

PBC-2.5 Compressor w. alt. Controller for 70-Litre Portable Cooling Boxes 12/24V DC R134a w. alt. Electronic Unit (Controller)



GENERAL

Code number compressor with electronic unit	SBC00N21
Electronic unit	30 pcs: 101N0225
Compressors on pallet	150

APPLICATION

Application	LBP/MBP
Evaporating temperature °C	-30 to 0
Voltage range DC VDC	9.6 - 17 / 21.3 - 31.5
Max. condensing temperature continuous (short) °C	60 (70)
Max. winding temperature continuous (short) °C	125 (135)

COOLING REQUIREMENTS

Application	LBP	MBP	HBP
32°C	S	S	-
38°C	F ₁	F ₁	-
43°C	F ₁	F ₁	-

MOTOR

Motor type	variable speed
Resistance, all 3 windings (25°C) Ω	2.2

DESIGN

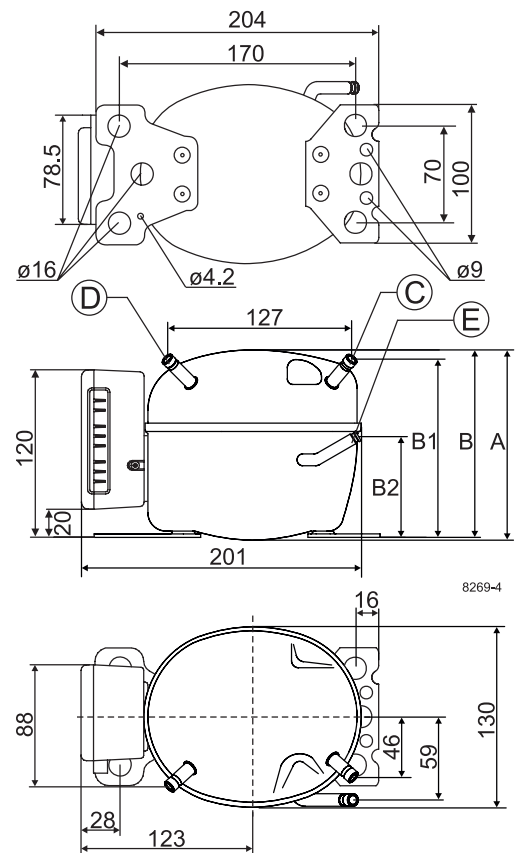
Displacement cm ³	2.50
Oil quantity (type) cm ³	150 (polyolester)
Maximum refrigerant charge g	300
Free gas volume in compressor cm ³	870
Weight - Compressor/Electronic unit kg	4.3 / 0.27

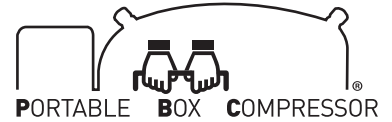
STANDARD BATTERY PROTECTION SETTINGS

Voltage	12V	24V
Cut out VDC	10.4	22.8
Cut in VDC	11.7	24.2

DIMENSIONS

Height mm	A	137
	B	135
	B1	128
	B2	73
Suction connector location/I.D. mm angle	C	6.2 40°
material comment		Cu-plated steel Al cap
Process connector location/I.D. mm angle	D	6.2 45°
material comment		Cu-plated steel Al cap
Discharge connector location/I.D. mm angle	E	5.0 21°
material comment		Cu-plated steel Al cap
Connector tolerance I.D. mm		±0.09, on 5.0 +0.12/+0.20
Remarks: Dimensional sketch shows original controller		





ELECTRONIC UNIT

Supply voltage	DC supply voltage range [V]	9.6 - 17 21.3 - 31.5
	Fuses (DIN 7258) required for 12/24V DC [A]	15 / 7.5
	Main switch [A]	min. 20
Ambient & enclosure	Ambient temperature operation [°C]	43
	Ambient temp. during storage/transport [°C]	-40 to 85
	IP Class	20
	Weight [kg]	0.27
Connectivity	Spade Connectors [mm]	6.3
	Fan [V/W _{max}]	12 / 6
	NTC sensor	no
	LED (alarm)	yes
	Setpoint selection (mechanical thermostat -M /external resistor -R)	M / -

Compressor speed	Resistor (R1) [Ω] calculated values	Motor speed [rpm]
	0	2,000
	277	2,500
	692	3,000
	1523	3,500

Wire dimensions	Size		Max. length *		Max. length *	
	Cross section [mm ²]	AWG	12V operation		24V operation	
		[Gauge]	[m]	[ft.]	[m]	[ft.]
	2.5	12	2.5	8	5	16
	4	12	4	13	8	26
6	10	6	20	12	39	
10	8	10	33	20	66	

* Length between battery and electronic unit

Optional battery protection settings

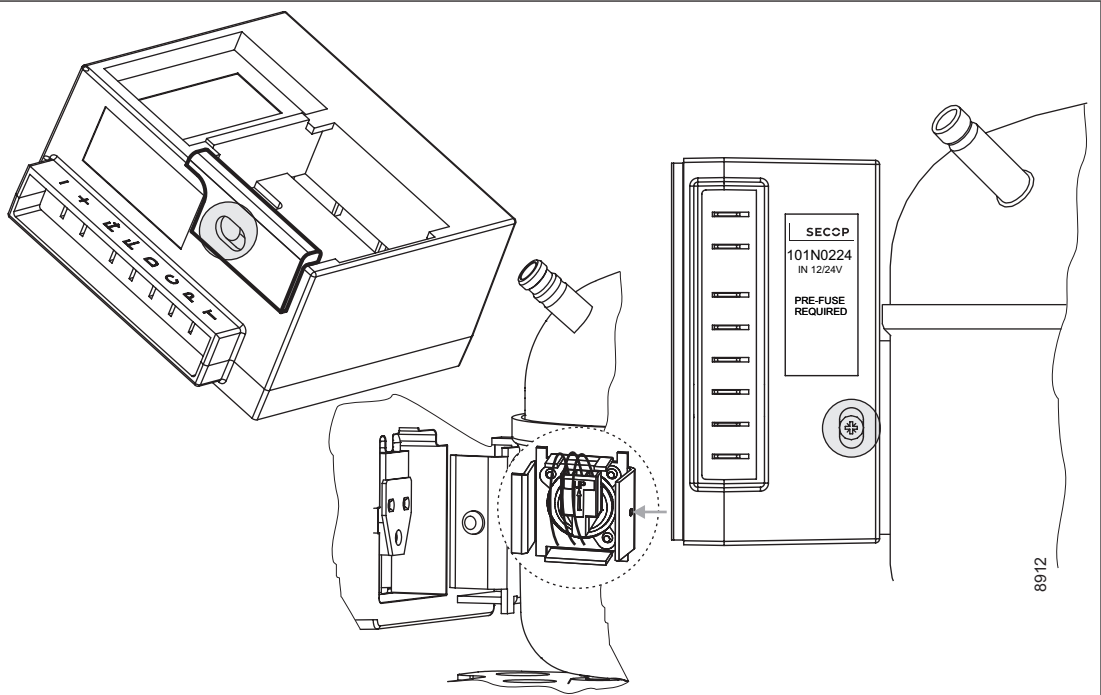
Resistor (8) kΩ	12V cut-out [V]	12V cut-in [V]	12V max. [V]	24V cut-out [V]	24V cut-in [V]	24V max. [V]
0	9.6	10.9	17.0	21.3	22.7	31.5
1.6	9.7	11.0	17.0	21.5	22.9	31.5
2.4	9.9	11.1	17.0	21.8	23.2	31.5
3.6	10.0	11.3	17.0	22.0	23.4	31.5
4.7	10.1	11.4	17.0	22.3	23.7	31.5
6.2	10.2	11.5	17.0	22.5	23.9	31.5
11	10.5	11.8	17.0	23.0	24.5	31.5
14	10.6	11.9	17.0	23.3	24.7	31.5
18	10.8	12.0	17.0	23.6	25.0	31.5
24	10.9	12.2	17.0	23.8	25.2	31.5
33	11.0	12.3	17.0	24.1	25.5	31.5
47	11.1	12.4	17.0	24.3	25.7	31.5
82	11.3	12.5	17.0	24.6	26.0	31.5
220	9.6	10.9				31.5

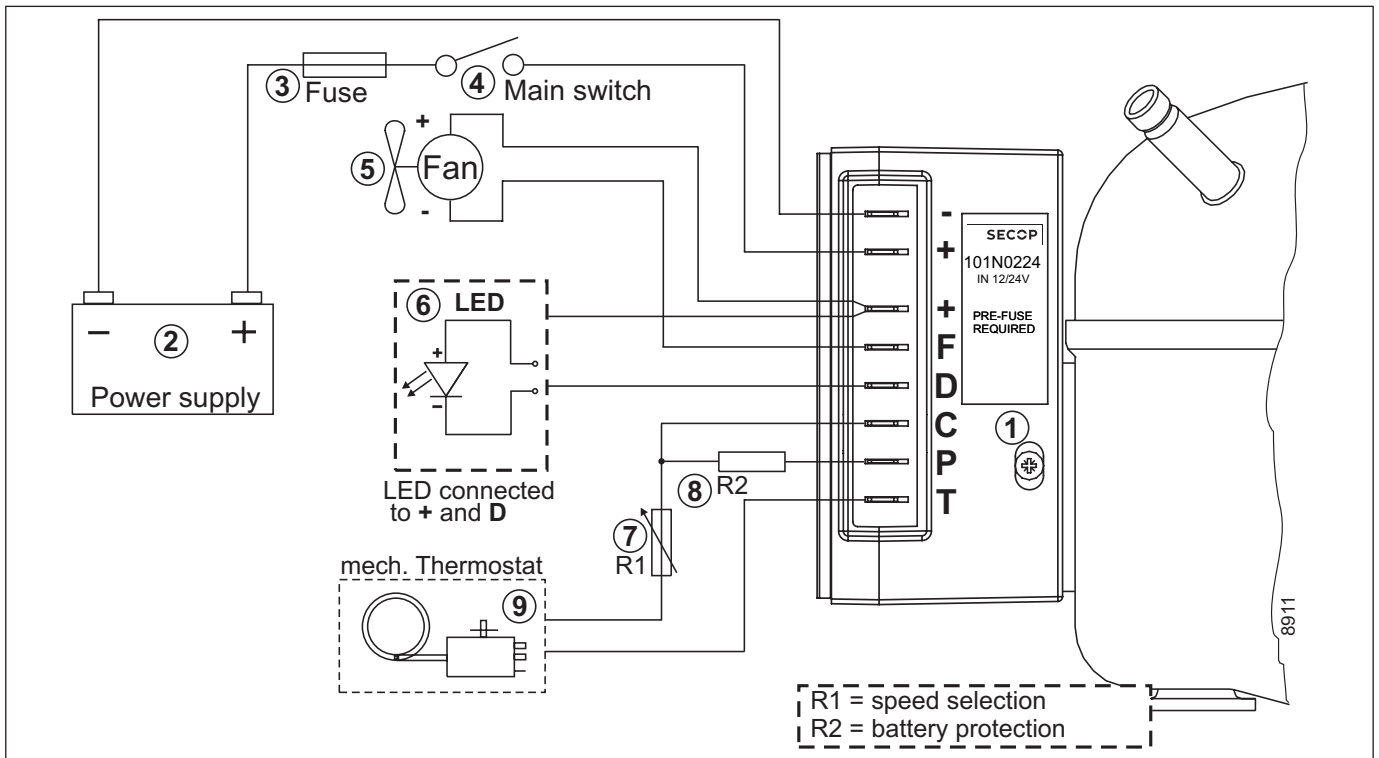
Mounting

Connect the terminal plug from the electronic unit to the compressor terminal.

Mount the electronic unit on the compressor and fix it with one screw (sideways, marked in grey).

Use the screw provided in the packaging to fasten the electronic unit to the compressor with a torque of 2 Nm to make sure it is tight.





The electronic unit is a dual voltage device. This means that the same unit can be used in both 12V and 24V power supply systems. Maximum voltage is 17V for a 12V system and 31.5V for a 24V power supply system. Max. ambient temperature is 43°C. The electronic unit has a built-in thermal protection which is actuated and stops compressor operation if the electronic unit temperature gets too high.

Intended applications and refrigerants

This electronic unit is intended for portable box applications only. It may only be used with compressors with a R134a refrigerant. The compressor may only be operated within the limits stated in the compressor datasheet.

Installation

Mount the electronic unit on the compressor and fix it with one screw (1).

Power supply

The electronic unit must always be connected directly to the battery poles (2). The electronic unit is protected against reverse battery connection. A fuse (3) must be mounted in the + cable as close to the battery as possible. 15A fuse for 12V and 7.5A fuse for 24V circuits are recommended.

If a main switch (4) is used, it should be rated to a current of min. 20A. The wire dimensions (refer to page 2) must be observed.

Avoid extra junctions in the power supply system to prevent voltage drop from affecting the battery protection setting.

Battery protection

The compressor stops and restarts according to the voltage measured on the + and - terminals of the electronic unit. The standard settings can be found on page 1.

Other settings are optional if a R2 resistor (8) is connected between terminals C and P.

Fan (optional)

A fan (5) can be connected between the terminals + and F. **A 12V fan must be used for both 12V and 24V power supply systems.**

The fan output can supply a continuous current of $1A_{avg}$. A higher current draw is allowed for 2 seconds during start.

Speed selection

A mechanical thermostat (9) can be connected between the terminals C and T.

If a mechanical thermostat is used without any R1 resistor (7), the compressor will run with a fixed speed of **2,000 rpm**. Other fixed compressor speeds in the range between 2,000 and 3,500 rpm can be obtained when a resistor (7) is installed. Resistor values for various motor speeds can be found on page 2.

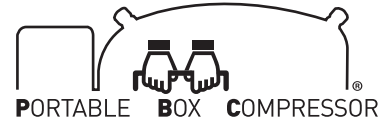
LED error handling

A 10mA light emitting diode (LED) (6) can be connected between the terminals + and D.

In case the electronic unit records an operational error, the diode will flash a number of times. The number of flashes depends on what kind of operational error was recorded. Each flash will last $\frac{1}{4}$ second. After the actual number of flashes there will be a delay with no flashes, so that the sequence for each error protection recording is repeated every 4 seconds.

Operational errors

LED flashes	Error type
6	Internal error booster (Compressor load too high or sudden pressure drop).
5	Thermal cut-out of electronic unit (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	Minimum motor speed error (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed at approximately 1,850 rpm).
3	Motor start error (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).
2	Fan over-current cut-out (The fan loads the electronic unit with more than $1A_{avg}$).
1	Battery protection cut-out (The voltage is outside the cut-out setting).



PERFORMANCE DATA

Speed	ASHRAE (International System of Units)							
	Tc=54.4°C, Tliq=32.2°C, Tsuc=32.2°C							
	LBP rating point -23.3°C / 54.4°C				MBP rating point -6.7°C / 54.4°C			
	Cooling capacity	COP	Power consumption	Current **	Cooling capacity	COP	Power consumption	Current **
[rpm]	[W]	[W/W]	[W]	[A]	[W]	[W/W]	[W]	[A]
2,000	41.8	1.25	33.8	2.8	105	1.93	54.7	4.7
2,500	51.3	1.21	42.4	3.5	129	1.85	70	5.9
3,000	62.0	1.21	51.6	4.3	155	1.85	83.8	6.5
3,500	71.6	1.18	60.7	5.0	179	1.82 ***	98.5 ***	8.3 ***

Speed	ASHRAE (Imperial Units)							
	Tc=130°F, Tliq=90°F, Tsuc=90°F							
	LBP rating point -10°F / 130°F				MBP rating point 20°F / 130°F			
	Cooling capacity	EER	Power consumption	Current **	Cooling capacity	EER	Power consumption	Current **
[rpm]	[BTU/h]	[BTU/Wh]	[W]	[A]	[BTU/h]	[BTU/Wh]	[W]	[A]
2,000	142	4.24	33.5	2.8	360	6.57	54.8	4.7
2,500	174	4.12	42.3	3.5	442	6.30	70.2	5.9
3,000	211	4.10	51.4	4.3	531	6.32	84.0	7.0
3,500	244	4.03	60.5	4.5	613 ***	6.21 ***	98.7 ***	8.3 ***

** for 24V applications the values must be halved
 *** fan cooling of electronic unit compulsory

MOUNTING ACCESSORIES

Bolt joint for one compressor	Ø:16 mm	118-1917		
Bolt joint in quantities	Ø:16 mm	118-1918		
Snap-on in quantities	Ø:16 mm	118-1919		

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