SIEMENS

Climatix™

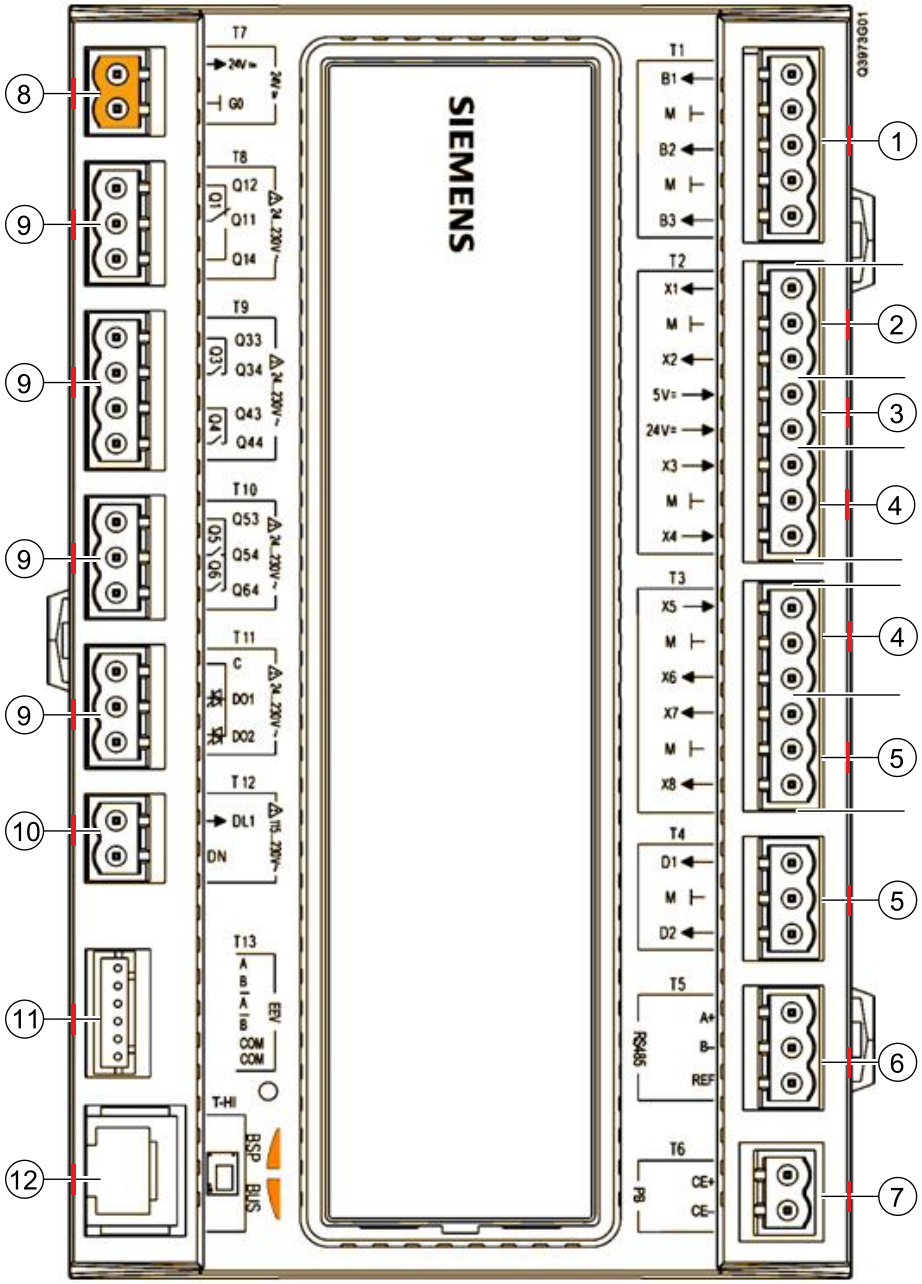
Climatix programmable controllers

POL42X.50/XXX

The Climatix POL42X.50/XXX programmable controllers are HVAC controllers optimized for air handling units, rooftop units, chillers and heat pumps.

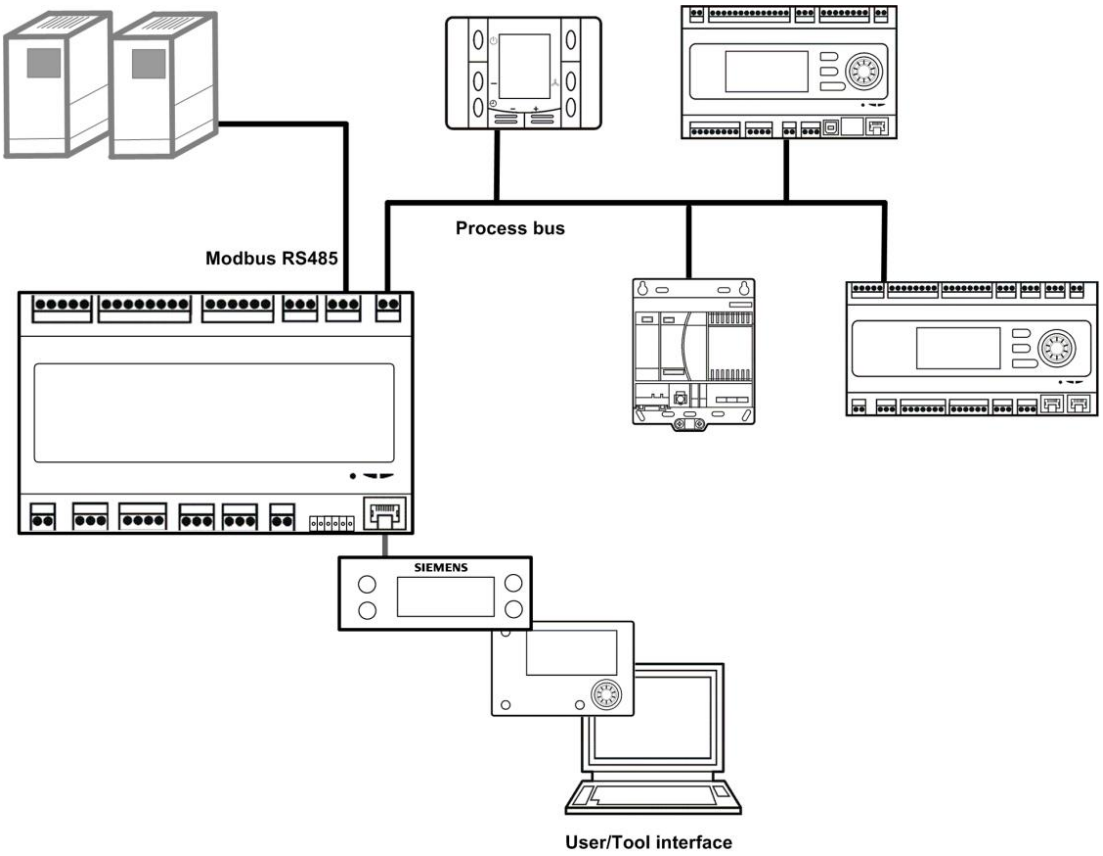
- Power supply AC 24 V or DC 24 V
- DC 24 V and DC 5 V power supplies for active sensors on board
- 3 analog inputs for temperature sensor
- 2 configurable inputs as digital input/DC 0…10 V input/temperature sensor
- 3 configurable outputs as DC 0…10 V analog output/digital output for off-board load
- 4 digital inputs for potential-free contacts
- 1 digital input for potential-free contact or fan speed measurement
- 1 digital input galvanically isolated (AC 115…230 V)
- 5 relay outputs (4 NO contacts, 1 changeover switching type)
- 2 triac outputs (AC 24/115/230 V) or 2 relay outputs (NO contacts)
- 1 stepper motor drive for electrical expansion valve or PWM output
- RS-485 for Modbus RTU or BACnet MS/TP (with VVS10.50 or higher) for third-party bus communication
- Process bus for network functionalities
- Local service connector for user interface and PC tools (supporting USB)
- SD card interface for application and operating system upgrade
- Operating temperature range is -40…70 °C
- Powerful service tools are available to facilitate commissioning.

Overview

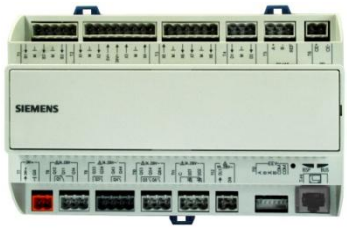
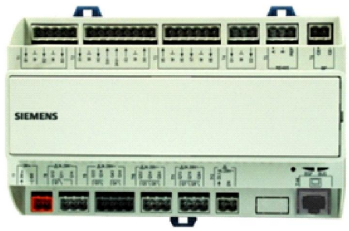


1	Analog inputs	7	Process bus
2	Configurable inputs	8	Power supply
3	Sensor power supply	9	Digital outputs
4	Configurable outputs	10	Active digital input
5	Digital inputs	11	EEV
6	RS-485	12	Service interface

Communication concept



Type summary

Type	Photo
POL422.50/XXX	
POL424.50/XXX	

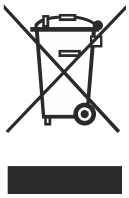
Notes

Engineering

- In order to protect against accidental contact with relay connections at voltages above 42 Veff, 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 115…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.

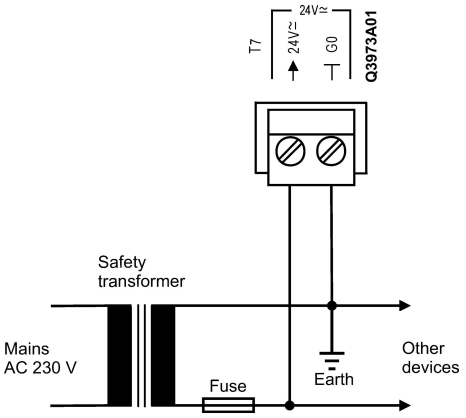
- Use external fuse for over current protection of relay and triac outputs.
- Avoid negative voltage on analogue inputs, because the measured ADC values are undefined. The accuracy of the 10 V analogue inputs is valid for values above 100 mV.

Disposal

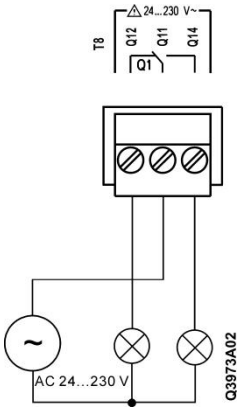
	The device is considered an electronics device for disposal in terms of European Directive 2012/19/EU and may not be disposed of as domestic garbage. • Dispose of the device through channels provided for this purpose. • Comply with all local and currently applicable laws and regulations.

Technical data

Power supply AC 24 V, G0 (T7)	
Operating voltage	AC 24 V ±20% / DC 24 V ±10%
Frequency	45…65 Hz @ AC 24 V
Max. AC current	1.6 A @ AC 24 V
Max. DC current	1.5 A @ DC 24 V
Max. external supply line fusing	6.3 A slow wire fuse or circuit breaker

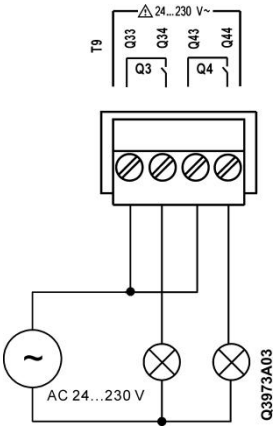


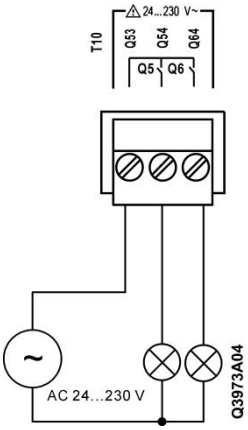
Relay output Q1 (T8)	
Contact	Monostable, NO/NC contact, SPDT
Switching voltage	AC 24…230 V (-20%, +10%) DC 18…30 V
Rated current (res./ind.)	AC 3 A (res.)/2 A (ind. cosφ 0.6) DC 3 A (res.)
Min. switching current at AC 19 V	30 mA
Endurance	100,000 cycles @ AC 230 V, 3.0 A (res.)
Max. external supply 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.

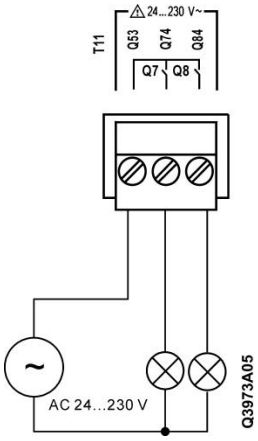
Relay output Q3, Q4 (T9) Q5, Q6 (T10)	
Contact	Monostable, NO contact, SPST
Switching voltage	AC 24…230 V (-20%, +10%) DC 18…30 V
Rated current (res./ind.)	AC 3 A (res.)/2 A (ind. cosφ 0.6) DC 3 A (res.)
Min. switching current @ AC 19 V	30 mA
Endurance	100,000 cycles @ AC 230 V, 3.0 A (res.)
Max. external supply line fusing	6.3 A slow wire fuse or circuit breaker





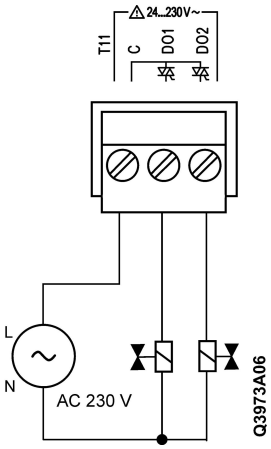
	⚠ WARNING
	Do NOT mix SELV / PELV and line voltage on the same terminal. Use external protection for inductive load.

Relay output Q7, Q8 (T11)	
Contact	Monostable, NO/NC 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 @ AC 19 V	30 mA
Endurance	100,000 cycles @ 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.

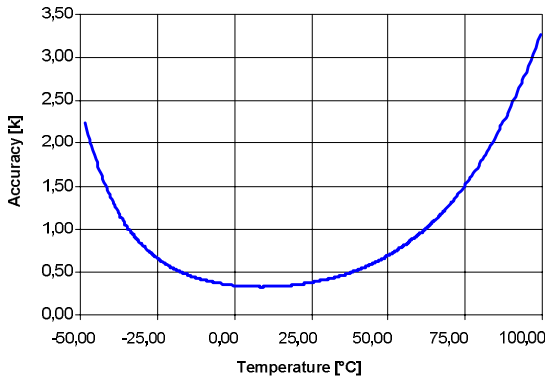
Triac outputs DO1, DO2 (T11)	
Triac data	(Assembled in POL422.50)
Switching voltage	AC 24…230 V (-20%, +10%)
Switching capacity	Max. 500 mA/Min. 30 mA
Max. external supply line fusing	2.0 A slow wire fuse or circuit breaker

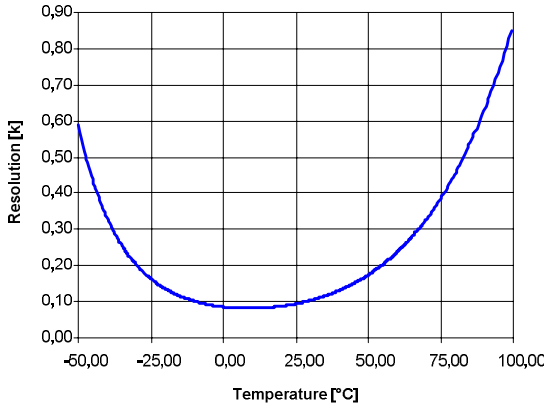


	WARNING
	Do NOT mix SELV / PELV and line voltage on the same terminal. Use external protection for inductive load.

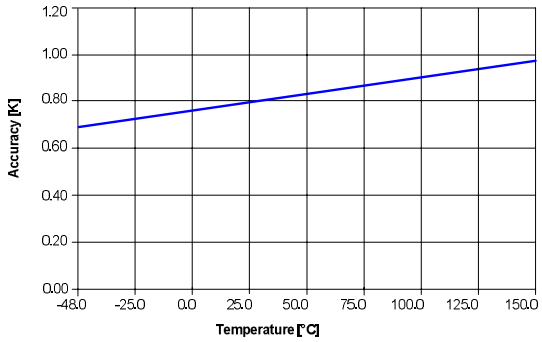
Analog inputs B1…B3 (T1)	
NTC 10k ($B_{25/85}$=3977 K)	(Assembled in POL422.50)
Sensor current	120 µA @ 25 °C
Temperature range	-50…100 °C
Accuracy and resolution of input	See diagram below

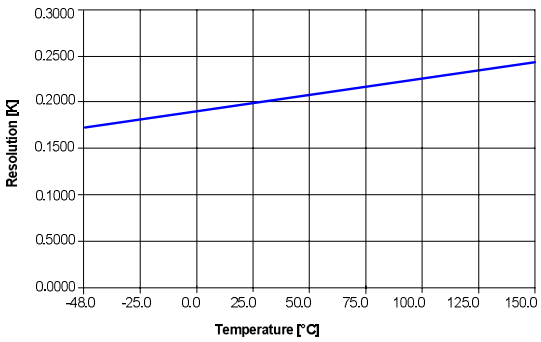
Analog inputs B1…B3 (T1)		
Temperature	Accuracy	Resolution
-50 °C	2.5 K	0.6 K
-40 °C	1.4 K	0.4 K
-30 °C	0.9 K	0.2 K
-10 °C	0.5 K	0.1 K
50 °C	0.7 K	0.2 K
70 °C	1.3 K	0.4 K
90 °C	2.5 K	0.7 K
100 °C	3.4 K	0.9 K



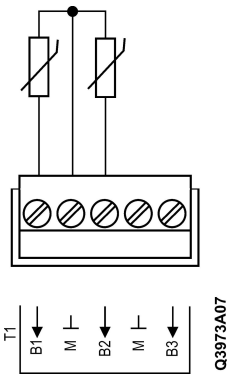


Ni1000 (TK5000) / Pt1000	(Assembled in POL424.50)
Sensor current	1.4 mA @ 0 °C
Temperature range	-48…150 °C
Accuracy	±1 K
Resolution	±0.25 K





These data are acquired under operating temperature of 25 °C.



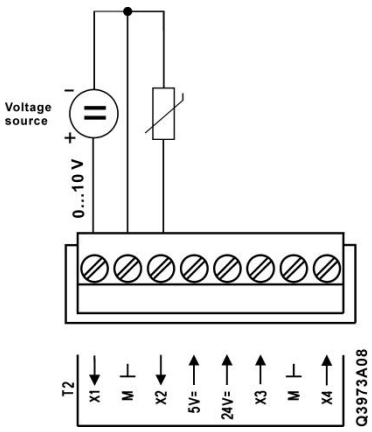
Configurable inputs X1, X2 (T2)	
Configurable	By software
Reference potential	Terminals ⊥

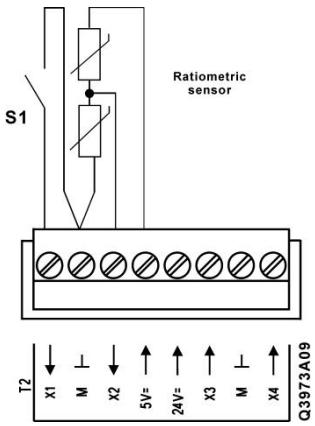
NTC 10k ($B_{25/85}$=3977 K)	(Assembled in POL422.50)
Accuracy	Please refer to B1…B3

Ni1000 (TK5000) / Pt1000	(Assembled in POL424.50)
Accuracy	Please refer to B1…B3

DC 0…5/0…10 V ratiometric sensor	
Resolution	50 mV
Accuracy	100 mV
Input resistance	100 kΩ

Digital input	
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. 20 Hz

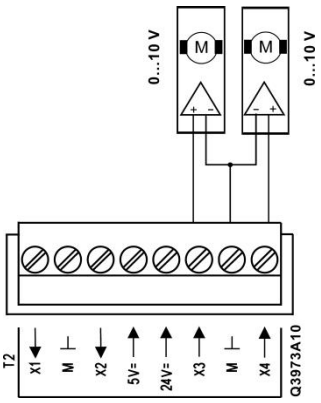


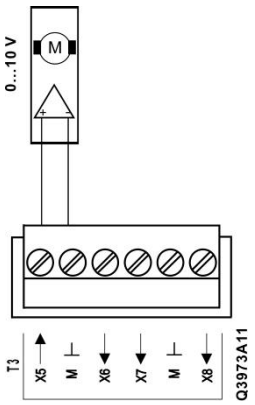


	WARNING
	Avoid negative voltages at the analog inputs because the conversion leads to undetermined results.

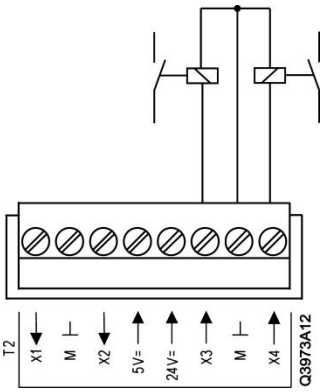
Configurable outputs X3, X4 (T2), X5(T3)	
Configurable	By software
Reference potential	Terminals ⊥

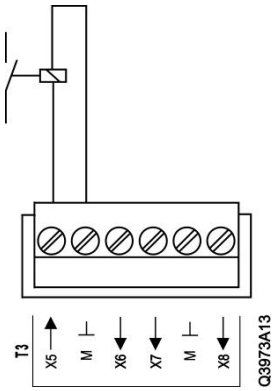
DC 0…10 V output	
Resolution	30 mV
Accuracy	100 mV
Output current	Max. 1 mA





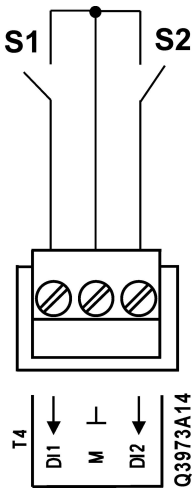
DC output for off-board load	
Switching voltage	DC 24 V
Switching capacity	Max. 25 mA

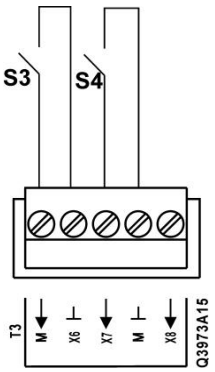




Use free wheel diode for inductive load.

Digital inputs X6, X7 (T3) DI1, DI2 (T4)	
0/1digital 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. 20 Hz

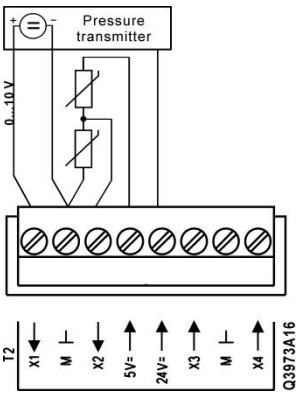




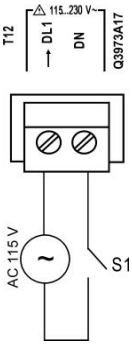
Digital input X8 (T3)	
Configurable	By software

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. 20 Hz
Pulse measurement	
Sensor	Open-collector
Sampling voltage	DC 24 V, Max. 8 mA
Max. speed	6000 RPM
Min. ON/OFF time	500 µs

Powering sensors Active/ratiometric DC 5 V, DC 24 V (T2)	
Voltage/current	DC 5 V ±2.5%, 20 mA
Voltage/current	DC 24 V (-25%, +10%), 40 mA
Reference potential	Terminals ⊥
Connection	Short circuit protected

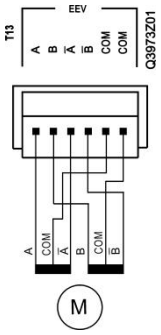


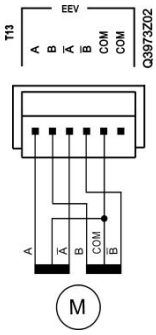
Active digital input DL1 (T12)	
Digital input (0/1 binary)	Galvanically isolated voltage input
Nominal voltage	AC 115…230 V (-15%, +10%)
Frequency range	45…65 Hz
Input current	3 mA @ AC 230 V
Delay	100 ms
Pulse frequency	Max. 5 Hz



EEV (T13)	
Configurable	By software
Connector	B6B-XH-A, JST

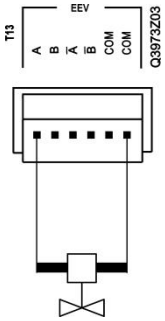
Stepper motor drive	(Assembled in POL422.50)
Motor	Unipolar stepper motor, full step DC 12 V, Max. 2 x 375 mA
Connection	5/6 wires
Supply voltage	DC 12 V (short circuit protected)
Driver output	4 channels





Max. current for phase A and phase B is 375 mA respectively.

PWM output	(Assembled in POL422.50)
Frequency	1...60 Hz
Duty cycle	0...100% (at an increment of 0.5%)
Max. current	750 mA (short circuit protected)
Supply voltage on COM	12 V, Max. 750 mA (short circuit protected)

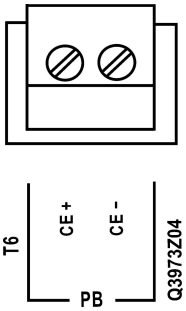


Only channel A supports PWM output.

Interfaces

Process bus **CE+, CE- (T6)**	
Based on KNX TP1	
Bus connection	CE+, CE-, NOT interchangeable
Bus electronics	Galvanically isolated

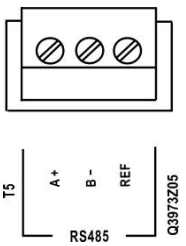
Process bus CE+, CE- (T6)	
Bus load	Max. 5 mA
Bus cable	Must be shielded; Please refer to KNX manual “System Specifications”
Bus cable length between 2 nodes	Max. 350 m
Total length of bus cable	Max. 700 m
DPSU	40 mA rated current



Third party bus (RS-485 Modbus RTU) A+, B-, REF (T5)	
RS-485 (EIA-485)	Modbus RTU or BACnet MS/TP° mode
Bus connection	A+, B-, REF
Bus electronics	NOT galvanically isolated
Bus cable	Shielded if length>3 m, twisted pair
Bus polarization	Configurable by software
Bus termination	None*

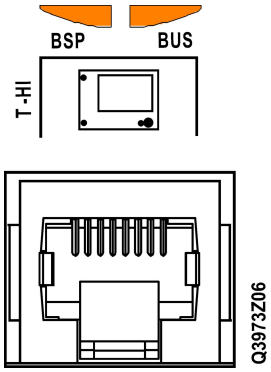
° BACnet MS/TP (with BSP 10.50 or higher)

* On RS485 network, it is essential to use termination resistors that match the cable’s characteristic impedance to prevent signal echoes from corrupting the data on the line.



Tools/HMI Local service interface (T-HI)	
Cable connection	RJ45 jack, 8 pins, length of cable<3 m

Local-HMI	
RS-485 (EIA-485)	NOT galvanically 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



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	Orange on
Application not loaded	Orange on
BSP error (software error)	Red flashing at 2 Hz
Hardware error	Red on

!	*NOTICE*
	LED for bus only indicates the status of the integrated modem communication. POL42X controllers do not provide this modem communication.

Connection terminals	
Possible plugs for I/O signals and communication (available on request)	Phoenix FKCVW 2,5/x-ST Phoenix FKCT 2,5/x-ST Phoenix MVSTBW 2,5/x-ST
Possible plugs for power supply (available on request)	Phoenix FKCVW 2,5/2-ST OG Phoenix FKCT 2,5/2-ST OG Phoenix MVSTBW 2,5/2-ST OG

Connection terminals	
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. 4 hours

SD card	
SD card	At the right side of the housing
Max. capability	32 GB
Formation	FAT32

Ambient conditions and protection classification	
Climatic ambient conditions	
• Transport (packaged for transport) as per EN 60721-3-2	Temperature: -40...70 °C Air humidity: <95% r.h. (no condensation) Air pressure: Min. 260 hPa, corresponding to Max. 10,000 m above sea level
• Operation as per EN 60721-3-3.	Temperature -40...70 °C Restriction process bus -25…70 °C Air humidity <95% r.h. (no condensation). Air pressure Min. 700 hPa, corresponding to Max. 3,000 m above sea level
Mechanical ambient conditions • Transport as per EN 60721-3-2	Class 2M2
Degree of protection of housing to EN 60529	IP20
Safety class	Suitable for use in plants with safety class II

Standards, directives and approvals	
Product standard	EN 60730-1 Automatic electronic controls for household and similar use.
Electromagnetic compatibility (applications)	For residential, commercial, and light-industrial and industrial environments.
EU conformity (CE)	CE1T3973xx *)
RCM conformity (EMC)	CE1T3973en_C1 *)
Listings	UL916, UL873 http://database.ul.com/ CSA Class 4812 http://www.csagroup.org
Environmental compatibility	The product environmental declaration (232370-T-1109_EN *)) contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging,

Standards, directives and approvals	
	environmental benefit, disposal).

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

General data	
Dimensions	180 x 110 x 75 mm
Weight excl. packaging	400 g
Base	Plastic, pigeon blue RAL 5014
Housing	Plastic, light grey RAL 7035

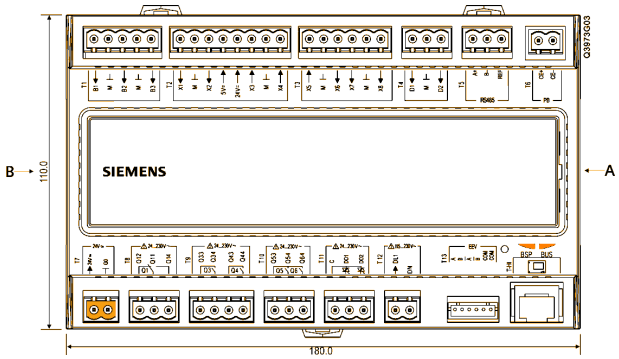
Accessory parts	
PC service cable 1.5 m	POL0C2.40/STD
Connector set (screw, cable side entry) 1 x Phoenix MVSTBW 2,5/2-ST OG 2 x Phoenix MVSTBW 2,5/2-ST GY7035 7 x Phoenix MVSTBW 2,5/3-ST GY7035 1 x Phoenix MVSTBW 2,5/4-ST GY7035 1 x Phoenix MVSTBW 2,5/5-ST GY7035 1 x Phoenix MVSTBW 2,5/8-ST GY7035	POL042.25/STD

Climatix 42X variants list

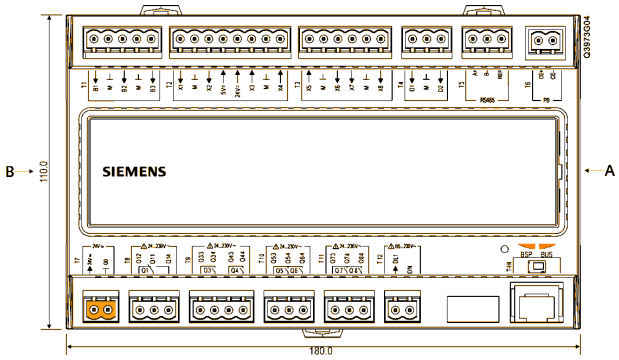
Hardware I/Os		POL422.50	POL424.50
Analog inputs	B1, B2, B3 (NTC 10k)	✓	
	B1, B2, B3 (Ni1000/Pt1000)		✓
Configurable inputs	X1, X2 (NTC 10k / 0…10 V / DI)	✓	
	X1, X2 (Ni1000/ Pt1000 / 0…10 V / DI)		✓
Digital inputs	X6, X7 (binary)	✓	✓
	X8 (binary/fan speed)	✓	✓
	D1, D2 (binary)	✓	✓
	DL1 (active AC 115…230 V)	✓	✓
Configurable outputs	X3, X4, X5 (DC 0...10 V analog output / off-board digital output)	✓	✓
Digital outputs	Q1, Q3, Q4, Q5, Q6 (relay output)	✓	✓
	Q7, Q8 (relay output)		✓
	DO1, DO2 (triac output)	✓	
Interfaces	Process bus interface	✓	✓
	Modbus RTU or BACnet MS/TP (with BSP 10.50 or higher) over RS485 interface	✓	✓
	EEV (stepper motor drive/PWM)	✓	
	SD card interface	✓	✓

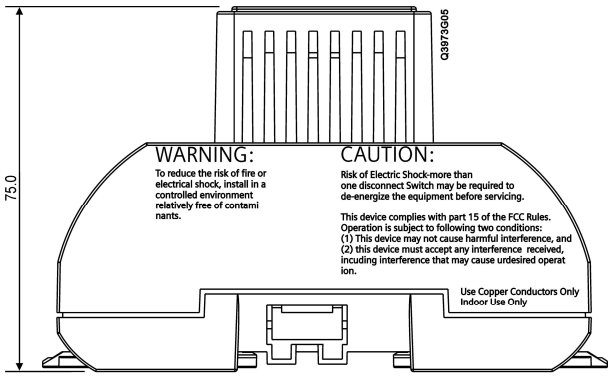
Dimensions

POL422.50/XXX



POL424.50/XXX





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