SIEMENS

3998

Climatix™

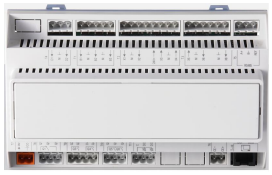
Climatix controller

POL423.50/XXX
POL425.50/XXX
POL426.50/XXX

For controlling, switching and monitoring functions

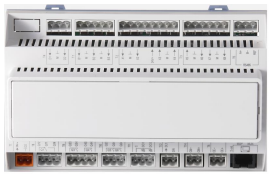
The Climatix controllers are HVAC controllers optimized for district heating substation (POL425.50/XXX and POL426.50/XXX), heat pump (POL423.50/XXX) and wood boiler (POL425.50/XXX) applications.

Controller types



POL425.50/XXX

POL423.50/XXX



POL426.50/XXX

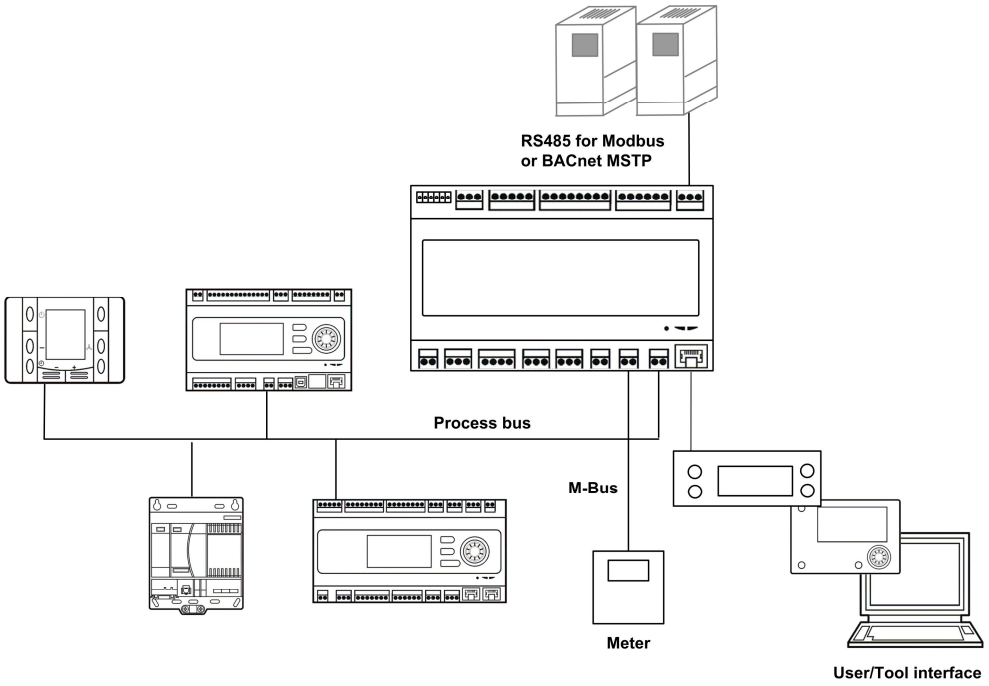
Main features

The Climatix POL42X.50/XXX controllers provide the following features:

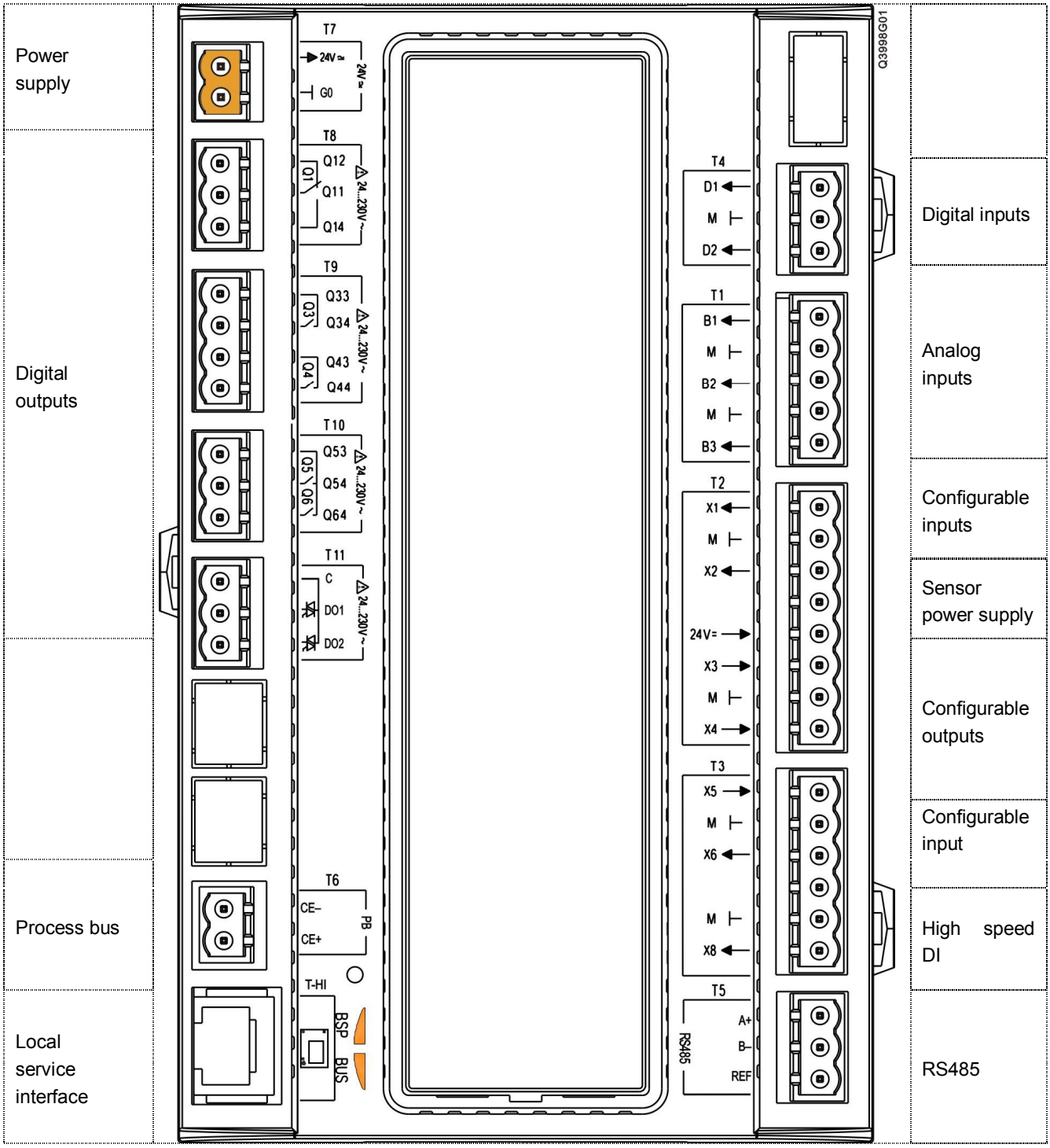
- **Power supply AC 24 V or DC 24 V**
- **DC 5 V on-board power supply for ratiometric sensor for POL423.50/XXX**
- **DC 24 V on-board power supply for active sensors**
- **3 analog inputs for NTC10k or NTC1k temperature sensor**
- **3 configurable inputs for digital inputs or DC 0…10 V signals or temperature sensors for POL425.50/XXX**
- **4 configurable inputs for digital inputs or DC 0…10 V signals or temperature sensors for POL423.50/XXX and POL426.50/XXX**
- **3 configurable outputs for DC 0…10 V analog output or PWM outputs**
- **2 digital inputs for potential-free contacts**
- **1 digital input for potential-free contact with fast pulses for flow sensor/ switch**
- **1 digital input galvanically isolated (AC 115…230 V) for POL423.50/XXX and POL426.50/XXX**
- **5 relay outputs (4 NO contacts, 1 changeover switching type)**
- **2 triac outputs (AC 24/115/230 V)**
- **1 stepper motor drive for electronic expansion valve for POL423.50/XXX**
- **On-board Modbus RTU or BACnet MSTP over RS485 for third-party bus communication**
- **Process bus for network functionalities**
- **SD card interface for application and operating system upgrade**
- **Local service connector for user interface or PC tools**
- **Operating temperature range is -40…70 °C**
- **M-Bus Master interface for up to 3 M-Bus slaves for POL 426.50/XXX**
- **Powerful service tools are available to facilitate commissioning**

Note: **All devices are programmable controllers.**

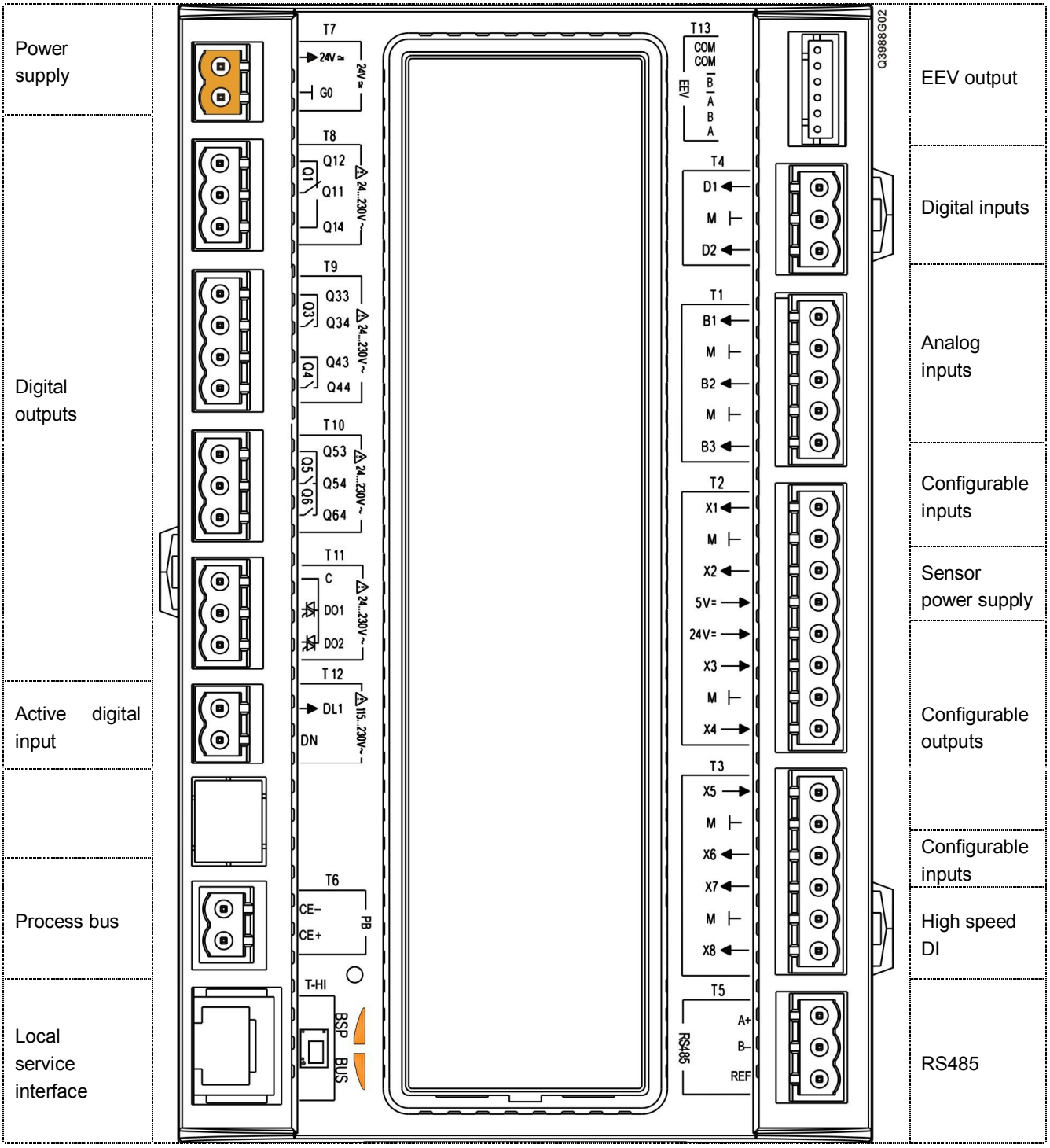
Communication concept



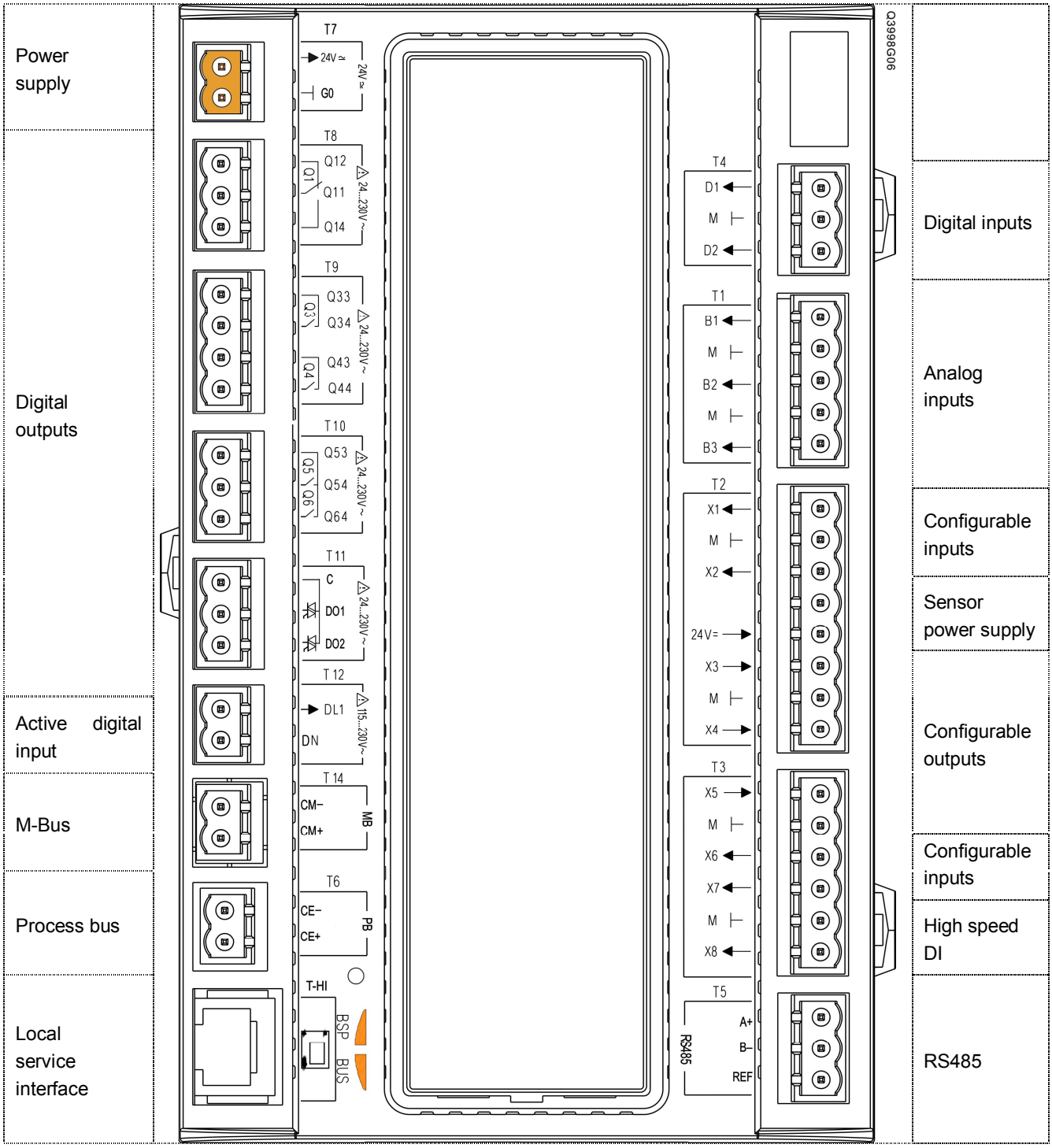
Overview (POL425.50/XXX)



Overview (POL423.50/XXX)



Overview (POL426.50/XXX)



Disposal

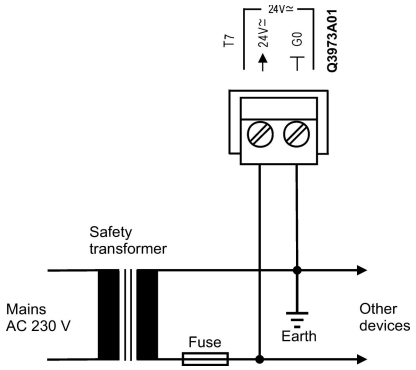
The device is considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Note: Accuracy and resolution stated in this datasheet are valid over the full operating temperature range (-40...70°C) unless stated differently.

Power supply
AC 24 V, G0 (T7)

Operating voltage	AC 24 V ±20% / DC 24 V ±10%
Frequency	45…65 Hz at AC 24 V
Max. AC current	1.6 A at AC 24 V (POL423.50) 1.1 A at AC 24 V (POL425.50, POL426.50)
Max. DC current	1.5 A at DC 24 V (POL423.50) 1 A at DC 24V (POL425.50, POL426.50)
Max. external supply line fusing	3 A slow wire fuse or circuit breaker



Relay output
Q1 (T8)

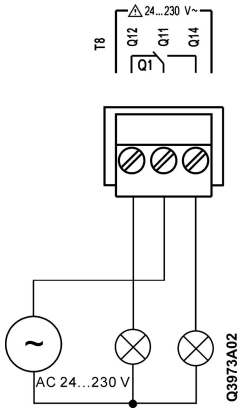
Relay

Contact	Monostable, NO/NC contact, SPDT
Switching voltage	AC 24…230 V (-20%, +10%) DC 18…30 V
Rated current (res./ind.)	AC 3 A (res.)/2 A (ind. cosφ 0.6) DC 3 A (res.)
Min. switching current at AC 19 V	30 mA
Endurance	100,000 cycles at AC 230 V, 3.0 A (res.)
Max. external supply line fusing	6.3 A slow wire fuse or circuit breaker

Warning

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

Use external protection for inductive load.



Relay outputs
Q3, Q4 (T9)
Q5, Q6 (T10)

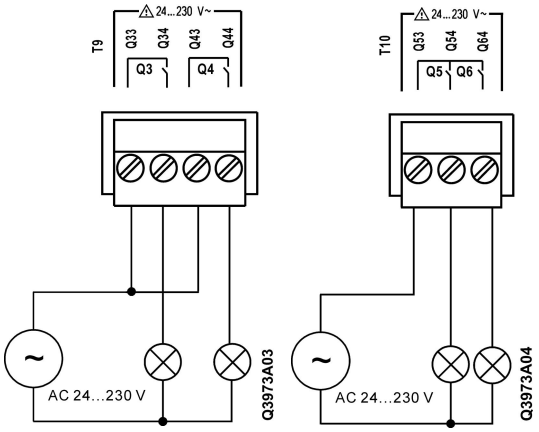
Relay

Contact	Monostable, NO contact, SPST
Switching voltage	AC 24…230 V (-20%, +10%) DC 18…30 V
Rated current (res./ind.)	AC 3 A (res.)/2 A (ind. cosφ 0.6) DC 3 A (res.)
Min. switching current at AC 19 V	30 mA
Endurance	100,000 cycles at AC 230 V, 3.0 A (res.)
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.



Triac outputs
DO1, DO2 (T11)

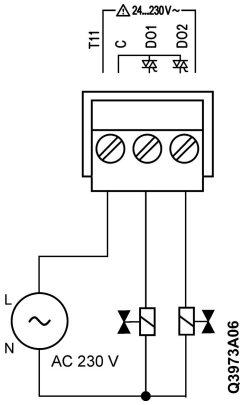
Triac

Switching voltage	AC 24…230 V (-20%, +10%)
Switching capacity	Max. 500 mA Min. 10 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.

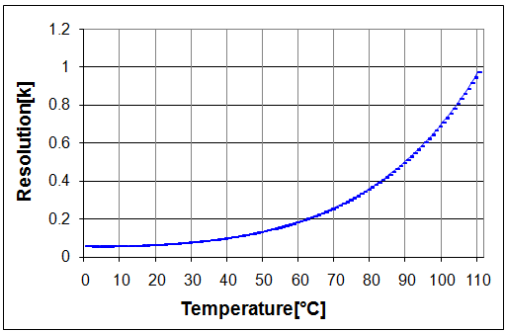


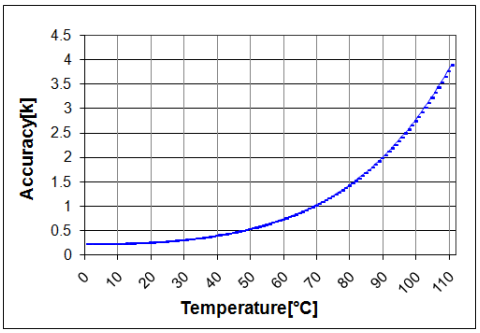
Analog inputs
B1…B3 (T1)

NTC 10k ($B_{25/85}$=3977 K)

Sensor current	530 µA at 25 °C (pulse sampling)
Temperature range	0…110 °C
Accuracy and resolution of input	See diagram below

Temperature	Accuracy	Resolution
0 °C	0.3 K	0.1 K
50 °C	0.6 K	0.2 K
70 °C	1.1 K	0.3 K
90 °C	2.1 K	0.6 K
100 °C	2.9 K	0.8 K
110 °C	3.9 K	1.0 K

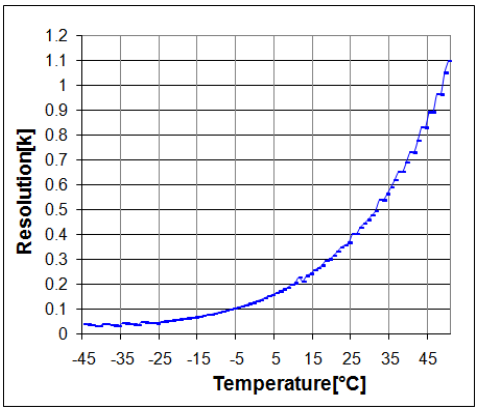


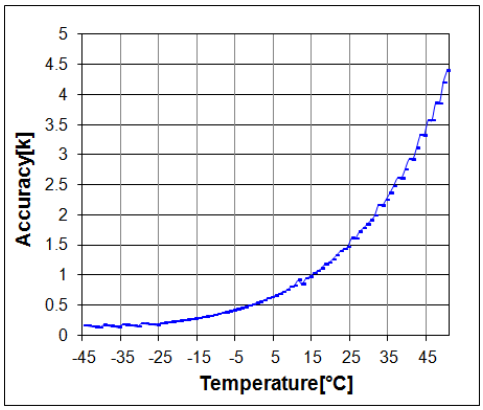


NTC 1k ($B_{25/85}$=3528 K)

Sensor current	680 µA at 25 °C (pulse sampling)
Temperature range	-45…+50 °C
Accuracy and resolution of input	See diagram below

Temperature	Accuracy	Resolution
-45 °C	0.2 K	0.05 K
-30 °C	0.2 K	0.05 K
-20 °C	0.3 K	0.1 K
-10 °C	0.4 K	0.1 K
50 °C	4.4 K	1.1 K





Configurable inputs
X1, X2 (T2)
X6, X7 (T3)

Configurable	By software
Reference potential	Terminals ⊥

NTC 10k ($B_{25/85}$=3977 K)

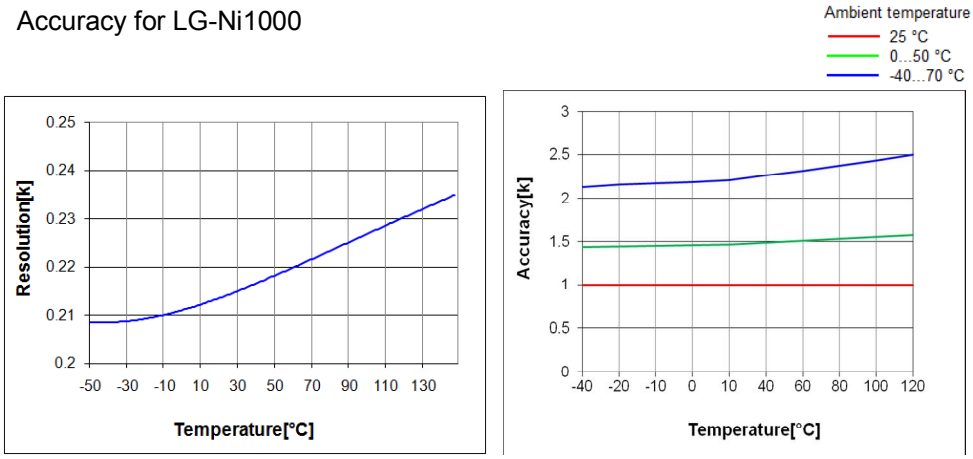
Accuracy	Please refer to analog inputs B1…B3

NTC 1k ($B_{25/85}$=3528 K)

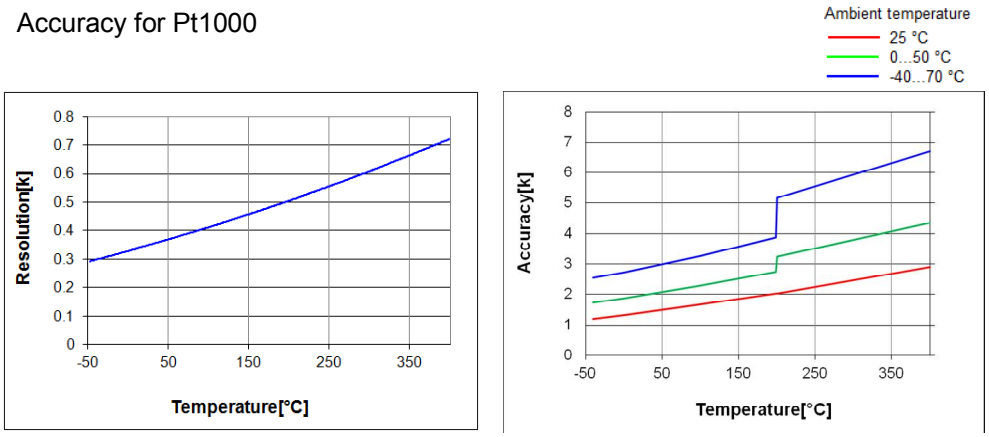
Accuracy	Please refer to analog inputs B1…B3

LG-Ni1000 / Pt1000

Accuracy for LG-Ni1000



Accuracy for Pt1000



Note: For Pt1000, the sensing circuit changes automatically when the measured temperature is around 200 °C. Below 200 °C the measuring accuracy is significantly improved under harsh ambient temperature. At 25 °C ambient temperature this effect is negligible.

DC 0…5/0…10 V ratiometric sensor

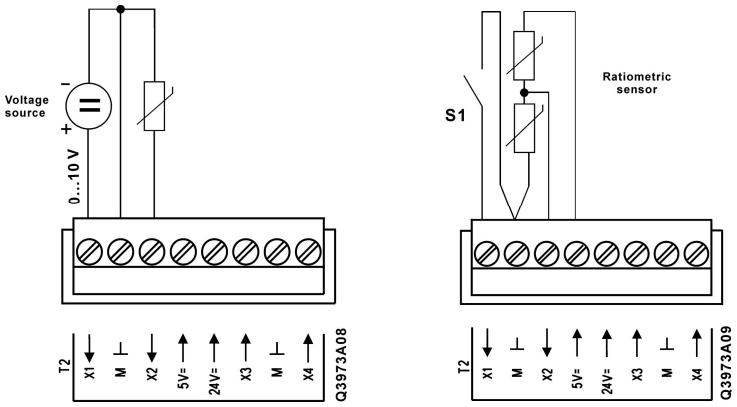
Resolution	10 mV
Accuracy	100 mV
Input resistance	100 kΩ

Digital input

0/1 digital signal (binary)	For potential-free contacts
Sampling voltage/current	DC 21.2 V, 7.8 mA
Contact resistance	Max. 200 Ω (closed) Min. 50 kΩ (open)
Delay	10 ms
Pulse frequency	Max. 20 Hz

Warning

Avoid negative voltages at the analog inputs because the conversion leads to undetermined results.



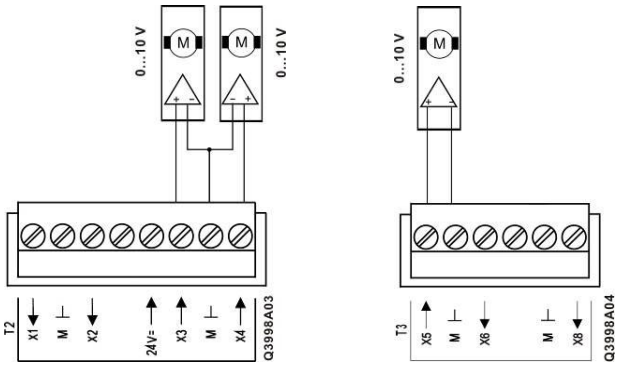
Note: Configurable input X7 is only available on POL423.50/XXX and POL426.50/XXX.

Configurable outputs
X3, X4 (T2)
X5 (T3)

Configurable	By software
Reference potential	Terminals ⊥

DC 0…10 V output

Resolution	30 mV
Accuracy	100 mV
Output current	Max. 10 mA

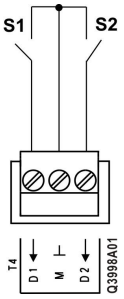


PWM outputs

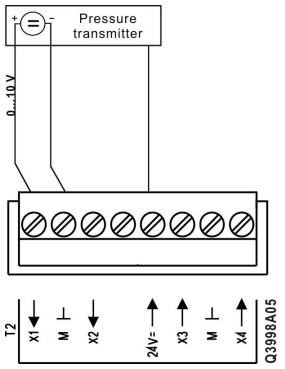
Frequency	2.5 kHz
Duty cycle	0...100% (at an increment of 0.5%)
Max. current	10 mA
Signal amplitude	10 V

Digital inputs
D1, D2 (T4)

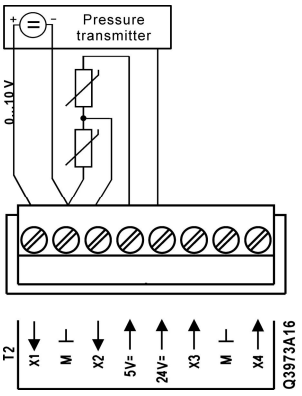
0/1digital signal (binary)	For potential-free contacts
Sampling voltage/current	DC 24 V, Max. 12 mA
Contact resistance	Max. 200 Ω (closed) Min. 50 kΩ (open)
Delay	10 ms
Pulse frequency	Max. 20 Hz



Digital input X8 (T3)	Configurable	By software
	0/1 digital signal (binary)	For potential-free contacts
	Sampling voltage/current	DC 21.2 V, 8 mA
	Contact resistance	Max. 200 Ω (closed) Min. 50 kΩ (open)
	Delay	10 ms
	Pulse frequency	Max. 300 Hz
	Pulse measurement	
	Sensor	Open-collector
	Sampling voltage	DC 21.2 V, Max. 8 mA
	Max. speed	18000 RPM
	Min. ON/OFF time	500 µs
Power supply for sensors Active DC 24 V (T2)	**POL425.50 and POL426.50**	
	Voltage/current	DC 24 V (±10%), 40 mA
	Reference potential	Terminals ⊥
	Connection	Short-circuit protected

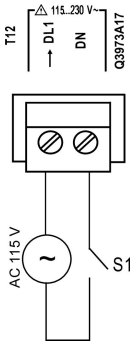


Power supply for sensors Active/ratiometric DC 5 V, DC 24 V (T2)	**POL423.50**	
	Voltage/current	DC 5 V (±2.5%), 20 mA
	Voltage/current	DC 24 V (±10%), 40 mA
	Reference potential	Terminals ⊥
	Connection	Short-circuit protected



Active digital input
DL1 (T12)

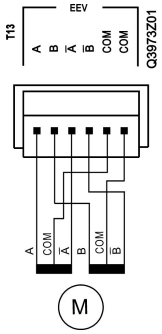
Digital input (0/1 binary)	(Assembled in POL423.50, POL426.50)
Input	Galvanic isolated voltage input
Nominal voltage	AC 115…230 V (-15%, +10%)
Frequency range	45…65 Hz
Input current	3 mA at AC 230 V
Delay	100 ms
Pulse frequency	Max. 5 Hz

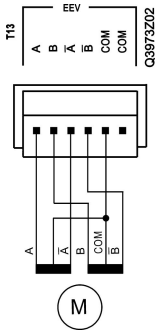


EEV (T13)

Configurable	By software
Connector	B6B-XH-A, JST

Stepper motor drive	(Assembled in POL423.50)
Motor	Unipolar stepper motor DC 12 V, Max. 2 x 375 mA
Connection	5/6 wires
Supply voltage	DC 12 V (short-circuit protected)
Driver output	4 channels
Length of motor cable	<10 m





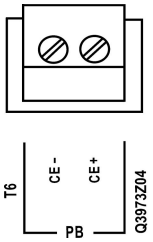
Note: Maximum current for phase A and phase B is 375 mA respectively.

Interfaces

Process bus
CE+, CE- (T6)

Based on KNX TP1

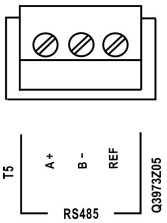
Bus connection	CE+, CE-, not interchangeable
Bus electronics	Galvanic isolated
Bus load	Max. 5 mA
Bus cable	Must be shielded (Please refer to *KNX manual - System Specifications*)
Bus cable length between 2 nodes	Max. 350 m
Total length of bus cable	Max. 700 m
DPSU	40 mA rated current



Third-party bus (Modbus RTU or BACnet MSTP)
A+, B-, REF (T5)

RS485 (EIA-485)	1 interface on terminal T5
Bus connection	A+, B-, REF
Bus protocols	Modbus RTU mode or BACnet MSTP
Bus electronics	Not galvanic isolated
Bus cable	Shielded twisted pair (like AWG 24)
Bus polarization	Switchable by software (680 Ω)
Baud rate	600, 1200, 2400, 4800, 9600, 19200, 38400
Bus termination	None (require external termination, e.g. 150 Ω)*

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



Tools/HMI
Local service interface
(T-HI)

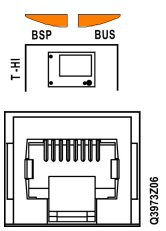
Cable connection	RJ45 jack, 8 pins, length of cable<3 m

Local-HMI

RS485 (EIA-485)	Not galvanic isolated
Bus polarization	680 Ω/680 Ω
Bus termination	120 Ω/1 nF
Supply voltage	DC 24 V, Max. 100 mA (short-circuit protected)

Tool

USB	Use PC service cable POL0C2 for tools



M-Bus (T14)	POL426.50/XXX 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 galvanic 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
	Approved for use with meter types	UH50.. , 2WR6..
	Cable types, bus topology, bus termination	Refer to M-Bus norm DIN EN 13757
	Baud rate	300, 2400

LED for BSP run/stop	**Mode**	**LED status**
	SW 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	Yellow on
	Application not loaded	Yellow on
	BSP error (software error)	Red blinking at 2 Hz
	Hardware error	Red on
Note:	LED for bus is not in operation.	

Connection terminals	Possible plugs for I/O signals and communication (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 (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 or with ferrule)	0.5…1.5 mm²
	Cable length	In compliance with the load, local regulations and installation documents

Real-time clock	Buffering with internal Gold Cap	Min. 8 hours

SD card	SD card	At the right side of the housing
	Max. capacity	32 GB
	Format	FAT32

Environment	**Operation**	IEC 60721-3-3
	Temperature	-40...70 °C
	Restriction process bus	-25…70 °C
	Humidity	<90% r.h. (no condensation)
	Air pressure	Min. 700 hPa, corresponding to Max. 3,000 m above sea level
	Transport	IEC 60721-3-2
	Temperature	-40...70 °C
	Humidity	<95% r.h. (no condensation)
	Air pressure	Min. 260 hPa, corresponding to Max. 10,000 m above sea level
	Mechanical conditions	IEC 60721-3-2 Class 2M2

Protection	Degree of protection	IP20 (EN 60529)
	Safety class	Suitable for use in plants with safety class II
Standards	EU Conformity (CE)	CB1T3998xx *)
	RCM conformity	CB1T3998en_C1 *)
General data	Dimensions	180 x 110 x 75 mm
	Weight excl. packaging	POL423.50/STD: 391 g POL425.50/STD: 388 g POL426.50/STD: 390 g
	Base	Plastic, pigeon blue RAL 5014
	Housing	Plastic, light grey RAL 7035
Accessories	PC service cable 1.5 m	POL 0C2.40/XXX
	Connector set (screw, cable side entry) 1 x Phoenix MVSTBW 2,5/2-ST OG 2 x Phoenix MVSTBW 2,5/2-ST GY7035 7 x Phoenix MVSTBW 2,5/3-ST GY7035 1 x Phoenix MVSTBW 2,5/4-ST GY7035 1 x Phoenix MVSTBW 2,5/5-ST GY7035 1 x Phoenix MVSTBW 2,5/8-ST GY7035	POL042.25/XXX

*) The documents can be downloaded from http://siemens.com/bt/download.

Climatix POL42X.50/XXX variants list

Types and features

Hardware I/Os		POL423.50/XXX	POL425.50/XXX	POL426.50/XXX
Analog inputs	B1, B2, B3 (NTC 10k / NTC 1k)	√	√	√
Configurable inputs	X1, X2, X6 (Pt1000 / NTC 10k / NTC 1k / LG-Ni1000 / DC 0…10 V/ DI)	√	√	√
	X7 (Pt1000 / NTC 10k / NTC 1k / LG-Ni1000 / DC 0…10 V/ DI)	√		√
Digital inputs	X8 (binary/high speed)	√	√	√
	D1, D2 (binary)	√	√	√
	DL1 (active AC 115…230 V)	√		√
Configurable outputs	X3, X4, X5 (DC 0...10 V analog / PWM output)	√	√	√
Digital outputs	Q1, Q3, Q4, Q5, Q6 (relay output)	√	√	√
	DO1, DO2 (triac output)	√	√	√
Interfaces	Process bus interface	√	√	√
	Modbus RTU or BACnet MSTP interface	√	√	√
	SD card interface	√	√	√
	Local service interface	√	√	√
	EEV	√		
	M-Bus Master for up to 3 slaves			√

Engineering notes

Warning

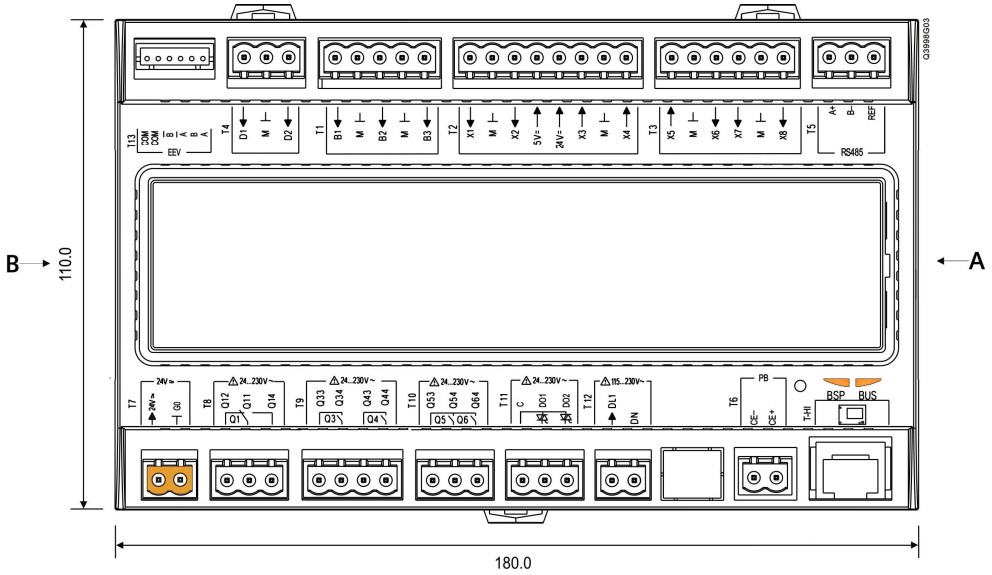
In order to protect against accidental contact with relay connections at voltages above 42 V_{eff}, the device must be installed in an enclosure (preferably a control panel). It must be impossible to open the enclosure without the aid of a key or tool.

AC 230 V cables must be double-insulated against safety extra-low voltage (SELV) cables.
Do **not** mix SELV/PELV and line voltage on the same terminal.
Use external protection for inductive load of relay outputs.
Use external fuse for over current protection of relay and triac outputs.

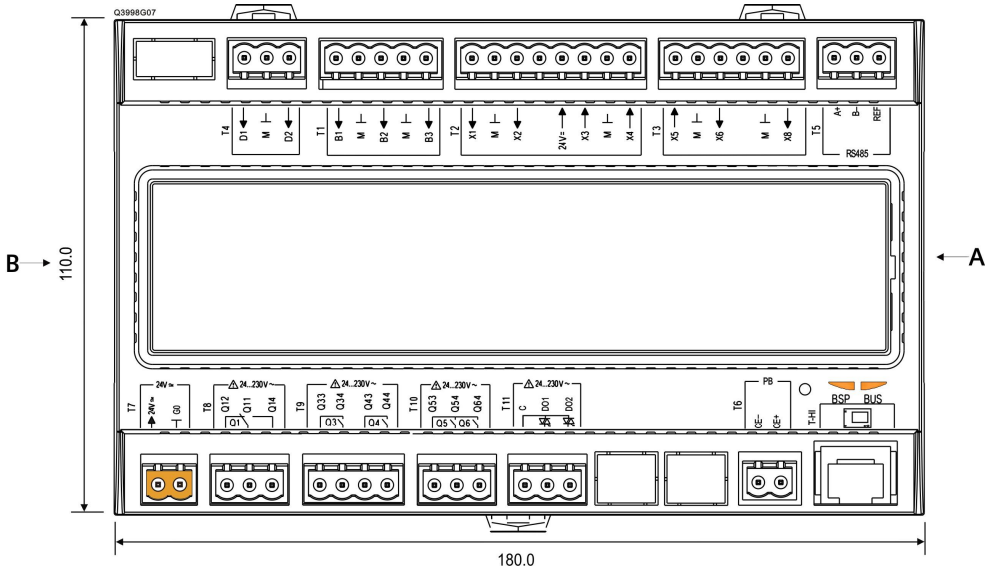
Avoid negative voltage on analogue inputs, because the measured ADC values are undefined. The accuracy of the 10 V analogue inputs is valid for values above 100 mV.

Layout of controller (mm)

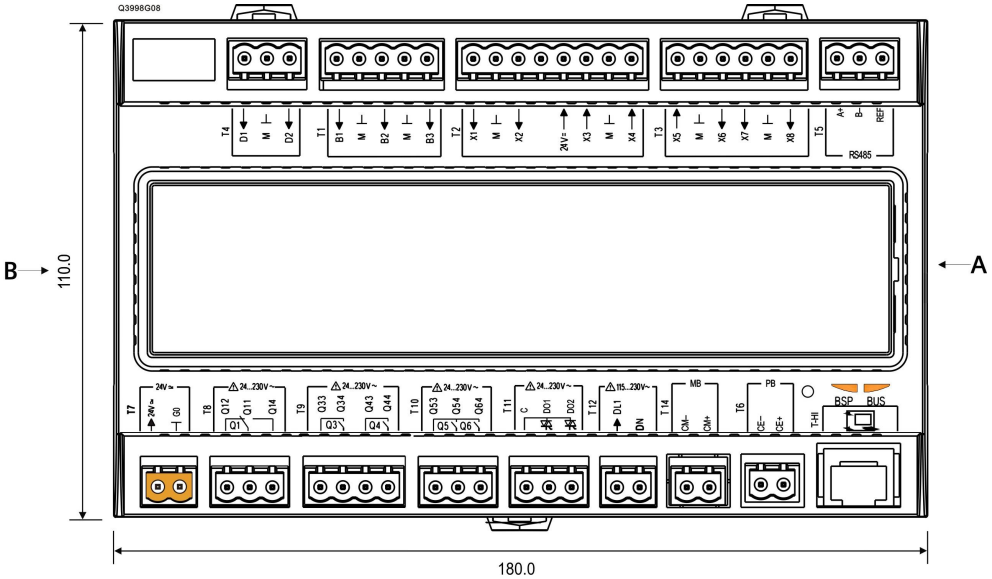
POL 423.50/XXX

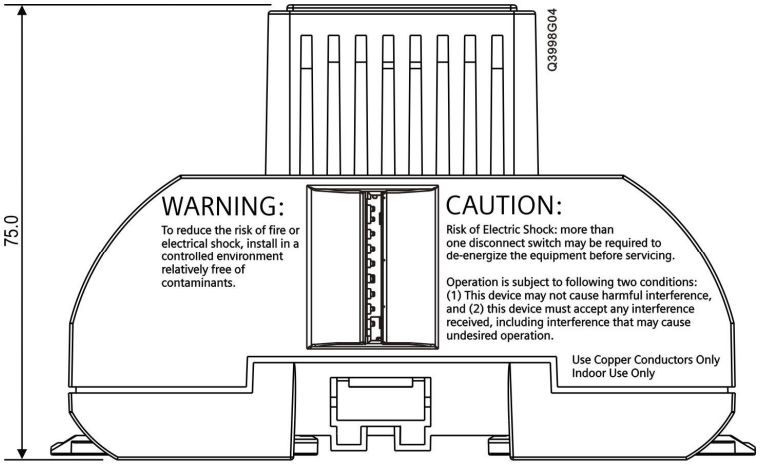


POL 425.50/XXX

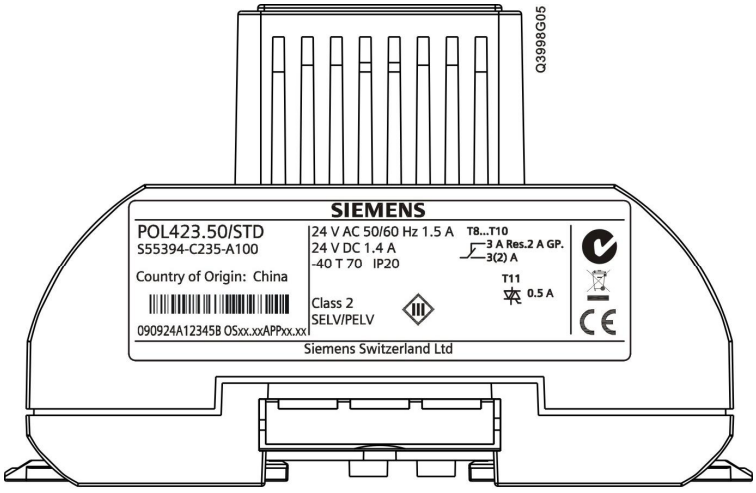


POL 426.50/XXX




Q3998G04
75.0
WARNING:
To reduce the risk of fire or electrical shock, install in a controlled environment relatively free of contaminants.
CAUTION:
Risk of Electric Shock: more than one disconnect switch may be required to de-energize the equipment before servicing.
Operation is subject to following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Use Copper Conductors Only
Indoor Use Only

A


Q3998G05
SIEMENS
POL423.50/STD
S55394-C235-A100
Country of Origin: China
090924A12345B OSxx.xxAPPxx.xx
24 V AC 50/60 Hz 1.5 A
24 V DC 1.4 A
-40 T 70 IP20
Class 2
SELV/PELV
T8...T10
3 A Res.2 A GP.
3(2) A
T11
0.5 A
Siemens Switzerland Ltd

B

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