

The tree topology is advantageous for an extensive KNX network.



## Branching and connection variants

The following illustration shows the 2 options of terminals:



## Bus connection

For Climatix devices, the bus lines are connected to terminals CE+ and CE-. Observe the polarity of the bus lines CE+ and CE- and do not interchange them.

## Terminating resistor

The KNX networks do **not** require bus terminating resistors.



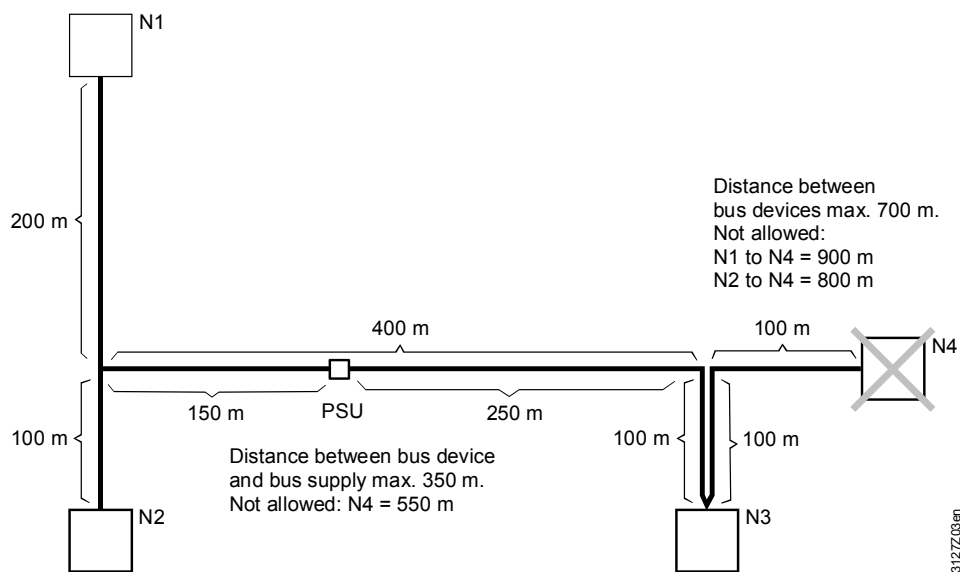


## Process bus description (cont'd)

### Distances and line lengths (examples)

#### Example 1: Distances

Examples of distances:



N1...N4 Bus devices

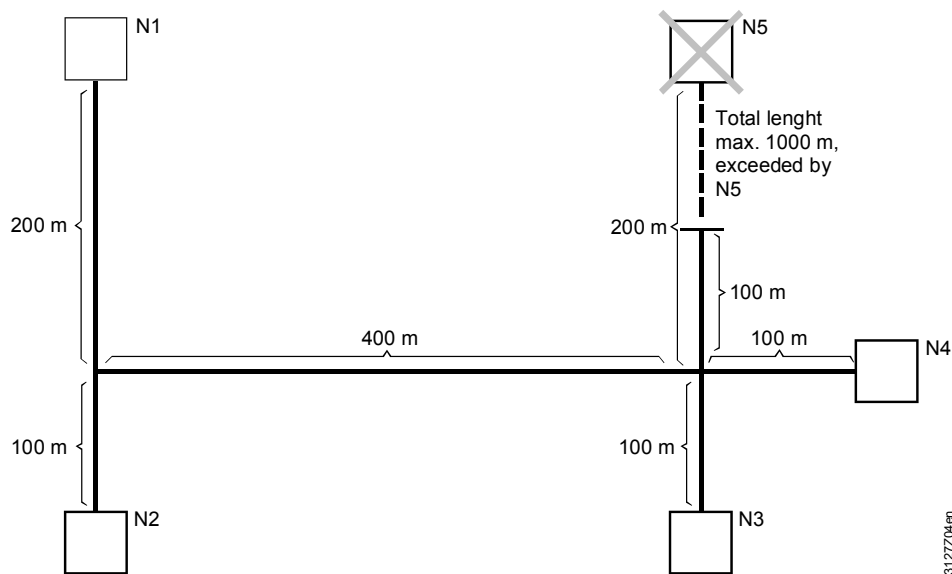
3127Z03en

#### Explanation

When observing the maximum distance of 700 m between bus devices, bus device N4 cannot be integrated in the bus if bus device N3 is integrated with a loop (instead of sub-line).

#### Example 2: Total length

The bus supply must be placed at 150 m/250 m on the 400 meter line if the maximum distance between the PSU and the bus device (without bus supply) is 350 m.



N1...N5 Bus devices

3127Z04en

#### Explanation

The permissible total length of 1,000 m in the line is exceeded, if device N5 is integrated in the bus at the given bus wiring.

## Process bus description *(cont'd)*

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- Commissioning aspects** Comply with the following when commissioning a process bus network as intended.
- Wiring KNX bus** Check bus wiring prior to commissioning and make sure that the bus line polarity is not interchanged (terminals CE+ and CE-).  
Do **not** interchange bus line polarity.
- Operating voltage** Check the operating voltage wiring to make sure that the devices are connected to AC 24 V or AC 230 V (as per the technical device information). Apply operating voltage only after this check.
- Bus power supply** Check to ensure that power is supplied to the bus after applying operating voltage. Supply via:
- DPSUClimatix devices set to "ProcessBus/PowerSupply = On"
  - Central bus power supply via PSU(s)

- Addressing** The network address is composed of area, line, and device address (A.L.D). This is true as well if no area or line coupler is used.  
Begin by setting the area or line address in the couplers if area and line couplers are installed in the KNX network.

Address	Ranges
Area	Set the area address A (A.0.0, with A = 1...15) for each area coupler.
Line	Set the line address L (A.L.0, with L = 1...15) for each line coupler.
Device	<b>Important:</b> Climatix devices assume area and line coupler addresses from the preceding couplers. If there is no coupler, network address 0.2.D (with D = 1...64) applies. The device address may be used only once within a line. The permissible device addresses are 1 to 255. Address 254 remains reserved for the service tool if the OCI700.1 is used.

- Zone addresses, KNX LTE-Mode** Set the zone addresses during commissioning in accordance with plant functions.  
Set the zone addresses in Climatix 4XX devices via the HMI or use SCOPE for programmable controllers.

## 8.3 Providing power via the process bus

### Devices with DPSU

In a process bus network, some devices can provide power over the bus. These devices are called DPSU (decentralized power supply units). They can have DPSU functionality set to ON or OFF, depending on the requirements.

Product no. (ASN)	Description	Current provided with DPSU = ON
POL422.XX	Climatix controller 21 I/Os	Nominal 45 mA / Max. 90 mA
POL424.XX	Climatix controller 21 I/Os	Nominal 45 mA / Max. 90 mA
POL423.50	Climatix controller 21 I/Os	Nominal 45 mA / Max. 90 mA
POL425.50	Climatix controller 19 I/Os	Nominal 45 mA / Max. 90 mA
POL426.50	Climatix controller 21 I/Os	Nominal 45 mA / Max. 90 mA
POL42X.70	Climatix controller 21 I/Os	Nominal 45 mA / Max. 90 mA

Product no. (ASN)	Description	Current consumption with DPSU = ON or OFF
POL422.XX	Climatix controller 21 I/Os	5 mA
POL424.XX	Climatix controller 21 I/Os	5 mA
POL423.50	Climatix controller 21 I/Os	5 mA
POL425.50	Climatix controller 19 I/Os	5 mA
POL426.50	Climatix controller 21 I/Os	5 mA
POL42X.70	Climatix controller 21 I/Os	5 mA

### Devices without DPSU

Other devices cannot supply power and need to get power from external sources. These devices are:

Product no. (ASN)	Description	Current consumption
POL822.60/STD	Room unit	7 mA
POL822.70/STD	Room unit	7 mA
POL895.51/STD	Climatix HMI-DM	45 mA

## Providing power via the process bus *(cont'd)*

### Calculation of current consumption over the process bus

Additional PSUs must be added to the process bus network if the power available from devices with DPSU = ON is insufficient. The workflow is as follows:

Step	Action
1	Calculate the sum of nominal current available from all controllers with DPSU = ON (the reserve from maximum current is needed as communication current). The nominal current is the current available for powering all devices on the process bus line.
2	Calculate the current needed by all devices.

The process bus can operate if the current from all DPSUs is sufficient to power all devices.

Proceed as follows if the current is not sufficient:

Step	Action
1	Add external centralized PSUs to the process bus Example: Use N125/11 with a power output of 320 mA.
2	In case 2 PSU are needed, disable the DPSU on all controllers (set DPSU = OFF).
3	Consider the total current needed (all controllers with DPSU = OFF and all devices without DPSU). The PSU needs to provide enough current for all these devices.



You can also use one PSU and a maximum of 4 DPSUs.

### Siemens power supply units

Power supply units N125/11 for KNX networks:

<b>Product no.</b>	5WG+ 125-1AB11	Power output <b>320 mA</b> .
<b>Data</b>	Operating voltage	AC 230 V, 50...60 Hz
	Bus supply output	DC 29 V (DC 28...30 V, with choke)

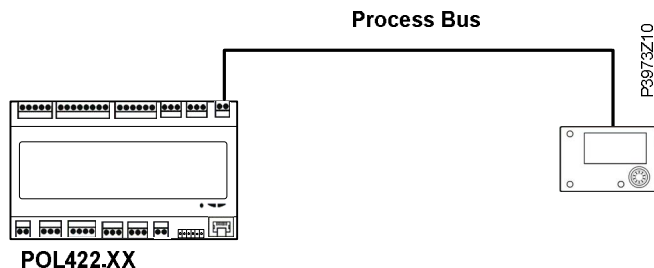
### Note:

For restrictions on distances, refer to paragraph *Distances and line lengths*.

## Providing power via the process bus (cont'd)

### 1 controller – 1 HMI-DM

The following illustration shows the connection of one remote HMI-DM to one POL4XX controller (POL422.XX) via the process bus:



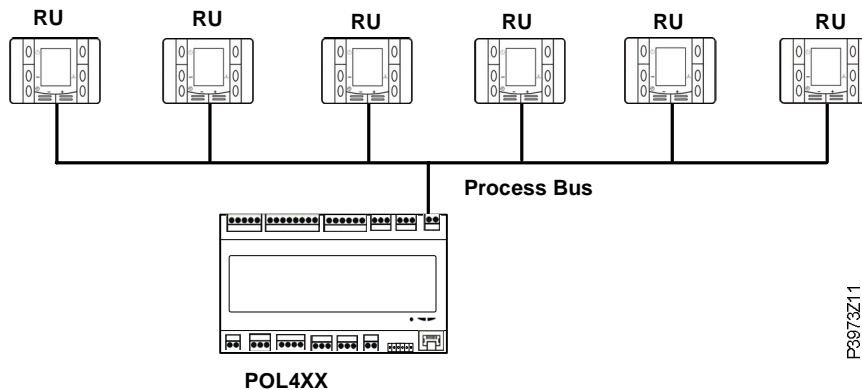
### Explanation

The consumption of the HMI-DM POL895.51 is 45 mA. The POL4XX controller with DPSU = ON is capable of supplying 45 mA.

In this case, for distances up to 350 m, one POL895.51 can be connected to one controller without any external PSU.

### 1 controller – n HMI-SGs

The following illustration shows the connection of several HMI-SGs to one POL4XX controller via the process bus:



### Explanation

The consumption of one room unit POL822 (RU) is 7 mA, and the nominal current available from a controller with DPSU = ON is 45 mA. This means that a maximum of 6 devices can be connected to one POL4XX controller without adding any external PSU.

An external PSU is required to increase the number of room units whenever more than 6 room units POL822 are on the same process bus line with only one POL4XX controller (e.g. POL424) with DPSU = ON.

## Providing power via the process bus *(cont'd)*

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### Communication modes for the Climatix process bus

The Climatix process bus is based on standard KNX technology and relies on the same communication principles and mechanisms.

The present implementation does not, however, fully conform to KNX, so that there are some restrictions to consider including interoperability with generic KNX devices (requires verification on a case-by-case basis).

The Climatix process bus supports different communication modes:

Modes	Description	POL4XX	POL6XX
1	KNX S-Mode communication	No	Yes
2	Simple KNX LTE-Mode communication	Yes	Yes
3	Full KNX LTE-Mode communication	No	Yes

### Full KNX LTE-Mode

The **full KNX LTE-Mode** is the most complete mode available and takes advantage of the standard KNX tool for configuring communication. The data types are standard data types so that, in principle, communication with 3<sup>rd</sup>-party KNX devices is possible, assuming that the application is correctly engineered and qualified.

### Simple KNX LTE-Mode and KNX S-Mode

The **Simple KNX LTE-Mode** and **KNX S-Mode** are even simpler, but are also limited.

- In KNX S-Mode, the group address is defined in the language support file and cannot be changed later in the application running on the controllers
- In Simple KNX LTE-Mode, the data types are limited and do not conform to the standard data types. So this mode should be used in closed systems only - and not in the same system with 3<sup>rd</sup>-party KNX devices

### HMI-DM and HMI-SG

The HMI-DM POL895.XX and HMI-SG POL822 work over the process bus in any case, as they include special proprietary telegrams to operate with as little engineering effort as possible.

# 9 Commissioning and service

## 9.1 Status diagnostics

### General information

Each controller features 2 bi-color LEDs.



The power supply is off when all LEDs are off.

### Controllers

The status LEDs of BSP and BUS can be red, green or yellow.

### BSP LED

The LED displays the status of the "board support package" (BSP):

Mode	LED status
Software update mode (download active on a new BSP, application)	Alternating between red and green every second
Application running	Green on
Application loaded but not running	Orange on
Application not loaded	Orange on
BSP error (software error)	Red blinking at 2 Hz
Hardware error	Red on

### BUS LED

Not available



## 9.2 Commissioning tool – SCOPE

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### What is SCOPE

SCOPE is a commissioning and service tool for use with the Climatix controllers and operation units (HMI). SCOPE is used in conjunction with SAPRO to create and maintain entire applications.

Key functions of SCOPE:

- Download program (application, HMI, object language file)
- Download BSP (basic service package, UCF format)
- Reading and editing data point objects and their members
- Uploading and downloading parameters (objects and members)
- Logging, saving, and displaying online trend data
- Configuring the archiving function plus data display and reading
- Editing the Unicode HMI template
- Map engineering various communication protocols including Modbus slave and process bus
- Implementation of factory save and restore (POL4XX programmable version)

Key functions of HMI:

- Creating and loading files for layout and menu texts
- Creating and loading Unicode character sets
- Creating and loading files for language support of object texts and member designations

### Contents of this chapter

The following pages provide short descriptions on:

- Starting SCOPE
- Connecting SCOPE
- Downloading an application
- Uploading/downloading parameters




Refer to *Climatix SCOPE online help* for detailed information.

## 9.3 Starting SCOPE


### VVS Switcher

Prior to starting SCOPE, you need to use the VVS Switcher to select the correct SCOPE components for the controller you are currently using if SCOPE of a lower version is installed on your computer (e.g. VVS8 or VVS10).

Step	Action
1	<p>Select <b>Start</b> → <b>Programs</b> → <b>Climatix Suite</b> and then <b>Rainbow VVS Switcher</b>:</p> 
2	Select <b>SCOPE</b> and <b>Components</b> fitting your installation and click <b>OK</b> .

### Starting SCOPE

Proceed as follows to start SCOPE:

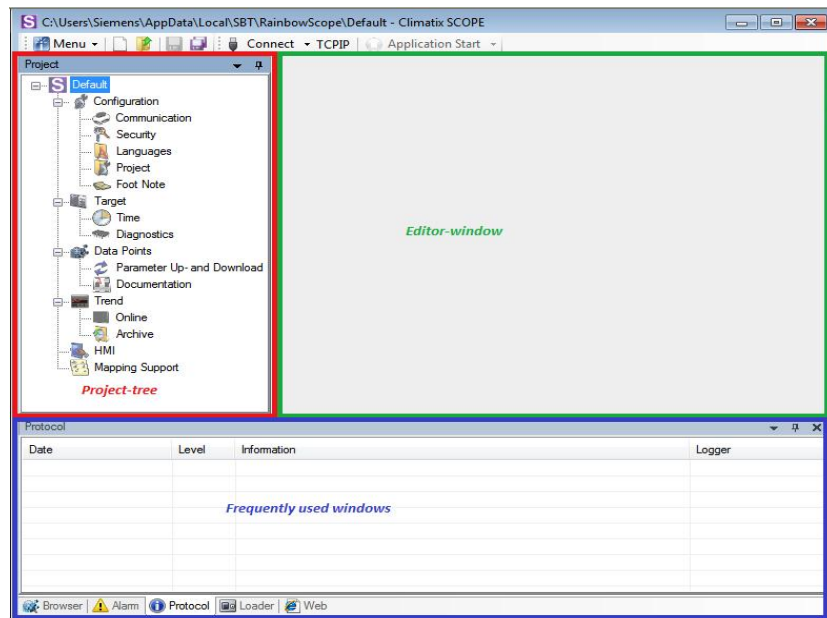
Step	Action
1	<p>Select <b>Start</b> → <b>Programs</b> → <b>Climatix Suite</b> and then <b>Climatix SCOPE</b>:</p>  <p>→ SCOPE opens the program window.</p>

## Starting SCOPE (cont'd)

### The program pane

The following figure shows the top program window immediately after start. It will open a default project in the system folder. You should create a new project saved in your own project folder. You will see:

- The menu bar and project tree
- Editor window
- Frequently used windows



The menu bar contains basic operations available with SCOPE.

The project tree contains general window program commands in folders (such as Configuration, Target and etc.). Every folder has its own commands.

The other window tab is located at the bottom of the program window.

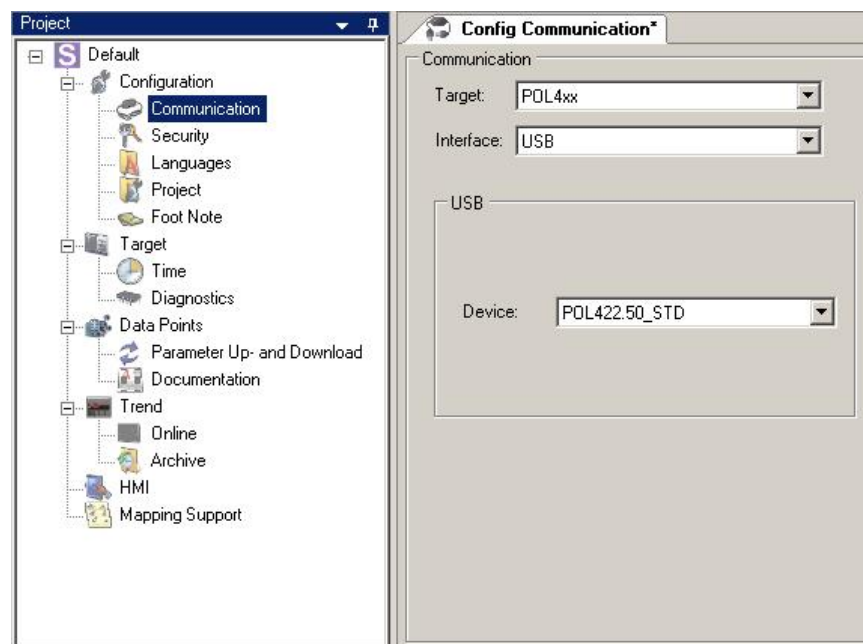


Every tab has its own function and information.

## 9.4 Connecting SCOPE

### Requirements

The usual physical route for local communication between SCOPE and a Climatix controller is USB.



Make sure to have the proper communication cable and communication interface prior to connecting your PC and the Climatix controller.

### Target and communication type

Check the basic settings for local communication when starting SCOPE for the first time:

Step	Action
1	Select <b>Communication</b> tab in the project tree (see the picture above).
2	In the right area, select <b>POL4XX</b> in <b>Target</b> , select <b>USB</b> in <b>Interface</b> . You will find your connected controller.
3	Click <b>Save</b> to save the configuration. Click <b>Connect</b> to connect with the controller. Click <b>Disconnect</b> to disconnect from the controller. Click <b>Stop Application</b> to stop the application in the controller.

## 9.5 Up-/downloading parameters via SCOPE

### Introduction

The **Parameter** function allows users to ...

- upload all parameters (members for all objects) for the application from the target device to the PC and save the data to file.
- only adjustable, or all parameters for the saved file are downloaded to the target device.

### Application examples

The benefits of the **Parameter** function in the work process include:

- Current parameter settings for the controller are saved following successful commissioning to allow a complete download of the data to a new controller in the event a controller is replaced.

As a result, you do not need to re-specify or reenter plant-specific settings such as setpoints, controller parameters, schedules and etc.

- Commissioning of 30 controllers in a plant with the same basic application but using variants (e.g. 3). Specific parameter settings distinguish the variants (e.g. schedules for different user groups).

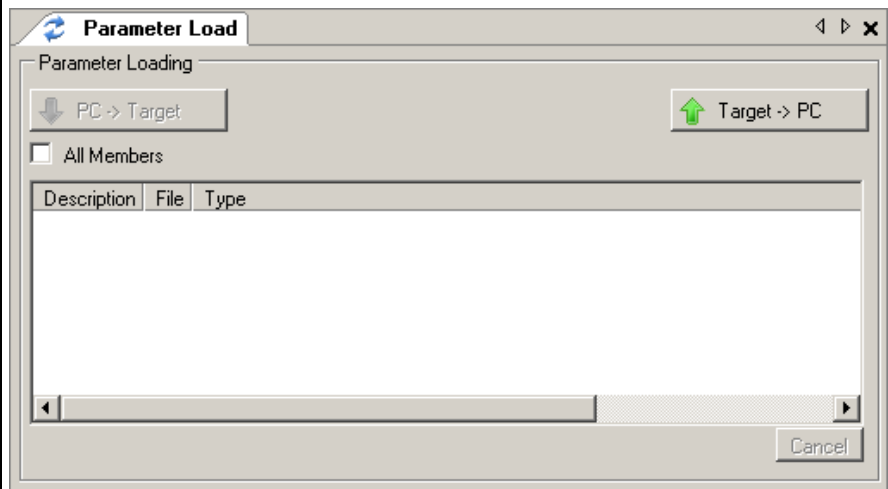
Procedure: Each of the 3 variants is uploaded once and then downloaded to each of the other 9 controllers.

### Uploading parameters

Proceed as follows to upload data from the controller:

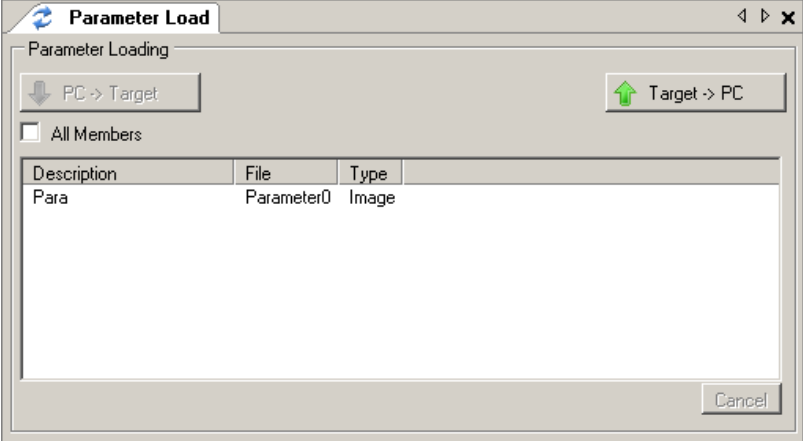
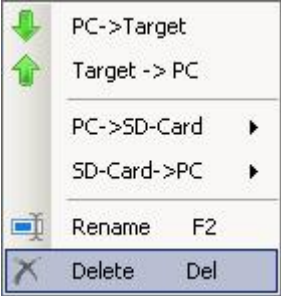
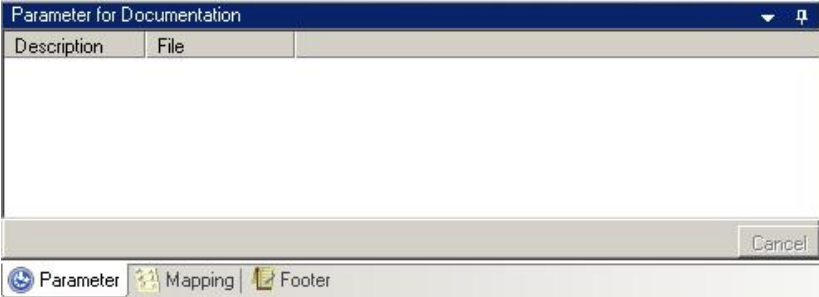

Step	Action
------	--------

- |   |   |
|---|---|
| 1 | Select <b>Parameter Up- and Download</b> .<br>→ The <b>Parameter Load</b> dialog box opens: |
|---|---|



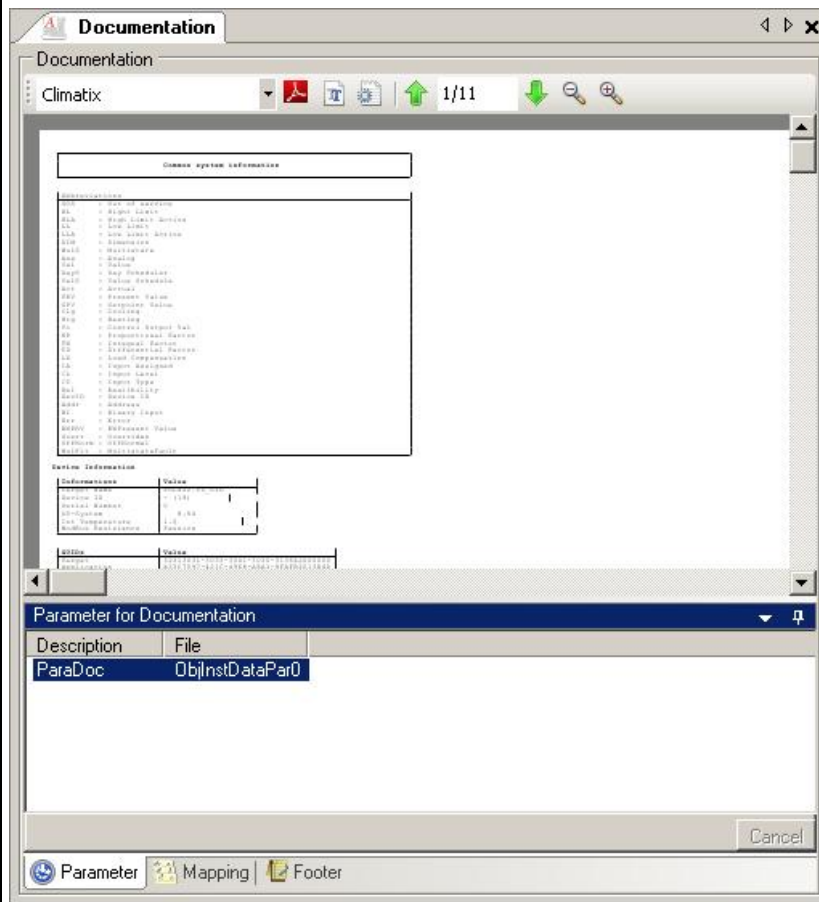
The list box contains the data created during previous uploads.

## Up-/downloading parameters via SCOPE *(cont'd)*

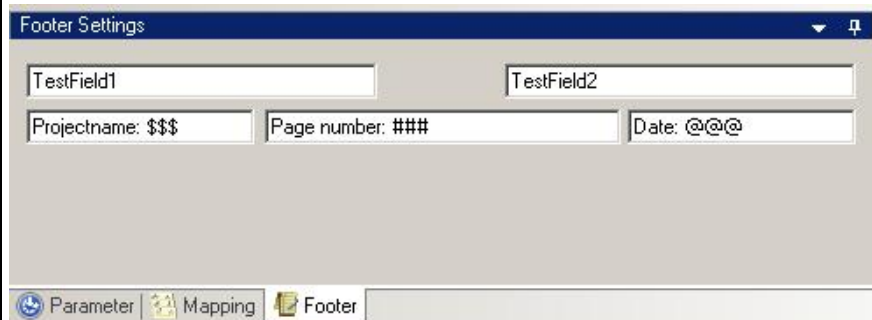
Step	Action
2	<p>Select <b>Target</b> → <b>PC</b>  Rename <b>Description</b> as required.  Result:</p> 
3	<p>Right click the parameter file. There are some commands to help you arrange the files.</p> 
4	<p>If you want to convert the parameter file to a PDF file, select <b>Documentation</b>. <b>Parameter for Documentation</b> will appear.</p> 
5	<p>Right click in the blank area, select <b>Target -&gt; PC</b>, a new file will be created.  Rename the <b>Description</b> as required.</p> 

## Up-/downloading parameters via SCOPE *(cont'd)*

- | Step | Action  |
|------|---|
| 6    | Select the file <b>ParaDoc</b> file. The parameter will be shown in a PDF file. |



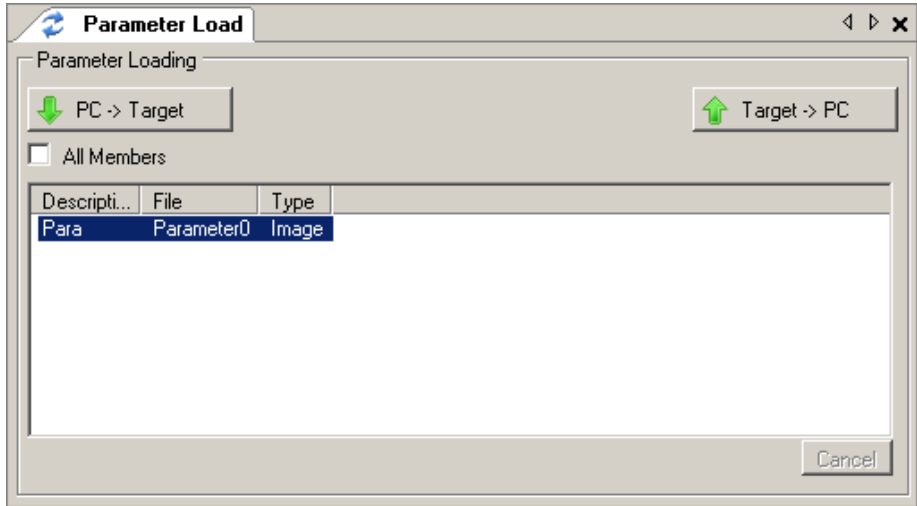
- |   |   |
|---|---|
| 7 | In the <b>Footer</b> tab, you can configure the format. |
|---|---|



## Up-/downloading parameters via SCOPE (cont'd)

### Downloading parameters

Proceed as follows to download data to the controller:

Step	Action
1	<p>Select <b>Parameter Up- and Download</b>.            → The <b>Parameter Up- and Download</b> dialog box opens:</p> 
	<p><b>Note:</b>  <b>All Members</b> is not selected by default. This means that only members without a conditional flag in the block are written (refer to SAPRO documentation). All dynamic members are written to the blocks if <b>All Members</b> is selected.</p>
2	<p>As needed:            Select <b>All Members</b>. All members are downloaded.</p>
3	<p>Click <b>PC → Target</b>:            → SCOPE loads the objects to the controller (see progress bar next to <b>Cancel</b>).</p>
4	<p>Click <b>OK</b> to exit.</p>

### Deleting parameter files

Proceed as follows to delete a parameter file:

Step	Action
1	<p>In the <b>Parameter Up- and Download</b> dialog box:            Right-click the file you want to delete and select <b>Delete</b>.</p>
2	<p>Click <b>Yes</b> to confirm the deletion:            → The file is deleted.</p>



# 10 Downloading the UCF file

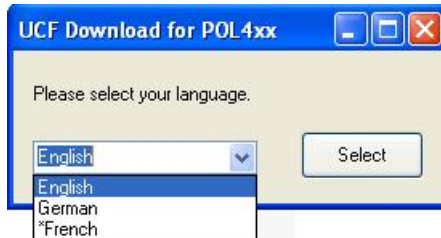
## 10.1 Downloading the UCF file via UCF tool

### Downloading the UCF file

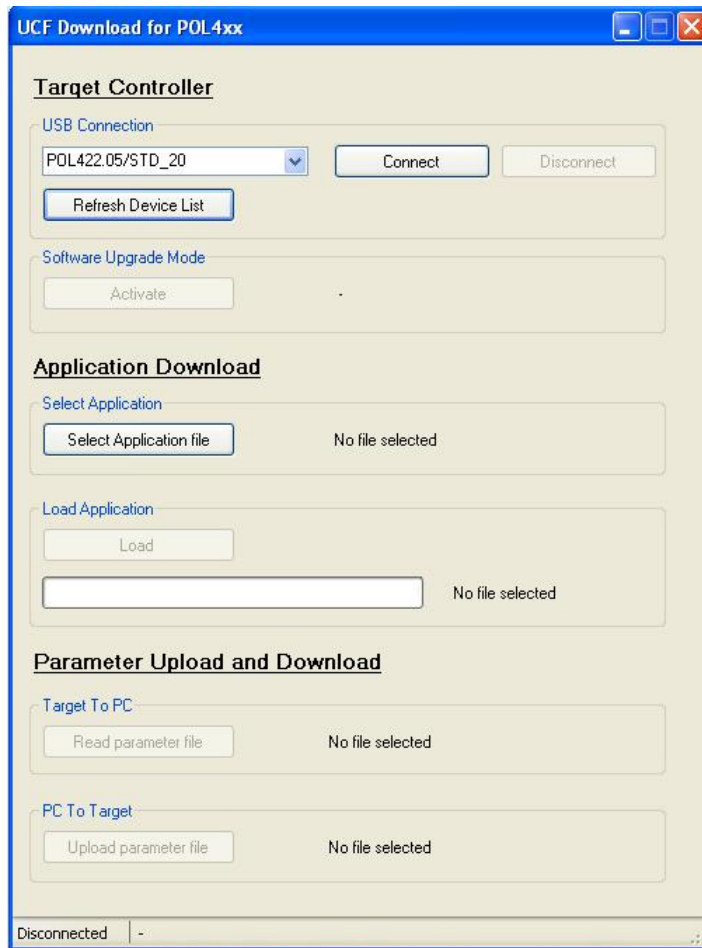
Proceed as follows to download the application UCF file to the controller:

Step	Action
------	--------

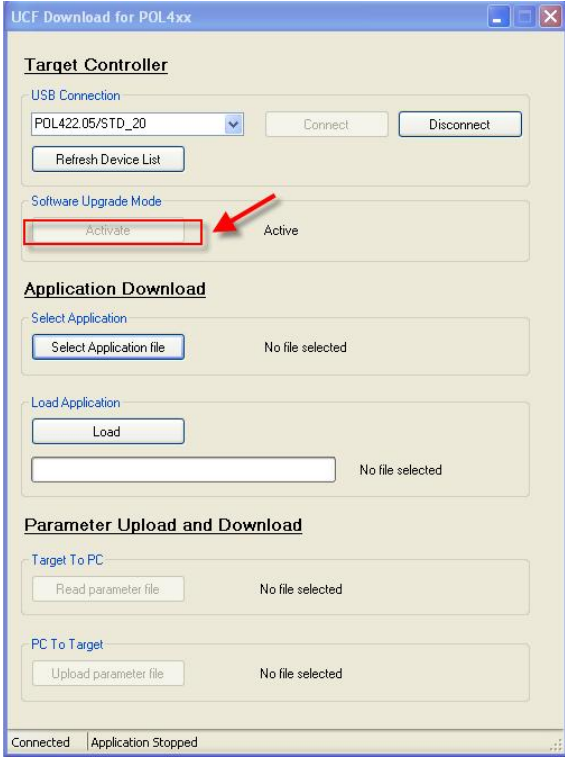
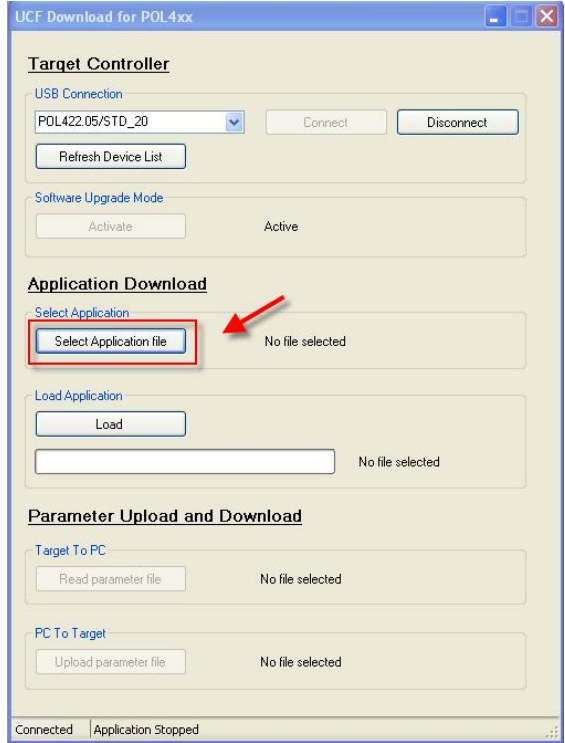
- 1 Open **UCF Tool** and select your **language**. There is a choice of 3 languages.



- 2 Refresh **Device List** and the **Target Controller** will appear. Click **Connect** to connect with the target controller.

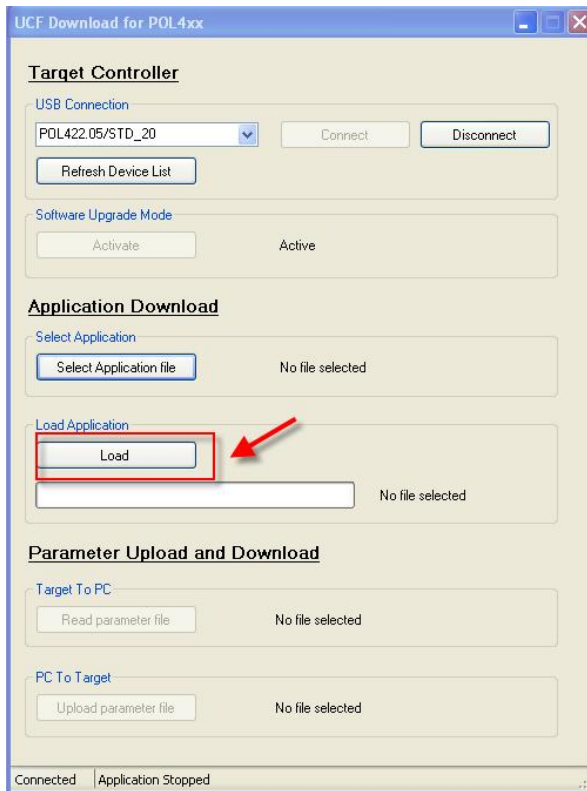


## Downloading the UCF file via UCF tool (cont'd)

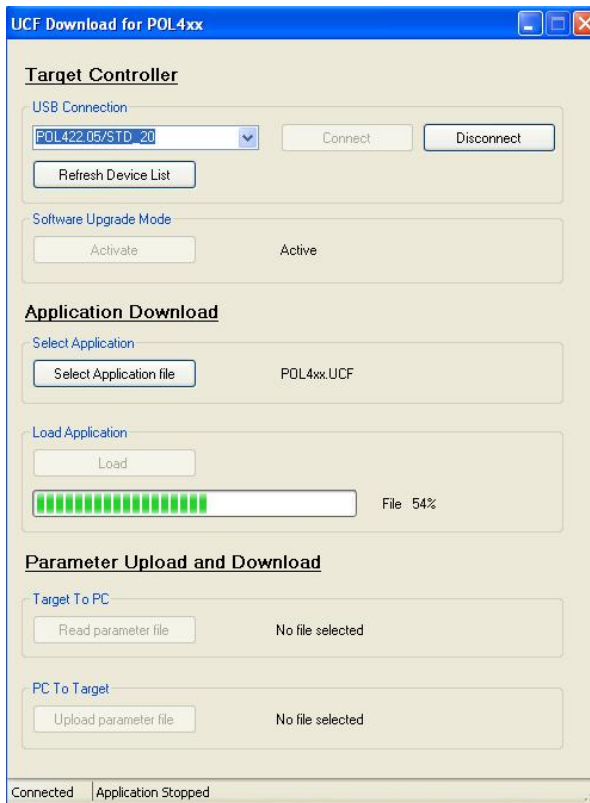
Step	Action
3	<p>After connection of the <b>Target Controller</b>. You need to activate the <b>Software Upgrade Mode</b>.</p>  <p>The screenshot shows the 'UCF Download for POL4xx' application window. Under the 'Target Controller' section, the 'Software Upgrade Mode' is currently 'Inactive'. The 'Activate' button is highlighted with a red rectangular box, and a red arrow points to it from the right. Below this, the 'Application Download' section has a 'Select Application file' button highlighted with a red box and a red arrow pointing to it from the right. The 'Parameter Upload and Download' section is also visible.</p>
4	<p>After activation of the <b>Software Upgrade Mode</b>: Click <b>Select Application File</b> to select the UCF file which needs to be downloaded to the target controller.</p>  <p>The screenshot shows the same 'UCF Download for POL4xx' application window. The 'Software Upgrade Mode' is now 'Active'. The 'Select Application file' button in the 'Application Download' section is highlighted with a red rectangular box, and a red arrow points to it from the right. The status bar at the bottom indicates 'Connected' and 'Application Stopped'.</p>

# Downloading the UCF file via UCF tool *(cont'd)*

Step	Action
5	Click <b>Load</b> for loading the UCF file.



UCF file is being loaded.



## Downloading the UCF file via UCF tool (cont'd)

Step	Action
6	When you see the <b>File is successfully loaded</b> , power off, then restart the target controller. The target controller will start to run the loaded application.



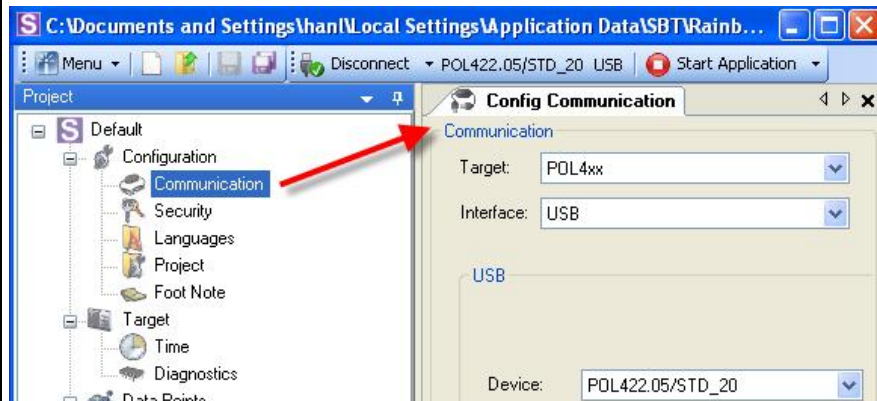
## 10.2 Downloading the UCF file via SCOPE (VVS9)

### Downloading the UCF file

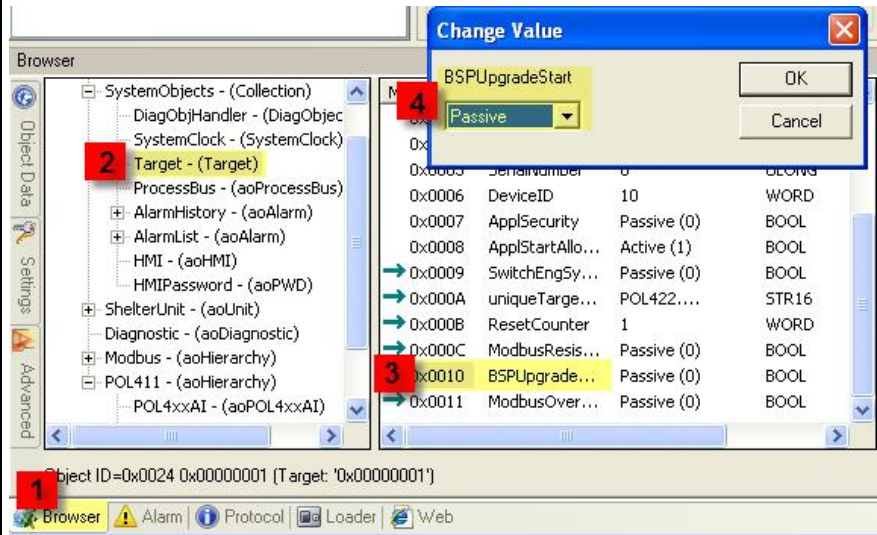
Proceed as follows to download the application UCF file to the controller:

Step	Action
------	--------

- 1 Click **Connect** to connect with the controller.

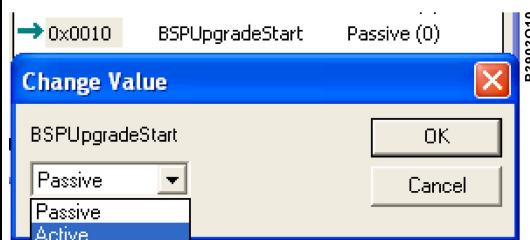


- 2 Click **Browser** to open the tree view of application from the target controller. The following tree view window appears:



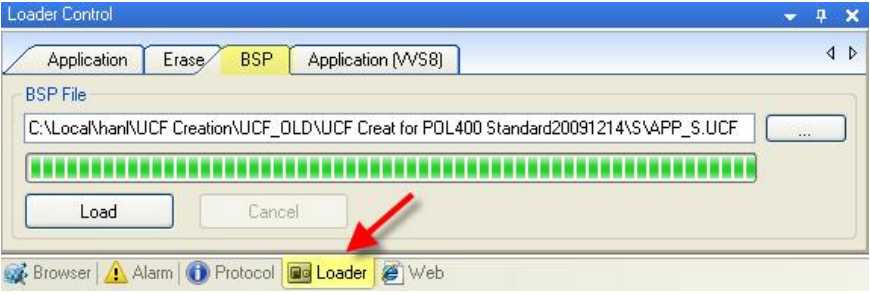
Click **Target** → **BSPUpgradeStart**.

**Target** is under **Device** → **SystemObjects** → **Target**



Select **Active** under **BSPUpgradeStart**, then click **OK**.

## Downloading the UCF file via SCOPE (VVS9) *(cont'd)*

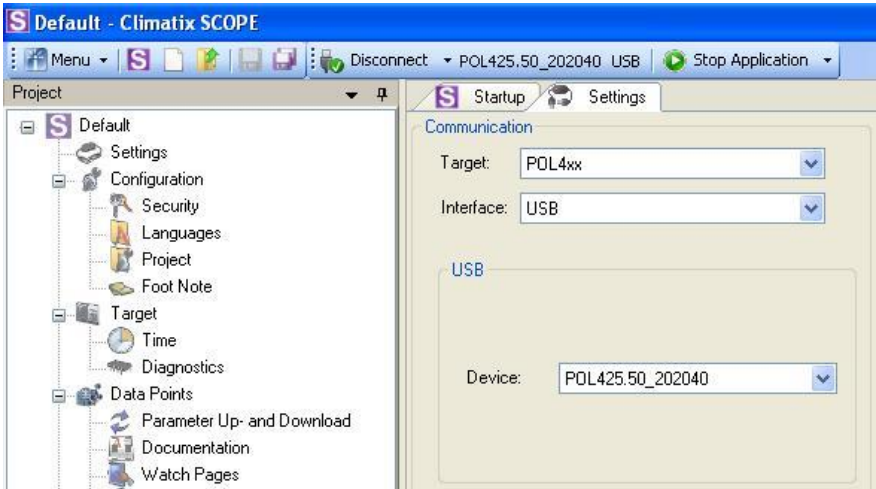
Step	Action
3	<p>Click <b>Loader</b> under <b>BSP</b> tab for UCF file loading.</p>  <p>Click <b>Folder</b> to select the folder where you save your UCF file. Click <b>Load</b> and wait until status bar changes to full green.</p>
4	<p>Power off the target controller and restart it. The application loaded will start running.</p>

## 10.3 Downloading the UCF file via SCOPE (VVS10)

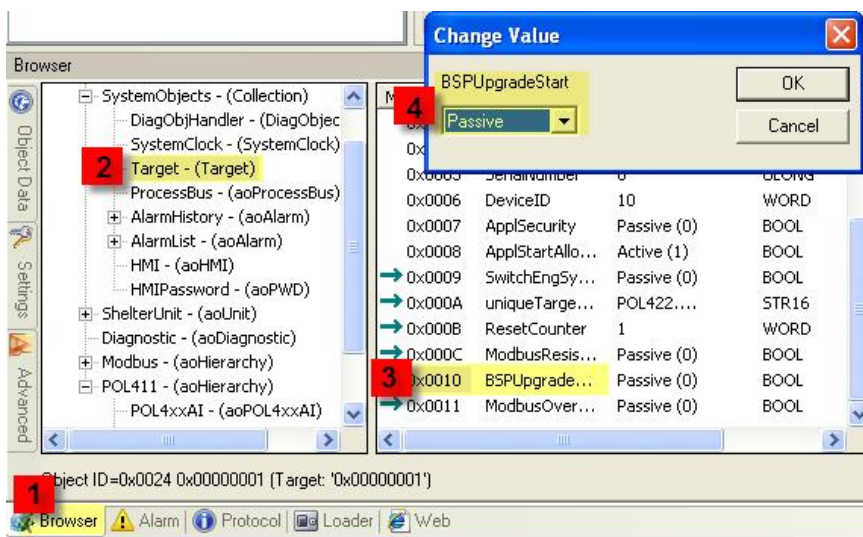
### Downloading the UCF file

Proceed as follows to download the application UCF file to the controller:

Step	Action
1	Click <b>Connect</b> to connect with the controller.

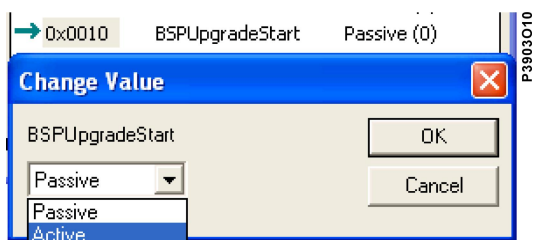


- 2 Click **Browser** to open the tree view of application from the target controller. The following tree view window appears:



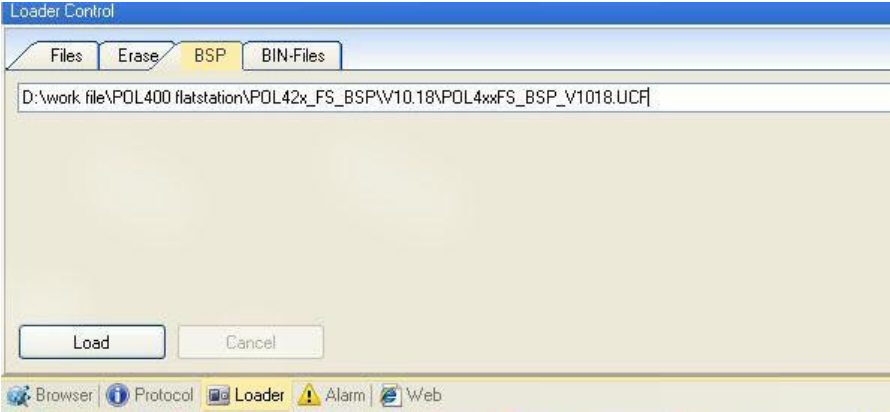
Click **Target** → **BSPUpgradeStart**.

**Target** is under **Device** → **SystemObjects** → **Target**



Select **Active** under **BSPUpgradeStart**, then click **OK**.

## Downloading the UCF file via SCOPE (VVS10) *(cont'd)*

Step	Action
3	<p>Click <b>Loader</b> under <b>BSP</b> tab for UCF File loading.</p>  <p>The screenshot shows a software window titled 'Loader Control'. It has four tabs: 'Files', 'Erase', 'BSP', and 'BIN-Files'. The 'BSP' tab is active. Below the tabs is a text input field containing the file path: 'D:\work file\POL400 flatstation\POL42x_FS_BSP\V10.18\POL4xxFS_BSP_V1018.UCF'. At the bottom of the window are two buttons: 'Load' and 'Cancel'. The 'Load' button is highlighted with a blue border. Below the window, a status bar shows icons for 'Browser', 'Protocol', 'Loader', 'Alarm', and 'Web'.</p>
	<p>Click <b>Folder</b> to select the folder where you save your UCF file. Click <b>Load</b> and wait until status bar changes to full green.</p>
4	Power off the target controller and restart it. The application loaded will start running.



# 11 Appendix


## 11.1 Input/output signals and labeling

### Overview




The following tables show ...

- the signal types supported by the Climatix range
- the corresponding labeling


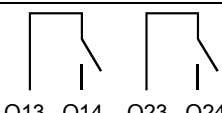
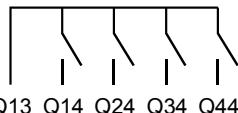
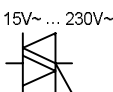
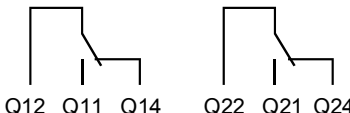
### Power supply

Input	Labeling
AC or DC Equipotent common	24 V $\approx$ G0 

### Input signals

Signal	Supported input	Labeling
2-wire resistive sensors	NTC sensor 10 k $\Omega$ or 100 k $\Omega$ Reference ground	B, B1...B(n) M 
Configurable signals	Programmable I/Os Reference ground	X, X1...X(n) M 
Contact reading "potential-free"	Digital input potential-free (SELV 24 V, 8 mA) Reference ground	D, D1...D(n) M 
Contact reading 24 V	Digital input AC 24 V or DC 24 V, galvanically isolated Reference ground from contact	DU, DU1...DU(n) DG
Contact reading 230 V	Digital Input AC 115 V or AC 230 V, galvanically isolated Different neutral from contact	DL, DL1...DL(n) DN

### Output signals

Signal	Supported output	Labeling
Voltage output DC 0...10 V	DC 0...10 V Reference ground	Y, Y1...Y(n) M 
Unipolar motor drive	Stepper motor	A $\bar{A}$ B $\bar{B}$ Com Com
Normally open, switched output	Single contact NO, external supply	 Q13 Q14 Q23 Q24
	Multi contact NO, external supply	 Q13 Q14 Q24 Q34 Q44
	Add-on for triac	 115V~...230V~
Changeover, switched output	Normally open or normally closed NO/NC	 Q12 Q11 Q14 Q22 Q21 Q24

## 11.2 Service cable

---

**Specific USB-RJ45  
cable needed**

To connect with a PC to POL4XX controllers via the USB port, a specific USB-RJ45 adapter cable is required to access the T-HI connector (local service interface for tool via USB).

**Product no./length**

The cable looks as follows.



The cable's product no. is POL0C2.40/STD and the length is 1.5 m.

## 11.3 Demo case

### Purpose

The Climatix demo case **POL0G6.87/STD** is designed for use with all Climatix platform controllers. It provides full functional testing and simulates input and output signals for the Climatix controllers and associated extension I/O modules. In other words, it can be used to test the complete range of Climatix controllers as well as the customer's application.

Compatible hardware:

- POL 4XX controllers
- POL 68X controllers
- POL 63X extension I/Os
- POL 92X, POL94X, POL95X, POL96X, POL98X



### Summary

The demo case consists of front panel and box:

- The front panel mainly displays the Climatix controller inputs and outputs
- The box operates controller or extension I/O modules

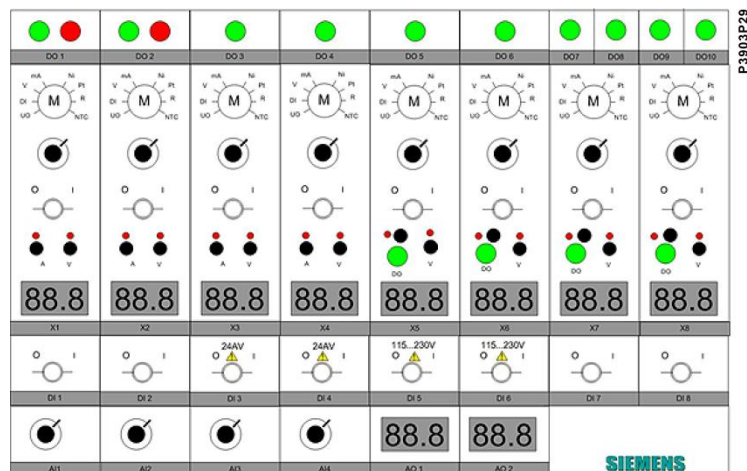
The power supply for the demo case is AC 230 V or AC 150 V depending on the country where the case is used (select the demo case accordingly). The box accommodates a transformer AC 230 V/AC 24 V or AC 110 V/AC 24 V.

The controller is installed in the box on a DIN rail.

Various devices can be connected to the I/O demo case channels by manual wiring, depending on specific or customized needs.

### Function and I/O list

All inputs can be operated from the front panel. The LEDs and displays represent Climatix device outputs.



For detailed information, refer to the Operating Manual *22\_CE1B3978en\_UseClimatixDemocase*.

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