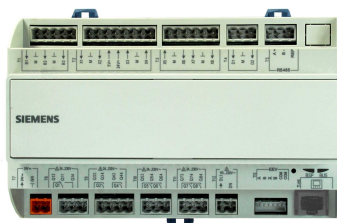


Climatix™
Climatix Controllers POL42X.05/XXX
POL42X.50/XXX

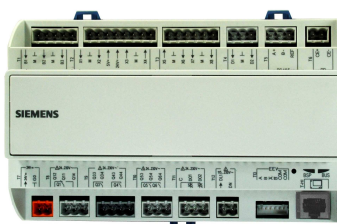
For controlling, switching and monitoring functions

The Climatix 42X.05/XXX controllers are HVAC controllers optimized for air handling units, rooftop units, chillers and heat pumps.

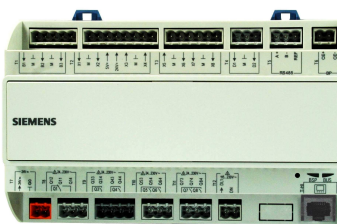
Controller types



POL421.05/XXX



POL422.05/XXX
 POL422.50/XXX



POL424.05/XXX
 POL424.50/XXX

Main features

The controllers offer the following features:

- 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 in Modbus RTU 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

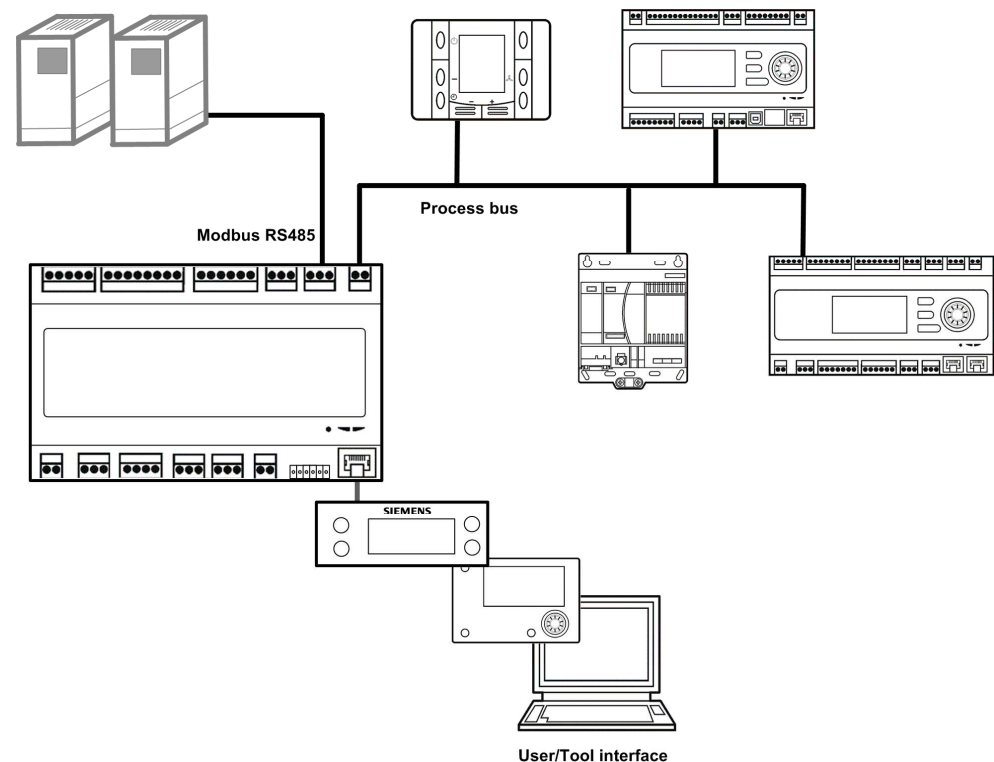
Powerful service tools are available to facilitate commissioning.

Note

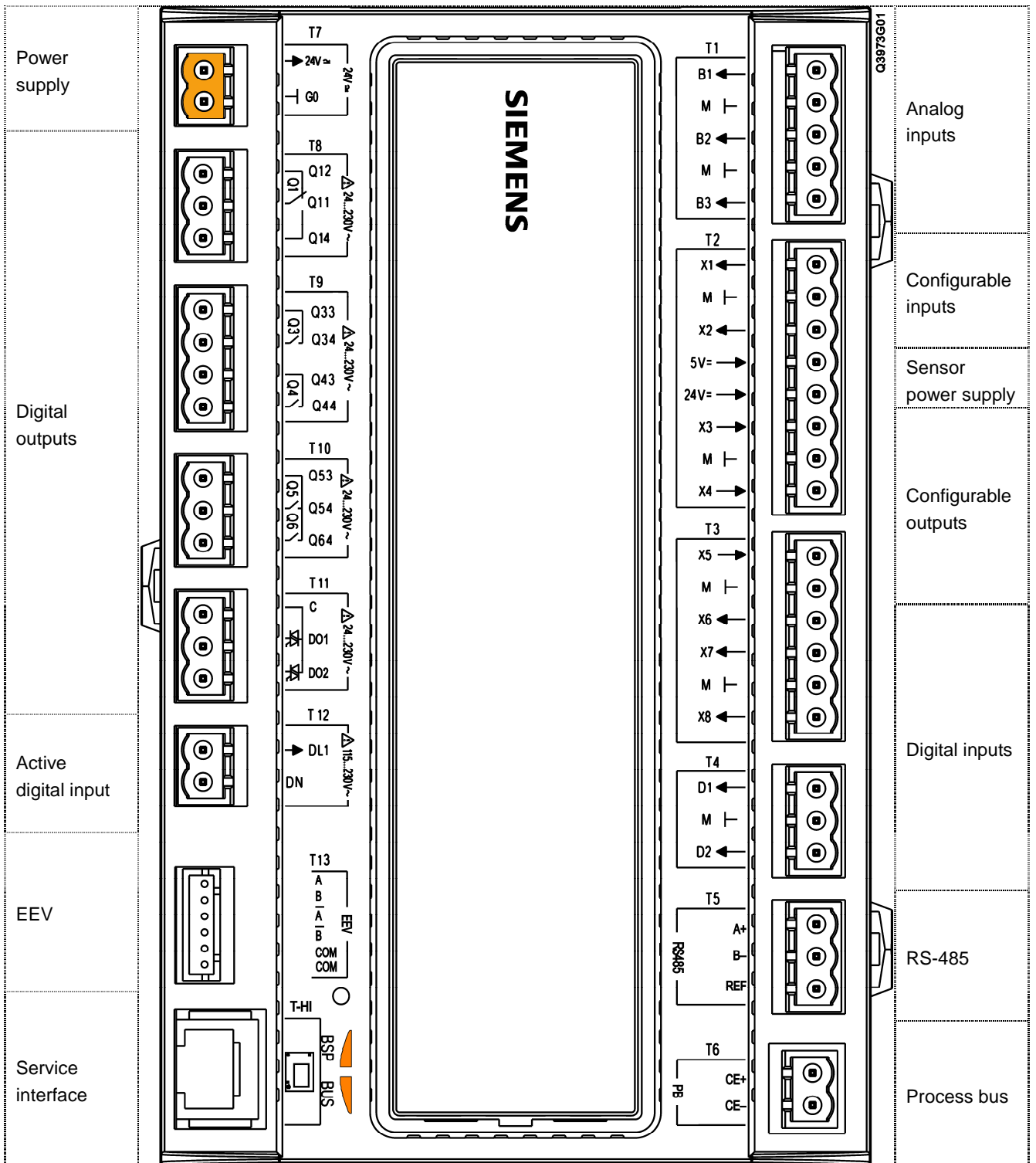


POL42X.05 is standard controllers without programmability.
POL42X.50 is programmable controllers with programmability.

Communication concept



Overview

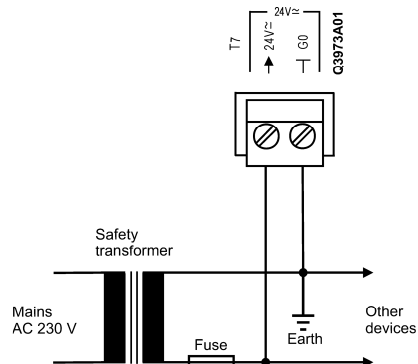


Technical data

Power supply

AC 24 V, G0 (T7)

Operating voltage	AC 24 V $\pm 20\%$ / DC 24 V $\pm 10\%$
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)

Relay

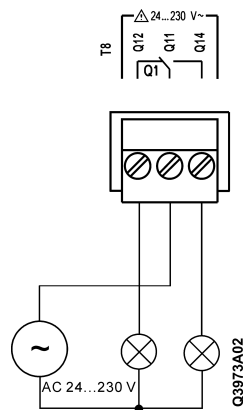
Contact	Monostable, NO/NC contact, SPDT
Switching voltage	AC 24...230 V (-20%, +10%) DC 18...30 V
Rated current (res./ind.)	AC 3 A (res.)/2 A (ind. $\cos\phi$ 0.6) DC 3 A (res.)
Min. switching current at AC 19 V	30 mA
Endurance	100,000 cycles @ AC 230 V, 3.0 A (res.)
Max. external supply line fusing	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 outputs

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

Relay

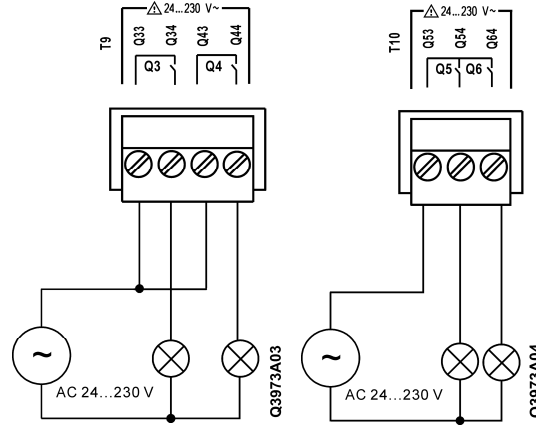
Contact Monostable, NO contact, SPST
Switching voltage AC 24...230 V (-20%, +10%)
DC 18...30 V
Rated current (res./ind.) AC 3 A (res.)/2 A (ind. $\cos\phi$ 0.6)
DC 3 A (res.)
Min. switching current at AC 19 V 30 mA
Endurance 100,000 cycles @ AC 230 V, 3.0 A (res.)
Max. external supply line fusing 6.3 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 outputs

Q7, Q8 (T11)

Relay

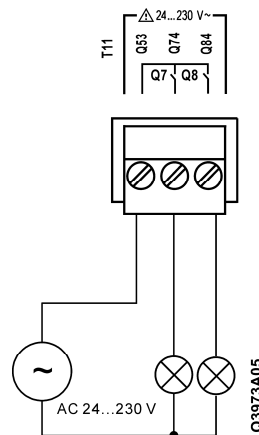
(Assembled in POL421.05, POL424.05)
Contact Monostable, NO/NC contact, SPST
Switching voltage AC 24...230 V (-20%, +10%)
DC 18...30 V
Rated current (res./ind.) AC 3 A (res.)/2 A (ind. $\cos\phi$ 0.6)
DC 3 A (res.)
Min. switching current at AC 19 V 30 mA
Endurance 100,000 cycles @ AC 230 V, 3.0 A (res.)
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.



Triac outputs
DO1, DO2 (T11)



Warning

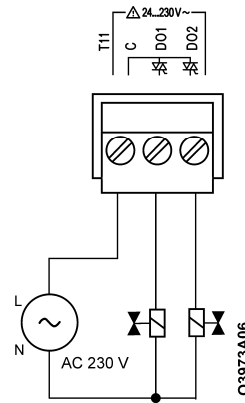
Triac data

Switching voltage
Switching capacity
Max. external supply line fusing

(Assembled in POL422.05)
AC 24...230 V (-20%, +10%)
Max. 500 mA/Min. 30 mA
2.0 A slow wire fuse or circuit breaker

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

Use external protection
for inductive load.



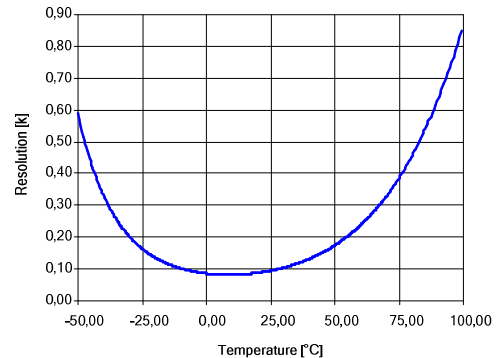
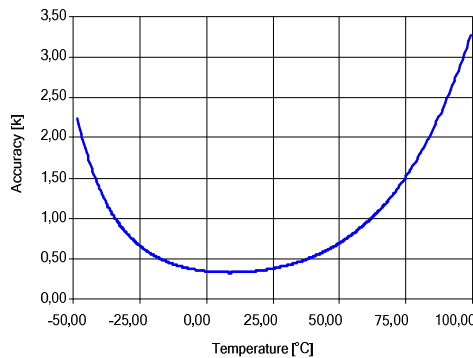
Analog inputs
B1...B3 (T1)

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

Sensor current
Temperature range
Accuracy and resolution of input

(Assembled in POL421.05, POL422.05)
120 μA @ 25 $^{\circ}\text{C}$
-50...100 $^{\circ}\text{C}$
See diagram below

Temperature	Accuracy	Resolution
-50 $^{\circ}\text{C}$	2.5 K	0.6 K
-40 $^{\circ}\text{C}$	1.4 K	0.4 K
-30 $^{\circ}\text{C}$	0.9 K	0.2 K
-10 $^{\circ}\text{C}$	0.5 K	0.1 K
50 $^{\circ}\text{C}$	0.7 K	0.2 K
70 $^{\circ}\text{C}$	1.3 K	0.4 K
90 $^{\circ}\text{C}$	2.5 K	0.7 K
100 $^{\circ}\text{C}$	3.4 K	0.9 K



Ni1000 (TK5000) / Pt1000

(Assembled in POL424.05)

Sensor current

1.4 mA @ 0 °C

Temperature range

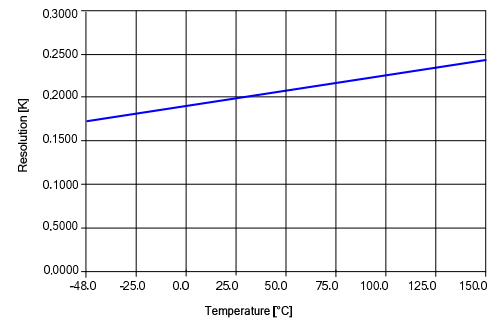
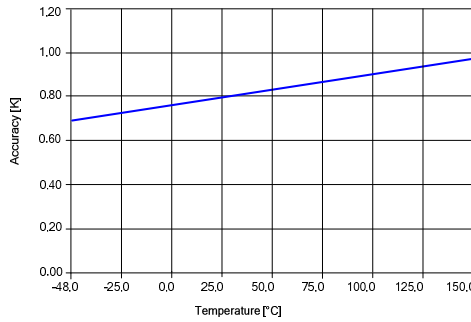
-48...150 °C

Accuracy

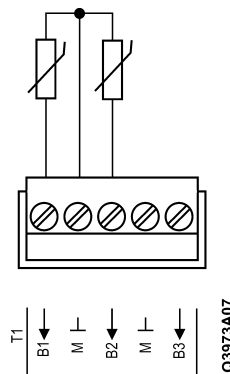
±1 K

Resolution

±0.25 K

**Note**

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 POL421.05, POL422.05)

Accuracy

Please refer to B1...B3

Ni1000 (TK5000) / Pt1000

(Assembled in POL424.05)

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

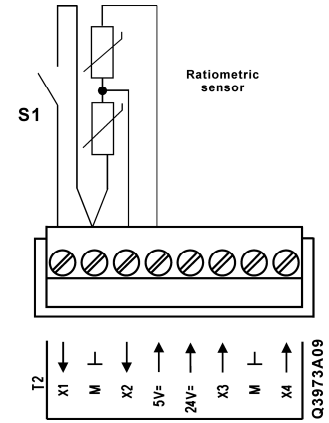
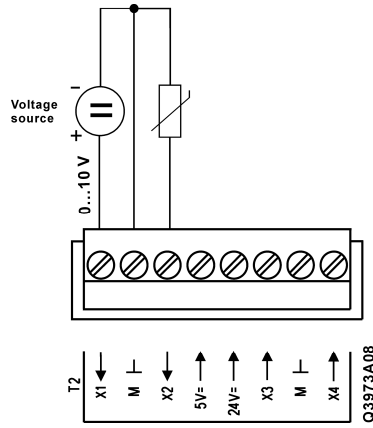
Pulse frequency

Max. 20 Hz



Warning

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



Configurable outputs

X3, X4 (T2), X5 (T3)

Configurable

Reference potential

By software

Terminals ⊥

DC 0...10 V output

Resolution

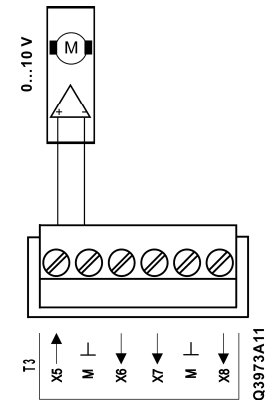
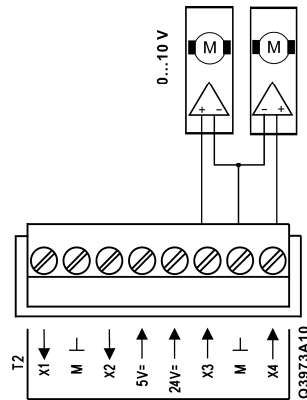
30 mV

Accuracy

100 mV

Output current

Max. 1 mA



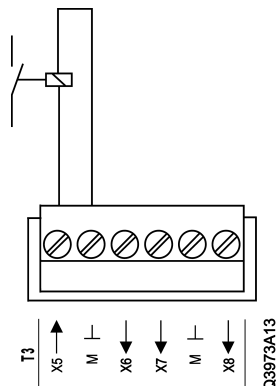
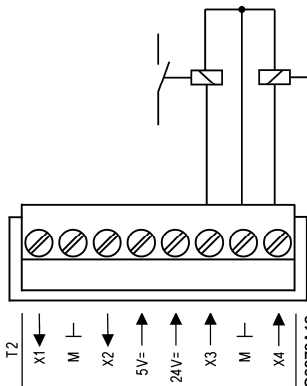
DC output for off-board load

Switching voltage

DC 24 V

Switching capacity

Max. 25 mA



Note



Use free wheel diode for inductive load.

Digital inputs

X6, X7 (T3)

DI1, DI2 (T4)

0/1 digital signal (binary)

Sampling voltage/current

Contact resistance

Delay

Pulse frequency

For potential free contacts

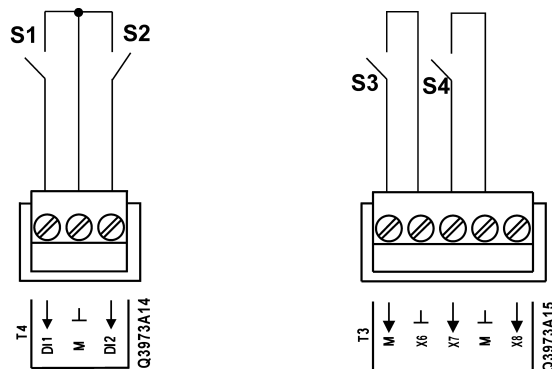
DC 24 V, 8 mA

Max. 200 Ω (closed)

Min. 50 kΩ (open)

10 ms

Max. 20 Hz



Digital input

X8 (T3)

Configurable

By software

0/1 digital signal (binary)

Sampling voltage/current

Contact resistance

Delay

Pulse frequency

For potential free contacts

DC 24 V, 8 mA

Max. 200 Ω (closed)

Min. 50 kΩ (open)

10 ms

Max. 20 Hz

Pulse measurement

Sensor

Sampling voltage

Max. speed

Min. ON/OFF time

Open-collector

DC 24 V, Max. 8 mA

6000 RPM

500 μs

Powering sensors

Active/ratiometric

DC 5 V, DC 24 V (T2)

Voltage/current

Voltage/current

Reference potential

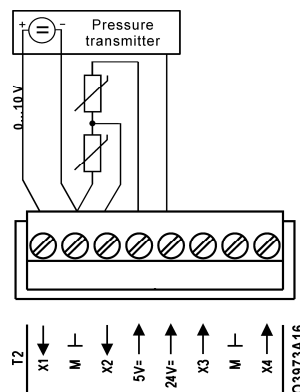
Connection

DC 5 V ±2.5%, 20 mA

DC 24 V (-25%, +10%), 40 mA

Terminals ⊥

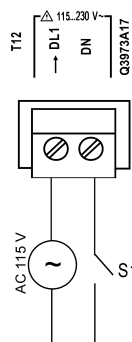
Short circuit protected



Active digital input
DL1 (T12)

Digital input (0/1 binary)

Nominal voltage	Galvanically isolated voltage input
Frequency range	AC 115...230 V (-15%, +10%)
Input current	45...65 Hz
Delay	3 mA @ AC 230 V
Pulse frequency	100 ms
	Max. 5 Hz



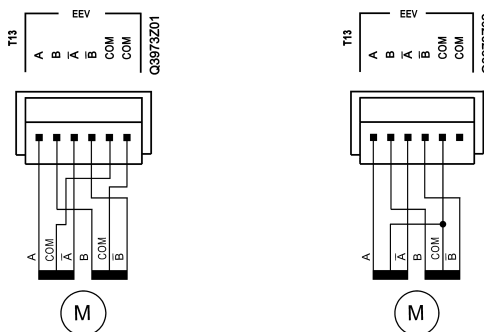
EEV (T13)

Configurable
Connector

By software
B6B-XH-A, JST

Stepper motor drive

Motor	(Assembled in POL421.05, POL422.05)
Connection	Unipolar stepper motor
Supply voltage	DC 12 V, Max. 2 x 375 mA
Driver output	5/6 wires DC 12 V (short circuit protected) 4 channels



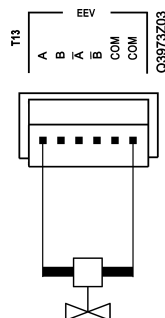
Note



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

PWM output

Frequency	(Assembled in POL421.05, POL422.05)
Duty cycle	1...60 Hz
Max. current	0...100% (at an increment of 0.5%)
Supply voltage on COM	750 mA (short circuit protected) 12 V, Max. 750 mA (short circuit protected)



Note



Only channel A supports PWM output.

Interfaces

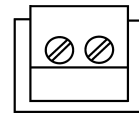
Process bus CE+, CE- (T6)

Based on KNX TP1

Bus connection
Bus electronics
Bus load
Bus cable

(Assembled in POL422.05, POL424.05)
CE+, CE-, not interchangeable
Galvanically isolated
Max. 5 mA
Must be shielded; Please refer to
KNX manual "System Specifications"
Max. 350 m
Max. 700 m
40 mA rated current

Bus cable length between 2 nodes
Total length of bus cable
DPSU



Third party bus (RS-485 Modbus RTU) A+, B-, REF (T5)

RS-485 (EIA-485)

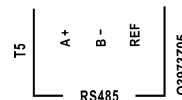
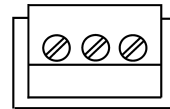
Bus connection
Bus electronics
Bus cable
Bus polarization
Bus termination

Modbus RTU mode
A+, B-, REF
Not galvanically isolated
Shielded if length > 3 m, twisted pair
Configurable by software
None*

Note



*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

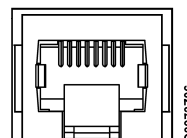
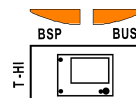
RS-485 (EIA-485)
Bus polarization
Bus termination
Supply voltage




Not galvanically isolated
680 Ω/680 Ω
120 Ω/1 nF
DC 24 V, Max. 100 mA
(short circuit protected)

Tool

USB

Use PC service cable POL0C2 for tools



LED for BSP run/stop	Mode SW update mode (download active on a new BSP, application) Application running Application loaded but not running Application not loaded BSP error (software error) Hardware error	LED status Alternating between red and green every second Green on Yellow on Yellow on Red blinking at 2 Hz Red on
Note	 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 (not included) Possible plugs for power supply (not included) Solid wire Stranded wire (twisted or with ferrule) Cable length	Phoenix FKCVW 2,5/x-ST Phoenix FKCT 2,5/x-ST Phoenix MVSTBW 2,5/x-ST Phoenix FKCVW 2,5/2-ST OG Phoenix FKCT 2,5/2-ST OG Phoenix MVSTBW 2,5/2-ST OG 0.5...2.5 mm ² 0.5...1.5 mm ² 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 Max. capability Formation	At the right side of the housing (Assembled in POL422.50, POL424.50) Slot 128 MB...2 GB FAT16, FAT32
Note	 SD Card is installed on POL42X.50/XXX only.	
Environment	Operation Temperature Restriction process bus Humidity Air pressure Transport Temperature Humidity Air pressure Mechanical conditions	IEC 60721-3-3 -40...70 °C -25...70 °C <90% r.h. (no condensation) Min. 700 hPa, corresponding to Max. 3,000 m above sea level IEC 60721-3-2 -40...70 °C <95% r.h. (no condensation) Min. 260 hPa, corresponding to Max. 10,000 m above sea level IEC 60721-3-2 Class 2M2
Protection	Degree of protection Safety class	IP 20 (EN 60529) Suitable for use in plants with safety class II

Standards	Product safety	
	Automatic electrical controls	EN 60730-1
	Electromagnetic compatibility	Suitable for residential and industrial EMC environment
	Immunity in the industrial sector	EN 61000-6-2
	Emissions in the domestic sector	EN 61000-6-3
	CE conformity	
	EMC Directive	2004/108/EC
	Low Voltage Directive	2006/95/EC
	Listings	UL916, UL873 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	180 x 110 x 75 mm
	Weight excl. packaging	600 g
	Base	Plastic, pigeon blue RAL 5014
	Housing	Plastic, light grey RAL 7035
Accessory parts	PC service cable 1.5 m	POL 0C2.40/STD
	Connector set (screw, cable side entry)	POL042.25/STD
	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		

Types and features

Hardware I/Os		POL421.05	POL422.05	POL424.05	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 / 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 (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 interface	✓	✓	✓	✓	✓
	EEV (stepper motor drive/PWM)	✓	✓		✓	
	SD card interface				✓	✓

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 analog inputs, because the measured ADC values are undefined. The accuracy of the 10 V analog inputs is valid for values above 100 mV.

Disposal notes

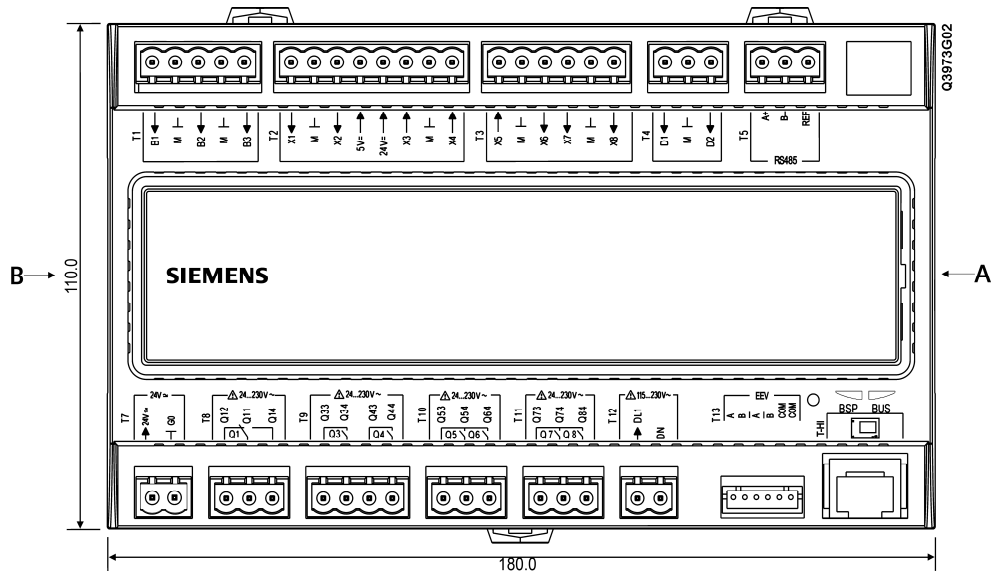


The controller contains electrical and electronic components and must not be disposed of together with household waste.

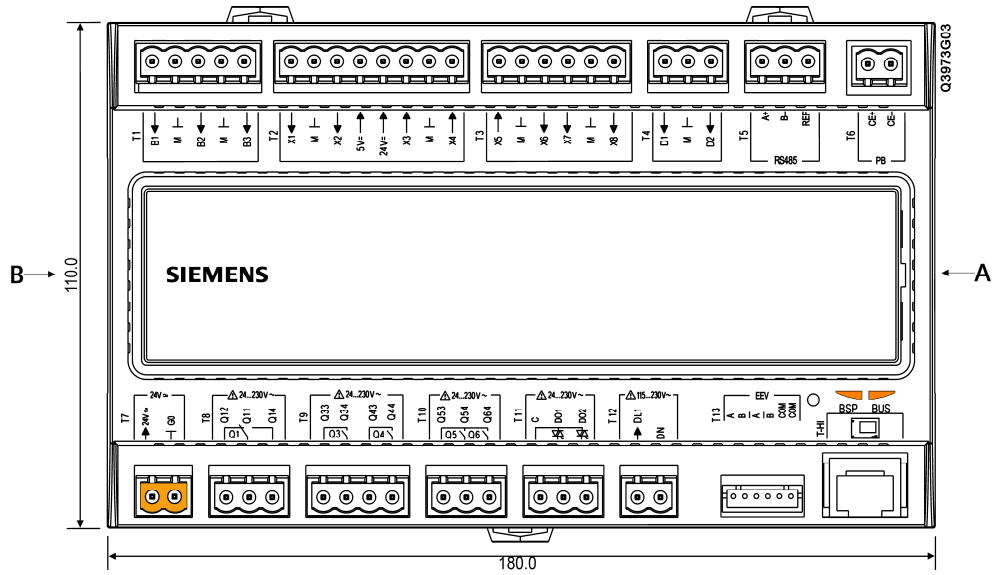
Local and currently valid legislation must be observed!

Layout of controller (mm)

POL 421.05/XXX



POL 422.05/XXX
POL 422.50/XXX



POL 424.05/XXX
POL 424.50/XXX

