07/2021

Mod: ML20/B5-R2

Production code: PY200PSSND97H

Diamond

EV3 L series

Controllers for refrigerated cabinets, counters and islands



PLEASE READ CAREFULLY
and save this document
CONSIDER THE ENVIRONMENT

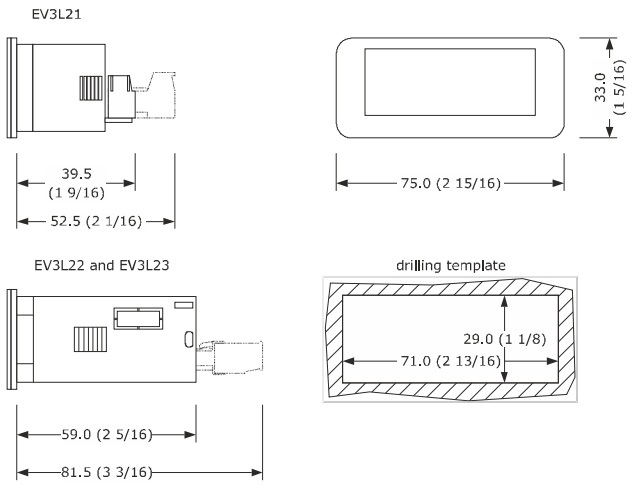
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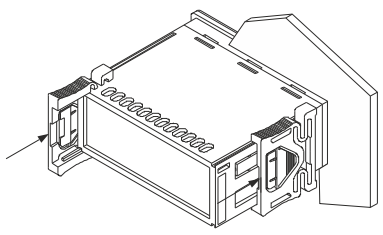
- Controllers for normal and low temperature units.
- Power supply 115 or 230 VAC (according to the model).
- Cabinet probe and evaporator probe (NTC).
- Door switch input.
- Compressor relay 16 A res. @ 250 VAC.

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.



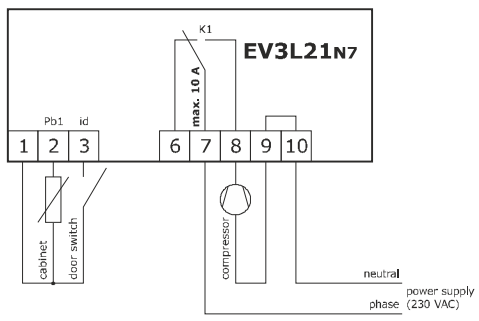


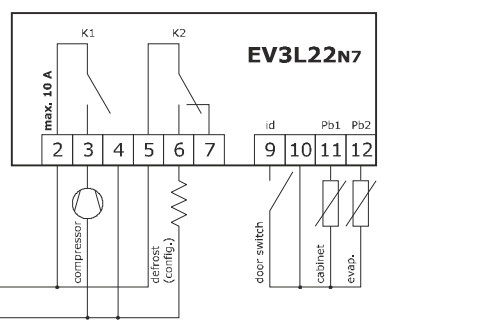
INSTALLATION PRECAUTIONS

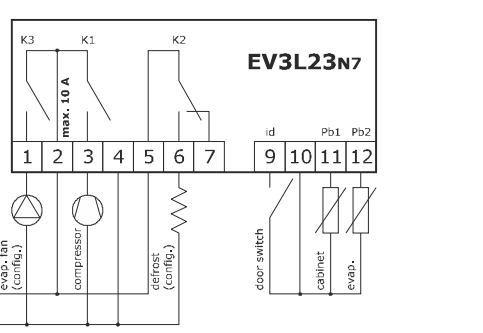
- The thickness of the panel must be between 0.8 and 2.0 mm (1/32 and 1/16 in)
- Ensure that the working conditions are within the limits stated in the *TECHNICAL SPECIFICATIONS* section.
- Do not install the device close to heat sources, equipment with a strong magnetic field, in places subject to direct 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.







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

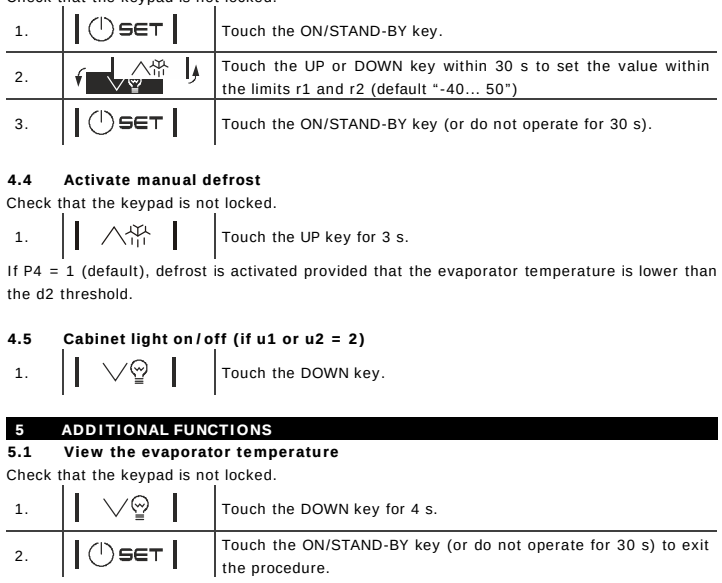
1. Install following the instructions given in the section *MEASUREMENTS AND INSTALLATION*.
2. Power up the device as shown in the section *ELECTRICAL CONNECTION* and an internal test will be run.
   The test normally takes a few seconds, when it is finished the display will switch off.
3. Configure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



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. UP or DOWN — 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. UP — 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. DOWN — Touch the DOWN key.

5 ADDITIONAL FUNCTIONS

5.1 View the evaporator temperature

Check that the keypad is not locked.

1. DOWN — 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. UP or DOWN — 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. UP or DOWN — Touch the UP or DOWN key to select a parameter.
6. SET — Touch the ON/STAND-BY key.
7. UP or DOWN — 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. UP or DOWN — 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. UP or DOWN — 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 min
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 = disabilitata
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

N.B.
The device must be disposed of according to local regulations governing the collection of electrical and electronic waste.

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