Diamond

MOD : MD12/B5-R2

Production code : OI120PSVND97H

07/2023

EV3 L series

Controllers for refrigerated cabinets, counters and islands

EVCO

PLEASE READ CAREFULLY
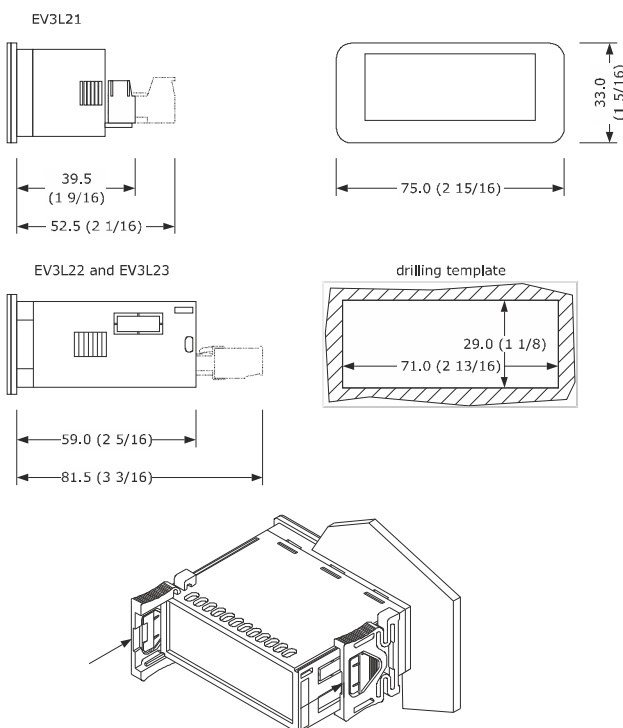and save this document
CONSIDER THE ENVIRONMENT

E   ENGLISH

- Controllers for normal and low temperature units.
- Power supply 115 or 230 VAC (according to the model).
- Cabinet probe and evaporator probe (NTC).
- Door switch input.
- Compressor relay 16 A res. @ 250 VAC.

Purchasing code	Relays	Probes (NTC)	Power supply
EV3L21N5	1	1	115 VAC
EV3L21N7	1	1	230 VAC
EV3L22N5	2	2	115 VAC
EV3L22N7	2	2	230 VAC
EV3L23N5	3	2	115 VAC
EV3L23N7	3	2	230 VAC

1   MEASUREMENTS AND INSTALLATION

Measurements in mm (inches). To be fitted to a panel, snap-in brackets provided.

EV3L21

39.5 (1 9/16)
52.5 (2 1/16)
75.0 (2 15/16)
33.0 (1 5/16)

EV3L22 and EV3L23

drilling template

29.0 (1 1/8)
71.0 (2 13/16)
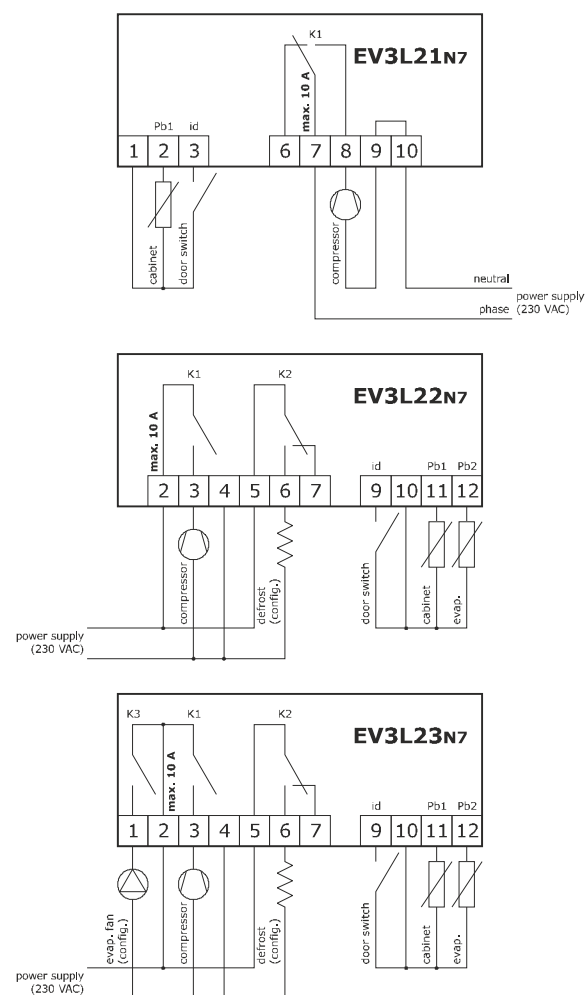
59.0 (2 5/16)
81.5 (3 3/16)

INSTALLATION PRECAUTIONS

- The thickness of the panel must be between 0.8 and 2.0 mm (1/32 and 1/16 in)
- Ensure that the working conditions are within the limits stated in the *TECHNICAL SPECIFICATIONS* section.
- Do not install the device close to heat sources, equipment with a strong magnetic field, in places subject to direct sunlight, rain, damp, excessive dust, mechanical vibrations or shocks.
- In compliance with safety regulations, the device must be installed properly to ensure adequate protection from contact with electrical parts. All protective parts must be fixed in such a way as to need the aid of a tool to remove them.

2   ELECTRICAL CONNECTION

N.B.
- Use cables of an adequate section for the current running through them.
- To reduce any electromagnetic interference connect the power cables as far away as possible from the signal cables.

EV3L21N7
K1
max. 10 A
Pb1 id
1 2 3   6 7 8 9 10
cabinet
door switch
compressor
neutral
power supply (230 VAC)
phase

EV3L22N7
K1   K2
max. 10 A
2 3 4 5 6 7   9 10 11 12
compressor
defrost (config.)
door switch
cabinet
evap.
id Pb1 Pb2
power supply (230 VAC)

EV3L23N7
K3   K1   K2
max. 10 A
1 2 3 4 5 6 7   9 10 11 12
evapo. fan (config.)
compressor
defrost (config.)
door switch
cabinet
evap.
id Pb1 Pb2
power supply (230 VAC)

PRECAUTIONS FOR ELECTRICAL CONNECTION

- If using an electrical or pneumatic screwdriver, adjust the tightening torque.
- If the device has been moved from a cold to a warm place, the humidity may have caused condensation to form inside. Wait about an hour before switching on the power.
- Make sure that the supply voltage, electrical frequency and power are within the set limits. See the section *TECHNICAL SPECIFICATIONS*.
- Disconnect the power supply before doing any type of maintenance.
- Do not use the device as safety device.
- For repairs and for further information, contact the EVCO sales network.
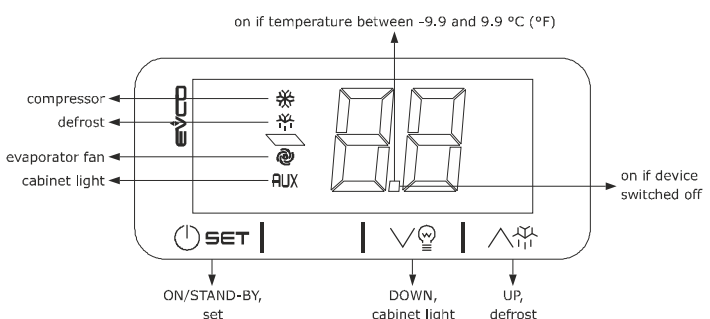
3   FIRST-TIME

1. Install following the instructions given in the section *MEASUREMENTS AND INSTALLATION*.
2. Power up the device as shown in the section *ELECTRICAL CONNECTION* and an internal test will be run.
   The test normally takes a few seconds, when it is finished the display will switch off.
3. Configure the device as shown in the section *Setting configuration parameters*.
   Recommended configuration parameters for first-time use.

PAR.	DEF.	PARAMETER	MIN… MAX.
SP	0	setpoint	r1… r2
P2	0	temperature unit of measurement	0 = °C 1 = °F
d1	0	defrost type	0 = electric 1 = hot gas

   Then check that the remaining settings are appropriate; see the section *CONFIGURATION PARAMETERS*.
4. Disconnect the device from the mains.
5. Make the electrical connection as shown in the section *ELECTRICAL CONNECTION* without powering up the device.
6. Power up the device.

4   USER INTERFACE AND MAIN FUNCTIONS

on if temperature between -9.9 and 9.9 °C (°F)

compressor
defrost
evaporator fan
cabinet light

on if device switched off

ON/STAND-BY, set
DOWN, cabinet light
UP, defrost

4.1   Switching the device on/off

1.	⏻ SET	Touch the ON/STAND-BY key for 3 s.

If the device is switched on, the display will show the cabinet temperature; if the display shows an alarm code, see the section *ALARMS*.

LED	ON	OFF	FLASHING
❄	compressor on	compressor off	- compressor protection active - setpoint setting active
❄❄	defrost active	-	- defrost delay active - dripping active
⊚	evaporator fan on	evaporator fan off	evaporator fan stop active
AUX	cabinet light on	cabinet light off	cabinet light on by digital input

If 30 s have elapsed without the keys being pressed, the display will show the "**Lo**" label and the keypad will lock automatically.

4.2   Unlock keypad

Touch a key for 3 s: the display will show the label "**Un**".

4.3   Set the setpoint

Check that the keypad is not locked.

1.	⏻ SET	Touch the ON/STAND-BY key.
2.		Touch the UP or DOWN key within 30 s to set the value within the limits r1 and r2 (default "-40… 50")
3.	⏻ SET	Touch the ON/STAND-BY key (or do not operate for 30 s).

4.4   Activate manual defrost

Check that the keypad is not locked.

1.	∧❄❄	Touch the UP key for 3 s.

If P4 = 1 (default), defrost is activated provided that the evaporator temperature is lower than the d2 threshold.

4.5   Cabinet light on/off (if u1 or u2 = 2)

1.	∨💡	Touch the DOWN key.

5   ADDITIONAL FUNCTIONS

5.1   View the evaporator temperature

Check that the keypad is not locked.

1.	∨💡	Touch the DOWN key for 4 s.
2.	⏻ SET	Touch the ON/STAND-BY key (or do not operate for 30 s) to exit the procedure.

6   SETTINGS

6.1   Setting configuration parameters

Check that the device is switched on and the keypad is not locked.

1.	⏻ SET	Touch the ON/STAND-BY key for 6 s: once 3 s have elapsed the display will switch off, once 6 s have elapsed the display will show the label "**PA**".
2.	⏻ SET	Touch the ON/STAND-BY key again.
3.		Touch the UP or DOWN key within 30 s to set the PS value (default "-19").
4.	⏻ SET	Touch the ON/STAND-BY key: the display will show the label "**SP**".
5.		Touch the UP or DOWN key to select a parameter.
6.	⏻ SET	Touch the ON/STAND-BY key.
7.		Touch the UP or DOWN key within 30 s to set the value.
8.	⏻ SET	Touch the ON/STAND-BY key.
9.	⏻ SET	Touch the ON/STAND-BY key for 3 s (or do not operate for 30 s) to exit the procedure.

6.2   Restore the factory settings (default) and store customized settings as default

N.B.
- Check that the factory settings are appropriate; see the section *CONFIGURATION PARAMETERS*.
- the storing of customized settings overwrites the default.

Check that the device is switched on and the keypad is not locked.

1.	⏻ SET	Touch the ON/STAND-BY key for 6 s: once 3 s have elapsed the display will switch off, once 6 s have elapsed the display will show the label "**PA**".
2.	⏻ SET	Touch the ON/STAND-BY key again.
3.		Touch the UP or DOWN key within 30 s to set "**49**".
4.	⏻ SET	Touch the ON/STAND-BY key again: the display will show the label "**dF**".
5.	⏻ SET	Touch the ON/STAND-BY key again.
6.		Touch the UP or DOWN key within 30 s to set the value.

VAL.	DESCRIPTION
1	value to restore the factory settings (default)
-2	value to store customized settings as default

7.	🔒 SET	Touch the SET key: the device will exit the procedure.
8.	🔒 SET	Touch the SET key 2 s before action 6. (or do not operate for 30 s) to exit the procedure beforehand.

7   CONFIGURATION PARAMETERS

N.	PAR.	DEF.	SETPOINT	MIN… MAX.
1	SP	0	setpoint	r1… r2

N.	PAR.	DEF.	ANALOGUE INPUTS	MIN… MAX.
2	o1	0	cabinet probe offset	-99… 99 °C/°F
3	o2	0	evaporator probe offset **not available in EV3L21**	-99… 99 °C/°F
4	P2	0	temperature unit of measurement	0 = °C 1 = °F
5	P4	1	enable evaporator probe **not available in EV3L21**	0 = no 1 = yes
6	P8	4	filter for cabinet temperature display	1… 10 1 = quick 4 = normal 7 = slow 10= very slow

N.	PAR.	DEF.	REGULATION	MIN… MAX.
7	r0	-2	setpoint differential	-99… 0 °C/°F symmetric 0… 99 °C/°F asymmetric
8	r1	-40	minimum setpoint	-99… 99 °C/°F
9	r2	50	maximum setpoint	-99… 99 °C/°F

N.	PAR.	DEF.	COMPRESSOR	MIN… MAX.
10	C0	0	compressor on delay after power-on	0… 99 s x 10
11	C1	5	delay between 2 compressor switch-ons	0… 99 min
12	C2	3	compressor off minimum time	0… 99 min
13	C4	50	percentage compressor on during cabinet probe alarm	referred to the average time compressor on 0… On On= 100 %

N.	PAR.	DEF.	DEFROST	MIN… MAX.
14	d0	8	automatic defrost interval	-99… 1 min (for unit test) 1… 99 h
15	d1	0	defrost type **not available in EV3L21**	0 = electric 1 = hot gas
16	d2	2	threshold for defrost end **not available in EV3L21**	-99… 99 °C/°F
17	d3	30	defrost duration **not available in EV3L21**	0… 99 min if P4 = 1, maximum duration
18	d7	2	dripping time **not available in EV3L21**	0… 99 min
19	d8	0	defrost relay status during dripping **not available in EV3L21**	0 = not active 1 = active
20	d9	0	compressor on consecutive time for hot gas defrost **not available in EV3L21**	0… 99 min

N.	PAR.	DEF.	ALARMS	MIN… MAX.
21	A1	-99	threshold for low temperature alarm	-99… 99 °C/°F
22	A4	99	threshold for high temperature alarm	-99… 99 °C/°F
23	A5	-2	high/low temperature alarms reset differential	-99… 0 °C/°F absolute alarms 0… 99 °C/°F alarms relative to setpoint
24	A7	2	high/low temperature alarms delay	0… 99 min x 10 1 h after defrost

N.	PAR.	DEF.	FANS **not available in EV3L21**	MIN… MAX.
25	F0	0	evaporator fan mode during normal operation	0 = on 1 = on if compressor on 2 = thermoregulated (with F1
26	F1	-1	threshold for evaporator fan operation	-99… 99 °C/°F differential = 1 °C/2 °F
27	F2	0	evaporator fan mode during dripping	0 = off 1 = on
28	F3	2	evaporator fan off time	0… 99 s x 10
2	F4	30	evaporator fan off time with compressor off	0… 99 s x 10
30	F5	10	evaporator fan on time with compressor off	0… 99 s x 10

N.	PAR.	DEF.	DIGITAL INPUTS	MIN… MAX.
31	i0	0	door switch input function **options 0 and 2 not available in EV3L21**	0 = cabinet light on 1 = compressor + evaporator fan off, cabinet light on 2 = evaporator fan off, cabinet light on
32	i1	0	door switch input activation	0 = with contact closed 1 = with contact open
33	i2	30	open door alarm delay: also regulation inhibition maximum time with door open	-1… 99 min -1 = disabled

N.	PAR.	DEF.	DIGITAL OUTPUTS	MIN… MAX.
34	u1	1	auxiliary output 1 configuration (relay K2) **not available in EV3L21**	0 = evaporator fan 1 = defrost 2 = cabinet light
35	u2	0	auxiliary output 2 configuration (relay K3) **not available in EV3L21 and EV3L22**	0 = evaporator fan 1 = defrost 2 = cabinet light

N.	PAR.	DEF.	SAFETIES	MIN… MAX.
36	nS	0	compressor start-up number	0… 99 x 10,000
37	PS	-19	password	-99… 99 min 0 = disabilita
38	MP	1	parameters map identification	0… 9

8   ALARMS

COD.	DESCRIPTION	RESET	REMEDIES
P1	cabinet probe alarm	automatic	- check probe integrity
P2	evaporator probe alarm	automatic	- check electrical connection
AL	low temperature alarm	automatic	check A1
AH	high temperature alarm	automatic	check A4
id	open door alarm	automatic	check i0 e i1

9   TECHNICAL SPECIFICATIONS

Purpose of the control device	Function controller
Construction of the control device	Built-in electronic device
Container	Black, self-extinguishing
Category of heat and fire resistance	D
Measurements	
With fixed screw terminal blocks: 75.0 x 33.0 x 39.5 mm (2 15/16 x 1 5/16 x 1 9/16 in) for EV3L21, 75.0 x 33.0 x 59.0 mm (2 15/16 x 1 5/16 x 2 5/16 in) otherwise	With removable screw terminal blocks: 75.0 x 33.0 x 52.5 mm (2 15/16 x 1 5/16 x 2 1/16 in) for EV3L21, 75.0 x 33.0 x 81.5 mm (2 15/16 x 1 5/16 x 3 3/16 in) otherwise
Mounting methods for the control device	To be fitted to a panel, snap-in brackets provided
Degree of protection provided by the covering	IP65 (front)
Connection method	
Fixed screw terminal blocks for wires up to 2,5 mm²	Removable screw terminal blocks for wires up to 2,5 mm²: by request
Maximum permitted length for connection cables	
Power supply: 10 m (32.8 ft)	Analogue inputs: 10 m (32.8 ft)
Digital inputs: 10 m (32.8 ft)	Digital outputs: 10 m (32.8 ft)
Operating temperature	From 0 to 55 °C (from 32 to 131 °F)
Storage temperature	From -25 to 70 °C (from -13 to 158 °F)
Operating humidity	Relative humidity without condensate from 10 to 90 %
Pollution status of the control device	2
Conformity	
RoHS 2011/65/CE WEEE 2012/19/EU	REACH (EC) Regulation 1907/2006
EMC 2014/30/UE	LVD 2014/35/UE
Power supply	230 VAC (+10% -15%), 50/60 Hz (±3 Hz), max. 3 VA isolated
Earthing methods for the control device	None
Rated impulse-withstand voltage	4 KV
Over-voltage category	III
Software class and structure	A
Analogue inputs	- 1 in EV3L21 (cabinet probe) - 2 in EV3L22 and EV3L23 (cabinet probe and evaporator probe) for NTC probes
NTC probes	Sensor type	ß3435 (10 KΩ @ 25 °C, 77 °F)
	Measurement field	From -40 to 90 °C (from -40 to 194 °F)
	Resolution	- 0.1 °C (0.1 °F) between -9.9 and 9.9 - 1 °C (1 °F) otherwise
Digital inputs	1 dry contact (door switch)
Dry contact	Contact type	5 VDC, 1.5 mA
	Protection	None
Digital outputs	- 1 in EV3L21 (K1) - 2 in EV3L22 (K1 and K2) - 3 in EV3L23 (K1, K2 and K3) electro-mechanical relays **The maximum current allowed on the loads is 10 A**
Relay K1 (compressor):	SPST, 16 A res. @ 250 VAC
Relay K2 (auxiliary output 1, default defrost):	SPDT, 8 A res. @ 250 VAC
Relay K3 (auxiliary output 2, default evaporator fan):	SPST, 5 A res. @ 250 VAC
Type 1 or Type 2 Actions	Type 1
Additional features of Type 1 or Type 2 actions	C
Displays	2 digits custom display 17 mm (11/16 in) high, with function icons