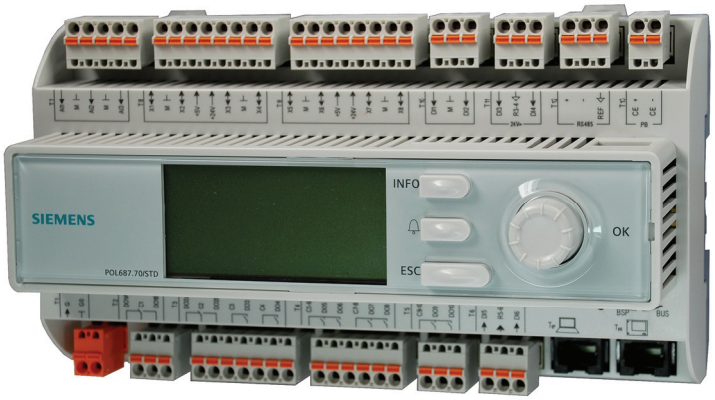


Climatix™

Climatix Controllers

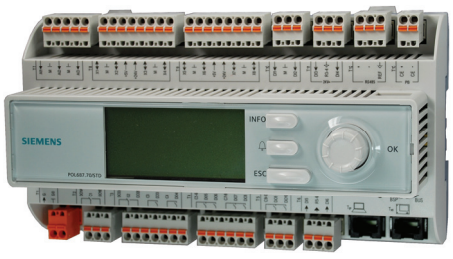
POL687.70/XXX
POL687.00/XXX

For control, switching and monitoring functions

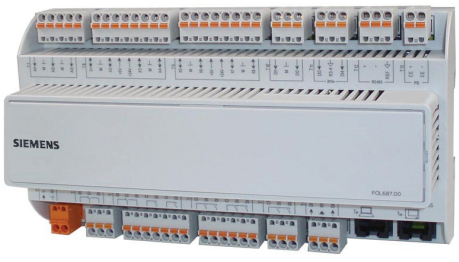
The Climatix POL68X controllers are designed for use in ventilation, air conditioning and refrigeration plants.

They are products of the Climatix range.

Controller types



POL687.70 with inbuilt HMI



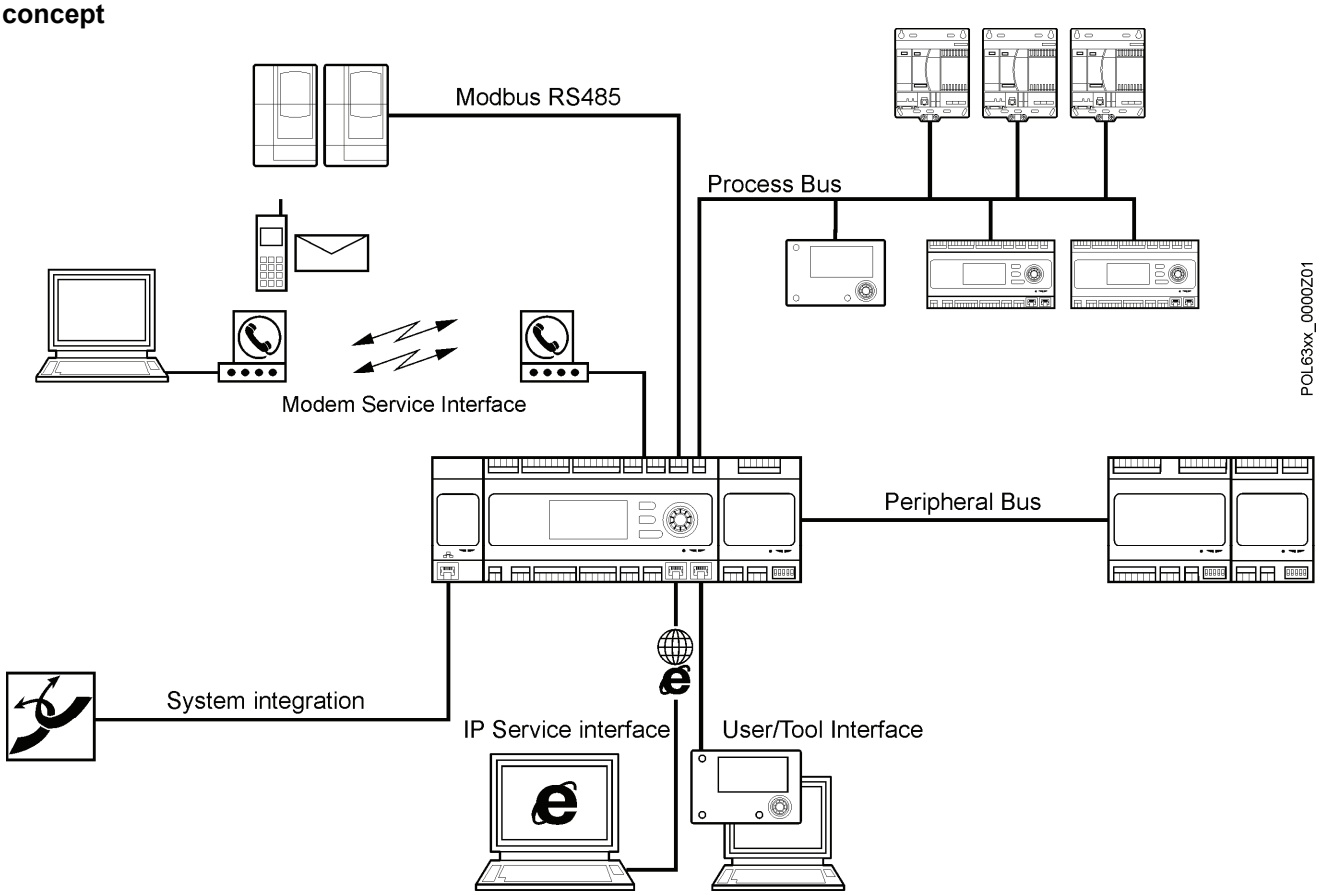
POL687.00 without inbuilt HMI

To create ventilation, air conditioning and refrigeration applications and to facilitate commissioning, powerful engineering and service tools are available (also refer to Data Sheet 3900 and Mounting Instructions M3910).

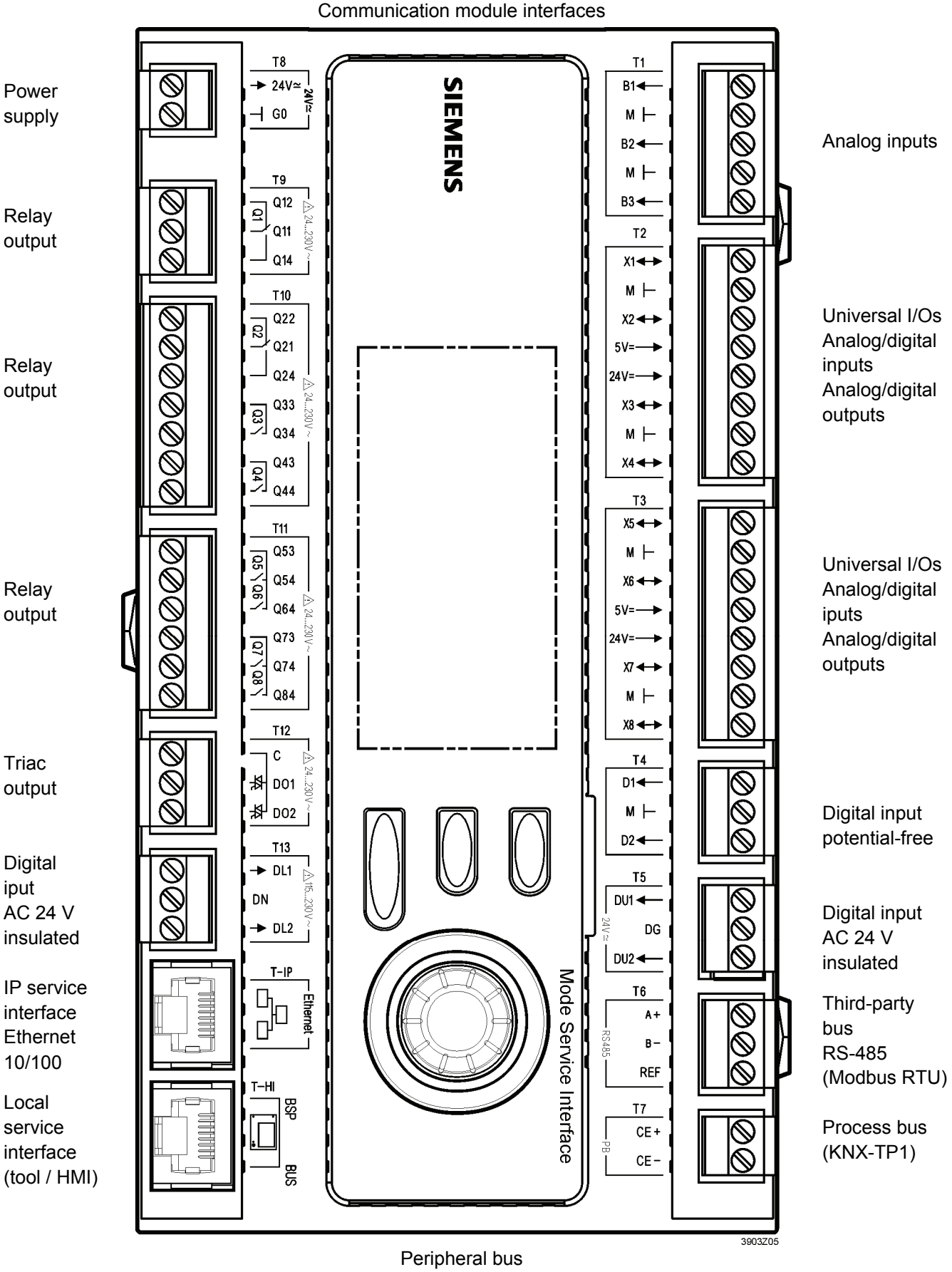
The Climatix™ 687 controllers offers the following features:

- **Freely programmable (SAPRO)**
- **Object-orientated programming by graphical editor SAPRO**
- **Expandability via peripheral bus for local / remote extension modules**
- **Power supply AC 24 V or DC 24 V**
- **8 universal I/Os**
- **3 analog inputs NTC 10k and NTC 100k**
- **DC 24 V and DC 5 V power supply for active sensors on board**
- **2 digital inputs for potential-free contacts**
- **2 digital inputs galvanically isolated AC 24 V**
- **2 digital inputs galvanically isolated AC 115/230 V**
- **8 relay outputs (6 NO contacts, 2 relays switching type)**
- **2 triac outputs (AC 24/115/230 V)**
- **RS-485 in Modbus RTU for third-party bus**
- **Process bus for network functionalities (based on KNX protocol)**
- **Integration interfaces with up to 3 additional communication modules**
- **Local service connector for user interface and PC tools (supporting USB)**
- **Ethernet port for local / remote servicing (by browsers) and tools over IP**
- **Full modem RS-232 port for remote service**
- **SD card interface for application and operating system upgrade**
- **Operating temperature -20…60 °C (without LCD -40…70 °C)**

Communication concept



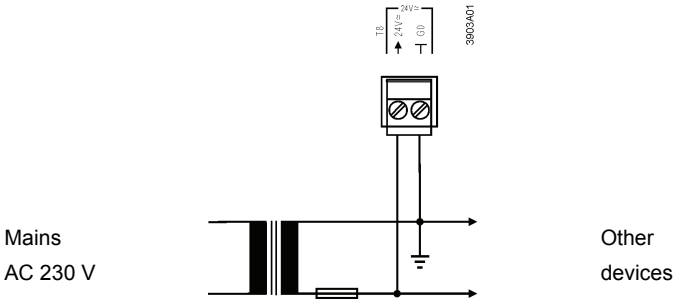
Connection terminals and connectors



Technical data

Power supply AC 24 V, G0 (T8)

Operating voltage	AC 24 V ±20%; DC 24 V ±10%
Frequency	45…65 Hz
Power consumption	Appox. 15 VA (without extension modules)
Max. AC current without extension modules	1.8 A @ AC 24 V
Max. DC current without extension modules	1.0 A @ DC 24 V
Max. current for extension modules	2,2 A @ AC 24 V / 3.0 A @ DC 24 V
Max. external supply line fusing	10 A slow wire fuse or circuit breaker



Safety transformer

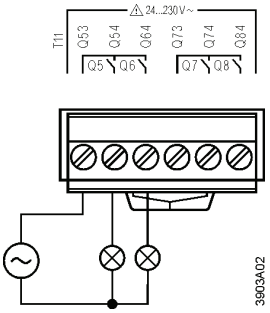
Relay outputs Q1…Q8 (T9, T10, T11)

Relay: Type, contact	Monostable, NO/NC contact Monostable, NO contact
Contact rating	
Switching voltage	AC 24 V…230 V (-20%, +10%)
Rated current (res. / ind.)	Max. AC 3 A / 2 A (cosφ 0.6)
Switching current at AC 19 V	Min. AC 30 mA
Max. external supply line fusing	6.3 A slow wire fuse or circuit breaker

Warning

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

Use external protection for inductive load



Connecting signal lamps to relay outputs

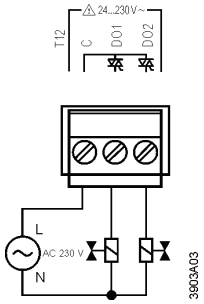
Triac outputs DO1,DO2 (T11)

Triac output values	
Switching voltage	AC 24…230 V (-20%, +10%)
Switching capacity	Max. 500 mA / min. 30 mA
Max. external supply line fusing	2.0 A slow wire fuse or circuit breaker

Warning

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

Use external protection for inductive load

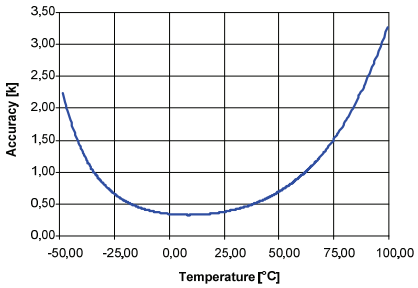


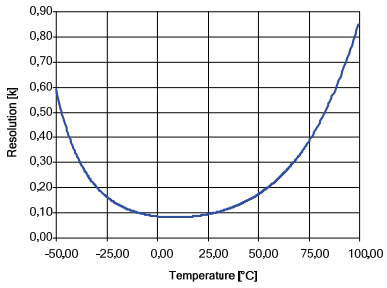
Connecting solenoid valves to triac output

Analog inputs
B1…B3 (T1)

NTC 10k

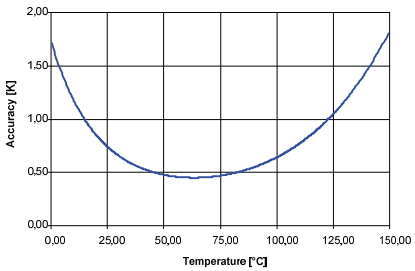
Sensor current	60 µA @ 25 °C	
Temperature	Accuracy	Resolution
-50 °C	2.5 K	0.6 K
-40 °C	1.4 K	0.4 K
-30 °C	0.9 K	0.2 K
-10 °C	0.5 K	0.1 K
50 °C	0.7 K	0.2 K
70 °C	1.3 K	0.4 K
90 °C	2.5 K	0.7 K
100 °C	3.4 K	0.9 K

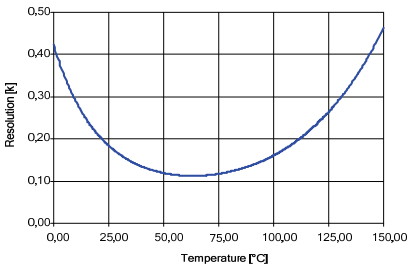


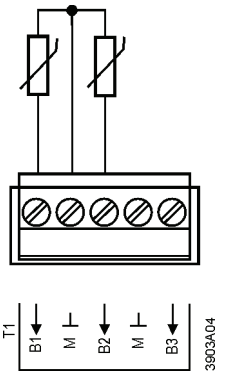


NTC 100k

Sensor current	15 µA @ 25 °C	
Temperature	Accuracy	Resolution
0 °C	1.8 K	0.5 K
10 °C	1.2 K	0.3 K
30 °C	0.7 K	0.2 K
70 °C	0.5 K	0.2 K
110 °C	0.8 K	0.2 K
120 °C	1.0 K	0.3 K
140 °C	1.5 K	0.4 K
150 °C	1.9 K	0.5K







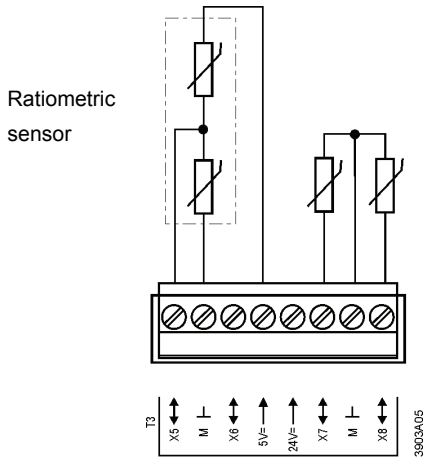
Connecting thermostats
to analog inputs

Universal I/Os
X1…X8 (T2, T3)

Configurable	Via software
Reference potential	Terminals ⊥
Contact voltage	Max. DC 24 V (SELV)
Overvoltage protection	Up to 40 V

Analog inputs (X1…X8)

Ni1000		
Sensor current	1.4 mA	
Resolution	0.1 K	
Accuracy within the range -50…150 °C	0.5 K	
Pt1000		
Sensor current	1.8 mA	
Resolution	0.1 K	
Accuracy within the range -40…120 °C	0.5 K	
NTC 10k		
Sensor current	140 µA	
Temperature range	Accuracy	Resolution
-50…-26 °C	1 K	0.2 K
-25…74 °C	0.5 K	0.1 K
75…99 °C	1 K	0.3 K
100…124 °C	3 K	1 K
125…150 °C	6 K	2.5 K
NTC 100k		
Sensor current	140 µA	
Temperature range	Accuracy	Resolution
-25…-11 °C	3 K	0.2 K
-10…9 °C	1 K	0.1 K
10…99 °C	0.5 K	0.1 K
100…150 °C	1 K	0.2 K
0...2.5 kΩ		
Sensor current	1.8 mA	
Resolution	1 Ω	
Accuracy	4 Ω	
DC 0…5 V input for ratiometric sensors		
Resolution	1 mV	
Accuracy at 0 V	10 mV	
Accuracy at 5 V	25 mV	
Input resistance	100 kΩ	

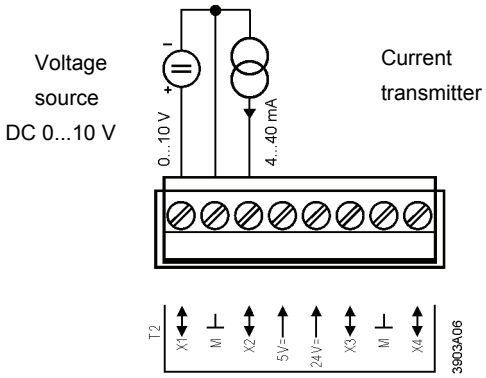


Connecting a ratiometric sensor to universal I/O

Connecting NTC to universal I/O

Analog inputs (X1…X8)

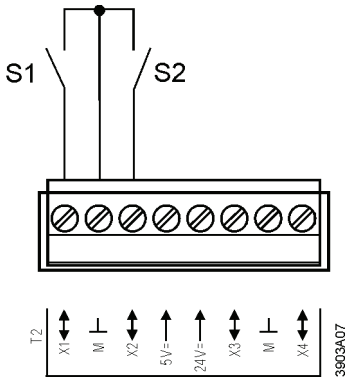
DC 0...10 V input	
Resolution	1 mV
Accuracy at 0 V	10 mV
Accuracy at 5 V	25 mV
Accuracy at 10 V	50 mV
Input resistance	100 kΩ
DC 0/4…20 mA input	
Resolution	1 µA
Accuracy at 4 mA	40 uA
Accuracy at 12 mA	70 uA
Accuracy at 20 mA	120 uA



Voltage input DC 0...10 V and current input 4...20 mA

Digital inputs (X1…X8)

0/1 digital signal (binary)	For potential-free contacts
Sampling voltage / current	DC 24 V / 8 mA
Contact resistance	Max. 200 Ω (closed) Min. 50 kΩ (open)
Delay	10 ms
Pulse frequency	Max. 30 Hz



Connecting floating contacts to universal I/Os

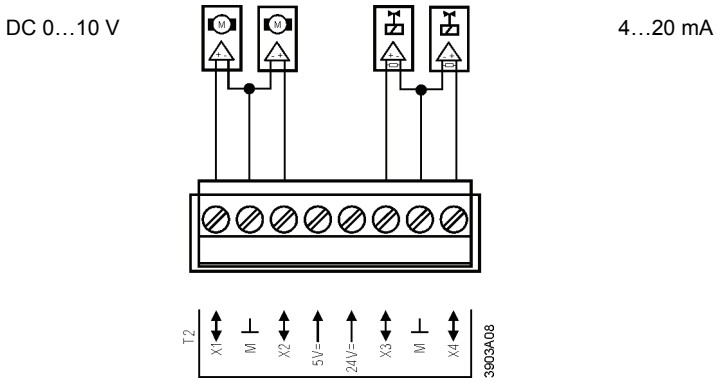
Analog outputs (X1…X4)

DC 0…10 V output

Resolution	11 mV
Accuracy at 0 V	66 mV
Accuracy at 5 V	95 mV
Accuracy at 10 V	124 mV
Output current	1 mA (short-circuit-proof)

DC 4…20 mA output

Resolution	22 µA
Accuracy at 4 mA	150 µA
Accuracy at 12 mA	196 µA
Accuracy at 20 mA	243 µA



Connecting voltage output and current output to universal I/Os

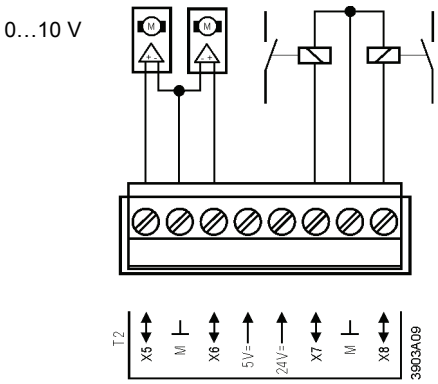
Analog / digital outputs (X5…X8)

DC 0…10 V output

Resolution	11 mV
Accuracy at 0 V	66 mV
Accuracy at 5 V	95 mV
Accuracy at 10 V	124 mV
Output current	1 mA (short-circuit-proof)

DC output for off board loads

Switching voltage	DC 24 V
Switching capacity	Max. 25 mA

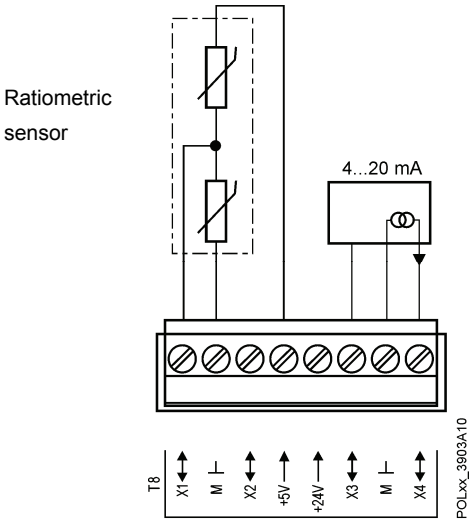


Connecting voltage output and off board relays to universal I/Os

Powering sensors active / ratiometric
5 V, 24 V

2 x 2 outputs

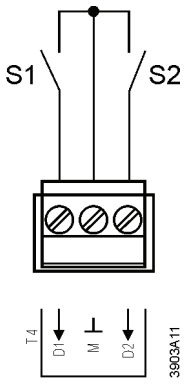
Voltage / current	DC 5 V ±2.5% / 2 x 20 mA
Voltage / current	DC 24 V +10 %, -25% / 2 x 40 mA
Reference potential	Terminals ⊥
Connection	Short-circuit-proof



Connecting a ratiometric sensor
5 V sensor supply voltage

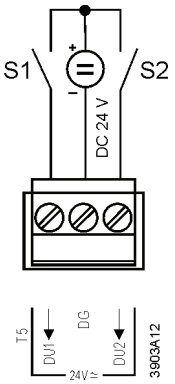
Digital inputs potential-free
D1, D2 (T4)

0/1 digital signal (binary)	For potential-free contacts
Sampling voltage / current	DC 24 V / 8 mA
Contact resistance	Max. 200 Ω (closed) Min. 50 kΩ (open)
Delay	10 ms
Pulse frequency	Max. 30 Hz



Connecting floating contact
to digital input

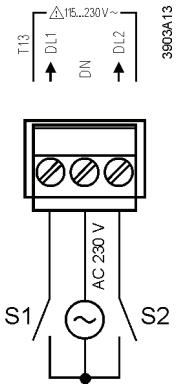
Digital input AC 24 V DU1,DU2 (T5)	0/1 digital signal (binary)	Galvanically isolated contact
	Rated voltage	AC / DC 24 V
	Input current	8 mA
	Delay	20 ms
	Pulse frequency	Max. 5 Hz



Connecting a DC 24 V signal to digital input

Digital input AC 230 V DL1,DL2 (T13)	0/1 digital signal (binary)	Galvanically isolated contact
	Rated voltage	AC 115 V…230 V (-15%, +10%)
	Frequency range	45…65 Hz
	Input current	3 mA @ AC 230 V
	Delay	100 ms
	Pulse frequency	Max. 5 Hz

Connecting a AC 230 V signal to a galvanically isolated digital input

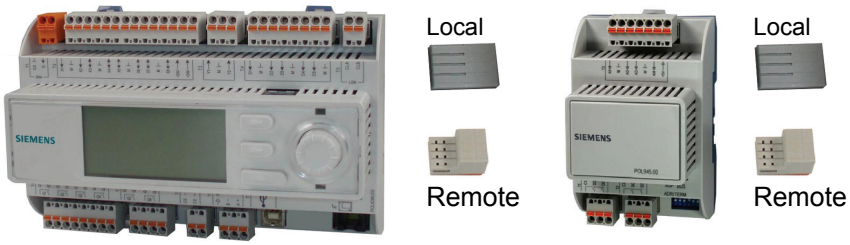


Interfaces

Peripheral bus

Connection via plug at bottom right of the controller.
Based on RS-485 interface for the I/O module connection.

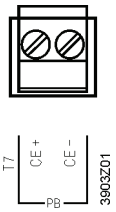
Power supply in the controller	Ueff = AC 24 V ± 20%, fmain = 45...65 Hz or U = DC 24 V ± 10%, no internal fuse
Bus termination selectable	(680 Ω / 120 Ω +1 nF / 680 Ω)
Board-to-board (not included)	ZEC1,0/4-LPV-3,5 GY35AUC2CI1
Board-to-wire (not included)	ZEC1,0/4-ST-3,5 GY35AUC1R1,4
Solid wire	0.2…1.0 mm²
Stranded wire (twisted and with ferrule)	0.2…1.0 mm²
Bus cable	Shielded if length >3m , twisted pair
Max. number of extension modules	31 (1…31) 0 not usable
Cable lengths	Total max. 30 m



Process bus CE+, CE- (T7)

Based on KNX TP1

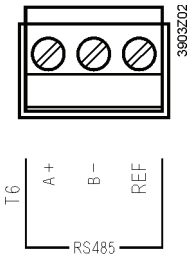
Bus connection	CE+, CE-, not interchangeable
Bus electronics	Galvanically isolated
Bus load	Max. 5 mA
Bus cable	Must be shielded; also refer to KNX Manual "System Specifications"
Bus cable length between 2 KNX nodes	Max. 700 m
Total length of bus KNX cable	Max. 1,000 m
Bus power supply via	Internal DPSU with 50 mA rated current External standard KNX power pack



Third-party bus (RS-485 Modbus RTU) A+, B-, REF (T6)

RS-485 (EIA 485) — Modbus RTU mode

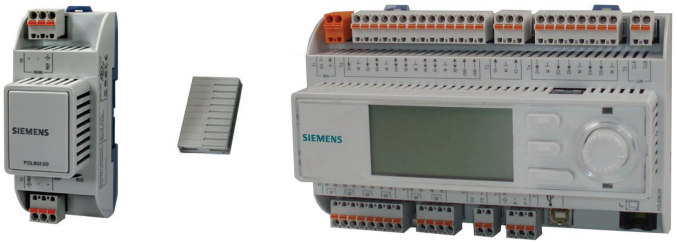
Bus connection	A+, B-, REF
Bus electronics	Galvanically isolated
Bus cable	Shielded if length > 3m , twisted pair
Bus termination (via software)	680 Ω / 120 Ω +1 nF / 680 Ω



COMM interface

Connection via plug at bottom left of the controller.
Based on SPI interface for the communication module connection.

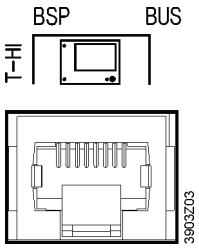
Low-voltage power supply for COM module	
Voltage / current	DC 5 V ±10% / max. 1A Short-circuit-proof
Board-to-board (not included)	ZEC1,0/10-LPV-3,5 GY35AUC2CI1



Tools / HMI local service interface (T_{HI})

Tool (on USB) and HMI (on RS485)

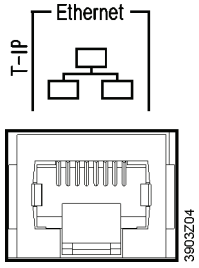
Cable connection	RJ45 jack, 8 pins, length of cable <3 m Use USB cable POL0C2 for tools HMI cable included in POL895.51



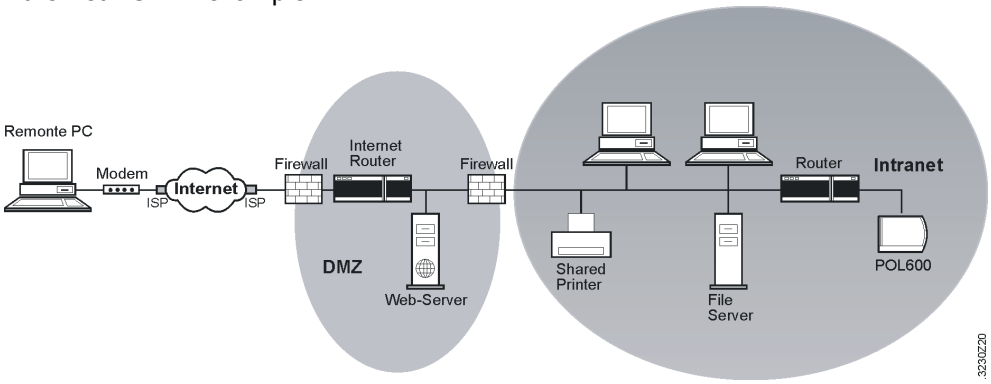
IP service interface Ethernet (T_{IP})

10/100 Mbit (IEEE 802.3U)

Cable connection	RJ45 jack, 8 pins



Ethernet TCP/IP example



Modem service interface

Connection via plug at top right of the controller

Tool and modem (full modem interface)

Cable connection	RJ45 jack, 8 pins, at top right Cable length <3 m
Supported modem types	Siemens TC65 GSM modem terminal Devolo Microlink 56k I

SD card

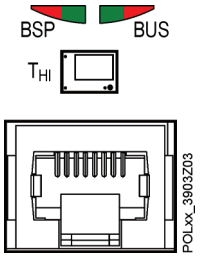
Connection via plug at top right of the controller

SD card	Slot 128 MB…2 GB
Slot	Laterally

Warning

Switching on/off during the read-and-write access can lead to loss of data.

LEDs for diagnostics



LED for BSP Run / Stop 3 colors (green, red and yellow)

Mode	LED status
SW update mode (download active on a new BSP, application)	Every second alternating between red and yellow
Application running	Green on
Application loaded but not running	Yellow on
Application not loaded	Yellow flashing (50 ms on, 1000 ms off)
BSP error (software error)	Red blinking at 2 Hz
Hardware error	Red on

LED for BUS 3 colors (green, red and yellow)

This LED only indicates the status of the integrated modem communication. It does not indicate the status of the internal communication (like I/O extension, TCOM extension). This status is visible on the extension modules.
The modem LED can be enabled over the 'EnableModem' member in the modem object. The default is disable. Modem functionality itself is not influenced.

Mode	LED status
No modem connected, or LED disabled	Off
Modem connected and initialized no communication active	Yellow on
Modem connected and communication active	Green on
Modem connected but errors active (like provider missing, no initialization possible)	Red on
BSP error (software errror)	Red blinking at 2 Hz
Hardware error	Red on

Connection terminals	Possible plugs for I/O signals and communication (plugs not included)	Phoenix FKCVW 2,5 / x-ST Phoenix FKCT 2,5 / x-ST Phoenix MVSTBW 2,5 / x-ST
	Possible plugs for power supply (plugs not included)	Phoenix FKCVW 2,5 / 2-ST OG Phoenix FKCT 2,5 / 2-ST OG Phoenix MVSTBW 2,5 / 2-ST OG
	Solid wire	0.5…2.5 mm²
	Stranded wire (twisted and with ferrule)	0.5…1.5 mm²
	Cable lengths	In compliance with the load, local regulations and installation documents
Cable types	Process bus	Twisted pair cable; 0.5…1.5 mm^2 (as per KNX specification)
	RS-485 interface	2-wire twisted pair, shielded
	Peripheral bus	4-wire / 2-wire twisted pair, shielded
Real-time clock	Buffering with internal gold cap	Min. 3 days
	Buffering with accessory battery	Min. 200 days
Inbuilt HMI (POL687.70/MCQ only)	LCD with white backlight	144 x 64 dots
	Navigation	Roll-and-push knob 3 function buttons
Environmental conditions	Operation	IEC 60721-3-3 class 3K5
	Temperature	-40...70 °C
	Restriction LCD	-20…60 °C
	Restriction process bus	-25…70 °C
	Humidity	<90% r.h. (non-condensing)
	Atmospheric pressure	Min. 700 hPa, corresponding to max. 3,000 m above sea level
	Transport	IEC 60721-3-2 class 2K3/2K4
	Temperature	-40...70 °C
	Humidity	<95% r.h. (non-condensing)
	Atmospheric pressure	Min. 260 hPa, corresponding to max. 10,000 m above sea level
	Mechanical conditions	IEC 60721-3-2 class 2M2
Reliability	MTBF	24 years
Protection	Degree of protection	IP20 (EN 60529)
	Safety class	Suitable for use in installations of safety class II
Insulation resistance	Reinforced insulation between relay outputs and between relay outputs and system electronic	AC 3750 V to EN 60730-1
Standards	Product safety and EMC	
	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	
In accordance with Australian EMC framework	Radio Communications Act 1992 AS/NZS CISPR11
Radio Emission Standard	AS/NZS CISPR 22
UL approvals	UL916, UL873
Signal equipment certified for Canada	CSA C22.2M205
RoHs compliance	2002/95/EC (Europe) ACPEIP (China)
N474 C-Tick conformity to EMC emission standard	AS/NSZ CISPR 22

General data

Dimensions	
Controller without HMI	207 x 110 x 75 mm
Controller with HMI	207 x 110 x 79 mm
Weight excl. packaging	
Controller without HMI	375 g
Controller with HMI	450 g
Base	Plastic, pigeon-blue RAL 5014
Housing	Plastic, light-grey RAL 7035

Ordering data

PolyCool 600 controller	POL687.00/STD
PolyCool 600 controller with inbuilt HMI	POL687.70/STD

Accessory parts

Real-time clock battery BR2032	POL 0B1.20/STD
PC service cable 0.8 m	POL 0C2.20/STD
PC service cable 1.5 m	POL 0C2.40/STD
SAPRO programming tool license	ACX93.000
Test and demo case	POL 0G6.87/STD
Connector set (spring cage, cable top entry)	POL 068.76/STD
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	

Warning

Engineering notes

To ensure protection against accidental contact with relay connections carrying voltages above 42 V_{eff}, the controller must be installed in an enclosure (preferably a control panel). It must be impossible to open the enclosure without the aid of a key or tool.

AC 230 V cables must be double-insulated against safety extra low-voltage (SELV) cables.

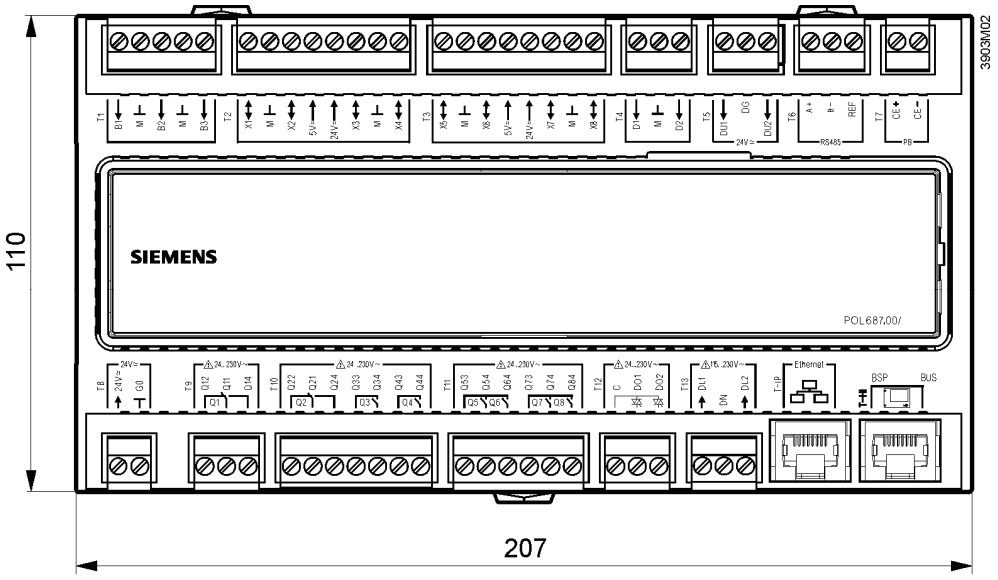
Disposal notes

The controller contains electrical and electronic components and must not be disposed of together with household waste.

Local and currently valid legislation must be observed!

Layout of controller

POL 687.00/XXX



Dimension in mm

POL 687.70/XXX