

Installation guide-book

Room and superheat control panel + Electronic Expansion Valve

Models: PAW-CO2-PANEL-C

Topic: Installation and setting

Thank you very much for purchasing this products this time.

Please read this instruction guide-book and correctly comply with the explanations.

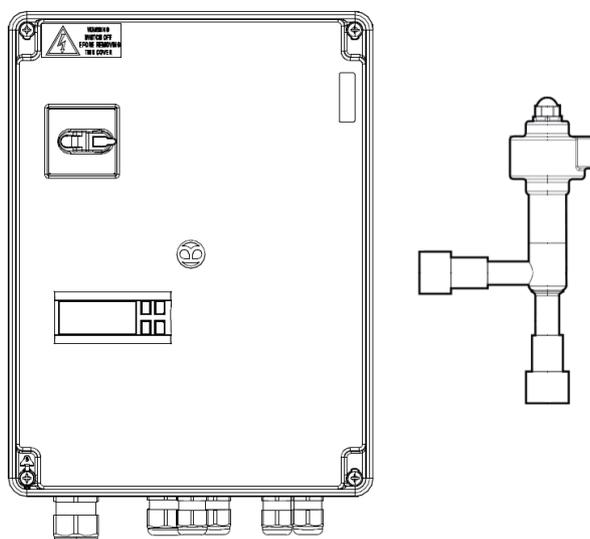
In particular, please read "Cautions for Safety" for ensuring safe operations.

In addition to this guide, please always follow as a complementary instructions the "User manual corresponding to the CAREL MPXPRO - +0300055EN rel. 1.4 - 20.10.2015".

Please retain this instruction guide-book in a safe place.

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Cautions for Safety

Please read "Cautions for Safety" for ensuring safe operations. For the purpose of avoiding harm to people and damage to properties, items to be complied with are explained here with this below symbol. In addition to this guide, please read carefully the "User manual corresponding to the CAREL **MPXPRO** - +0300055EN rel. 1.4 - 20.10.2015 , pag.3".



Indicates possibility of death, serious injury, minor injury, damage to properties or system malfunction.

Warranty

PANASONIC request strongly to carry out the works and recommendations that are exposed here in this document and CAREL User manual **MPXPRO** - +0300055EN rel. 1.4 - 20.10.2015 with the intention to well cover the warranty.

Otherwise, PANASONIC will reserve the right to provide these warranty and this must be understood from the beginning.

Electronic controller PAW-CO2-PANEL-C

It is a complete pre-setting electronic controller for MT or LT applications ready for a super quick commissioning process and with the integration of the complete and advanced management of stand-alone , multiplexed showcases or cold rooms, with built-in electronic expansion valve driver, ultra-cap and on top it is supplied with the size of electronic expansion valve that is required for each cooling capacity to choose between 7 different EEV sizes that can be easily selected through our online software: www.panasonicproclub.com

Or connect simply with your smartphone to the PRO Club using this QR :



It is designed for wall assembly and comes with 4 screws for this purpose.

The controller can manage a local Master-Slave network with a maximum of 6 controllers (1 Master and 5 Slaves).

Each controller have its own display user terminal (display plus keypad for programming).

This panel has been designed to offer maximum installation flexibility and significant energy saving when fitted with the CAREL E2V or PWM electronic expansion valve.

It features 7 analogue inputs for probes and 5 digital inputs, configurable by parameter if necessary. The following probes can be used: saturated evaporation pressure and superheated gas temperature probe, required for superheat control, outlet, intake and defrost probe for showcase temperature control, defrost probe for the second evaporator*, two auxiliary monitoring probes*, ambient temperature probe*, glass temperature sensor* and humidity probe* to prevent the showcase windows from misting (note*: this probes are not supplied with this panel).

In the latter case the PWM outputs can be used either to control the glass heaters or the evaporator fans for air circulation.

If the stepper expansion valve is not used, a second defrost probe can be installed to manage the defrost on a second evaporator.

The 5 digital outputs (relays) can control the compressor/solenoid valve, evaporator fans, defrost, light and alarm.

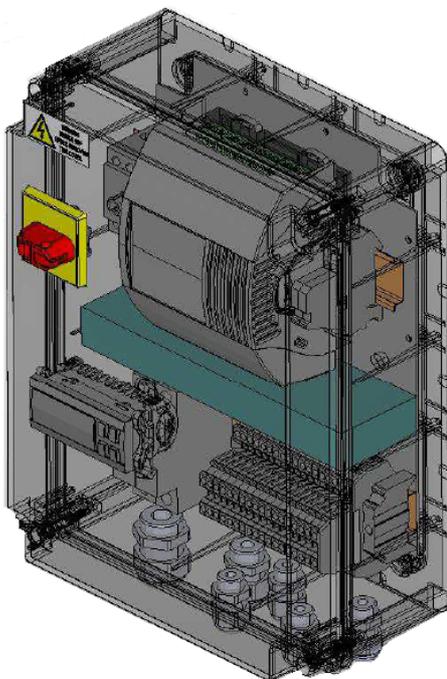
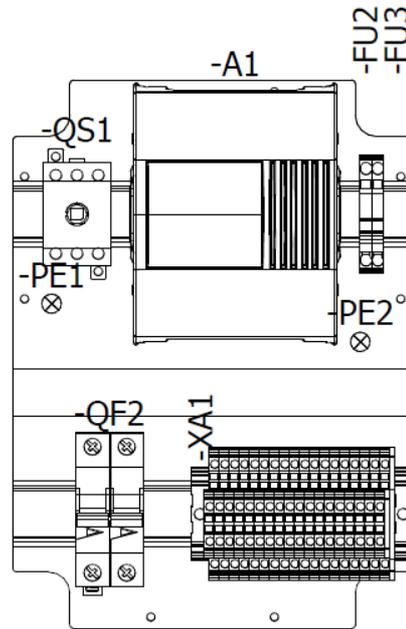
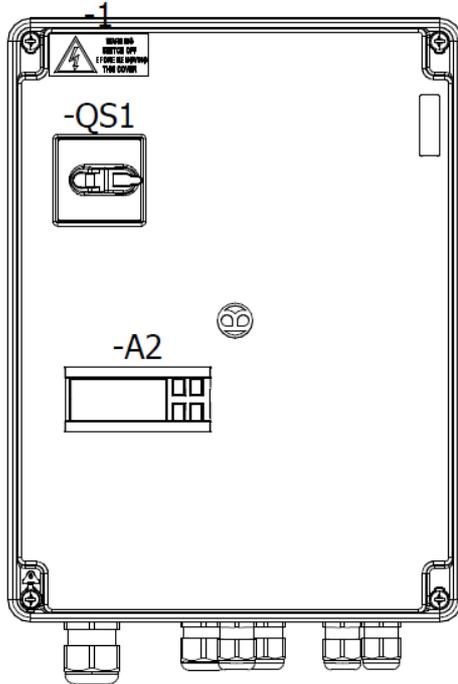
The digital inputs can be used for switching between day and night, for the defrost calls, for the door or curtain switch or to activate alarms.

By creating a Master/Slave network, a series of functions can be coordinated, such as defrosts, network solenoid valve management, sharing of the pressure probe, and sharing of control status.

Main features

- Compact structure, with built-in driver for CAREL stepper or PWM expansion valve;
- Ultracap technology for emergency closing in the event of mains power failure (no solenoid valve is required if the EEV valve is installed in direct way).
- Built-in switching power supply.
- Valve cable length could be extended to max 50m.
- Smooth Lines function (from version 3.2): to modulate evaporator capacity based on actual cooling demand.
- Display and master/slave network cable length could be extended to max100 m.
- Advanced superheat control with protection for low superheat (LowSH), low evaporation temperature (LOP), high evaporation temperature (MOP), low suction temperature (LSA);
- Defrost activated from the keypad, digital input, network control from Master, supervisor;
- Management of various types of defrost, on one or two evaporators: heater, natural (stop compressor), hot gas;
- Smart defrost functions;
- Coordinated network defrosts;
- Light and showcase curtain management;
- Anti-sweat heater modulation;
- Evaporator fan speed modulation;
- Remote control (accessory) for commissioning and programming;
- VPM program (Visual Parameter Manager), installed on a personal computer, for managing parameters and testing the controller;
- Possibility to display and set the Slave parameters from the Master;
- Propagation of digital input from Master to Slave;
- Display Slave alarms on the Master;
- Sharing of one or more network probes (e.g. network pressure probe);
- Management of network or local solenoid valve;
- Remote management of Master light and AUX outputs on Slave;
- Upload parameters from Master to Slaves;
- Master as gateway to supervisor for all Slaves;
- Management of HACCP alarms.

Main components and Accessories



Legend

- A1 Unit Control MPXPRO
- A2 User Interface and Display
- FU2 Fuse 10A (5x20)
- FU3 Fuse 3.15A (5x20)
- PE1 Ground
- PE2 Ground
- QF2 Power Circuit Breaker / Automatic Switch 16A/2
- XA1 Screw Terminal Block
- QS1 Main Switch Operation/Shaft

The PAW-CO2-PANEL-C it is basically made up of an MPXPRO controller and comes with all the necessary accessories, which will be described below (The expansion valve E2V will be supplied separately according to the needs) :

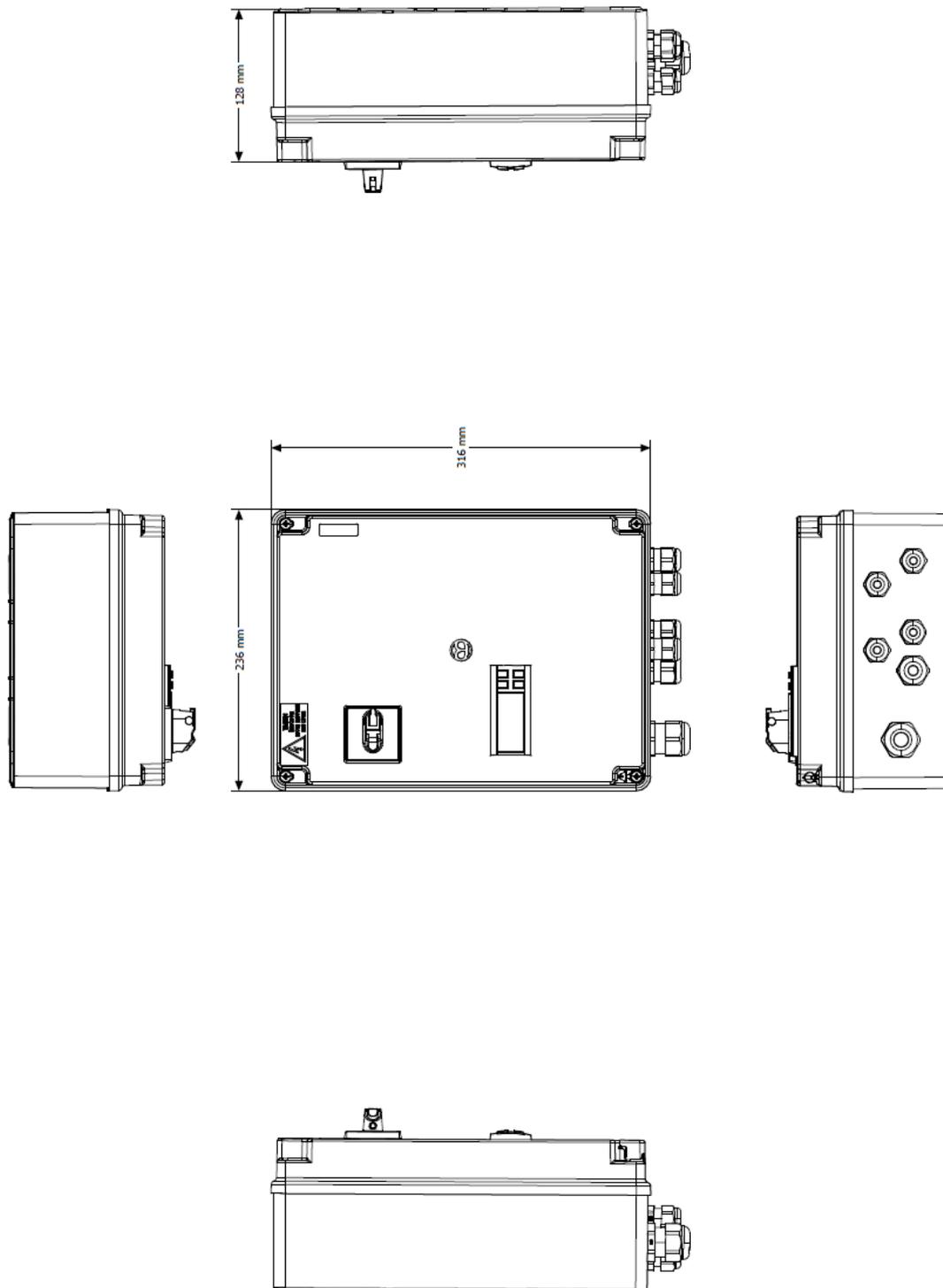
Item	Description	Qty
1	IR00UGC300 user terminal MPX-Pro (green LED's, buzzer, IR-port).	1
2	MX30M25HR0 MPX-Pro Master 5 relays, 115 to 230, EXV driver, ultra-cap.	1
3	NTC060HF03 SENSOR NTC HF IP67 -50T105 STRAP-ON L=6M.	1
4	NTC060WH03 SENSOR NTC WH IP68 -50T105 CABLE 6M.	3
5	SPKC005310 5m cable IP67 co-moulded Packard Connector for SPKT-probe.	1
6	SPKT00L1S0 pressure transducer high performance 0 to 90,0 bar relative, brass female.	1
7	E2VSTAS230 stator HERMETIC IP69K with 0,3 m cable & and super seal connector IP67.	1
8	E2VCABS610 6m connection cable with super seal connector IP67 for stator HERMETIC.	1



Dimensions & weight

External panel dimensions : 316 x 236 x 128 mm

- Full Package : 5,30 Kg
- Panel only : 3,30 Kg
- Accessories bag : 1,05 Kg



Installation

Follow the installation proceed with reference to the wiring diagrams:

1. Before performing any operations on the panel, disconnect the main power supply by turning the main switch in the electrical panel OFF. Then remove the plastic side cover and/or the covers to make the electrical connections;
2. Avoid touching the control board, as electrostatic discharges may damage the electronic components;
3. The index of protection required for the application must be ensured by the manufacturer of the display case or contractor by suitable assembly of the controller.
4. Connect any digital inputs, L max=10m;
5. Connect the power cable to the valve motor: to find the section or cable length, see “wiring diagram”.
6. Connect the actuators: Carefully evaluate the maximum ratings of the relay outputs as indicated in the “wiring diagram”;
7. Set the decided pre-setting program: see the chapter “User terminal / interface”.
8. For the tLAN connection of the Master/Slave network and user interfaces, use shielded cable and make sure:
 - The maximum distance between a controller and its user terminal/ remote display is 100 m (with section of cable not less than AWG22);
 - The maximum distance between the controllers and the maximum length of the cable between one controller and another is 100 m (with section of cable not less than AWG22).

Important: avoid installing the controllers in environments with the following characteristics:

- Relative humidity greater than the 90% or condensing;
- Strong vibrations or knocks;
- Exposure to continuous water sprays;
- Exposure to aggressive and polluting atmospheres (e.g.: sulphur and ammonia fumes, saline mist, smoke) to avoid corrosion and/or oxidation;
- Strong magnetic and/or radio frequency interference (avoid installing the controllers near transmitting antennae);
- Exposure of the controllers to direct sunlight and to the elements in general.

Important: when connecting the controllers, the following warnings must be observed:

- Incorrect connection to the power supply may seriously damage the controller;
- Use cable ends suitable for the corresponding terminals. Loosen each screw and insert the cable ends, then tighten the screws and lightly tug the cables to check correct tightness;
- Separate as much as possible the probe and digital input cables from the power cables to the loads so as to avoid possible electromagnetic disturbance. Never lay power cables and probe cables in the same conduits (including those in the electrical panels);
- Avoid installing the probe cables in the immediate vicinity of power devices (contactors, circuit breakers, etc.). Reduce the path of the probe cables as much as possible and avoid enclosing power devices.

Note: when connecting the RS485 serial network:

- Connect the shield to the GND terminals on all controllers;
- Do not connect the shield to the earth on the electrical panel;
- Use a twisted pair shielded cable (e.g. Belden 8762 – AWG 20 or BELDEN 8761-AWG 22);
- Connect a 120 Ω terminal resistor between the Tx/Rx+ and Tx/Rx terminals on the last MPXPRO controller.

Wiring diagram

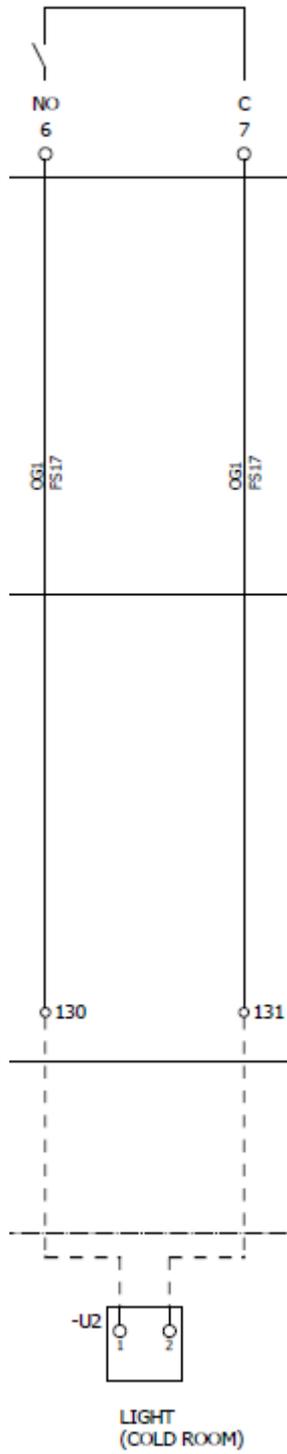
Please, read this information carefully.

- ⇒ Warming:
Before making any operation on the Panel,
turn off the main switch and ensures that
there is no power supply.
- ⇒ This document does not replace the Carel's
manual MPXPRO - 0300055EN
rel. 1.4 - 20.10.2015 (reference manual).
- ⇒ In the installation, separate the power and
load connections from the probes,
digital inputs, display , supervisor cables, etc.
- ⇒ Some components are not supplied
by Panasonic and must be supplied locally.
- ⇒ Probes must be installed at max.10m.
If it is necessary to extend the probe cables further,
it is recommended to use :
L<10m AWG22
L<30M AWG20
L<50M AWG18
Note: Readings may be affected and calibration
may be required through the MPXpro.

Wiring diagram

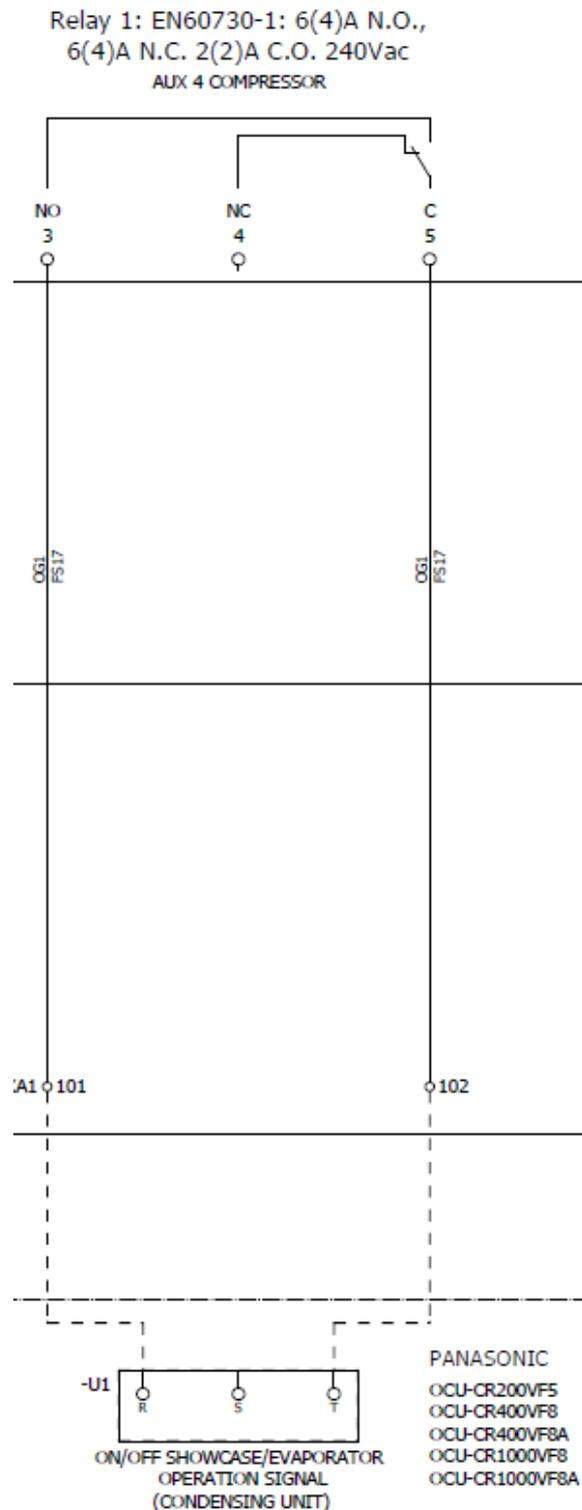
Light Connection (Not mandatory)

Relay 2: EN60730-1:
10(10)A N.O. 240Vac
AUX 3 LIGHT



Wiring diagram

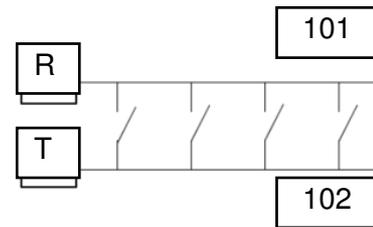
ON/OFF signal



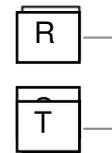
Note:

We can use it in 2 ways:

1. ON/OFF signal is coming from one or more Evaporators or Showcases.



2. ON/OFF signal should be bridged if we don't use the ON/OFF signal coming from the evaporator or showcase.



Connection is potential free.

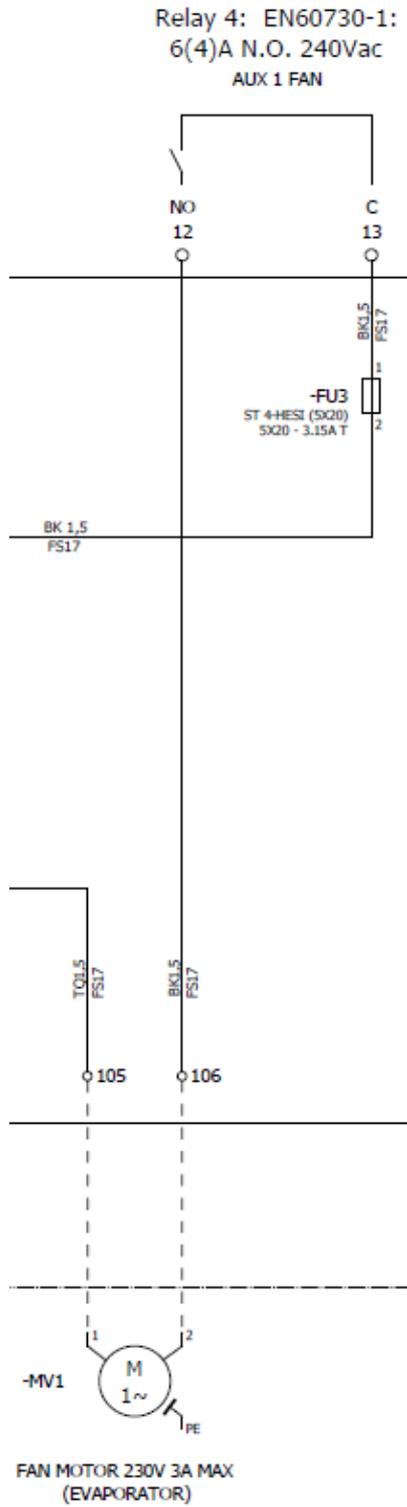
Wiring diagram

External Alarm



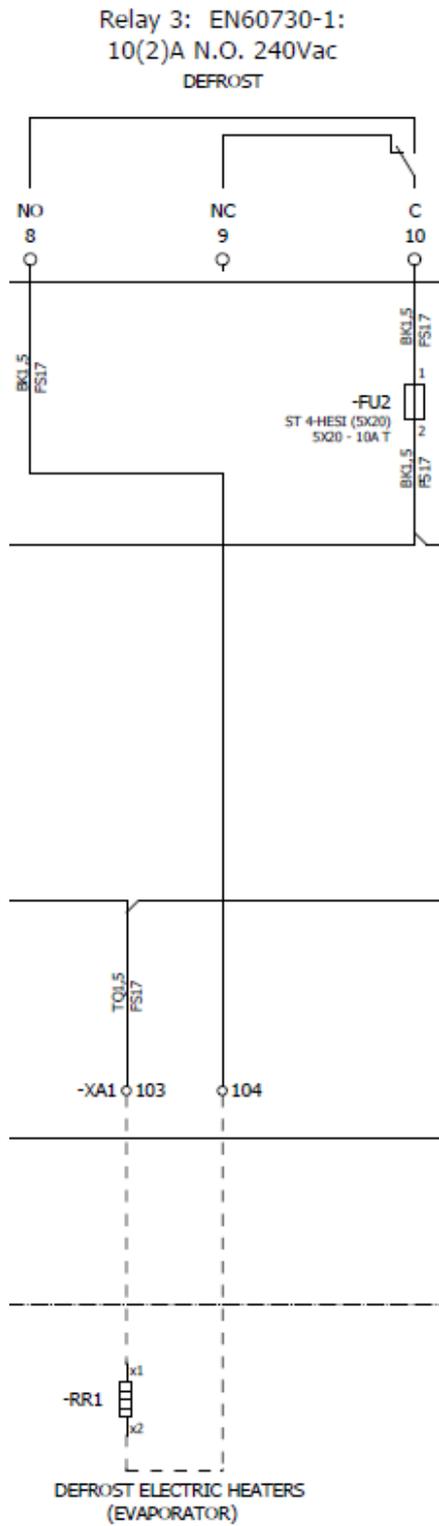
Wiring diagram

Fan motor connection



Wiring diagram

Defrost electric heater

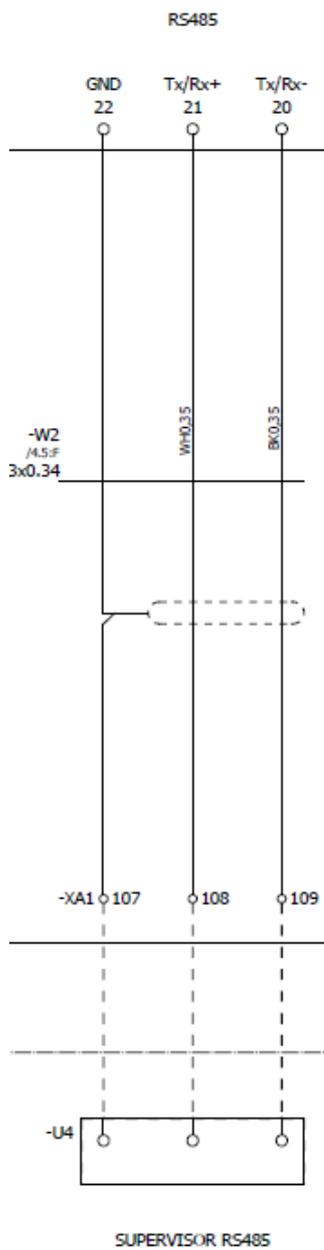


Wiring diagram

Modbus connection for checker or supervisor systems

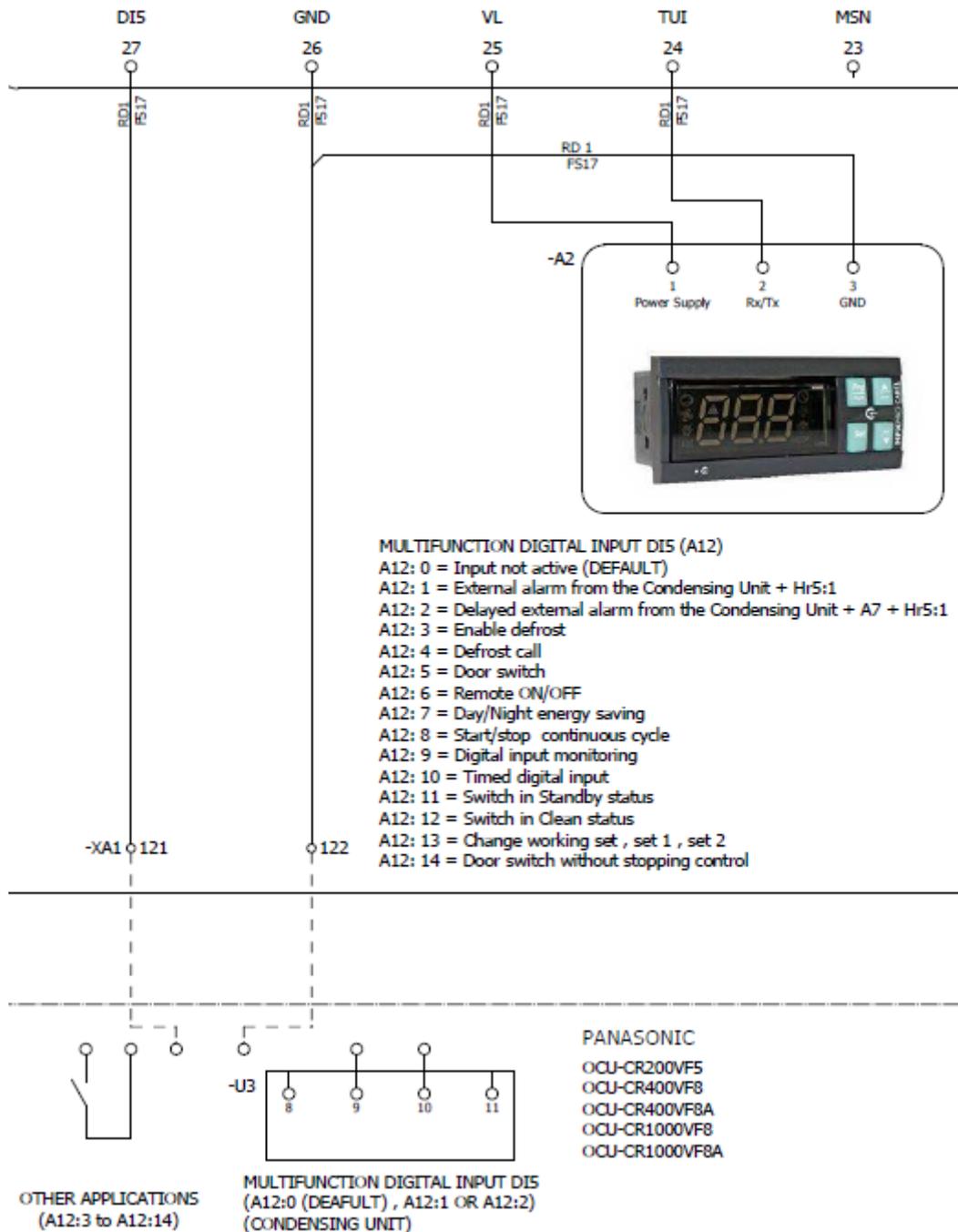
when connecting the RS485 serial network:

- Connect the shield to the GND terminals on all controllers;
- Do not connect the shield to the earth on the electrical panel;
- Use a twisted pair shielded cable (e.g. Belden 8762 – AWG 20 or BELDEN 8761-AWG 22);
- Connect a 120 Ω terminal resistor between the Tx/Rx+ and Tx/Rx- terminals on the last MPXPRO controller.



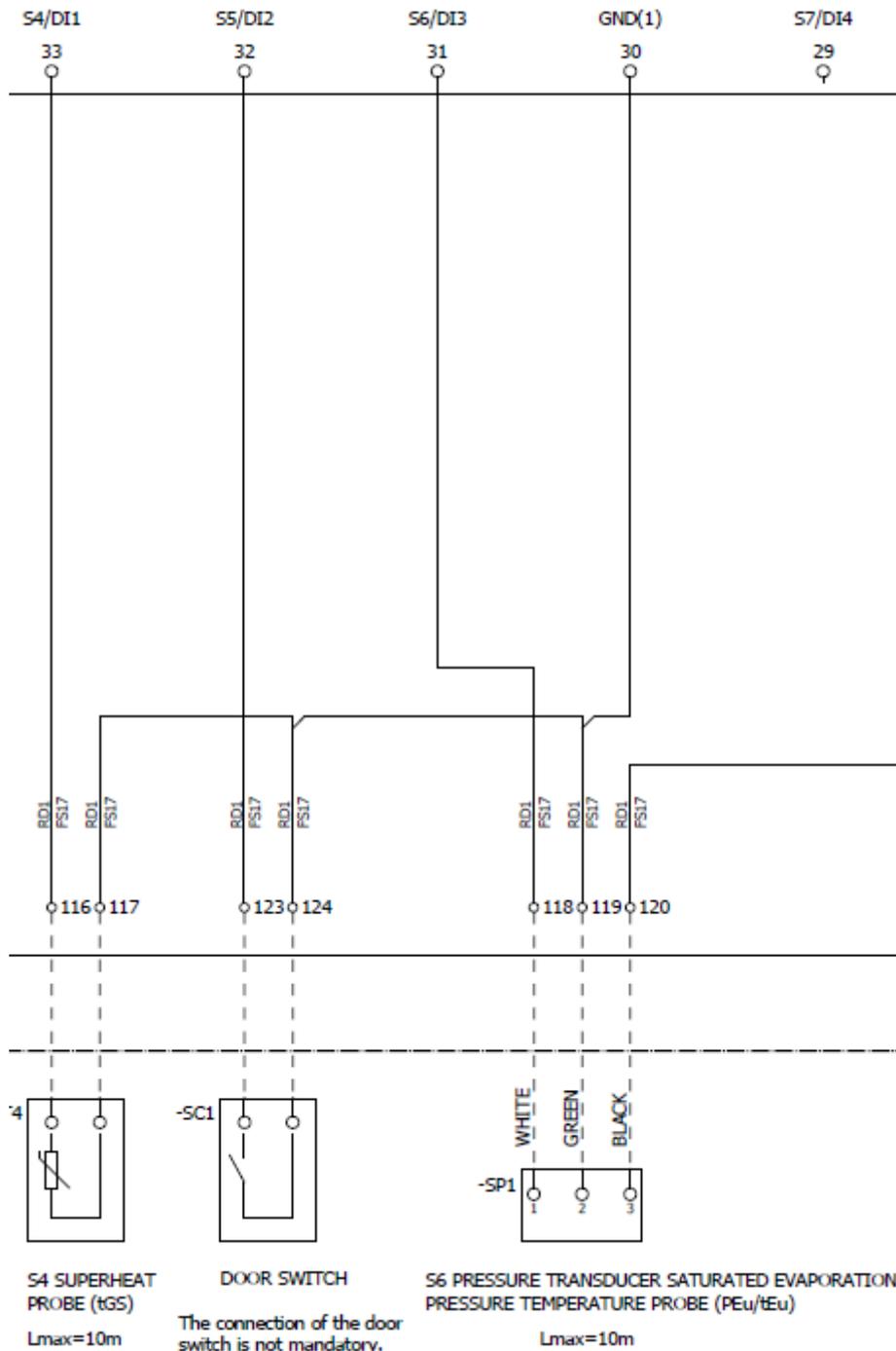
Wiring diagram

Multifunctional Digital Input DI5



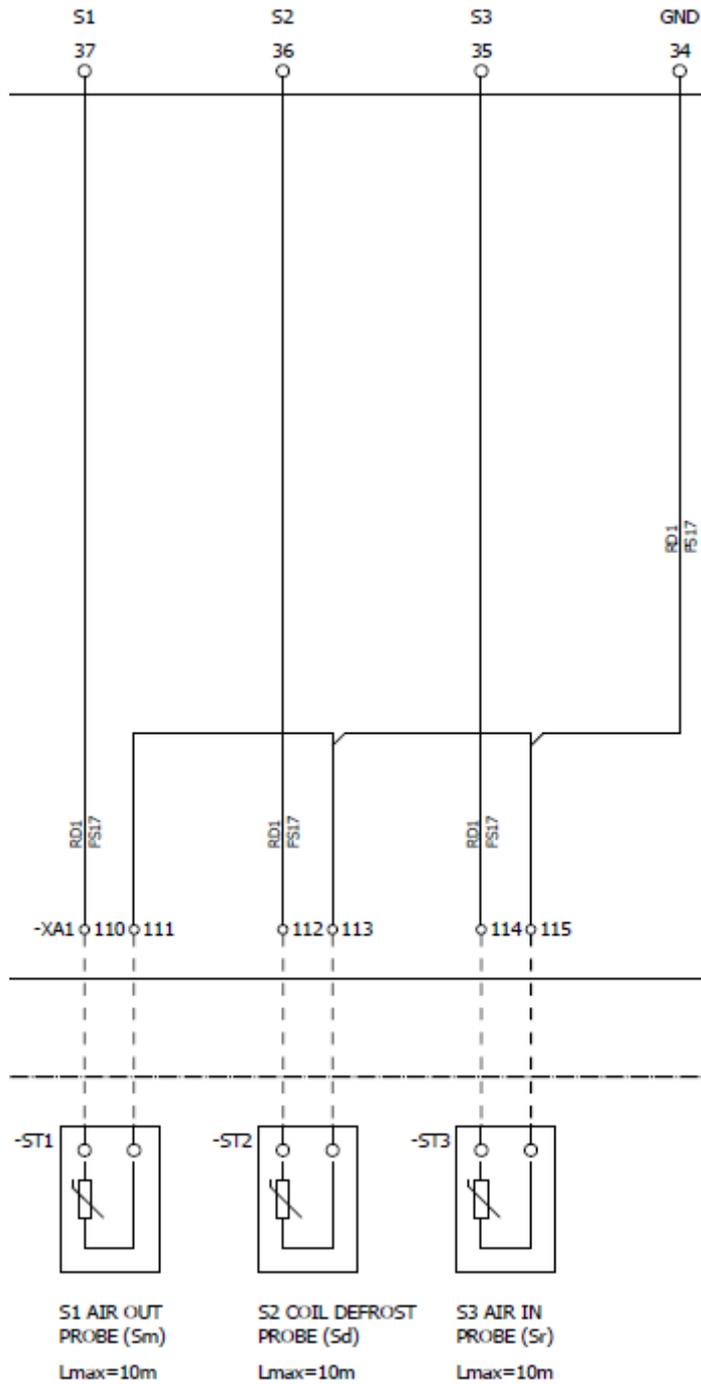
Wiring diagram

Super Heat (sh) probes S4&S6 / Door Switch (not mandatory)



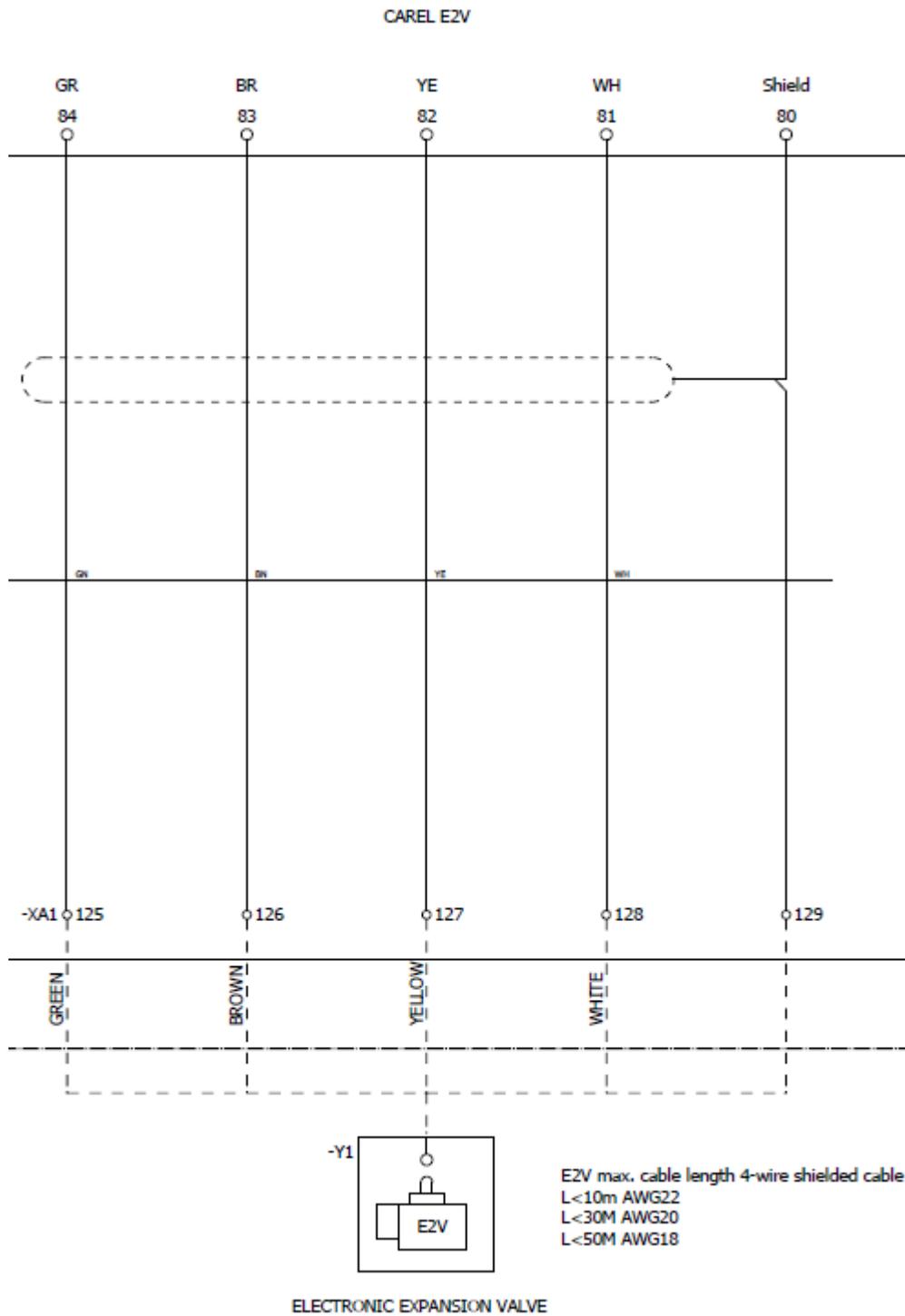
Wiring diagram

Air probes S1&S3 / Defrost probe S2



Wiring diagram

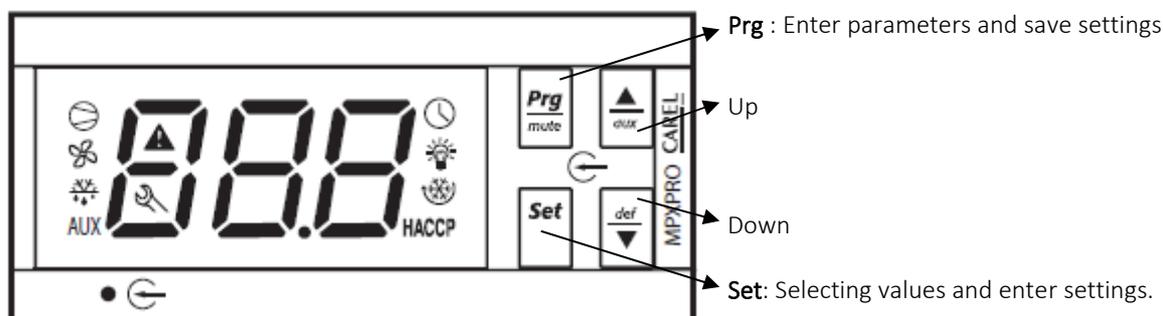
Electronic Expansion Valve



User terminal

The display shows measurements in the range –50 and +150 °C.

The decimal point can be disabled by setting (/6).



Icon	Function	Icon / function status			Note
		Active	Not active	FLASH	
	Compressor/Solenoid	Active	Not active	Request	Flashes when activation is delayed or stopped by protection times.
	Evaporator fans	Active	Not active	Request	Flashes when activation is prevented due to external disabling or procedures in progress.
	Defrost	Active	Not active	Request	Flashes when activation is prevented due to external disabling or procedures in progress.
	Auxiliary output	Active	Not active	-	Comes on with activation of the auxiliary output selected as local or network auxiliary.
	Alarm	Pre-activation of the delayed external digital alarm	-	Alarm in progress	Flashes in the event of alarms during normal operation (e.g. high/low temperature) or alarms from external digital input, immediate or delayed, on both Master and Slave controllers.
	Clock	Night-time operation	-	Clock alarm	On power-up the icon indicates the Real Time Clock (RTC) is fitted.
	Light (local or network)	Active	Not active	-	
	Service	On the Master indicates Upload parameters to Slaves	-	System error in progress	During commissioning, indicates that the parameter has not been set; during the connection to the remote control indicates override in progress.
	HACCP	HACCP function enabled	-	HACCP alarm saved	During the HACCP alarm HA and/or HF is shown on the display.
	Continuous cycle	Continuous cycle function activated	-	Request	Flashes when activation is prevented due to external disabling or procedures in progress (e.g. minimum compressor OFF time)

Keypad

Setting	Function	Front keypad controls	Display when setting / notes	
			Duration	
Set point	Temperature set point			Value on display flashing
				Set value
				Save set point and return to standard display
Access the parameters (programming level)	Type F parameters (frequ.)		5 s	The first type F parameter is displayed
			5 s	
	Type C (configuration) or A (advanced) parameters			Enter password (22 for configuration level and 33 for advanced level)
				Confirm the password, the first type C or A parameter is displayed
Output from the livello programming			5 s	The changes are saved

Always use password 33 when entering programming level.

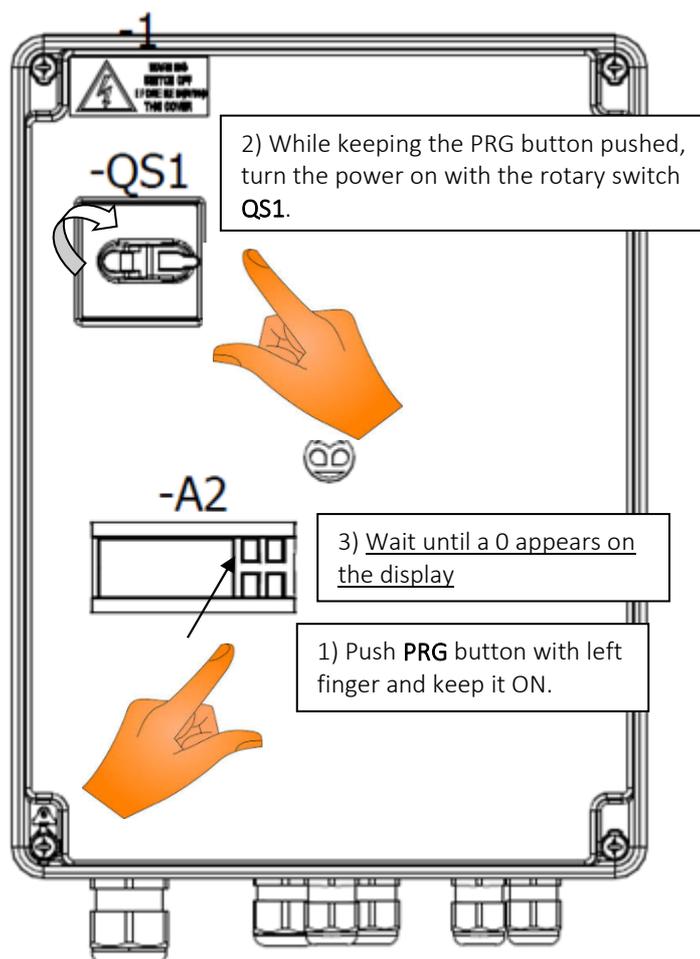
First commissioning

The panel is pre-programmed from factory for MT or LT and easy to start following the below instructions in this order:

- 1) Push **PRG** button with the index finger of the left hand hold it on the user interface **A2**.
- 2) At the same time with the right hand, turn ON the rotary switch **QS1**.
- 3) After turning on power keep the button **PRG** pushed and wait until a 0 appears on the display. Now you can release the PRG button.
- 4) With arrow keys Up and Down, choose between 1 and 2 (or 3) according to the below table and push "Set" in order to fix the desired pre-setting.

No	Use	Room temperature (°C)
1	Medium temperature (MT)	3
2	Low temperature (LT)	-18
3	Free setting	50 (Please change with wizard menu)

- 5) Note: Some settings must be changed depending on type of installation. See chapter " Pre-configuration of panel & advanced settings".



Factory setting

Application.	Parameter	MT	LT
Air off probe selection (Sm)	/FA	1	1
Air on probe selection (Sr)	/Fc	3	3
Defrost temperature probe selection (Sd)	/Fb	2	2
Group 1 (S1, S2, S3) probes type selection	/P1	0	0
Group 2 (S4, S5) probe type selection	/P2	0	0
Group 3 (S6) probe type selection	/P3	4	4
Saturated evaporation temperature probe selection (tEu/PEu)	/FE	6	6
Suction temperature probe selection (tGS)	/Fd	4	4
Virtual probe composition	/4	100	100
Probe 6 - S6 maximum value (barg)	/U6	90	90
Probe 6 - S6 minimum value (barg)	/L6	0	0
Regulation setpoint	St	3	-18
Regulation differential (on air off (Sm) with Double thermostat)	rd	2	2
Minimum regulation setpoint	r1	-5	-40
Maximum regulation setpoint	r2	10	-5
Minimum solenoid OFF time	c2	3	3
Minimum solenoid ON time	c3	3	3
Defrost type selection	d0	2	0
Defrost end temperature threshold	dt1	8	8
Maximum defrost duration	dP1	30	30
Time between two following defrosts	dl	8	8
Dripping time after defrost (fans off)	dd	2	2
High temperature alarm exclusion time after defrost	d8	30	30
Regulation setpoint relative or absolute alarm thresholds selection.	A1	0	0
Differential for high and low temperature alarm reset	A0	4	4
High and low temperature alarm probe selection	AA	1	1
High and low temperature alarms (HI-LO), time delay	Ad	120	120
High temperature 1 alarm threshold	AH	10	10
Low temperature 1 alarm threshold	AL	4	4
Digital input DI5 function configuration	A12	0	0
Fans management configuration	F0	0	0
Fans start-up threshold (only if F0=1 or 2)	F1	-5	-5
Enable fans switch-off during regulation off cycle	F2	0	0
Enable fans switch-off during defrost	F3	0	1

Valve type	P1	2	2
Superheat setpoint	P3	8	8
PID proportional gain	P4	20	20
PID integral time	P5	400	400
PID derivative time	P6	5	5
Enable bLO alarm	P14	1	1
Refrigerant type	PH	11	11

Advanced settings

For more details of parameter settings please refer to master manual of MPX controller.

CtL (Control)

St is desired "room temperature", when this temperature is reached unit stop. rd is hysteresis of St, when temperature increase the unit will start when differential of set-point is reached.

Parameter	Description	Default	Min	Max	UoM
St	Set point	MT :3	r1	r2	°C
		LT: -18			
rd	Set point differential St	2	0,1	20	K

/Pro (=PROBES)

Parameter	Function	Description	Default	Min	Max	UoM
/c1	Probe 1 calibration	Air OFF	0	-20	20	°C
/c2	Probe 2 calibration	Defrost sensor	0	-20	20	°C
/c3	Probe 3 calibration	Air ON	0	-20	20	°C

dEF (defrost)

It is important always to check conditions concerning defrost, as this is often different from one installation to another. Standard defrost is heater by temperature. We both consider time and temperature. More Advanced defrost can be controlled by RTC, please refer to Carel MPX-pro manual.

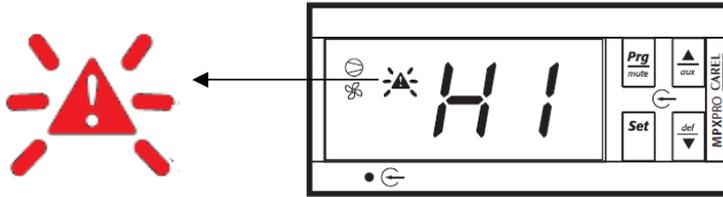
Parameter	Description	Default	Min	Max	UoM	
d0	Type of defrost		MT: 2 / LT: 0	0	6	--
	0 = heater by temperature (LT)	4 = heater by time with temp. Control				
	1 = Hot gas by temperature	5 = not use				
	2 = Heater by time (MT)	6 = not use				
	3 = Hot gas by time					
dI	Maximum interval between defrost	8	0	240	hour	
dt1	End defrost temperature	8	-50	50	°C	
dP1	Maximum defrost duration	30	1	240	min	
Sd1	Defrost probe reading	temp.			°C	

Fan (Evaporator fans)

Parameter	Description	Default	Min	Max	UoM
F0	Evaporator fan management	0	0	2	--
	0 = Always on				
	1 = Activated based on Sd - Sv				
	2 = Based on Sd				
F1	Evaporator fan activation threshold (only F0 = 1 or 2)	-5	-50	50	°C
F2	Evaporator fans with compressor off	0	0	1	°C
	0 = see F0				
	1 = Always off				
F3	Evaporator fans during defrost	MT = 0 / LT = 1	0	1	--
	0 = On				
	1 = Off				

ALM (Alarm)

If alarm led is flashing there is a defect or temperature alarm. Depending on the how critical the error is the system stop or continue.



Example: H1 flashing is, *High temperature alarm*.

The most common alarms are shown below. For more information, refer to the MPxpro manual.

Display code	Cause of the alarm	Icon flash on display	Alarm relay	Buzzer	Reset	Compressor	Defrost	Evaporator fans	Continuous cycle	Signalled on tLAN	Network solenoid valve
rE	Control probe fault		ON	ON	automatic	duty setting(c4)	unchanged	unchanged	unchanged	√	-
E1	Probe S1 fault		OFF	OFF	automatic	duty setting(c4)	unchanged	unchanged	unchanged	√	-
E2	Probe S2 fault		OFF	OFF	automatic	unchanged	unchanged	unchanged	unchanged	√	-
E3	Probe S3 fault		OFF	OFF	automatic	unchanged	unchanged	unchanged	unchanged	√	-
E4	Probe S4 fault		OFF	OFF	automatic	unchanged	unchanged	unchanged	unchanged	√	-
E5	Probe S5 fault		OFF	OFF	automatic	unchanged	unchanged	unchanged	unchanged	√	-
E6	Probe S6 fault		OFF	OFF	automatic	unchanged	unchanged	unchanged	unchanged	√	-
E7	Probe S7 fault		OFF	OFF	automatic	unchanged	unchanged	unchanged	unchanged	√	-
E8	Serial probe S8 not updated		OFF	OFF	automatic	duty setting(c4)	unchanged	unchanged	unchanged	√	-
E9	Serial probe S9 not updated		OFF	OFF	automatic	duty setting(c4)	unchanged	unchanged	unchanged	√	-
E10	Serial probe S10 not updated		OFF	OFF	automatic	duty setting(c4)	unchanged	unchanged	unchanged	√	-
E11	Serial probe S11 not updated		OFF	OFF	automatic	duty setting(c4)	unchanged	unchanged	unchanged	√	-
LO	Low temperature alarm		ON	ON	automatic	unchanged	unchanged	unchanged	unchanged	√	-
HI	High temperature alarm		ON	ON	automatic	unchanged	unchanged	unchanged	unchanged	√	-

Electronic Expansion Valve E2V

The expansion valve is supplied separately from this panel and must be ordered individually.

Main features

Maximum Working Pressure CE (PS):	Ps= 140 barg (2030psig)
Maximum Working Pressure Differential:	With bipolar driver: <ul style="list-style-type: none"> Sizes 03 ÷18 → 120 bar (1740psi) Size 24 → 85 bar (1230psi)
PED classification:	PED Art. 4, par. 3
Refrigerant temperature:	-40T70°C(-40T158°F)
Ambient temperature:	-30T70°C(-22T158°F)
Complete closing steps:	500
Regulation steps:	480
Control type:	It can be driven by both unipolar and bipolar Carel devices.
Fittings diameter raccordi (rame):	3/8" x 3/8" ODF

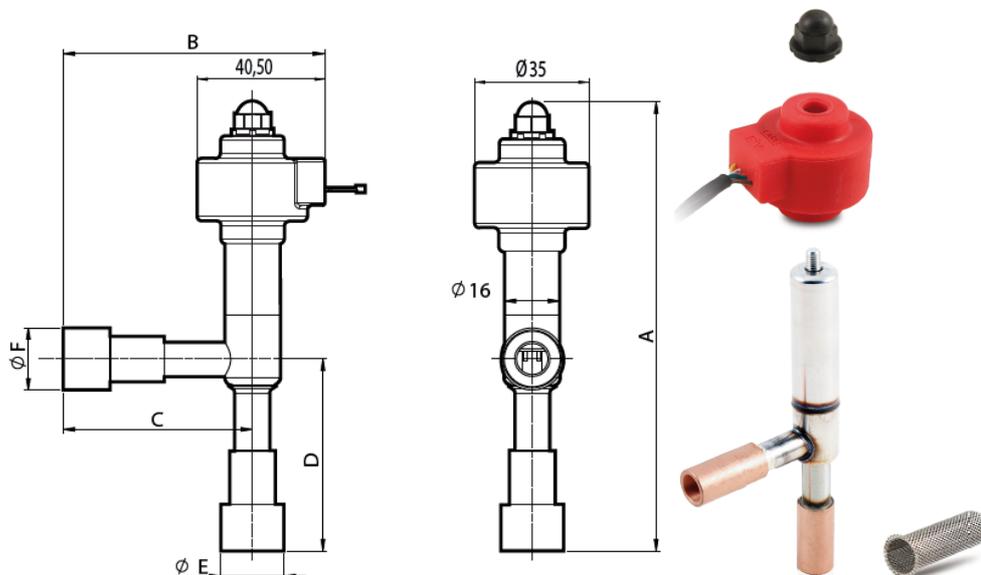
A wide range of 7 models for all applications in transcritical CO2 circuits.

Strainer included : 500 mesh

Equipercetile profile : This ensures precise control in all working conditions, from part load to full capacity.

		E2V03	E2V05	E2V09	E2V11	E2V14	E2V18	E2V24
Flow coefficient	kV [m3/h] @ 1 bar Δ p	0.009	0.014	0.024	0.042	0.066	0.09	0.180
	Cv [USGPM] @ 1 PSI Δ p	0.011	0.017	0.028	0.049	0.076	0.10	0.21

Dimensions



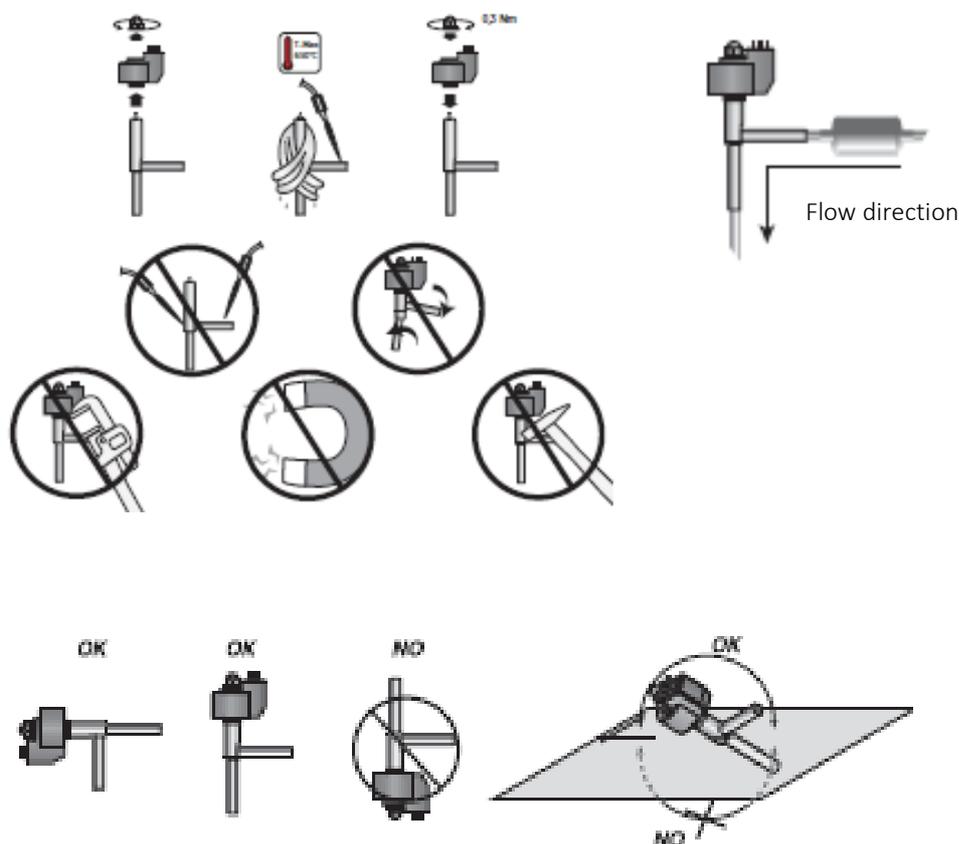
Code	A	B	C	D	E	F
E2V**CWAC*	125.8 mm (4.95 inch)	82.6 mm (3.25 inch)	52.3 mm (2.06 inch)	53.3 mm (2.10 inch)	In 9.5/ Out 13 mm (In 0.8 out 0.51 inch)	In 9.5/ Out 13 mm (In 0.8 out 0.51 inch)

Installation and handling

The E2V valves welded connections.

For the valves with welded connections, follow the steps shown in the figure, proceeding as follows:

1. If the stator is already assembled, remove it by unscrewing the fastening nut and sliding it out;
2. Wrap a wet rag around on the valve and perform the welding without overheating the valve, aiming the flame at the ends of the fittings (for better braze welding affecting the seal where welding, use alloys with a fusion temperature less than 650 °C or with a silver content above 25%).
3. When the valve has cooled down replace the stator on the cartridge, pushing it fully in and then completely tightening the black nut until deforming the rubber ring on the stator (tightening torque 0,5Nm).
4. Connect the four-pin end cables and the shield to the corresponding terminals 125,126,127,128,129 on the Carel panel controller according to the electric diagram.



Important.

1. Always install the filter you find in bag of accessories.
2. The pressens of dirt particles may cause valve malfunctions.
3. Do not install or use the valve in the event of:
 - Deformation or damage to the external structure
 - Heavy impact, for example due to dropping.
 - Damage to the electrical parts (stator, contact carrier connector).