

Hardware Implementation Guidelines

PeC Solution Controllers for Commercial Comfort Applications

PeC C100 & PeC C200



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About these guidelines

The purpose of these guidelines is to provide guidance in the application of Emerson controllers in users' systems. They are intended to answer the questions raised while designing, assembling and operating a system with these products.

Besides the support they provide, the instructions listed herein are also critical for the proper and safe functioning of the system. The performance and reliability of the system may be impacted if the product is not used according to these guidelines or is misused.

These guidelines cover stationary applications only. For mobile applications, please contact the Application Engineering department at Emerson as other considerations may apply.

1 Safety instructions






Emerson PeC controllers are manufactured according to the latest European safety standards. Particular emphasis has been placed on the user's safety.

The PeC controllers are intended for installation in systems in accordance with the European Machinery Directive MD 2006/42/EC, the Low Voltage Directive LVD 2014/35/EU and the Electromagnetic Compatibility Directive EMC 2014/30/EU. They may be put to service only if they have been installed in these systems according to instructions and conform to the corresponding provisions of legislation. For relevant standards please refer to the Manufacturers Declaration, available on request or at www.climate.emerson.com/en-gb.

These guidelines form part of the product and must always be kept near the controller for easy and quick reference. They should be retained throughout the lifetime of the controller.

You are strongly advised to follow these safety instructions.

1.1 Icon explanation

	WARNING This icon alerts the user of important instructions to avoid personal injury and material damage.		CAUTION This icon alerts the user of instructions to avoid property damage and possible personal injury.
	WARNING High voltage! This icon alerts the user of non-insulated "dangerous voltage" within the product area that is sufficiently high to constitute a risk of electric shock to persons.		IMPORTANT This icon alerts the user of important operating and maintenance or assistance instructions.
	Danger of explosive atmosphere This icon indicates a risk of explosive atmosphere.	NOTE	This word indicates a recommendation for easier operation.

1.2 Safety statements

- This product can only be used for purposes specified by the manufacturer.
- This product is designed to be used in HVAC/R systems and can only be installed, operated or maintained by qualified electrical personnel with additional system-related expertise. Please immediately contact the manufacturer for support if the user is uncertain with any safety-related issue.
- Electrical connections must be made by qualified electrical personnel with additional system-related expertise.
- All valid standards for connecting electrical and refrigeration equipment must be observed.
- The national legislation and regulations regarding personnel protection must be observed.



Use personal safety equipment. Safety goggles, gloves, protective clothing, safety boots and hard hats should be worn where necessary.

1.3 General warnings

**WARNING**

Conductor cables! Electrical shock hazard! This product operates at hazardous voltages which can cause severe personal injury or equipment damage. Extreme care and precautions must be taken when handling the product. Electrical connections must be made by qualified electrical personnel. Use a grounded system only. Moulded electrical plugs must be used in all applications. Refer to original equipment wiring diagrams. Do not operate system before all cable connections are completed. Disconnect all voltages from system before installation or service. Allow drive components to electrically discharge for a minimum of two minutes before servicing.

**WARNING**

Conductor cables! Electrical shock hazard! The controller must always be inserted inside an electrical panel that can only be accessed by authorised personnel. The keyboard must be the only part that can be reached. The device must never be hand-held while being used.

**CAUTION**

The controller cannot be used as a safety device. Verify the limits of application before using the device.

**IMPORTANT**

Transit damage! Controller disfunction! Use original packaging.

NOTE: The documentation can be downloaded from www.climate.emerson.com/en-gb even prior to purchase.

1.4 Use with flammable refrigerants

**WARNING**

The PeC controller is not designed or qualified based on the ATEX directive! The PeC controller fulfils the requirements of the mentioned system standard with the usage of flammable refrigerants.

The usage in systems with flammable refrigerants is limited to systems which are based on the IEC 60335-2-40 standard. Systems that are using flammable refrigerants A2L and A3 must consider the following points:

- The controller mounting area must be in **Zone 2** or outside any ATEX zone and in line with "**Pollution Degree 2**" classification.
- No airstream guided over the electronics.
- No condensation under normal operation.
- The IP class of the controller mounting area must be in line with the system standard.

1.5 General recommendations

The customer shall bear full responsibility and risk for product configuration in order to achieve the results pertaining to installation and/or final equipment/system. Upon customer's request and following a specific agreement, Emerson may be present during the start-up of the final machine/application, as a consultant. However, under no circumstances can Emerson be held responsible for the correct operation of the final equipment/system.

Since Emerson products form part of a very high level of technology, a qualification/configuration/programming/commissioning stage is required to use them as best as possible. Otherwise, these products may malfunction, and Emerson cannot be held responsible.

It is good practice to bear the following in mind for all Emerson products:

- Prevent the electronic circuits from getting wet as contact made with water, humidity or any other type of liquid can damage them. Comply with the temperature and humidity limits specified in the guidelines in order to store the product correctly.

- The device must not be installed in particularly hot environments as high temperatures can cause damage, eg, to electronic circuits and/or plastic components forming part of the casing. Comply with the temperature and humidity limits specified in the guidelines in order to store the product correctly.
- Under no circumstances is the device to be opened – the user does not require the internal components. Please contact qualified service personnel for any assistance.
- Prevent the device from being dropped, knocked or shaken as either can cause irreparable damage.
- Do not clean the device with corrosive chemical products, solvents or aggressive detergents.
- The device must not be used in applications that differ from those specified in these guidelines.



2.1 General information about Emerson controllers PeC C100 and C200

Controllers PeC C100 & C200 are a range of parametric controllers developed and manufactured by Emerson.

The system consists of a parametric controller and built-in EEV driver for bipolar valve, adapted to be used in any type of application in the commercial comfort sector.

The PeC controller is powered at 24 VAC/DC and uses a high-speed performance 32-bit Cortex M3 microprocessor. The model is a 10-DIN rail.

2.1.1 Software architecture

The possibility of all-round configuration allows the PeC controller to be used in specific applications such as chillers and heat pumps.

2.1.2 Hardware architecture

The PeC controller is structured as follows:

- 32-bit microprocessor used to run the application
- removable screw connectors 5 mm / 3.5 mm
- the programme and parameters are stored in a permanent flash memory – no data is lost in case of power failure
- local data logging function on serial-flash memory
- RS485 Master (Modbus RTU)
- 2 x RS485 Slave (Modbus RTU)
- USB port

2.2 Main features

2.2.1 Hardware technical data

Technical data	Values / type
Operating temperature	-20 to +60 °C Humidity: max. 80 %, not condensing
Relative humidity	20 to 85%
Power supply	24 VAC ± 10 %; fuse 3.15 A slow; 50 Hz / 60 Hz ± 5 %
Power consumption	PeC C100: 25 VA maximum (with 1 EX6 valve) PeC C200: 50 VA maximum (with 2 EX6 valves)
Plug-in connector	Screw terminals and/or cage clamp female connectors
Protection class	IP 00

Table 1: Technical data

2.2.2 Configuration of the PeC C100 controller

- 4 relays
- 9 analog inputs (7 = NTC 2 = 4...20 mA)
- 1 analog input (0 – 10 V)
- 2 digital inputs (voltage free)
- 1 digital inputs opto-isolated (24 – 230 VAC/DC)
- 1 EEV driver (for bipolar valve)
- 1 input for backup power supply (will accommodate an XEC single or double valve, sold separately)

2.2.3 Configuration of the PeC C200 controller

- 8 relays
- 17 analog inputs (13 = NTC 4 = 4...20 mA)
- 1 analog input (0 – 10 V)
- 2 digital inputs (voltage free)

- 2 digital inputs opto-isolated (24 – 230 VAC/DC)
- 2 EEV drivers (for bipolar valve)
- 1 input for backup power supply (will accommodate an XEC single or double valve, sold separately)

2.3 Advanced technical information

2.3.1 PeC C100 controller

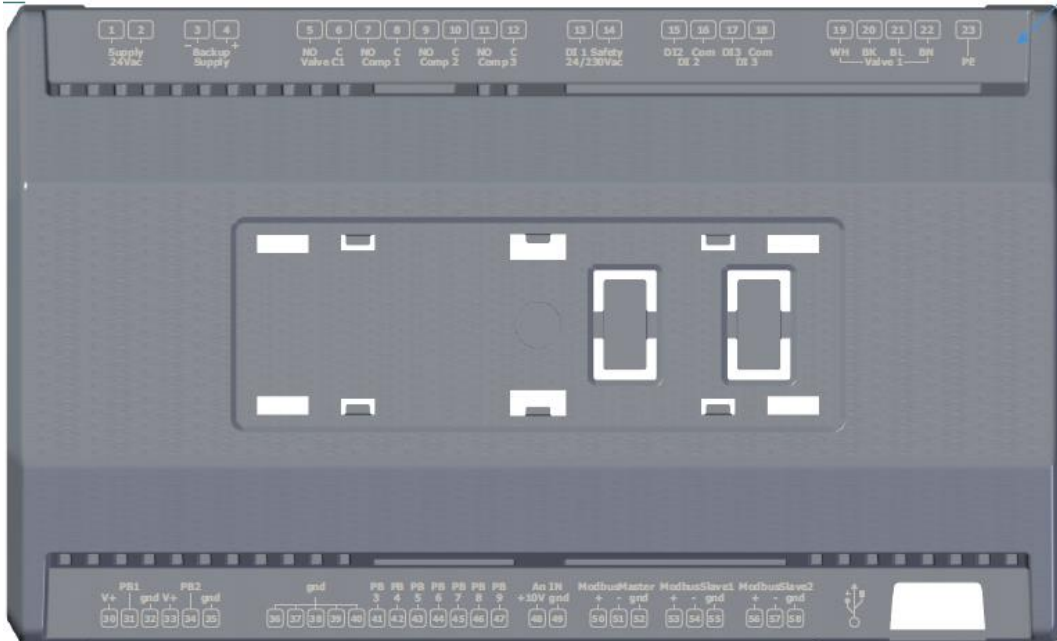


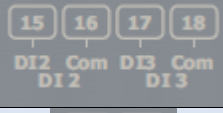
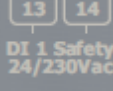

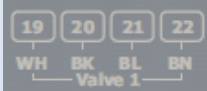



Figure 1

2.3.1.1 Description of the connections

Connector	Description
	Connector for 24 VAC/DC power supply (black colour) Green LED to indicate the presence of power supply
	Backup power supply for EXV closing in case of power failure. Voltage supply range (18-30 VDC) for min 10 sec Current requirements are dependent on number and type of EXV
	Dry contact, potential free
	24-240 VAC/DC, opto-isolated, feedback safety
	Connector for relay (5 A resistive, 3 A inductive $\cos \phi$ 0.5): - Relay DO1 (5-6) = 230 V~ potential free - Relay DO2 (7-8) = 230 V~ potential free - Relay DO3 (9-10) = 230 V~ potential free - Relay DO4 (11-12) = 230 V~ potential free
	Connector for bipolar valve circuit 1
	PE connection for EMC compliance

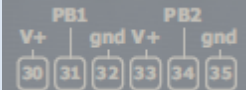
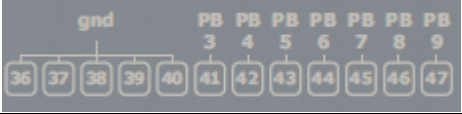
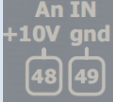


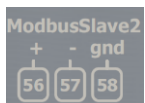

Connector	Description
	Analog input connector P1, P2 = 4...20 mA
	Analog input connector T1 to T7 = NTC
	Analog 0-10 V demand signal (future use)
	RS485 connector: - RS485 master (Modbus RTU) communication to inverter
	RS485 connector, may be used for system controller interface monitoring - RS485 slave (Modbus RTU)
	RS485 connector, may be used for system controller interface monitoring or flashing - RS485 slave (Modbus RTU)
	USB port (any stick to be plugged into a PeC must be formatted in FAT32 with 4K clusters)

Table 2

2.3.1.2 Inputs and outputs description

Input no.	Type of input	Description
1	Supply 24 VAC	Power supply
2	Supply 24 VAC	Power supply
3	Backup supply 24 VDC	Input backup power supply (Reference "-") (18-30 VDC) for min 10 sec
4	Backup supply 24 VDC	Input backup power supply (Reference "+") (18-30 VDC) for min 10 sec
5	RL1-NO	Relay 1 NO contact
6	RL1-C	Common relay 1 (230 VAC, max, 5 A resistive, 2 A inductive cos ϕ 0.5 switching capability)
7	RL2-NO	Relay 2 NO contact
8	RL2-C	Common relay 2 (230 VAC, max, 5 A resistive, 2 A inductive cos ϕ 0.5 switching capability)
9	RL3-NO	Relay 3 NO contact
10	RL3-C	Common relay 3 (230 VAC, max, 5 A resistive, 2 A inductive cos ϕ 0.5 switching capability)
11	RL4-NO	Relay 4 NO contact
12	RL4-C	Common relay 4 (230 VAC, max, 5 A resistive, 2 A inductive cos ϕ 0.5 switching capability)
13	DI1 C	Opto-insulated digital input 1 (24-230 VAC/DC)
14	Com	Opto-insulated digital input 1
15	DI2 C	Potential free digital input 2
16	Com	Potential free digital input 2
17	DI3 C	Potential free digital input 3
18	Com	Potential free digital input 3
21	V4 valve	Bipolar valve output

Input no.	Type of input	Description
22	V2 valve	Bipolar valve output
23	V3 valve	Bipolar valve output
24	V1 valve	Bipolar valve output
25	PE	Connector to PE for EMC
30	V+	<ul style="list-style-type: none"> Power supply pressure transducer +24 VDC (output) Future use: 5 VDC supply for ratiometric pressure transducer
31	PB1	<ul style="list-style-type: none"> Analog input (4-20 mA) Future use: 0-5 VDC signal input for ratiometric pressure transducer
32	GND	GND reference for ratiometric pressure transducer for future use
33	V+	<ul style="list-style-type: none"> Power supply pressure transducer +24 VDC (output) Future use: 5 VDC supply for ratiometric pressure transducer
34	PB2	<ul style="list-style-type: none"> Analog input (4-20 mA) Future use: 0-5 VDC signal input for ratiometric pressure transducer
35	GND	GND reference for ratiometric pressure transducer
36	GND	Analog input GND
37	GND	Analog input GND
38	GND	Analog input GND
39	GND	Analog input GND
40	GND	Analog input GND
41	PB3	Analog input 3 (TP1-NPx)
42	PB4	Analog input 4 (TP1-NPx)
43	PB5	Analog input 5 (TP1-NPx)
44	PB6	Analog input 6 (TP1-NPx)
45	PB7	Analog input 7 (TP1-NPx)
46	PB8	Analog input 8 (TP1-NPx)
47	PB9	Analog input 9 ((TP1-NPx)
48	10 V.	Analog input (0-10 Volt)
49	GND	GND reference (0-10 Volt)
50	RS485 +	RS485 Master connection (+)
51	RS485 -	RS485 Master connection (-)
52	GND	Ground reference for RS485
53	RS485 +	RS485 Slave connection (+)
54	RS485 -	RS485 Slave connection (-)
55	GND	Ground reference for RS485
56	RS485 +	RS485 Slave connection (+)
57	RS485 -	RS485 Slave connection (-)
58	GND	Ground reference for RS485

Table 3

2.3.1.3 Analog inputs

Analog conversion type	12-bit A/D converter
Number of inputs	9
Type of analog input (configurable via software parameter)	NTC Emerson (10 K Ω \pm 1 % at 25 $^{\circ}$ C) -40 $^{\circ}$ C to 150 $^{\circ}$ C NTC Emerson (100 K Ω \pm 1 % at 25 $^{\circ}$ C) 0 $^{\circ}$ C to 170 $^{\circ}$ C (future use) Voltage: 0-10 V (input resistance 9 K Ω) Current: 4-20 mA (input resistance 100 Ω)
Digital input status variation detection time	100 ms
Accuracy	See graph below (Figure 2) for more details

Table 4

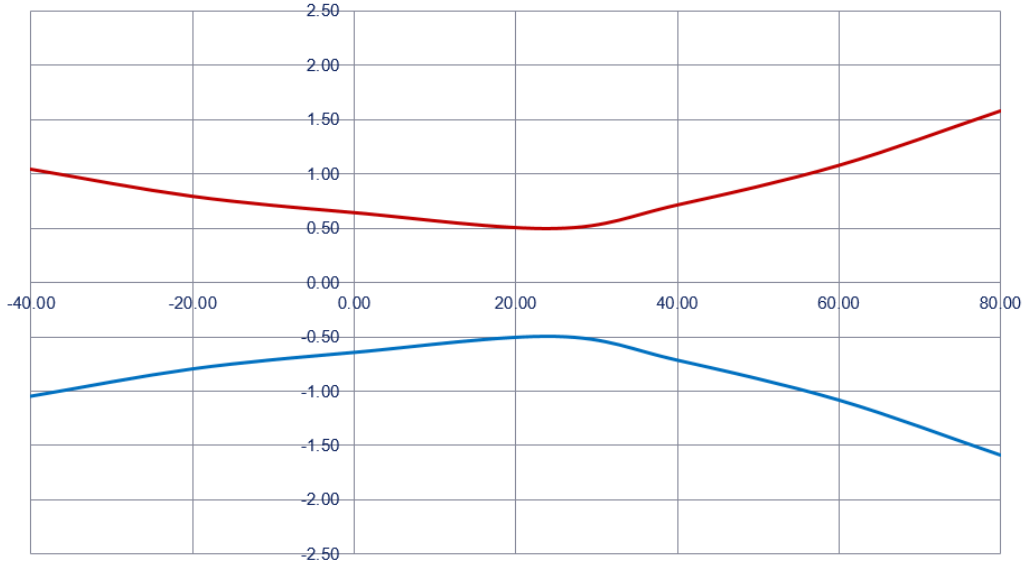


Figure 2: Temperature measurement accuracy (total error) NTC 10 KΩ

2.3.1.4 Digital inputs

Type	Opto-insulated / free voltage contacts
Number of inputs	1 DI 24-240 VAC/DC, opto-isolated 2 DI 24 VAC dry contact, potential free
Digital input status variation detection time	100 ms

Table 5

2.3.1.5 Digital outputs

Type	Relays with NO contacts
Number of outputs	4
Type of output (configurable via software parameter)	Relays with normally open contact (except LD1 that is normally closed)
Maximum load	230 VAC (5 A resistive, 2 A inductive $\cos \phi$ 0.5)
Caution!	Verify the capacity of the output used. There is double insulation between the digital outputs and the low voltage of the rest of the circuit.

Table 6

2.3.1.6 Wiring diagram PeC C100

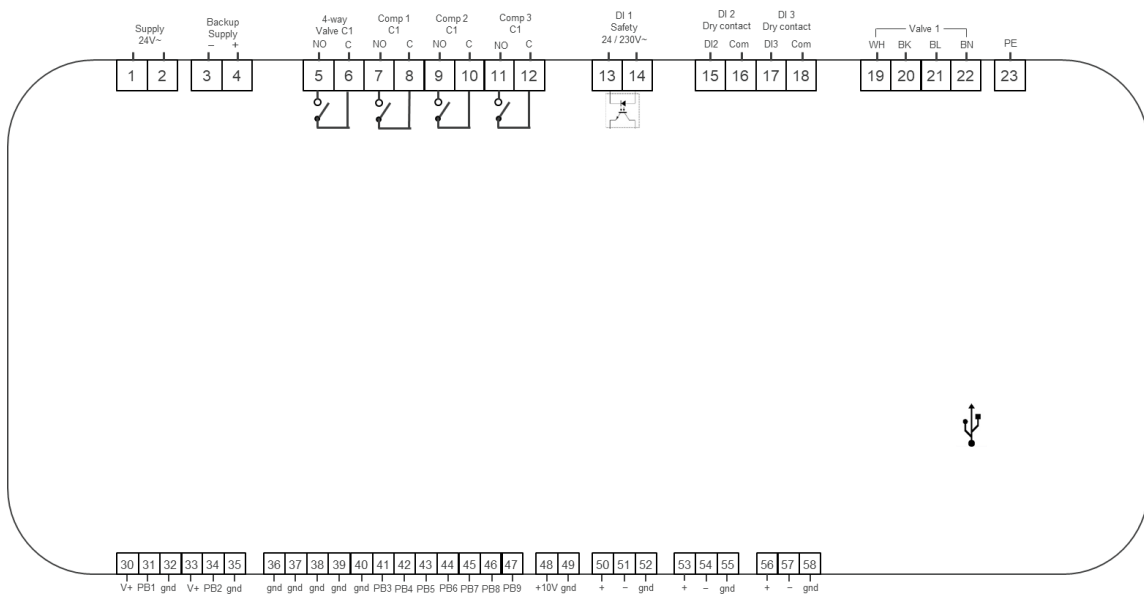


Figure 3

2.3.1.7 Mechanical specifications

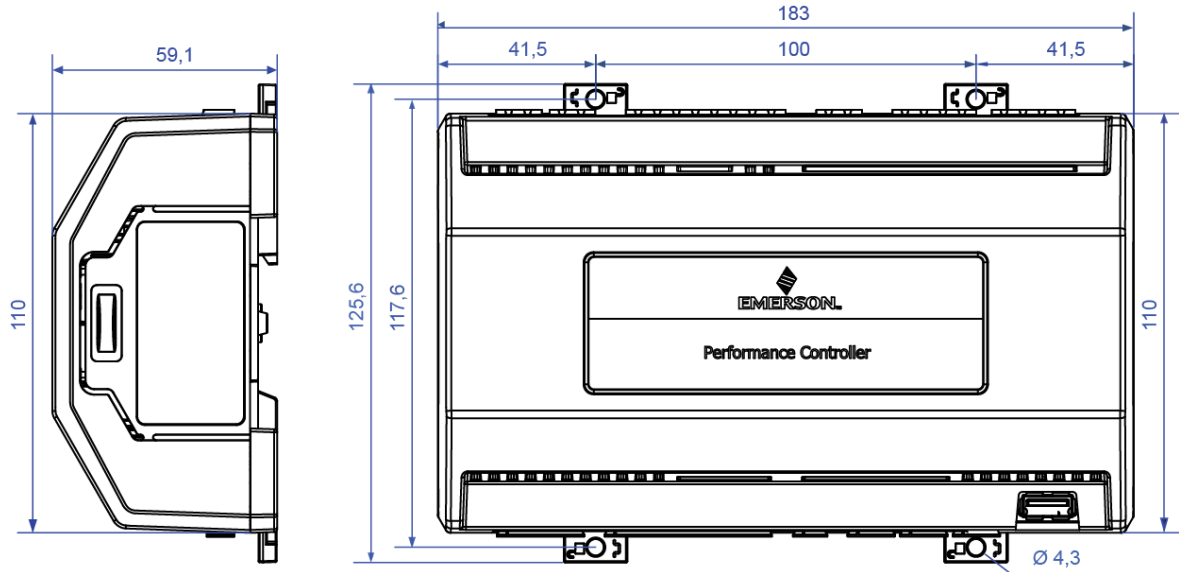


Figure 4: Dimensions of the PeC C100

2.3.1.8 Electrical specifications

Power supply	24 VAC \pm 10 %, 50/60 Hz 20-36 VDC
Consumption	25 VA (VAC), 30 W (VDC)
Connectors	STELVIO CPM series (board), STELVIO CPF series (disconnectable)
Microprocessor	LPC1766 32-bit 100 MHz
Permanent FLASH memory	256 KB
RAM	64 KB
Internal clock	100 MHz

Table 7

2.3.1.9 Plastic container

Mount	On a DIN rail (EN 50022, DIN 43880) Fastened with screws via the removable plastic flaps
Material	PC-ABS Thermoplastic
Self-extinguishing	V0 (UL94)
Comparative Tracking Index (CTI)	300 V
Colour	Grey

Table 8

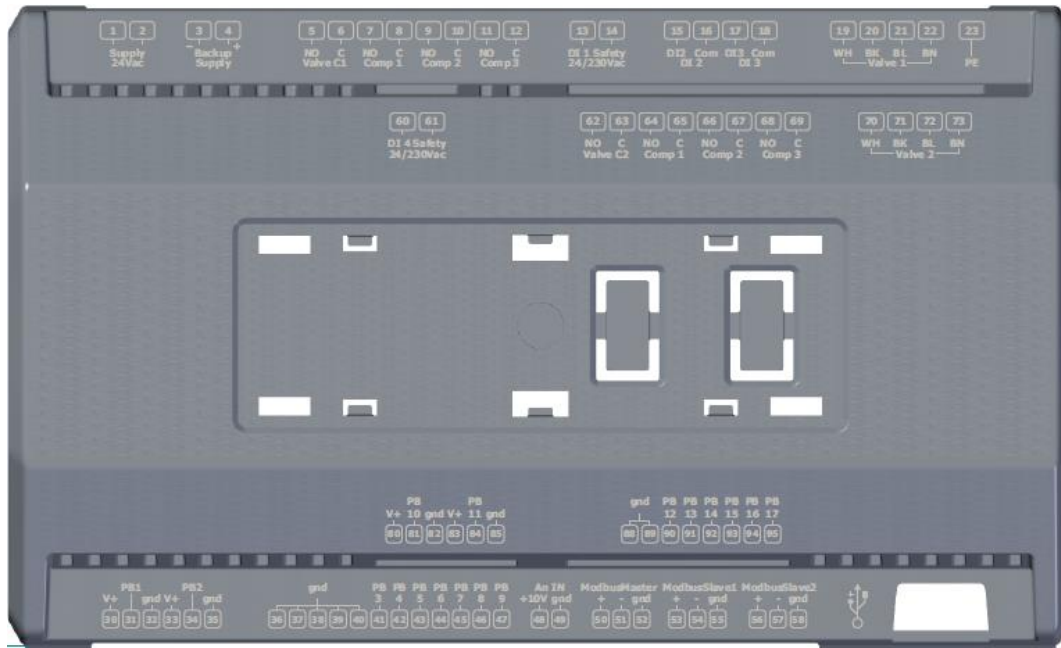
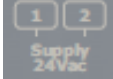

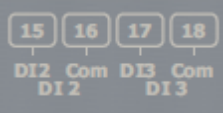




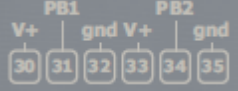
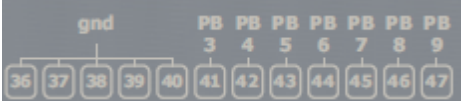


Figure 5

2.3.2.1 Description of the connections

Connector	Description
	Connector for 24 VAC/DC power supply (black colour) Green LED to indicate the presence of power supply
	Backup power supply for EXV closing in case of power failure. Voltage supply range (18-30 VDC) for min 10 sec. Current requirements are dependent on number and type of EXV.
	Dry contact, potential free
	24-240 Volt AC/DC, opto-isolated, feedback safety
	Connector for relay: - Relay DO1 (5-6) = 230 V~ potential free - Relay DO2 (7-8) = 230 V~ potential free - Relay DO3 (9-10) = 230 V~ potential free - Relay DO4 (11-12) = 230 V~ potential free
	Connector for bipolar valve circuit 1
	PE connection for EMC
	Analog input connector P1, P2 = 4...20 mA
	Analog input connector T1 to T7 = NTC

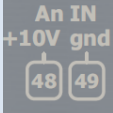
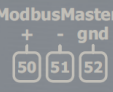
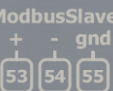
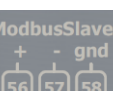

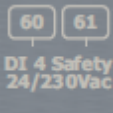
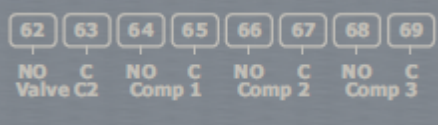
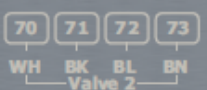
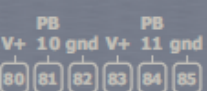
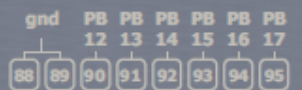
Connector	Description
	Analog 0-10 V demand signal (future use)
	RS 485 connector: - RS485 master (Modbus RTU) communication to inverter
	RS485 connector, may be used for system controller interface / monitoring - RS485 slave (Modbus RTU)
	RS485 connector, may be used for system controller interface / monitoring or flashing - RS485 slave (Modbus RTU)
	USB port (any stick to be plugged into a PeC must be formatted in FAT32 with 4K clusters)
	24-240 VAC/DC, opto-isolated, feedback safety (related to circuit 2)
	Connector for Relay: - Relay DO5 (62-63) = 230 V~ potential free - Relay DO6 (64-65) = 230 V~ potential free - Relay DO7 (66-67) = 230 V~ potential free - Relay DO8 (68-69) = 230 V~ potential free
	Connector for bipolar valve circuit 2
	Analog input connector PB10, PB11 = 4...20 mA (related to circuit 2)
	Analog input connector T8 to T17 = NTC

Table 9

2.3.2.2 Inputs and outputs description

Input no.	Type of input	Description
1	Supply 24 VAC	Power supply
2	Supply 24 VAC	Power supply
3	Backup supply	Backup power supply (Reference "-") (18-30 VDC) for min 10 sec
4	Backup supply	Backup power supply (Reference "+") (18-30 VDC) for min 10 sec
5	RL1-NO	Relay 1 NO contact
6	RL1-C	Common relay 1 (230 VAC, max, 5 A resistive, 2 A inductive cos ϕ 0.5 switching capability)
7	RL2-NO	Relay 2 NO contact
8	RL2-C	Common relay 2 (230 VAC, max, 5 A resistive, 2 A inductive cos ϕ 0.5 switching capability)
9	RL3-NO	Relay 3 NO contact
10	RL3-C	Common relay 3 (230 VAC, max, 5 A resistive, 2 A inductive cos ϕ 0.5 switching capability)
11	RL4-NO	Relay 4 NO contact

Input no.	Type of input	Description
12	RL4-C	Common relay 4 (230 VAC, max, 5 A resistive, 2 A inductive $\cos \phi$ 0.5 switching capability)
13	DI1 C	Opto-insulated digital input 1 1(24-230 VAC/DC)
14	Com	Common opto-insulated digital input 1
15	DI2 C	Potential free digital input 2
16	Com	Potential free digital input 2
17	DI3 C	Potential free digital input 3
18	Com	Potential free digital input 3
21	V4 valve	Bipolar valve output (circuit 1)
22	V2 valve	Bipolar valve output (circuit 1)
23	V3 valve	Bipolar valve output (circuit 1)
24	V1 valve	Bipolar valve output (circuit 1)
25	PE	Connector to PE for EMC
30	V+	<ul style="list-style-type: none"> ▪ Power supply pressure transducer +24 VDC (output) ▪ Future use: 5 VDC supply for ratiometric pressure transducer
31	PB1	<ul style="list-style-type: none"> ▪ Analog input (4-20 mA) ▪ Future use: 0-5 VDC signal input for ratiometric pressure transducer
32	GND	GND reference for ratiometric pressure transducer for future use
33	V+	<ul style="list-style-type: none"> ▪ Power supply pressure transducer +24 VDC (output) ▪ Future use: 5 VDC supply for ratiometric pressure transducer
34	PB2	<ul style="list-style-type: none"> ▪ Analog input (4-20 mA) ▪ Future use: 0-5 VDC signal input for ratiometric pressure transducer
35	GND	GND reference for ratiometric pressure transducer for future use
36	GND	Analog input GND
37	GND	Analog input GND
38	GND	Analog input GND
39	GND	Analog input GND
40	GND	Analog input GND
41	PB3	Analog input 3 (TP1-NP _x)
42	PB4	Analog input 4 (TP1-NP _x)
43	PB5	Analog input 5 (TP1-NP _x)
44	PB6	Analog input 6 (TP1-NP _x)
45	PB7	Analog input 7 (TP1-NP _x)
46	PB8	Analog input 8 (TP1-NP _x)
47	PB9	Analog input 9 (TP1-NP _x)
48	10 V	Analog input (0-10 Volt)
49	GND	GND reference (0-10 Volt)
50	RS485 +	RS485 Master connection (+)
51	RS485 -	RS485 Master connection (-)
52	GND	Ground reference for RS485
53	RS485 +	RS485 Slave connection (+)
54	RS485 -	RS485 Slave connection (-)
55	GND	Ground reference for RS485
56	RS485 +	RS485 Slave connection (+)
57	RS485 -	RS485 Slave connection (-)
58	GND	Ground reference for RS485
60	DI4 C	Opto-insulated digital input 4 (24-230 VAC/DC)
61	Com	Common opto-insulated digital input 1
62	RL5-NO	Relay 5 NO contact

Input no.	Type of input	Description
63	RL5-C	Common relay 5 (230 VAC, max, 5 A resistive, 2 A inductive cos ϕ 0.5 switching capability)
64	RL6-NO	Relay 6 NO contact
65	RL6-C	Common relay 6 (230 VAC, max, 5 A resistive, 2 A inductive cos ϕ 0.5 switching capability)
66	RL7-NO	Relay 7 NO contact
67	RL7-C	Common relay 7 (230 VAC, max, 5 A resistive, 2 A inductive cos ϕ 0.5 switching capability)
68	RL8-NO	Relay 8 NO contact
69	RL8-C	Common relay 8 (230 VAC, max, 5 A resistive, 2 A inductive cos ϕ 0.5 switching capability)
70	V4 valve	Bipolar valve output (circuit 2)
71	V2 valve	Bipolar valve output (circuit 2)
72	V3 valve	Bipolar valve output (circuit 2)
73	V1 valve	Bipolar valve output (circuit 2)
80	V+	<ul style="list-style-type: none"> ▪ Power supply pressure transducer +24 VDC (output) ▪ Future use: 5 VDC supply for ratiometric pressure transducer
81	PB10	<ul style="list-style-type: none"> ▪ Analog input (4-20 mA) ▪ Future use: 0-5 VDC signal input for ratiometric pressure transducer
82	GND	GND reference for ratiometric pressure transducer for future use
83	V+	<ul style="list-style-type: none"> ▪ Power supply pressure transducer +24 VDC (output) ▪ Future use: 5 VDC supply for ratiometric pressure transducer
84	PB11	<ul style="list-style-type: none"> ▪ Analog input (4-20 mA) ▪ Future use: 0-5 VDC signal input for ratiometric pressure transducer
85	GND	GND reference for 5VDC/24VDC and analog inputs
86	GND	Analog input GND
87	GND	Analog input GND
88	GND	Analog input GND
89	GND	Analog input GND
90	PB12	Analog input 12 (TP1-NP _x)
91	PB13	Analog input 13 (TP1-NP _x)
92	PB14	Analog input 14 (TP1-NP _x)
93	PB15	Analog input 15 (TP1-NP _x)
94	PB16	Analog input 16 (TP1-NP _x)
95	PB17	Analog input 17 (TP1-NP _x)

Table 10

2.3.2.3 Analog inputs

Analog conversion type	12-bit A/D converter
Number of inputs	9
Type of analog input (configurable via software parameter)	NTC Emerson (10 K Ω \pm 1 % at 25 °C) -40 °C to 150 °C NTC Emerson (100 K Ω \pm 1 % at 25 °C) 0 °C to 170 °C (future use) Voltage: 0-10 V (input resistance 9 K Ω) Current: 4-20 mA (input resistance 100 Ω)
Digital input status variation detection time	100 ms
Accuracy	See graph below (Figure 6) for more details
Additional power	+24 V: max 25 mA per channel +5 V: (future use)

Table 11

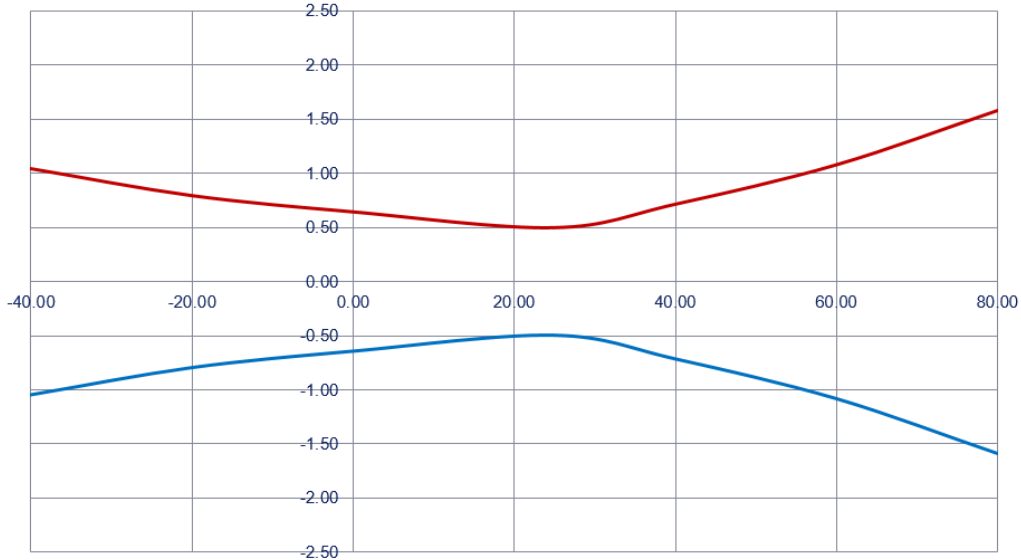


Figure 6: Temperature measurement accuracy (Total error) NTC 10 KΩ

2.3.2.4 Digital inputs

Type	Opto-insulated / free voltage contacts
Number of inputs	1 DI 24-240 VAC/DC, opto-isolated 2 DI 24 VAC Dry contact, potential free
Digital input status variation detection time	1 second

Table 12

2.3.2.5 Digital outputs

Type	Relays with NO contacts
Number of outputs	8
Type of output (configurable via software parameter)	Relays with normally open contact
Maximum load	230 VAC (5 A resistive, 2 A inductive cos φ 0.5)
Caution!	Verify the capacity of the output used. There is double insulation between the digital outputs and the low voltage of the rest of the circuit. Gas-tight version (EN 66079-15 clause 22.5)

Table 13

2.3.2.6 Wiring diagram PeC C200

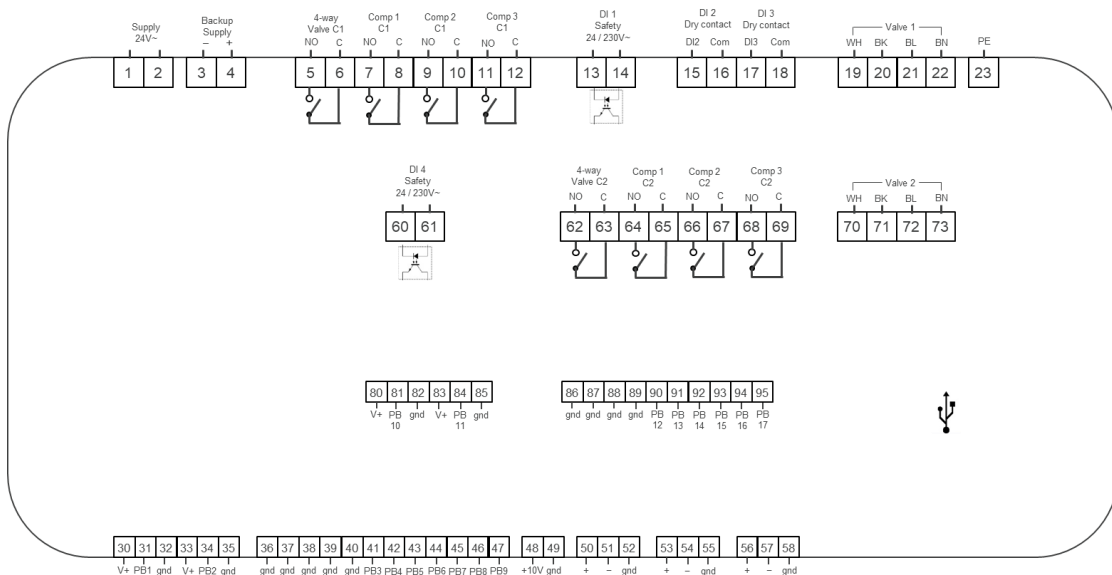


Figure 7

2.3.2.7 Mechanical specifications

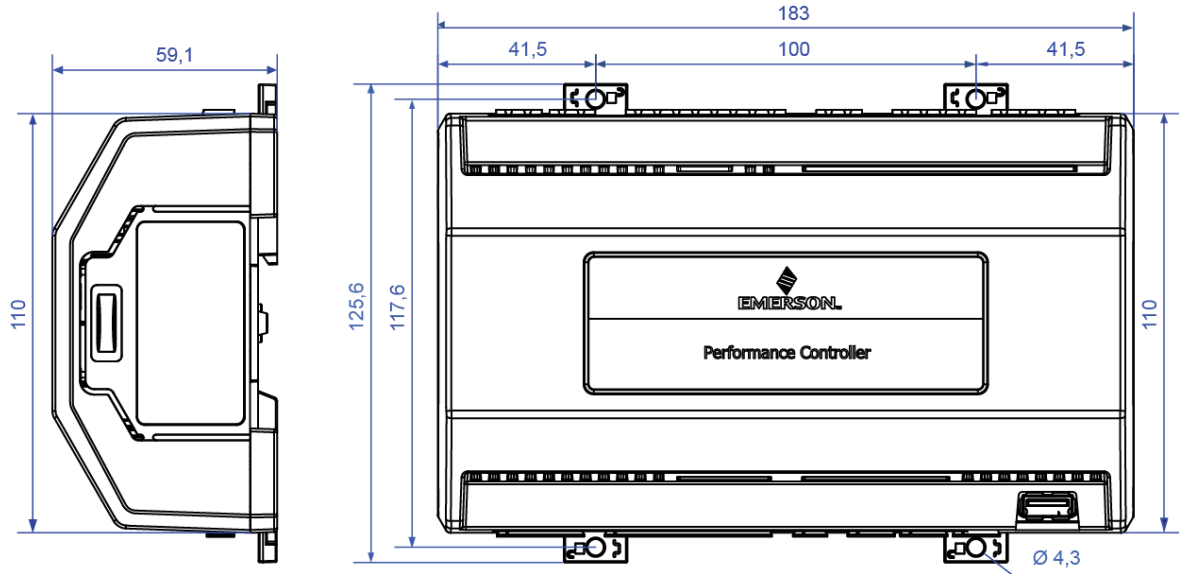


Figure 8: Dimensions of the PeC C200

2.3.2.8 Electrical specifications

Power supply	24 VAC \pm 10%, 50/60 Hz 20-36 VDC
Consumption	50 VA (VAC), 15 W (VDC) With the driver: 40 VA (VAC), 30 W (VDC)
Connectors	STELVIO CPM series (board), STELVIO CPF series (disconnectable)
Microprocessor	LPC1766 32-bit 100 MHz
Permanent FLASH memory	256 KB
RAM	64 KB
Internal clock	100 MHz

Table 14

2.3.2.9 Plastic container

Mount	On a DIN rail (EN 50022, DIN 43880) Fastened with screws via the removable plastic flaps
Material	PC-ABS Thermoplastic
Self-extinguishing	V0 (UL94)
Comparative Tracking Index (CTI)	300 V
Colour	Grey

Table 15

2.4 USB-RS485 Adapter (optional accessory)

The PeC controllers can be connected to a computer via an Emerson external adapter.

This adapter is not set up for fixed or continuous connection. If the adapter should be kept connected continuously, the room temperature must not exceed 50 °C.



Figure 9

3.1 Important recommendations



WARNING

Conductor cables! Electrical shock! The controller operates at hazardous voltages which can cause severe personal injury or equipment damage. Extreme care and precautions must be taken when handling the product.

The controller must not be opened.

The controller must always be inserted inside an electrical panel that can only be accessed by authorised personnel. The keyboard must be the only part that can be reached. Insert the probe where it cannot be reached by the end-user.



IMPORTANT

Humidity and condensation! Controller malfunction! Do not expose the controller to water or humidity. Use the device only within the operating limits, avoiding sudden changes in temperature and high atmospheric humidity in order to prevent condensation from forming.

The controllers must not be installed in environments where the following situations are present:

- temperature and humidity outside the range stipulated in the data plate; frequent and sudden changes in temperature and/or humidity;
- direct sunlight and weathering in general;
- high mechanical stress (vibrations and/or knocks);
- sulphur and ammonia gas, smoke and salt spray that can cause corrosion and/or oxidation;
- dust (no direct airstream over electronics – Pollution degree 2 must be fulfilled);
- devices that generate magnetic interference.

3.2 Controller installation

Position the controller inside the electrical panel, paying attention to the following:

- distance between the device and the electrical power components;
- distance between the device and the power cables;
- sufficient passage for the cooling air.

NOTE: Ensure compliance with the laws and regulations applicable in the country where the controller is installed.

NOTE: The controller must always be protected in such a manner that it is accessible solely to authorised personnel. In case of malfunctions, always contact the relative distributor for the device to be repaired.

4 Electrical connection

4.1 General recommendations



WARNING

Conductor cables! Electrical shock! The controller operates at hazardous voltages which can cause severe personal injury or equipment damage. Extreme care and precautions must be taken when handling the product.

The controller must always be inserted inside an electrical panel that can only be accessed by authorised personnel. The keyboard must be the only part that can be reached. Insert the probe where it cannot be reached by the end-user.

Disconnect all the electric connections before performing any maintenance or servicing work.

The device must never be hand-held while being used.



CAUTION

Wrong supply voltage! Material damage! Verify that the power supply voltage is correct before connecting the controller.

Consider the maximum current that can be applied to each relay.



IMPORTANT

Make sure that the wires for the probes, the loads and the electrical power supply are separated and sufficiently distant from each other, without crossing or intertwining with each other.

Separate the power of the controller from the rest of the electrical devices connected inside the electrical panel. The secondary of the transformer must never be connected to the earth.

In the case of applications in industrial environments, it may be useful to use the main filters in parallel to the inductive loads.

During the installation process, follow the recommendations below to prevent the device from malfunctioning:

- Separate the cables of the analog inputs from those of the digital inputs, and the serial line cables from the power cables, to avoid malfunction due to electromagnetic interference.
- Separate the power of the device from that of other electrical components.
- Never connect the secondary of the supply transformer to the earth.
- Separate the signal cables from the power cables. It is recommended to follow the diagram in **Figure 10** below as far as possible.

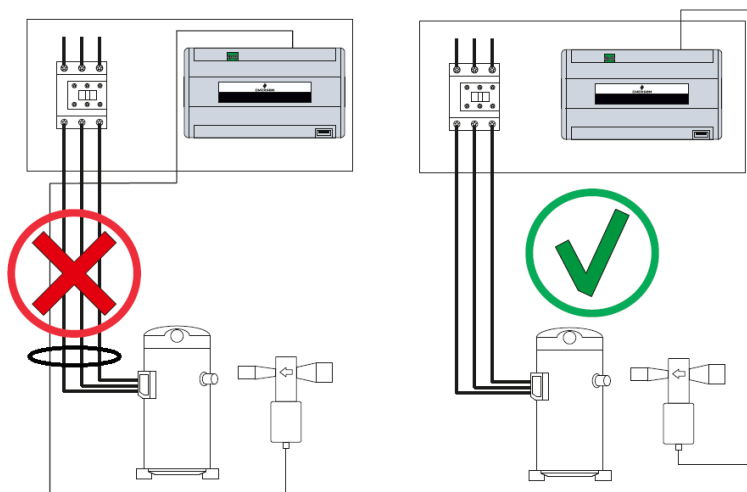


Figure 10

The example above refers to the EXV. It shows how improper connection can generate a wrong signal to the valve and the possibility to lose steps.

4.2 Power supply

4.2.1 Power supply voltage of the devices



CAUTION

Wrong supply voltage! Material damage! Never use power that differs from that indicated as it could damage the controller. Always use safety transformers.

- **PeC C100:** 24 VAC \pm 10 %, 50/60 Hz (consumption 25 VA) for the version with one EEV.
- **PeC C200:** 24 VAC \pm 10 %, 50/60 Hz (consumption 50 VA) for the version with 2 EEV.

4.2.2 Power supply voltage with battery backup

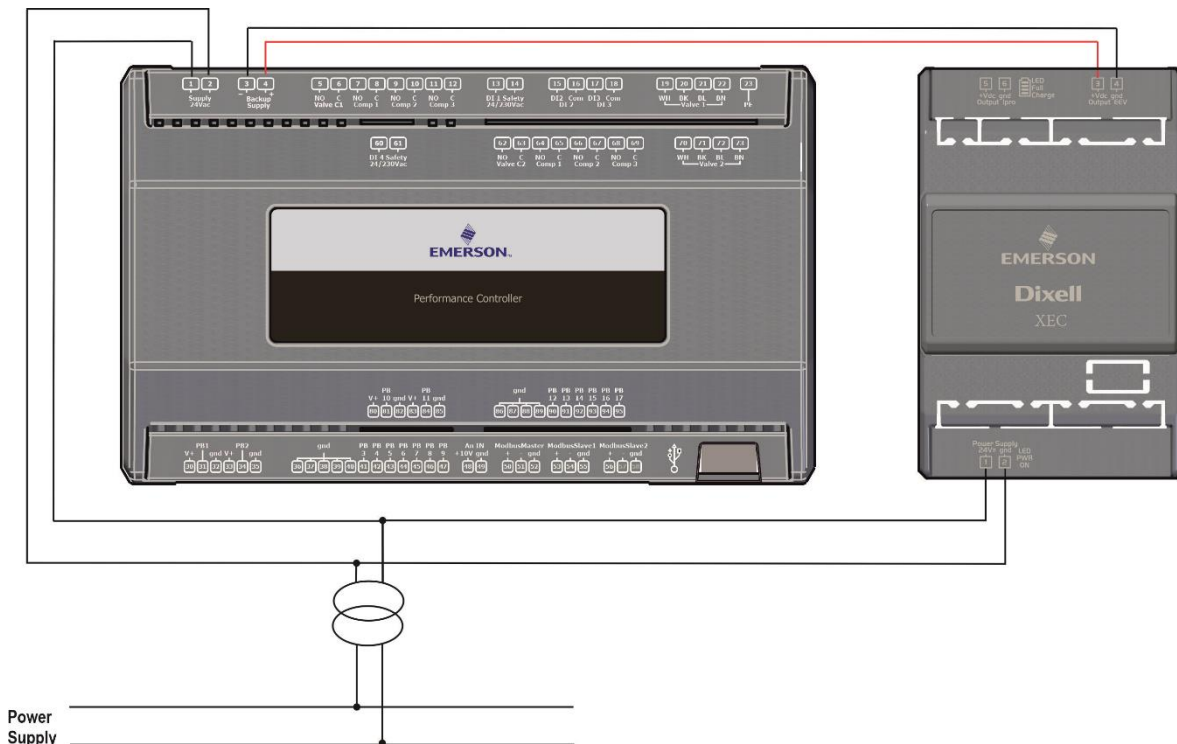


Figure 11

4.3 Connection of the analog inputs

4.3.1 Temperature probes (NTC)

Each sensor must be connected through one of the inputs (from PB3 to PB9) and the common (Com) as shown in the diagram in **Figure 12** below. Refer to **Tables 3 & 10** for the numbering.

The 2-wire sensor does not require polarity to be respected.

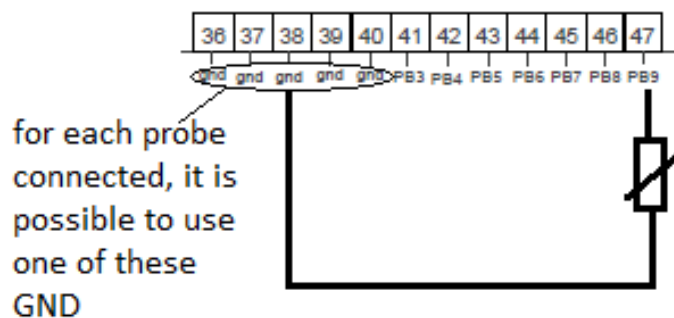


Figure 12: Temperature probes connection

4.3.2 Pressure transducers and current probes (4-20 mA)

Two sensors must be connected through one of the inputs (from PB1 to PB2) and the power supply as shown in the diagram in **Figure 13** below. Refer to **Tables 3 & 10** for the numbering.

The 2-wire sensors require polarity to be respected (+24 VDC power supply).

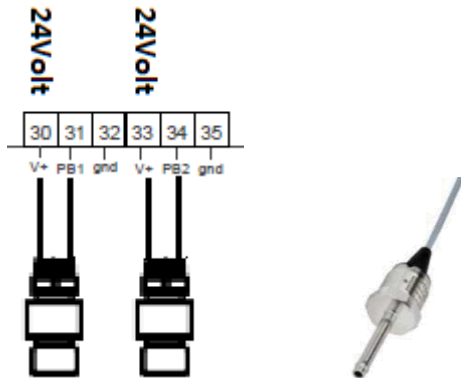


Figure 13

4.4 Connection of the digital inputs

The digital inputs in the PeC controllers can be used as potential free digital inputs.

4.4.1 Opto-insulated digital inputs (24-230 VAC/DC) DI1 and DI4

Refer to diagrams in **Figures 14 & 15** below and to **Tables 3 & 10** for the numbering.

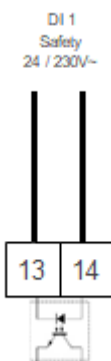


Figure 14: Digital inputs PeC C100

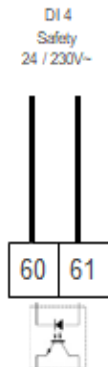


Figure 15: Digital inputs PeC C200

NOTE: For A2L and A3 applications use 24 volts.

4.4.2 Potential free digital input DI2 and DI3

Refer to diagram in **Figure 16** below and to **Tables 3 & 10** for the numbering.

The function is determined by the configuration (currently not in use).

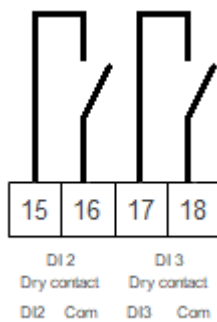


Figure 16: Digital inputs PeC C100 & C200

4.5 Connection of the digital outputs

The digital outputs are isolated from one another (no common contact).

The same voltage must always be used for the various groups of relays and within each group.

For the electrical specifications, refer to the relative paragraphs of the different models and to **Table 13**.

4.6 General overview of inputs and outputs

4.6.1 Circuit 1 – Top side

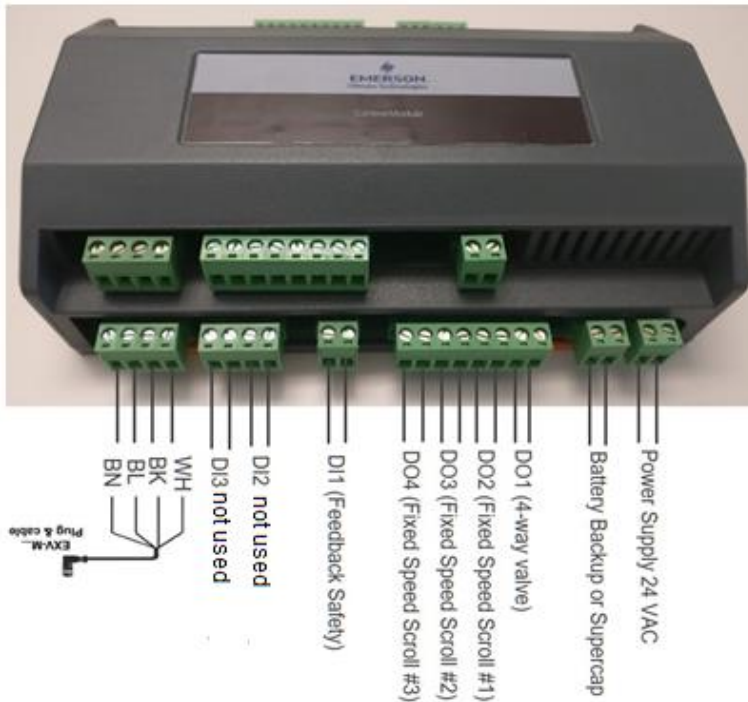


Figure 17: Circuit 1 top side – Power supply, digital outputs & inputs & EXV connections

4.6.2 Circuit 1 – Bottom side

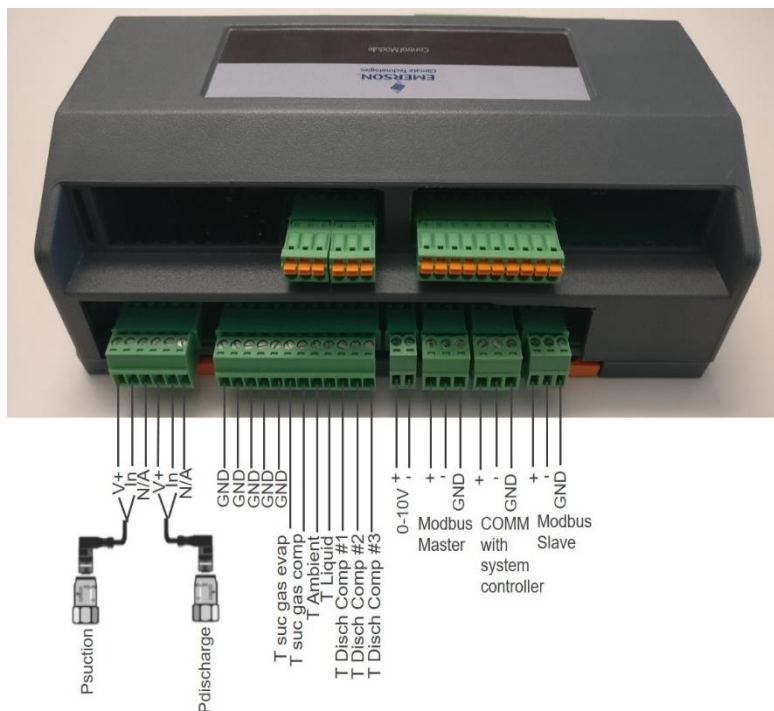


Figure 18: Circuit 1 bottom side – Digital inputs, Modbus communication, pressure and temperature inputs

4.6.3 Circuit 2 (with fixed-speed compressors only) – Top side

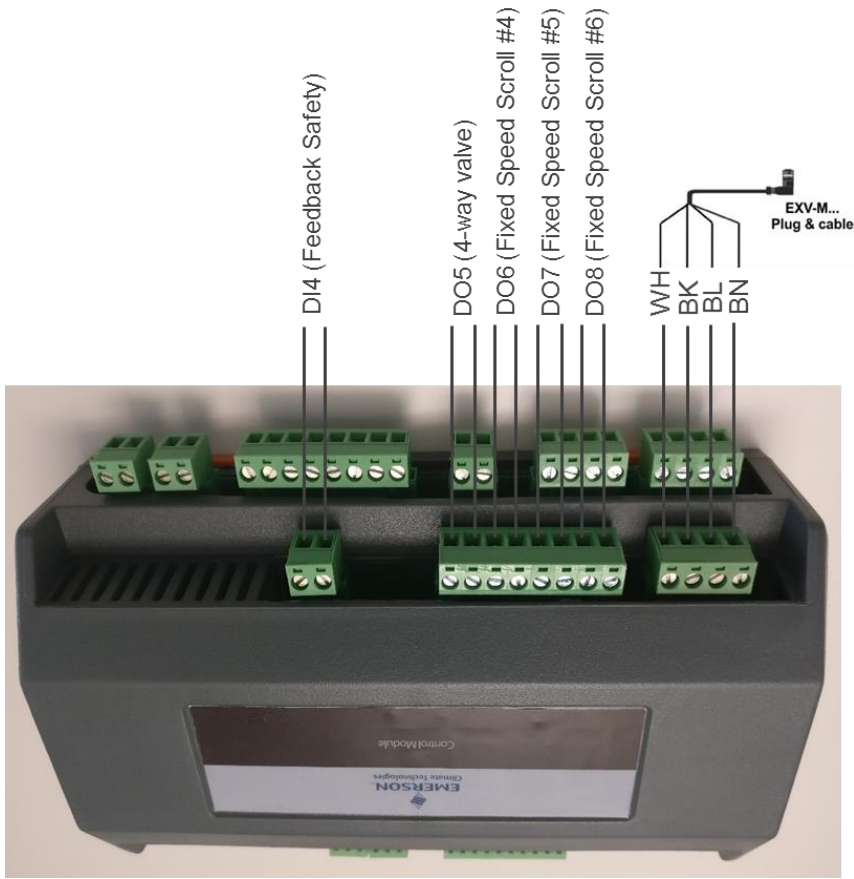


Figure 19: Circuit 2 top side – Power supply, digital outputs & EXV connections

4.6.4 Circuit 2 (with fixed-speed compressors only) – Bottom side

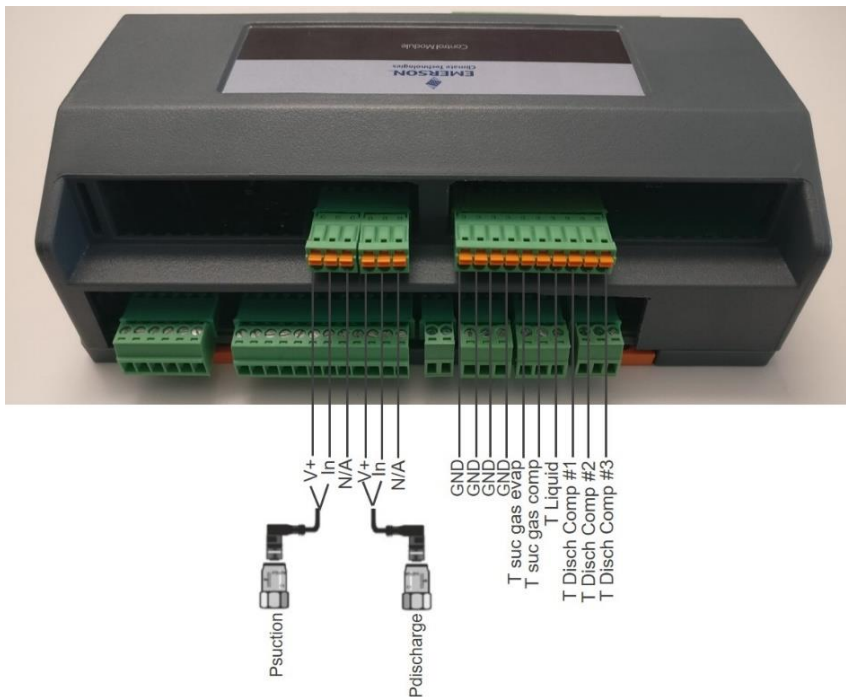


Figure 20: Circuit 2 bottom side – Pressure and temperature inputs

4.7 Electronic expansion valve driver

PeC C100 and PeC C200 are able to drive a wide range of stepper valves. **Table 16** below shows the connection details. The power supply of the PeC C100 requires a TF25D transformer; for PeC C200 a TF50 transformer is required.

Connection numbering	Emerson EXV
V4 valve	White
V2 valve	Brown
V3 valve	Black
V1 valve	Blue

Table 16: PeC valve connections

NOTE: The electrical power absorption of the valve is unrelated to its refrigeration power. Before using the actuator, please read the technical manual supplied by the valve manufacturer and check the maximum current used to drive the valve.

4.8 Variable speed compressor safety chain connection

4.8.1 EV3 drive to PeC

Communication between the EV3 drive and the PeC controller is standard 3-wires RS485 Modbus. The following connections have to be made on the EV3 drive to use Modbus control mode:

- Enable/Safety (Safety Pressure Switch) (between pins 3 and 4 of the controller terminal);
- Modbus connection to RJ485 port.

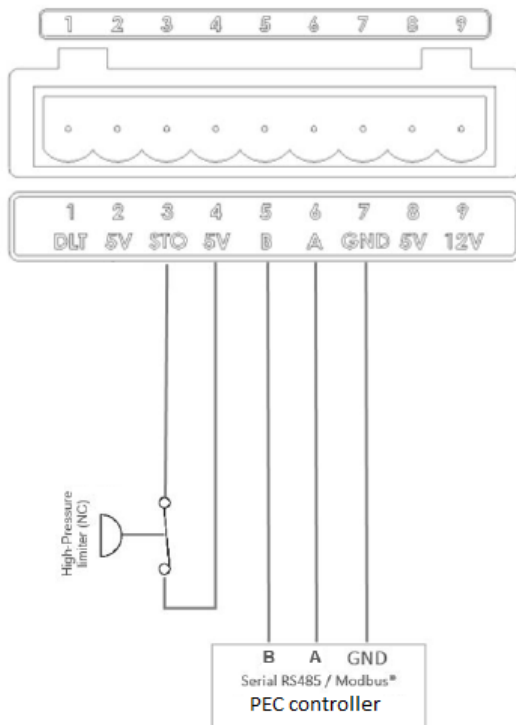


Figure 21: Communication between PeC controller and EV3 drive

NOTE: For more information, please refer to Application Guidelines AGL_SoI_EV3 "EV3 Inverter Drive for ZPV* Variable Speed Compressors" and AGL_AC_VS_YPV "Copeland Scroll Variable Speed Compressors for R32 Applications – YPV066* & YPV096*" or contact your local Application Engineering representative at Emerson.

4.8.2 Digital inputs and outputs wiring

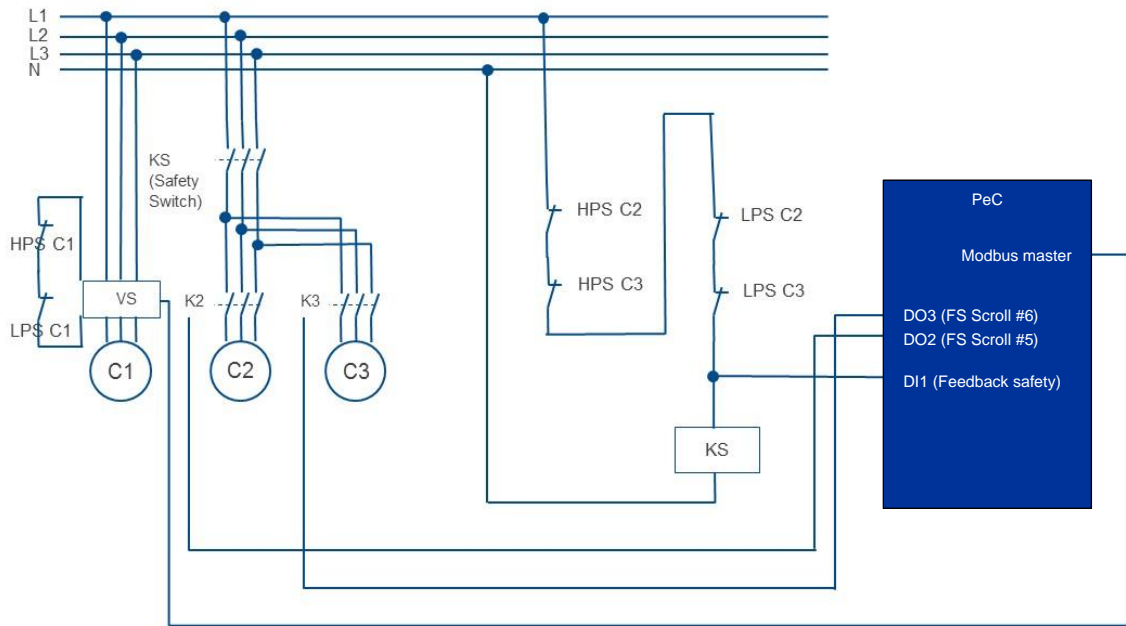


Figure 22: Digital inputs and outputs wiring for variable speed circuit (proposal)

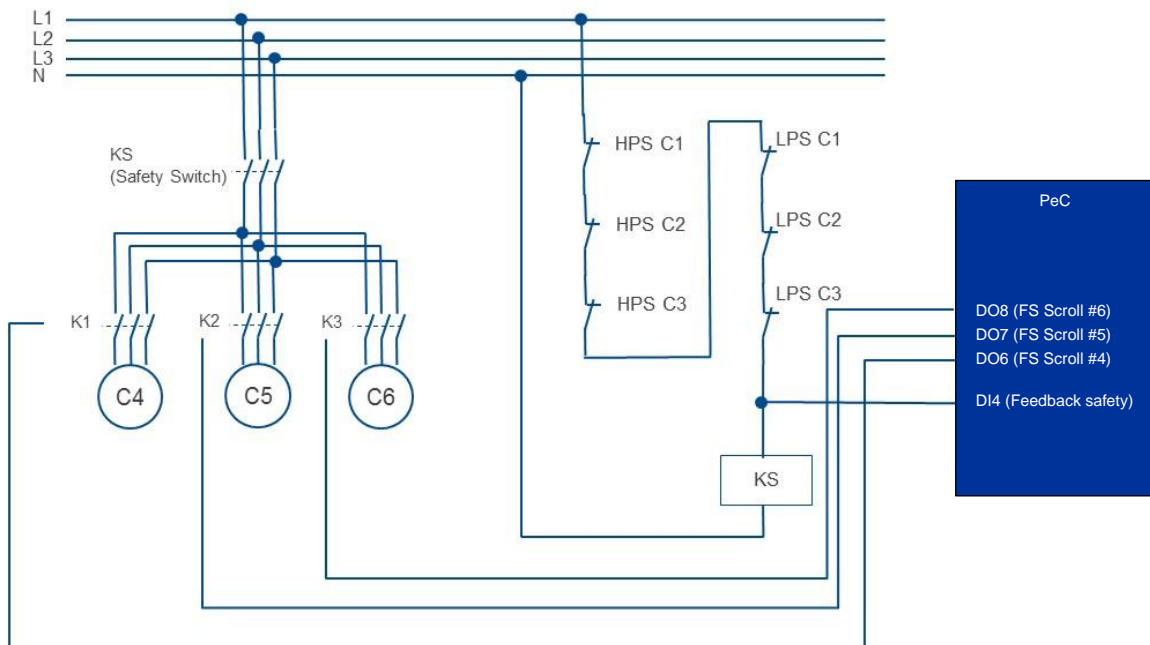


Figure 23: Digital inputs and outputs wiring for fixed-speed circuit

5 Certification & approval

- The controllers PeC C100 and C200 comply with the Low Voltage Directive LVD 2014/35/EU. The applied harmonised standards are:
 - EN 60335-1:2012/A11:2014: Household and similar electrical appliances - Safety - Part 1: Part 1: General requirements;
 - EN 60335-2-40:2003/A13:2012: Household and similar electrical appliances - Safety - Part 2-40: Particular requirements for electrical heat pumps, air conditioners and dehumidifiers.Other applied standards:
 - DIN IEC 60335-2-40:2018-05: Household and similar electrical appliances - Safety - Part 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers;
 - EN 60079-15:2010: Explosive atmospheres - Part 15: Equipment protection by type of protection "n".
- The controllers PeC C100 and C200 comply with the Electromagnetic Compatibility Directive EMC 2014/30/EU. The applied harmonised standards are:
 - EN 55014-1:2006/A2:2011: Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus Part 1: Emission;
 - EN 55014-2: 1997/A2:2008: Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus Part 2: Immunity - Product family standard.Other applied standards:
 - DIN EN 55014-1:2018-08: Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus Part 1: Emission;
 - DIN EN 55014-2:2016-01: Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus Part 2: Immunity - Product family standard.
- The controllers PeC C100 and C200 comply with RoHS 2011/65/EU, (EU) 2015/863.

6 Dismantling & disposal



With reference to the Waste Electrical and Electronic Equipment (WEEE) Directive 2012/19/EU and to the relative national legislation, please note that:

- **There lies the obligation not to dispose of electrical and electronic waste as municipal waste but to separate the waste.**
- **Public or private collection points must be used to dispose of the goods in accordance with local laws. Furthermore, at the end of the product's life, it is also possible to return this to the retailer when a new purchase is made.**
- **This equipment may contain hazardous substances. Improper use or incorrect disposal can have adverse effects on human health and the environment.**
- **The symbol shown on the product or the package indicates that the product has been placed on the market after 13 August 2005 and must be disposed of as separated waste.**
- **Should the product be disposed of incorrectly, sanctions may be applied as stipulated in applicable local regulations regarding waste disposal.**

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