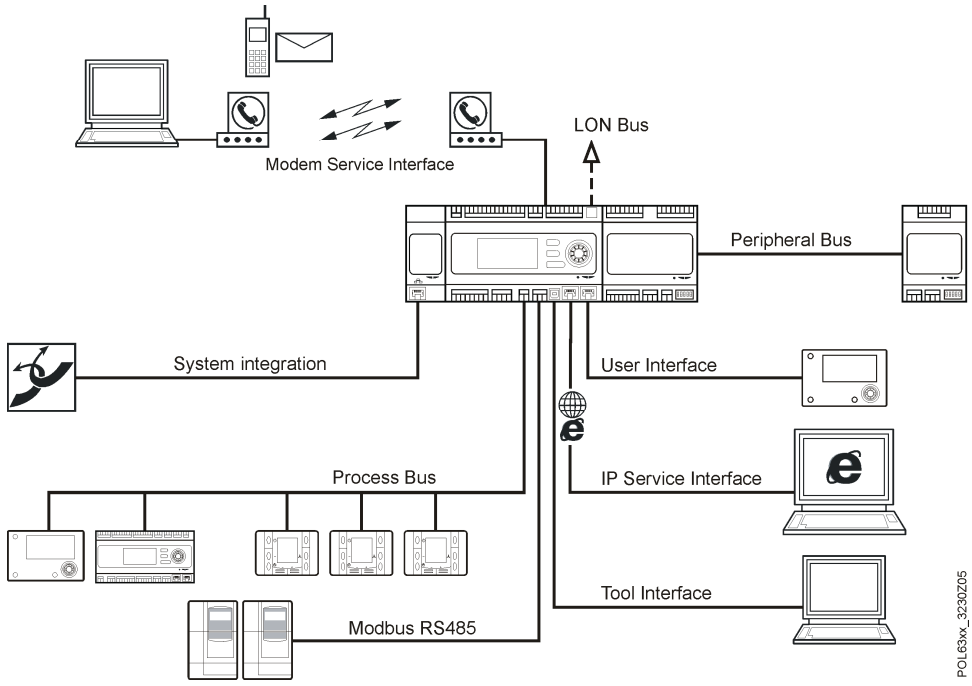
DESIGO™
POL 600 Series for BACnet Networks

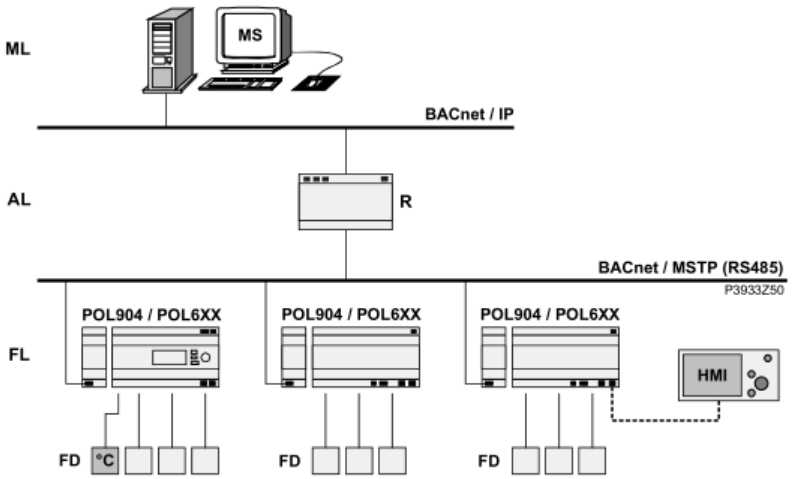
The controllers offer the following features:

- Freely programmable modular automation stations for HVAC and build ingservices plants.
- Support very high BACnet functionality, including time scheduling, alarming, trend and WATCHDOG functions.
- Integration into a building automation and control system via BACnet MS/TP, Connect to BACnet Router.
- Native BACnet automation station with communications BACnet via MS/TP, Support Peer to Peer.
- Supports BACnet MS/TP (B-AAC profile) with different Baud rates.
- Native BACnet automation station with communications BACnet via Lon Talk, PTP or Ethernet / IP.
- For stand-alone applications, or for use within a device or system network.
- BTL label (BACnet communications is BTL tested) .
- The integrated web server allows for generic or graphical web operation as well as sending alarms via SMS or email.
- The POL performs a sequence of power-up diagnostic checks and system initialization.
- Comprehensive alarm management, historical data trend collection, operator control and monitoring functions.
- Ethernet interface to connect PC engineering and service tools, touch panels and WEB based HMIs or PDA (HMI@web). .

Communication concept POL63X

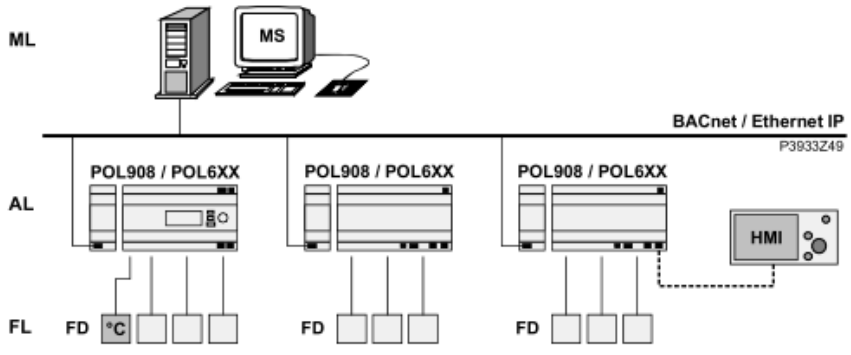


Communication BACnet MS/TP POL904



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

Communication BACnet/IP POL908



ML	Management level	FL	Field level
AL	Automation level	FD	Field devices

POL 600 range overview

POL 6XX products are designed for use in ventilation, air conditioning, refrigeration and district heating plants and provide a broad range of control and monitoring functions.
The product range is of modular design and primarily comprises controllers (versions with or without HMI) and different add-on I/O modules, including step motor and factory- or field-mounted communication modules. Different HMIs can be connected to the controllers, either directly (local HMI) or via the network (remote HMI). The controllers are freely programmable.

Controllers

The POL controllers are freely programmable with the help of a powerful SAPRO software tool, thus saving time and effort in air conditioning, ventilation and refrigeration application development and testing. A superior commissioning tool called SCOPE is also available free of charge.
A number of defined inputs / outputs (analog or digital) plus freely programmable I/O channels make it possible to create a host of applications with or without additional modules to meet specific requirements. In fact, on-board I/O functionality does not suffice, a peripheral bus allows for connecting further local and remote I/O extension modules.
The number and type of I/Os on the controller and extension modules are optimized for air conditioning, ventilation and refrigeration applications. On-board communication interfaces round off this scalable and intelligent control system. Additional communication modules can be added to the system in accordance with integration requirements.

Local service connector for user interface (RJ45) and PC tools (USB) .

HMI

The controllers can be operated with or without HMI – with the same functionality. The POL 6XX controllers offer an inbuilt HMI or an external local HMI (typically mounted on metal panels). In addition, a remote HMI is available, operating on the process bus, with power supply and communication over the same 2 wires (using KNX TP1 technology) to optimize installation costs.

I/O product range

The additional I/O extension product range for connection via the peripheral bus comprises different I/O extension modules**,** some of them also with programmable channel configuration. Specific modules for step motor control are also available via the peripheral bus.

Using extension I/O modules, it is easy to design units with certain main funtionalities provided by a controller plus extension I/Os, and then have extra functionalities by adding other extension I/O modules according to needs.

This flexibility in HW combinations also allows modularity of electrical panel design, supported by a suitable concept of mechanical properties, communication and power supply possibilities available on all extension I/O modules

Communication modules

Additional communication modules (BACnet/IP, BACnet/MSTP, OPC, LON, MBus, Modbus ,EIB, USS VSD interface RS-485 and advanced programmable Web modules) extend the connectivity options of POL controllers, aimed at matching integration interface requirements, or to povide specific servicing choices.

MS/TP (Master-Slave/Token-Passing) is also unique to BACnet and is implemented using the EIA-485 signaling standard. This is a shielded twisted-pair (STP) LAN operating at speeds from 9.6 kbit/s up to 76.8 kbit/s.

Web server module POL909

Today’s market requires simple Web visualization to control certain air handling units, district heating plants, refrigeration machines or other HVAC applications.

Generally, simple visualization without the need for additional software is requested.

The Climatix Advanced Web Module (AWM) provides powerful Web server functionality based on the Win CE5.0 platform.

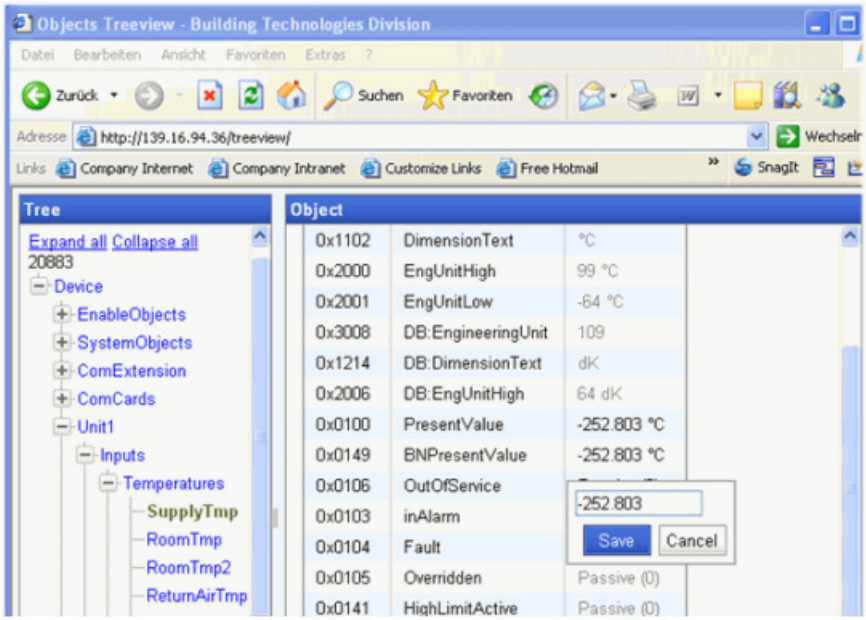
The module must be connected to the left side of the POL6XX controller.

You can create customized web pages or use the Siemens standard web solution.

Tree view

Tree view is available on every POL909 web server module to read and write the

complete data structure from the Climatix controller:



Functionality overview

Internet-based device powered by Intel® XSCALE processor:

- Embedded WindowsCE® platform with Web server application
- Generic tree view to read and write data points
- Platform to program Web applications
- Network parameters configurable via controller, HMI, SCOPE or Web
- Alarm server for SMS / mail
- Peer-to-peer communication
- RAS server
- FTP server
- Full modem RS-232 port : GSM / GPRS support , Dial in and dial out.

Programming language

These automation stations are freely programmable with the D-MAP programming language (follows closely CEN Standard 1131). All function blocks available in libraries are graphically linked with the plant operating programs.

Additional information

For detailed information refer to Documentation No. CB1P3904en, "Remote OPC Server".

Built-in Direct Digital Control Routines

These freely programmable automation stations provide the infrastructure for the provision and processing of system-specific and application-specific functions. In addition to the control functions, the automation station also incorporates convenient integrated management functions such as:

- Alarm management with alarm routing throughout the network. Management of simple, basic and extended alarms, with safe transfer tracking and automatic monitoring of alarm transmission
- Time schedules
- Trend Logging
- Remote management function
- Access protection throughout the network, with individually definable user profiles and categories

Built-in Energy Management Applications

The following applications are programmed in the POL6XX Modular and require simple parameter input for implementation:

- Automatic Daylight Saving Time switchover
- Calendar-based scheduling
- Duty cycling
- Logic Sequence Control
- Automatic Temperature Control
- Event scheduling
- Holiday scheduling
- P.I.D Control
- Peak Demand Limiting (PDL)
- Start-Stop Time Optimization (SSTO)
- Temperature-compensated duty cycling
- Global Information Access
- Power Demand Control

Built-in HMI

The following picture displays one of the Climatix controller types with built-in HMI (POL687.HMI):

P3903P09

Main features：

- 64x144 screen resolution
- Text / Aalarm icon graphics display plus editing capability
- White backlight
- One push and turn knob
- LCD for display of selected only temperature, humidity, pressure,operating modes, equipment start/stop, fan steps,time schedule etc.
- 3 standard buttons
- Different levels of password protection
- Clear process representation thanks to use of pixel-graphics displays
- Programmable menu and operational structure
- Adjustable commissioning and control internal parameters
- Multilanguage support
- UNICODE fonts

Function (continued)

All values visible in the POL6XX controller can be displayed in accordance with the defined operator profile. Typical displays:

- Display of current values
- Setpoint and parameter settings
- Maintenance and error messages
- Alarm lists and single alarm messages with acknowledgement option and/or reset (max 50 alarm messages)
- Time schedulers (7-day schedules and exception programs)
- Plant switching
- Login and password inputs

General device

- Freely programmable (SAPRO)
- Object-oriented programming by graphic editor (SAPRO)
- Expandability via peripheral bus for local or remonte I/O extension modules
- Power supply AC 24 V or DC 24 V
- 2 analog outputs (DC 0…10 V outputs).
- 5 digital inputs (potential-free contacts).
- 6 relay outputs (NO contacts).
- 8 universal I/Os (configurable inputs / outputs, for analog or digital signals)
- RS-485∗2 in Modbus RTU model for third-party bus.
- Full modem RS-232 port for remote service
- Process bus for connecting room units and remote HMI (DPSU)
- Up to 3 additional communication modules for BACS integration
- Hot-swappable electronic components allow powered electronics to be disconnected and even replaced with removing terminal wiring or disturbing
- Local service connector for user interface (RJ45) and PC tools (USB)
- SD card for application and operating system upgrade
- Ethernet port for remote or local servicing using standard browsers
- Operating temperature -20…60 °C (without LCD -40…70 °C)
- The plant operating program is downloaded using the tool POL Design from SAPRO – locally via the automation station's TCP/IP or USB interface or via the network.
- Comprehensive management and system functions (alarm management, time scheduling, trends, remote management, access protection etc.)

Limitations

- Observe these limitations for the Modbus RS485 master:
- Support 31 slaves
- Limits for object handler mapping:
- The following limitations apply to the Modbus RS485 slave: up to 80,000 I/O data points
- The defining limit is the number of trend log values per day
- Support Max.500 Trend log objects
- up to 150 physical data points
- Every active trend log object needs a BACnet reference Trends need 12 bytes per entry (irrespective of data type). Max. 128 Kbytes can be allocated to the log buffer (approx. 10,000 entries) for each trend log object. The log buffers are allocated to the D-MAP 128Mbyte SDRAM (see "Memory statistics" property of the device object). If the log buffer size is changed and there is insufficient D-MAP RAM available, the Reliability property of the trend log object is set to "Memory limit reached".

Monitoring the cycle time

In the event that the CPU does not complete the scan cycle in the specified minimum cycle time, the CPU completes the scan normally (including communition processing) and does not create any system reaction as a result of exceeding the minimum scan time.

The following table defines the ranges and defaults for the cycle time monitoring functions.

Cycle time	Range (ms)	Default
Maximum scan cycle time	1 - 6000	150 ms
Fixed minimum scan cycle time	1 - Maximum scan cycle time	Disabled

I/O points resolution	Analog Outputs	16 bit
	Analog Intputs	16 bit
	Digital Inputs (Pulse frequency)	30 Hz
	Universal Inputs (Pulse frequency)	20 Hz
	Digital Outputs (Relay Output)	230V / 3A
Power supply		
	AC/DC 24 V	
	Operating voltage	AC 24 V ±20%; DC 24 V ±10%
	Frequency	45…65 Hz
	Power consumption	Ca. 15 VA (short circuit protected)
Operating data		
	Processor	Intel StrongARM SA-1110 / LPC2460 (CPU 32 bit, 206 / 72 MHz)
	Storage	128 MB SDRAM 30 MB Flash Memory 512 KB EEPROM
Performance	Boolean execution speed	0.1 µs/instruction
	Move Word execution speed	12 µs/instruction
	Real Math execution speed	18 µs/instruction
P- bus	Process bus (CE+,CE-)	Based on KNX TP1 (refer to KNX Manual) or PPS2 for LCD room temperature
	Peripheral bus	Extension I/O modules
Built-in RS-485	POL 63*/POL 68*	2 * Modbus RTU Master/Slave
	Connector to device numbers	Max.250 Modbus-RTU devices
	Baud rates	600 bps to 119200 bps
	Distances lengths	1200 m
	Cable type	2-wire, stranded (one wire pair)
	Wire diameter	Min. 0.8 mm, max. 1.0 mm
	Line resistance	20 Ω/km to max. 75 Ω/km
	Capacity, bus line to bus line	Higher values require shorter cable
	Shield	required / recommended.
Modbus RS-485 (POL 902)	Interface type	2* RS485
	Connector to device numbers	Max.62 Modbus-RTU devices
	Baud rates	600 bps to 119200 bps
BACnet MS/TP (POL904)	Interface type	1*RS485 BACnet MS/TP
	Distances lengths	1200 m
	Baud rates	9600 bps to 76800 bps
	Cable type	2-wire, stranded (one wire pair), Shield, Higher values require shorter cable

Local service tool Interface	Local service tool	USB
Local HMI interface	HMI (RS-485)	RJ45 jack, 8 pins
 **SD card**	SD card	Slot 128 MB…2GB
LON interface CLA, CLB-	Plug-in terminals	2 wires, TP/FT-10A
	Interface type	1*RS485 LON bus
	Baud rates	78000 bps
IP service interface Built-in TCP/IP	10/100 Mbit (IEEE 802.3U)	RJ45 jack, 8 pins
BACnet IP (POL 908)	10/100 Mbit (IEEE 802.3U)	
	Cable connection	RJ45 jack, 8 pins
	BACnet/IP Interface	Supports B-AAC Profile
Real-time clock	Buffering with internal gold cap backup battery type BR2032	up to 5 years
		Max. 12 months (accumulated)
	Operation	IEC 721-3-3
	Temperature	-40...70 °C
	Restriction HMI	-20…60 °C
	Restriction with 1 com module	-40…65 °C
	Restriction with 2 com modules	-40…60 °C
	Humidity	<90% r.h. (non-condensing)
	Transport	IEC 721-3-2
	Temperature	-40...70 °C
	Humidity	<95% r.h. (non-condensing)
Protection		
	Degree of protection	IP20 to EN 60529
	Safety class	Suitable for use in safety class II plant
	Product safety	
	Automatic electrical controls	EN 60730-1
	Electromagnetic compatibility	Suitable for residential and industrial EMC environment
	Immunity	EN 60730-1 +A16
	Emissions	EN 60730-1 +A16
	CE conformity	
	EMC directive	2004/108/EEC
	Low-voltage directive	2006/95/EEC
C-tick conformity	EMC emission standard	AS/NSZ CISPR 22
	UL approvals	UL916, UL873
	Signal equipment certified for Canada	CSA C22.2M205

RoHs compliance	2002/95/EC (Europe) ACPEIP (China)
Agency Compliance	FCC Compliance BTL Certified

Status LEDs The status LEDs "BSP" and "BUS" are red, green and yellow.

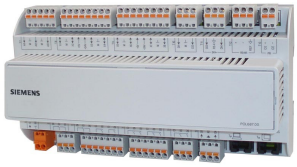
BSP LED State of the "Board Support Package" (BSP):

LED	Meaning
Green on	BSP running
Red flashing at 2 Hz	BSP error or slave address error

BUS LED Indicates the status of communication to the controller.

LED	Meaning
Green on	Communication ok
Red on	Communication error
Yellow	Communication running but parameter not successfully configured.

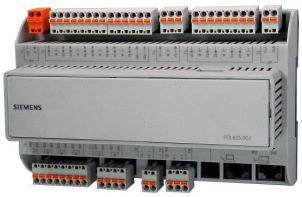
Controllers and HMIs



POL687.00/

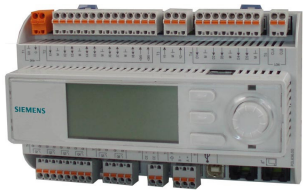
POL687.70/ with HMI

POL638.00/



POL635.00/

POL636.00/ with HMI



POL638.00/ with HMI

Extension modules

POL985.00/

POL965.00/

POL955.00

POL94U.00/

POL94E.00/

POL945.00/

POL925.00/

User interface

POL895.00/ external HMI

Touch panel HMIs

Room unit POL822.X

Communication modules

POL902.00/
Modbus RS485

POL904.00/
BACnet
MSTP

POL906.00/
LON

POL907.00/
Mbus

POL908.00/
BACnet IP

POL909.50/
Advanced
Web

SW tools

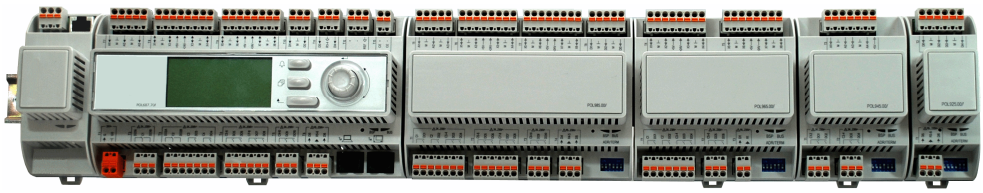
ACX93.00 SAPRO programming tool

SCOPE commisioning tool

Connecting the components

Communication module | Board-to-board connector | Controller with inbuilt HMI | Board-to-board connector | Extension module

Configuration example



Communication module | Controller with HMI | Extension modules

Ordering data for accessories

Peripheral bus

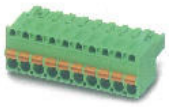
Board-to-board	Phoenix	ZEC1,0/4-LPV-3,5 GY35AUC2CI1
Board-to-wire	Phoenix	ZEC1,0/4-ST-3,5 GY35AUC1R1,4

COMM interface

Board-to-board	Phoenix	ZEC1,0/10-LPV-3,5 GY35AUC2CI1

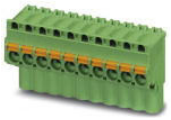
Accessories for controllers

Real time clock battery BR2032	POL 0B1.20/STD
SAPRO programming tool license	ACX93.000
Test and demo case	POL 0G6.87/STD
	POL 068.76/STD



Connector set (spring cage, cable top entry)

1 x Phoenix FKCT 2,5/2-ST OG
1 x Phoenix FKCT 2,5/2-ST GY7035
6 x Phoenix FKCT 2,5/3-ST KMGY
1 x Phoenix FKCT 2,5/5-ST GY7035
1 x Phoenix FKCT 2,5/6-ST GY7035
1 x Phoenix FKCT 2,5/7-ST GY7035
2 x Phoenix FKCT 2,5/8-ST GY7035



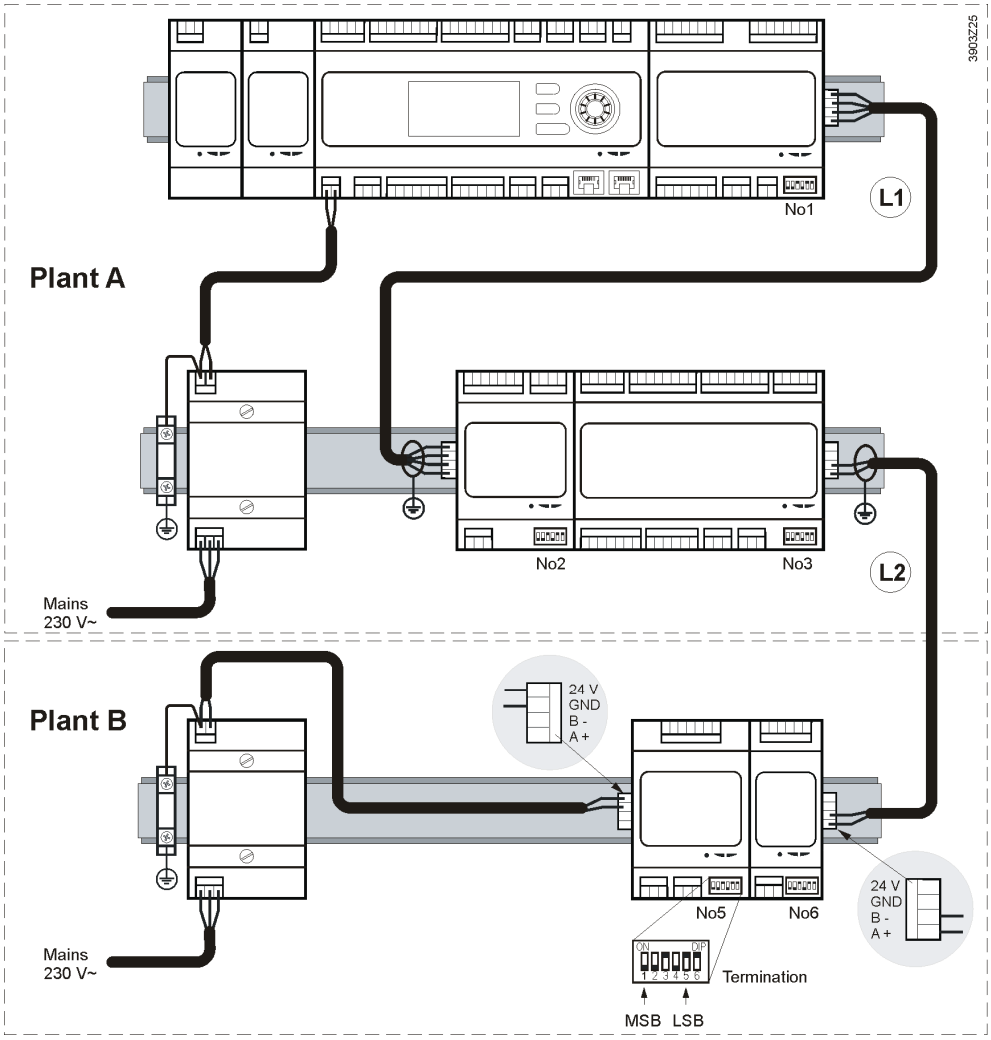
Connector set (spring cage, cable side entry) — Available on request

1 x Phoenix FKCVW 2,5/2-ST OG
1 x Phoenix FKCVW 2,5/2-ST GY7035
6 x Phoenix FKCVW 2,5/3-ST GY7035
1 x Phoenix FKCVW 2,5/5-ST GY7035
1 x Phoenix FKCVW 2,5/6-ST GY7035
1 x Phoenix FKCVW 2,5/7-ST GY7035
2 x Phoenix FKCVW 2,5/8-ST GY7035

Connector set (screws, cable side entry) — Available on request

1 x Phoenix MVSTBW 2,5/2-ST OG
1 x Phoenix MVSTBW 2,5/2-ST GY7035
6 x Phoenix MVSTBW 2,5/3-ST GY7035
1 x Phoenix MVSTBW 2,5/5-ST GY7035
1 x Phoenix MVSTBW 2,5/6-ST GY7035
1 x Phoenix MVSTBW 2,5/7-ST GY7035
2 x Phoenix MVSTBW 2,5/8-ST GY7035

Cabling and grounding rules



Specification for pheripheral bus cable and power supply:

- If the total length of the pheripheral bus cable exceeds 3 m, shielded cables must be used (L1 + L2 + Lx = >3 m)
- If the total length of the pheripheral bus cable is less than 3 m, shielded cables are not required (L1 + L2 + Lx = <3 m)
- Each shield must be grounded at one side only
- Maximum bus cable length is 30 m (L1 + L2 + Ln = <30 m)
- Used outside Power supply , The Maximum bus cable length is 900 m.
- To connect the bus cable to the modules, use the board-to-wire terminals
- GND of the power supply must be grounded (see illustration above)
- Connections from one plant to another can be effected via a 2-wire bus cable (A+ and B-). In this case, the modules must be powered by a separate supply (see illustration above). All plants must have the same GND. GND of the power supply must be grounded at one point only
- Refer to the pass-through-current rules for limiting the current across each device within the individual limits
- Slider for mounting on DIN rail

I/O mix / labeling

The inputs/outputs and labeling on housing:

Lbl.	63X	68X	Signal type
B..	–	3	Analog inputs NTC 10 k Ohm and NTC 100 k Ohm
D..	5	2	Digital inputs DC 24 V (binary) for potential-free contacts
DU..	–	2	Digital inputs, galvanically isolated, for AC/DC 24 V
DL..	–	2	Digital inputs, galvanically isolated, for AC 115/230 V
X..	8	8	Universal inputs/outputs, **configurable** via software as: *Analog inputs:* – Ni 1000 sensors – Pt 1000 sensors – NTC sensors 10 kΩ and 100 kΩ – Resistance transmitters 0…2500 Ω – DC 0…5 V (for ratiometric sensors) – DC 0…10 V signal – DC 0/4…20 mA signal *Digital inputs:* – 0/1 (binary) for potential-free contacts *Analog outputs:* – DC 0…10 V, output current 1 mA – DC 4…20 mA, **POL68X only!** *Digital outputs:* – DC 24 V, max. 25 mA, **4 outputs only!** **POL63X:** The first two X.. channels are universal **In**puts only!
Y..	2	–	Analog outputs DC 0…10 V, output current 2 mA
Q..	–	2	Relay outputs for AC 24 V… AC 230 V, NO/NC contact
Q..	6	6	Relay outputs for AC 24 V… AC 230 V, NO contact
DO..	–	2	Triac outputs AC 24 V … AC 230 V, 0.5 A
	21	**27**	**Total I/O amount**

Sensor power supplies

The sensor power supplies provided and labeling on housing:

Lbl.	63X	68X	Signal type
24V	2	2	DC 24 V power supply terminals
5V	–	2	DC 5 V ratiometric power supply terminals

User and service interfaces

The user and service interfaces provided and labeling on housing:

Lbl.	63X	68X	Signal type
T-HI	–	x	Tool interface / USB on RJ45 connector
T-SV	x	–	Tool interface / USB standard connector
T-IP	x *)	x	IP service interface

*) Ethernet version only!

Types / features

There are six types of extension I/O modules:

Picture	Type	Features
 P3903P03	POL985.00/STD	Module with 26 I/Os: • 8 relays • 2 Triacs • 3 NTC inputs • 8 universal I/O • 3 digital Inputs, voltage free • 2 digital Inputs for AC 115/230 V • 2 x DC 24 V sensor power supply • 2 x DC 5 V ratiometric power supply
 P3903P04	POL965.00/STD	Module with 15 I/Os: • 4 relays • 2 Triacs • 8 universal I/O • 1 digital Input for AC 115/230 V • 2 x DC 24 V sensor power supply • 2 x DC 5 V ratiometric power supply
 P3903P05	POL955.00/STD	Module with 14 I/Os: • 4 relays • 8 universal IO • 2 analog outputs DC 0-10 V
 P3903P06	POL945.00/STD	Module with 8 I/Os: • 4 DI for potential-free contacts **or** 4 AI (2 NTC / 2 Ratiometric) • 4 relays • 1 x DC 5 V ratiometric power supply
 P3903P07	POL94U / …94E	Module with electronically controlled valve driver (ECV): • 1 relay • 3 universal IO • 4-wires Output for Bipolar stepper motor, current controlled • 1 x DC 24 V sensor power supply • 1 x DC 5 V ratiometric power supply • UPS for automatic driving to safe position at power off • Variant …E without UPS
 P3903P08	POL925.00/STD	Module with 6 I/Os: • 4 digital inputs voltage free • 2 digital inputs 115-230V

Common characteristics

Extension I/O modules have the following common characteristics:

- Power supply AC 24 V or DC 24 V
- Peripheral bus