MPXone Electronic controller for centralised commercial refrigeration applications

ENG

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Description

MPXone is an electronic controller for centralised commercial refrigeration applications in which a group of showcases needs to operate in a coordinated manner. The user terminal allows wireless connectivity with mobile devices. This is built-in on the panel-mounted models or can be purchased separately on the DIN rail models. The range includes two versions, basic and medium, which differ in terms of the number of inputs/outputs. Near Field Connection (NFC) is available as standard on both versions, while Bluetooth (BLE) is available as an option on the latter. Power supply is 24 Vac/dc for the panel-mounted models (basic and medium) and 115...230 Vac for the DIN rail models (medium). The CAREL "APPLICA" app, available on Google Play for the Android operating system and Apple store for iOS, simplifies parameter configuration and unit commissioning in the field. The operation of MPXone is described in the user manual +0300086EN, downloadable, free download at www.carel.com.

MODELS

P/N	Description
S1M0004W0B060	Basic panel 24V, NFC, with connectors, single pack
S1M0004W00061	Basic panel 24V, NFC, without connectors, multiple pack (20 pcs.)
S1M0006W0B070	24V panel medium, NFC, with connectors, single pack
S1M0006W00071	24V panel medium, NFC, without connectors, multiple pack (20 pcs.)
S1M0006B0B080	Medium panel 24V, NFC+BLE, with connectors, single pack
S1M0006B00081	24V panel medium, NFC+BLE, without connectors, multiple pack (20 pcs.)
S1M0007N0B110	Medium DIN, 115-230V, with connectors, single pack
S1M0007N00111	Medium DIN, 115-230V, without connectors, multiple pack (10 pcs.)

ACCESSORIES

P/N	Description
AX3000PS2002(0/1)(*)	User terminal, NFC, 4 buttons, buzzer
AX3000PS2003(0/1)(*)	User terminal, NFC+BLE, 4 buttons, buzzer
AX3000PS20X1(0/1)(*)	Remote display
ACS00CB000020	Cable for user terminal - 1.5 m long
ACS00CB000010	Cable for user terminal - 3 m long

(0/1)(*) : single/multiple pack (20 pcs.)

PANEL MODEL

Dimensions - mm (in)

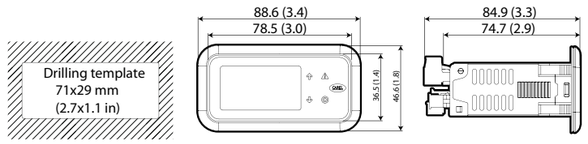


Fig. 1

Removal

Frame Controller

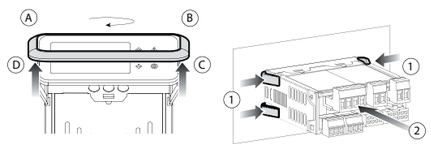


Fig. 2

Assembly

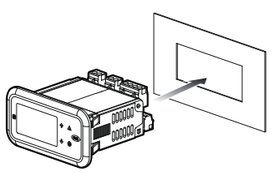


Fig. 3

DIN RAIL MODEL

Dimensions - mm(in)

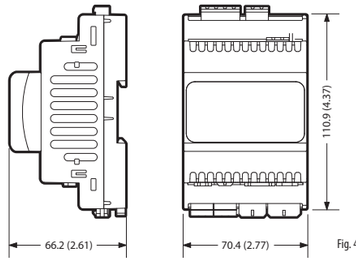


Fig. 4

Assembly

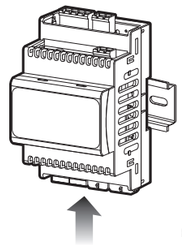
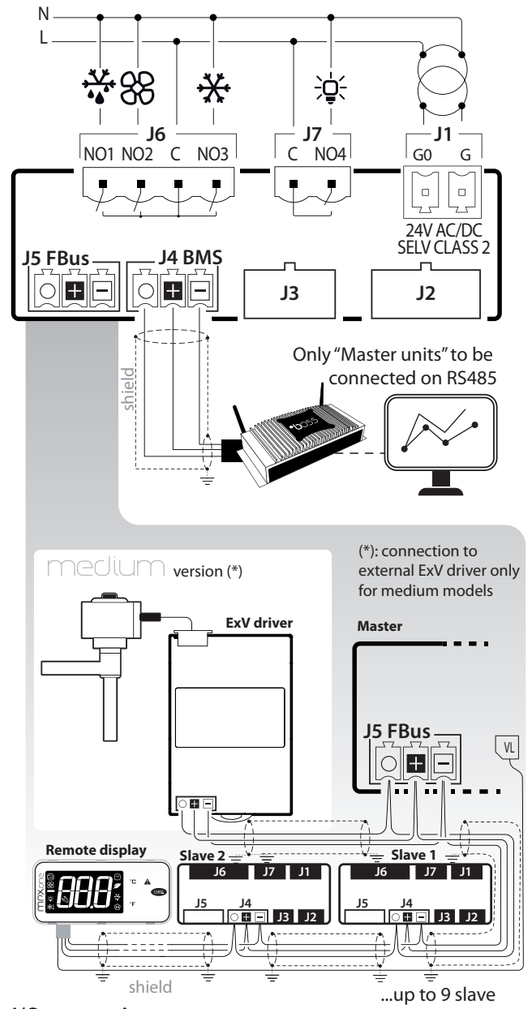


Fig. 5

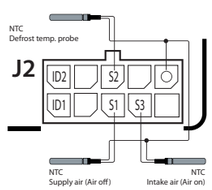
PANEL MODEL: CONNECTION DIAGRAM



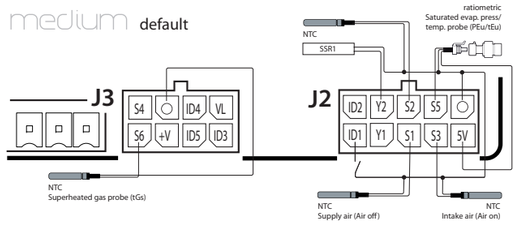
I/O connections

basic default(**)

(**): according to default parameter values



medium default



Possible connection

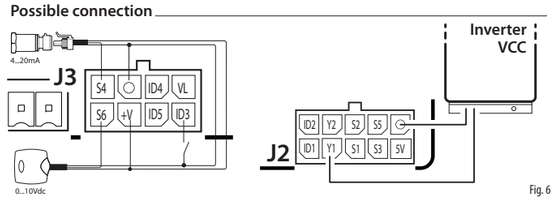
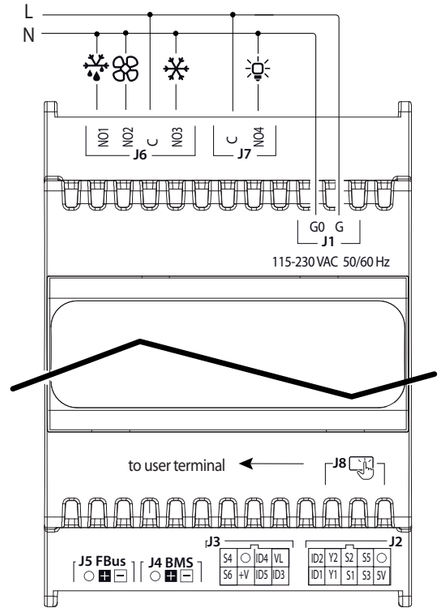


Fig. 6

Note 1: O = GND
Note 2: earthing G0 and G (transformer secondary) on controllers connected to the serial network will cause permanent damage to the controller.

DIN RAIL MODEL: CONNECTION DIAGRAM



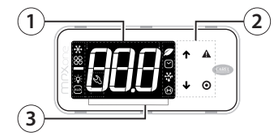
PRELIMINARY OPERATIONS

The panel version is supplied with the frame already fitted. Nonetheless, this can be be easily removed without affecting the IP protection rating.

Removing the frame	Procedure: press the frame gently upwards at point A (Fig. 2) until hearing a click and repeat the operation at the other points B, C, D so as to detach the frame.
Assembling the frame	Repeat the removal operations in reverse order
Ingress protection IP65 guaranteed only if:	• maximum deviation of the rectangular opening from flat surface: ≤ 0.5 mm; • thickness of the electrical panel sheet metal: 0.8-2 mm; • maximum roughness of the surface where the gasket is applied: ≤ 120 µm.

Note: the thickness of the sheet metal (or material) used to make the electrical panel must be adequate to ensure safe and stable mounting of the terminal.

USER TERMINAL



Buttons
1 display
2 keypad
3 status and operating mode icons

Display

Icon	Description	On	Flashing
	Solenoid/ compressor	Active	Timings active
	Evaporator fan	Active	-
	Lights	On	-
AUX	Auxiliary output	Active	-
	Clock	Hourly programming active	-
	Energy saving	Smooth Lines function active	-
	Defrost	Active	Waiting
	Service	Maintenance request	-
H	HACCP	Active	-

Keypad

Button	Description
UP - DOWN	• Increase/decrease the value • Scroll direct access functions • LED on/flashing: scroll menu, parameters, direct access functions/ set parameter values
PRG	Pressed briefly: • Save value and return to the parameter code • Enter direct access function menu (from main screen) and activate/ deactivate functions Pressed and held (3 s): • Enter programming mode or return to previous level without saving • LED on: main screen/programming mode
ALARM	• Pressed briefly: display alarms • Pressed and held (3s): reset alarms • LED on/flashing: acknowledged/active alarm

Commissioning

For further information, see the user manual (+0300086EN), available on www.carel.com under "Documentation". Before commissioning, set the initial configuration parameters, shown below and in the parameter table in the user manual, following the configuration wizard.

1. Power on the controller and wait for the display to show the first parameter (In=- Type of unit, 0/1 = Secondary/Main);

2. Press PRG to display the parameter value;

3. Press UP/DOWN to modify the value;

4. Press PRG to save the setting and return to the parameter code;

5. Press UP/DOWN to go to the next parameter (Sn = no. of Secondaries);
6. Repeat steps 2 to 5 for all the initial configuration parameters (see the table below);

7. Press PRG to terminate the initial configuration procedure (wizard);

8. Wait for the standard display to be shown

Mobile device

The "Applica" app can be used to configure the controller from a mobile device (smartphone, tablet), via NFC (Near Field Communication) or BLE (Bluetooth Low Energy). For further information, see the MPXone system user manual, +0300086EN

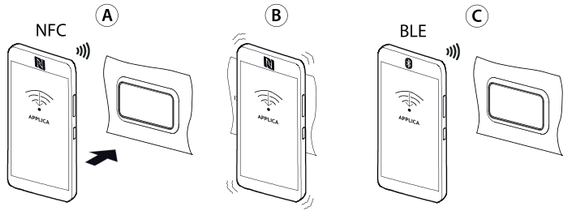


TABLE OF INITIAL CONFIGURATION PARAMETERS

Code	Description	Visibility*	Def	Min	Max	UOM
In	Type of unit: 0 = Secondary - 1 = Main	B, M	0	0	1	-
Sn	Number of Secondaries in the local network 0 = No Secondaries	B, M	0	0	9	-
H0	Serial or Main Secondary network address	B, M	199	0	199	-
H3	BMS serial port protocol 0 = Carel secondary - 1 = Modbus secondary	B, M	1	0	1	-
/P1	Sensor type group 1 (S1, S2, S3) 0 = PT1000 Standard Range –50T150 °C 1 = NTC Standard Range –50T90°C	M	1	0	1	-
P1	Electronic valve 0 = not present; 2 = Carel E2V valve (suction pressure probe on MPXone) 6 = Carel E2V valve (suction pressure probe on ExV driver)	M	0	0	6	-
PH	Type of refrigerant (see the table below)	M	3	0	41	-
/P2	Type of probe in Group 2 (S4, S5) 1 = NTC Standard Range –50T90°C 2 = 0-5 V 3 = 4-20 mA	M	2	1	3	-
/P3	Type of probe in Group 3 (S6) 0 = PT1000 Standard Range –50T150 °C 1 = NTC Standard Range –50T90°C 2 = 0-5 V 3 = 4-20mA 4 = 0-10V	M	1	0	4	-
/Fd	Assign superheated gas temperature probe (tGS) 0 = Function disabled 1 = Probe S1 2 = Probe S2 3 = Probe S3 4 = Probe S4 5 = Probe S5 6 = Probe S6 -1 = Serial probe S11 -2 = Serial probe S12 -3 = Serial probe S13 -4 = Serial probe S14	M	0	-4	6	-
/FE	Assign saturated evaporation pressure/ temperature probe (PEu/tEu) See /Fd	M	0	-4	6	-
/UE	Maximum saturated evaporation pressure/ temperature probe reading (PEu/tEu)	M	9.3	/LE	200	°C/°F
/LE	Minimum saturated evaporation pressure/ temperature probe reading (PEu/tEu)	M	-1	-1	/UE	°C/°F
End	End commissioning wizard					

(*): B/M = Basic/Medium

REFRIGERANT TYPE, PARAMETER PH

Val.	Desc.	Val.	Desc.	Val.	Desc.	Val.	Desc.
0	N.A.	12	R728	24	HTR01	36	R452A
1	R22	13	R1270	25	HTR02	37	R508B
2	R134a	14	R417A	26	R23	38	R452B
3	R404A	15	R422D	27	HFO1234yf	39	R513A
4	R407C	16	R413A	28	HFO1234ze	40	R454B
5	R410A	17	R422A	29	R455A	41	R458A
6	R507A	18	R423A	30	R170	42	R407H
7	R290	19	R407A	31	R442A	43	R454A
8	R600	20	R427A	32	R447A	44	R454C
9	R600a	21	R245Fa	33	R448A	45	R470A
10	R717	22	R407F	34	R449A	46	R515B
11	R744	23	R32	35	R450A	47	R466A

TECHNICAL SPECIFICATIONS

Physical specifications	Dimensions	See figures
	Case	Polycarbonate
	Assembly	PANEL: panel DIN: DIN rail
	Ball pressure test temper.	125°C
	Ingress protection	IP20 (rear panel) IP65 (front panel) IP00 (DIN model)
	Front cleaning (panel)	Use soft, non-abrasive cloth and neutral detergent or water
Environmental conditions	Operating temperature	-20T60 °C, <90% RH non-condensing
	Storage temperature	-40T80 °C, <90% RH non-condensing
Electrical characteristics	Rated power supply voltage	Panel: 24 Vac/dc, supplied by SELV or PELV class 2 power supply DIN: 115-230Vac
	Operating power supply voltage	Panel: 24 Vac/dc, +10% -15% DIN: 115-230Vac, +10% -15%
	Input frequency	50/60Hz
	Maximum current draw	PANEL: 600 mArms DIN: 150 mArms
	Min power consumption	400mW
	Clock	precision: +-50ppm; date/time retention after shutdown Basic: 72 hours; Medium: 6 months
	Software class and structure	A
	Environm. pollution class	3
	Class of protection against electric shock	To be incorporated in class I or II appliances
	Type of action and disconn.	1.C
	Rated impulse voltage	115-230V input and relay output: 4kV; 24 V input: 0.5 kV
	Surge immunity category	115-230V input and relay outputs: III 24 V input: II
	Control device construct.	Device to be incorporated
	Terminal block	Plug-in male-female. Cable size: see user manual
	Purpose of the controller	Electrical operating control
User interface	Buzzer	PANEL: integrated DIN: not included in the controller, integrated into the user terminal
	Display	3 digits, decimal point and icons multifunctional
Connectivity	NFC	Max distance 10 mm, variable according to the mobile device used
	Bluetooth Low Energy	Max distance 10 m, variable according to the mobile device used
	BMS serial interface	Modbus over RS485, not opto-isolated
	FieldBUS serial interface	Modbus over RS485, not opto-isolated, maximum number of devices that can be connected: 20
	HMI interface	Modbus over RS485, not opto-isolated
Analogue inputs (Lmax=10m)	S1, S2, S3: NTC / PT1000 S4, S5: 0-5V rat /4-20 mA / NTC S6: NTC / PT1000 / 0-5 Vrat / 0-10 V / 4-20 mA	NTC: resolution 0.1 °C; 10kΩ@25°C; error: ±1°C in the range -50T50°C, ±3°C in the range 50T90°C PT1000: resolution 0.1 °C; 1kΩ@0°C; error: ± 1° C in the range -60+120°C 0-5 Vrat: error 2% fs, typical 1% 4-20mA: error 5% fs, typical 1% 0-10 V: error 2% fs, typical 1%
Digital inputs	ID1, ID2, ID3, ID4, ID5	Voltage-free contact, not optically-isolated, typical closing current 6 mA, voltage with contact open 13 V, max contact resistance 50Ω
Analogue outputs	Y1, Y2	0-10V: 10 mA max Frequency Modulation, 8-170 Hz: amplitude 10 V: 10 mA max
Digital outputs	NO1 (16A),NO2 (8A), NO3 (5A), NO4 (5A) **Note:** NO1+NO2+NO3 cannot exceed 15A max.	**16 A:** Panel: EN60730: 15A resistive, 250 V, 100k cycles; UL60730: 15 A resistive, 240 Vac, 100k cycles; Pilot duty B300, 6k cycles DIN: EN60730: 10A resistive, 250 V, 100k cycles; UL60730: 10A resistive, 240Vac, 100k cycles; 10FLA, 60LRA, 250Vac; Pilot duty B300, 6k cycles **8A:** EN60730: 5 A resistive, 250 Vac, 100k cycles; 5(4), 250Vac, 100k cycles; 4(2), 250Vac, 100k cycles UL60730: 10 A resistive, 250 Vac, 100k cycles; 2 FLA, 12 LRA, 250 Vac, 30k cycles **5A:** EN60730: 5 A resistive, 250 Vac, 50k cycles; 4(1), 230 Vac, 100k cycles; 3 (1), 230 Vac, 100k cycles UL60730: 5 A resistive, 250 Vac, 30k cycles; 1 FLA, 6 LRA, 250 Vac, 30k cycles; Pilot Duty C300, 30k cycles
Probes and terminal power supply	5V	5 Vdc ± 2% to power the 0 to 5 V ratiometric probes. Maximum current delivered: 35 mA protected against short-circuits
	+V	8-11V to power the 4-20 mA current probes. Maximum current delivered: 80mA protected against short-circuits
	VL	13 Vdc ± 10% to power the remote display
	HMI power supply	13 Vdc ± 10% to power the user terminal
Cable lengths	Analogue inputs/outputs, digital inputs/outputs, probe power	<10m (*) (**) (*) in the panel version, if using the VL power supply in household environments, the maximum cable length is 2 m. (**) in the DIN version powered at 115 Vac, if using +V in household environments, the maximum cable length is 2 m.
	BMS and Fieldbus serial cables	<500m with shielded cable
Conformity	Electrical safety	UL/IEC: EN/UL60730-1, EN/UL60335-1
	EMC	CE: EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4
	Radio	Red: EN301489-1/EN301489-17, EN300328 FCC: Contains FCC ID: WAP2001 IC: Contains IC: 7922A-2001 ANATEL: ID: 03780-21-05684

APPLICATIONS WITH FLAMMABLE REFRIGERANT GAS (*)

About the use of this product (except SSR versions) with A3, A2 or A2L flammable refrigerants, it has been evaluated and judged compliant with the following requirements:

- Annex CC of IEC 60335-2-24:2010 referenced by clause 22.109 and Annex BB of IEC 60335-2-89:2019 referenced by clause 22.113; components that produce arcs or sparks during normal operation have been tested and found to comply with the requirements in UL/IEC 60079-15;
- IEC 60335-2-24:2010 (clauses 22.110)
- IEC 60335-2-40:2018 (clauses 22.116, 22.117)
- IEC 60335-2-89:2019 (clauses 22.114)

Surface temperatures of all components and parts have been measured and verified during the tests required by IEC 60335 cl. 11 and 19, and found not exceeding 268 °C. Models with SSR comply with standard IEC 60335-2-40:2018 in case of using A2L refrigerants (e.g. R32); in detail, electrical components that could be a source of ignition under normal operation are in compliance with Annex JJ, and the maximum surface temperature of all components does not exceed 268°C, during normal operation.

Acceptability of these controllers in end use application where flammable refrigerant is used shall be reviewed and judged in the end use application.

(*) Applicable to the products with revision above 1.5xx.

MODELS AND OPTIONS / MODEL TYPE (ACU)

Model type	Description
ACU4	PANEL 4 relays + NFC
ACU4B	PANEL 4 relays + NFC/BLE
ACU5	PANEL 5 relays + NFC
ACU5B	PANEL 5 relays + NFC/BLE
ACUD4L	DIN 4 relays 24V
ACUD4LN	DIN 4 relays 24V + NFC
ACUD4LB	DIN 4 relays 24V + NFC/BLE
ACUD5L	DIN 5 relays 24V
ACUD5LN	DIN 5 relays 24V + NFC
ACUD5LB	DIN 5 relays 24V + NFC/BLE
ACUD5YL	DIN 5 relays + 2xAO 24V
ACUD5YLN	DIN 5 relays + 2xAO 24V + NFC
ACUD5YLB	DIN 5 relays + 2xAO 24V + NFC/BLE
ACUD4H	DIN 4 relays 230V
ACUD4HN	DIN 4 relays 230V + NFC
ACUD4HB	DIN 4 relays 230V + NFC/BLE
ACUD5H	DIN 5 relays 230V
ACUD5HN	DIN 5 relays 230V + NFC
ACUD5HB	DIN 5 relays 230V + NFC/BLE
ACUD5YH	DIN 5 relays + 2xAO 230V
ACUD5YHN	DIN 5 relays + 2xAO 230V + NFC
ACUD5YHB	DIN 5 relays + 2xAO 230V + NFC/BLE

ALARM TABLE

When an alarm occurs, the ALARM button turns red and the user terminal displays the corresponding alarm code.

Code	Description
rE	Control probe
E1	Probe S1 fault
E2	Probe S2 fault
E3	Probe S3 fault
E4	Probe S4 fault
E5	Probe S5 fault
E6	Probe S6 fault
E11	Serial probe S11 not updated
E12	Serial probe S12 not updated
E13	Serial probe S13 not updated
E14	Serial probe S14 not updated
LO	Low temperature
HI	High temperature
LO2	Low temperature
HI2	High temperature
IA	Immediate alarm from ext. contact
dA	Delayed alarm from external contact
dor	Door open for too long
Etc	Real time clock not updated
LSH	Low superheat
LSA	Low suction temperature
MOP	Max evaporation pressure
LOP	Low evaporation pressure
bLo	Valve blocked
Edc	Communicat. error with stepper driver
dA1	EVD ice/mini: probe S1 fault
dA2	EVD ice/mini: probe S1 fault
AFr	EVD ice/mini: firmware <1.7
HA	HACCP type HA
HF	HACCP type HF
MA	Communication error with the Main (only on Secondary)
u1...u9	Communication error with the Secondary (only on Main)
n1...n9	Alarm on unit 1 ... 9 in the network
GPE	Error in the custom gas parameters
GHI	Generic function: MAX threshold exceeded alarm
GLO	Generic function: MIN threshold exceeded alarm

IMPORTANT WARNINGS

The CAREL product is a state-of-the-art product, whose operation is specified in the technical documentation supplied with the product or can be downloaded, even prior to purchase, from the website www.carel.com. The customer (manufacturer, developer or installer of the final equipment) accepts all liability and risk relating to the configuration of the product in order to reach the expected results in relation to the specific final installation and/or equipment. Failure to complete such operations, which are required/indicated in the user manual, may cause the final product to malfunction; CAREL accepts no liability in such cases. The customer must only use the product in the manner described in the documentation relating to the product. The liability of CAREL in relation to its products is specified in the CAREL general contract conditions, available on the website www.CAREL.com and/or by specific agreements with customers.

IMPORTANT: Separate as much as possible the probe and digital input cables from cables to inductive loads and power cables, so as to avoid possible electromagnetic disturbance. Never run power cables (including the electrical panel cables) and signal cables in the same conduits.

Disposal of the product

The appliance (or the product) must be disposed of separately in compliance with the local standards in force on waste disposal.

The complete user manual (+0300086EN) for the product can be downloaded at www.carel.com under the "Services / Documentation" section or via QR Code.

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