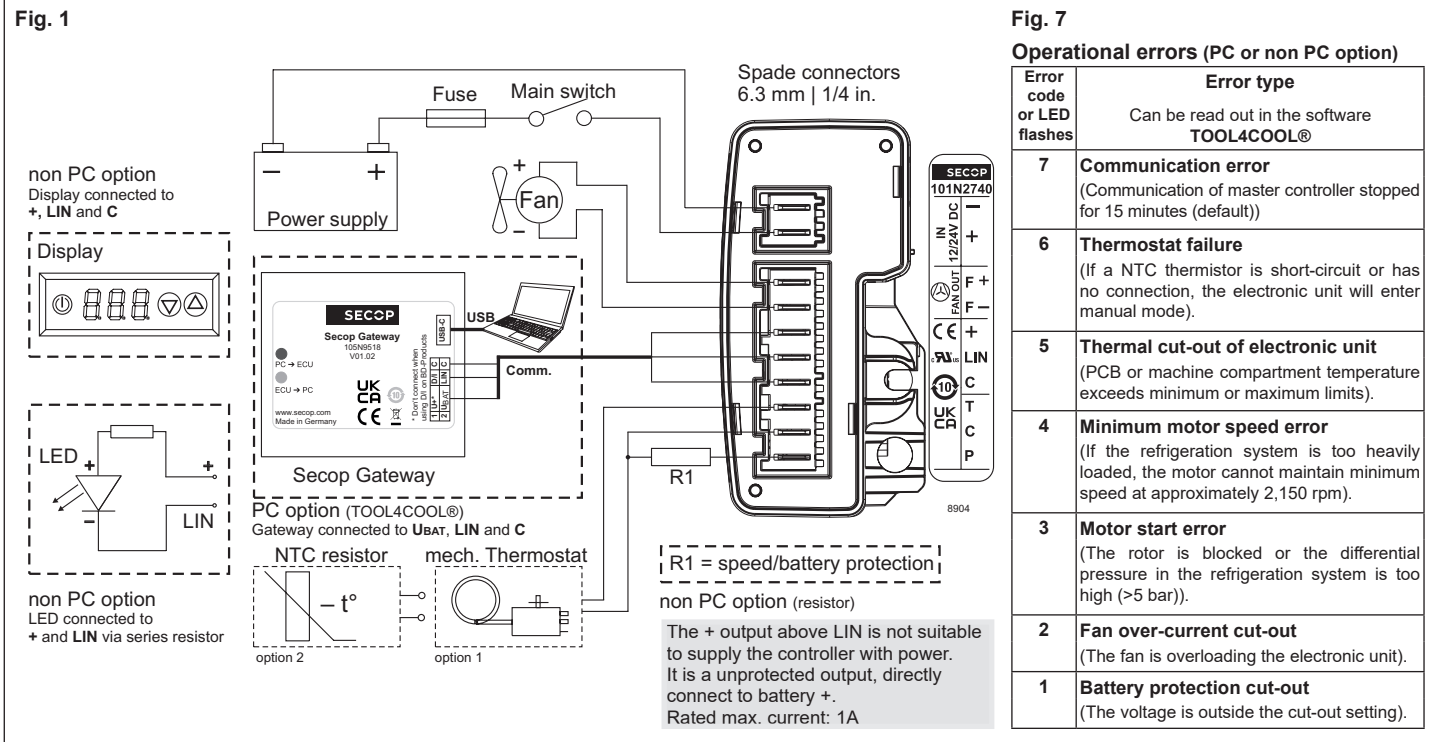


Instructions

Electronic Unit for BDN45F/50K Compressors
101N2740, 12-24V DC

SECCP



ENGLISH

The electronic unit is a dual voltage device. This means that the same unit can be used in 12V or 24V power supply systems. Maximum voltage is 17V for a 12V system and 34V for a 24V power supply system.

It can be connected to a PC through the *Secop Gateway* communication interface on the terminal LIN and C (Fig. 1). Communication gateway modules incl. communication cables can be ordered at Secop (Fig. 8).

The PC interface allows you to create different settings and reads out several measurements by using the software *TOOL4COOL®* supplied by Secop.

Installation (Fig. 3)

Attach the electronic unit by pressing it linearly onto compressor *Fusite®* connector and brackets. Press until both screwheads snap in place. Optionally the unit can be secured against excessive vibration with a third screw (Fig. 3).

Power supply (Fig. 1)

The electronic unit must always be connected directly to the battery poles. Connect the plus to + and the minus to -, otherwise the electronic unit will not work. The electronic unit is protected against reverse battery connection. For protection during installation, a fuse must be mounted in the + cable as close to the battery as possible. A 15A fuse for 12V and a 15A fuse for 24V circuits are recommended. If a main switch is used, it should be rated to a current of min. 20A. The wire dimensions in Fig. 4 must be observed. Avoid extra junctions in the power supply system to prevent voltage drop from affecting the battery protection setting.

Battery protection (Fig. 2)

The compressor stops and restarts again according to the designated voltage limits measured on the + and - terminals of the electronic unit. The standard settings for 12V and 24V power supply systems are shown in Fig. 2. (PC option).

Other settings are (Fig. 5) optional if a connection which includes a resistor (R1) is established between terminals C and P (**non PC option**).

Thermostat (Fig. 1)

The thermostat is connected between the terminals C and T. Either a NTC (electrical thermostat) or a mechanical thermostat can be connected. Three different thermostat modes can be chosen in the software - *Auto* (both NTC and mechanical), *NTC* or *Mechanical*. Standard setting is *Auto*. In case of using a NTC the set point in the range between -40°C and 40°C is set with the software and the temperature can also be seen by using the interface. When using the *Auto* setting in the software it is not possible to obtain NTC failures, so it is recommended to set the thermostat mode to *NTC* when using a NTC.

Customer display (Fig. 1)

A Customer designed display can be supplied by the electronic unit and used to control e.g. the speed settings, battery protection settings or temperature settings. The used display can communicate with the electronic unit via the LIN terminal and Modbus protocol. The display power supply can be achieved via an unprotected output of the battery voltage and C. For more detailed recommendations on how to use and initialise a customer display please contact Secop. Do not use the battery + terminal above LIN to supply the controller with power.

Speed selection (Fig. 5)

The compressor will run with a fixed speed of 3,000 rpm when the thermostat is switched on. Other fixed compressor speeds and start speeds in the range between 2,300 and 4,500 rpm can be obtained when changing the speed settings in the software (PC option) or with resistor R1 (**non PC option**).

A connected resistor overrules the speeds configured by software. A start delay in the range from 0 - 240 sec. (factory setting 2 sec.) after thermostat cut-in can also be chosen.

Fan (Fig. 1)

A fan can be connected to the FAN OUT terminals. Connect the plus to F+ (FAN OUT) and the minus to F-. Since the output voltage between the terminals F+ (FAN OUT) and F- is always regulated to 12V, a 12V fan must be used for both 12V and 24V power supply systems.

The fan output can supply a continuous power of 6W_{avg}.

Fan settings can be adjusted via *TOOL4COOL®*. It is also possible to set a start delay on the fan in the range from 0 - 240 sec..

Factory default setting for a fan is 0 seconds. Fan speed can be adjusted through the interface from 40 - 100%.

Error handling (Fig. 7)

If the electronic unit records an operational error, the error can be read out in the software (PC option). Error codes are defined as shown in Fig. 7.

A standard light emitting diode (LED) can alternatively be connected between the terminals LIN and +, when using a series resistor of about 1800 Ohm. 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 1/5 second. After the actual number of flashes there will be a delay with no flashes, so that the sequence for each error recording is repeated every 4 seconds (**non PC option**).

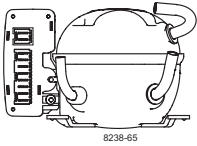
Machine compartment temperature

The electronic unit disables the compressor operation in case its PCB exceeds the maximum limits. The electronic unit does not limit the compressor to operate in its released conditions. It must be ensured the machine compartment temperature does not exceed the compressors maximum ratings, otherwise it might be damaged.

Min. PCB temperature: -10°C (14°F)

Max. PCB temperature: 110°C (230°F)

Please refer to the compressor datasheet regarding operating conditions and machine compartment temperature.



Instructions

SECCP

Electronic Unit for BDN45F/50K Compressors 101N2740, 12-24V DC

Fig. 2

Battery protection settings

Voltage (0.1 steps)		Default	Min. value	Max. value	
12V ± 0.3V DC, all values	Cut out level V DC	10.4	9.6	17	
24V ± 0.3V DC, all values	Cut out level V DC	21.3	19	32	
Battery cut-in difference		V DC	1.3	0.5	10

Fig. 4

Wire dimensions DC

Size		Max. length* 12V operation		Max. length* 24V operation	
Cross section	AWG				
[mm ²]	[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

Fig. 8

Periphery

Secop Gateway	105N9518*
Thermistor multi-pack	105N9615

*The previous gateway (105N9501) is not fully compatible with electronics using LIN bus above 24V. Please use the most recent gateway version.

Fig. 5

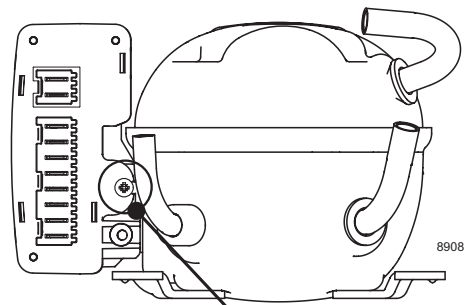
R1 [kΩ]	Duty Cycle [%]	Speed [RPM]	Cut in level [V]	Cut out level [V]	Cut in level [V]	Cut out level [V]	Mode	
open	0	Maintain	Maintain current value. Can be changed via Modbus			Delivery/external display		
91	9	Maintain	Maintain current value. Can be changed via Modbus			ECO on		
68	12	Maintain	Maintain current value. Can be changed via Modbus			ECO off		
51	15	Maintain	Battery protection off (full envelope 9.6V to 34V)			Solar on		
43	18	Maintain	Reset battery protection to default. Maintain speed			Solar off		
36	21	Maintain	11.7	10.4	22.6	21.3	Reset battery	
30	24	3000	11.7	10.4	22.6	21.3	Reset battery/speed	
27	27	4500	Maintain current value. Can be changed via Modbus			Default mode		
22	30	4500	10.9	9.6	22.6			21.3
20	33	4500	11.4	10.1	23.6			22.3
18	36	4500	12.4	11.1	24.6			23.3
15	39	4500	13.4	12.1	25.6			24.3
13	42	3800	Maintain current value. Can be changed via Modbus			Default mode		
12	45	3800	10.9	9.6	22.6			21.3
11	48	3800	11.4	10.1	23.6			22.3
9.1	51	3800	12.4	11.1	24.6			23.3
8.2	54	3800	13.4	12.1	25.6			24.3
7.5	57	3200	Maintain current value. Can be changed via Modbus			Default mode		
6.2	60	3200	10.9	9.6	22.6			21.3
5.6	63	3200	11.4	10.1	23.6			22.3
5.1	66	3200	12.4	11.1	24.6			23.3
4.3	69	3200	13.4	12.1	25.6			24.3
3.9	72	2700	Maintain current value. Can be changed via Modbus			Default mode		
3.3	75	2700	10.9	9.6	22.6			21.3
2.7	78	2700	11.4	10.1	23.6			22.3
2.2	81	2700	12.4	11.1	24.6			23.3
1.8	84	2700	13.4	12.1	25.6			24.3
1.5	87	2300	Maintain current value. Can be changed via Modbus			Default mode		
1.0	90	2300	10.9	9.6	22.6			21.3
0.68	93	2300	11.4	10.1	23.6			22.3
0.36	96	2300	12.4	11.1	24.6			23.3
0.051	99	2300	13.4	12.1	25.6			24.3

Fig. 6

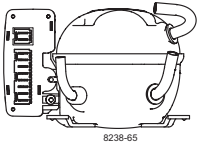
Recommended connector types

Power Supply	2-circuit	Molex: 945504102
Fan	2-circuit	Molex: 945504202
Display/Communication	3-circuit	Molex: 932504023
Thermostat/Program	3-circuit	Molex: 932504003
Crimp, 0.5 - 0.75 mm ²		Molex: 945180100
Crimp 0.75 - 2.5 mm ²		Molex: 945180201
Crimp for 2 wires 1.5 - 3.0 mm ² total		Molex: 945180400

Fig. 3



**! Optional third screw:
max. torque: 0,9 Nm**



Instructions

Connecting TOOL4COOL® to Electronic Unit 101N2740



The communication port of the electronic unit (terminal LIN, + and C) has two functions:

1. Communication mode (PC option):

The first 15 seconds after power up/wake up, both devices (compressor & PC) try to communicate. In case a successful connection is made, the port will stay in communication mode until next power up/wake up.

2. Diode output mode (non PC option):

After 15 seconds with no communication link successful established, the unit switches to diode output mode. No communication is possible until next power up/wake up.

To ensure a trouble free connection using TOOL4COOL®, the following method is recommended:

Change the default TOOL4COOL® network setup to allow TOOL4COOL® to search for the electronic unit every 3 seconds. While TOOL4COOL® is searching, power up the electronic unit and wait for a connection. The following shows how to arrange this setup.

Preconditions:

The electronic unit is physically connected via the gateway to the PC, **but the power to the electronic unit is not yet switched on.**

In the example to the right, the electronic unit is connected to the COM1 network.

Note:

Next to the USB connector of the gateway, there are also two LED's visible:
RED LED: blinks when TOOL4COOL® sends a command to the electronic unit. This must blink every second while TOOL4COOL® is trying to establish a connection with the electronic unit.
GREEN LED: blinks when the electronic unit responds to a TOOL4COOL® command. The node address of the electronic unit must match the command from TOOL4COOL® (The network setting above tells TOOL4COOL® to search for unit node address 1 every 3 sec.).

Step	Description / Display																					
1	Do not power up the electronic unit at this stage.																					
2	Start TOOL4COOL®																					
3	In case the network is already connected, disconnect it first using on screen network option.																					
4	Wait a few seconds, then select <i>Connect Network</i> (below the <i>File</i> menu).																					
5	Select the correct port, in this example <i>COM1</i> is used.																					
6	Click <i>Configure</i> .																					
7	Change <i>Last network node</i> address to 1 and change <i>Refresh rate</i> to 3. Leave the other settings at their default value and click <i>OK</i> twice. Now TOOL4COOL® will only look for an electronic unit with address 1, but every 3 seconds. This will ensure that the connection is established within the 15 second time limit after powering up the unit. Leave all other options unchanged.																					
8	Power up the electronic unit																					
9	The first time the unit is connected, TOOL4COOL® needs to obtain the parameter file from the unit before a connection is shown by the red arrow. Allow a few minutes for this task to complete. You also can read the current status by selecting the network and then select the tab <i>Unit Status</i> .																					
10	Look under <i>Error/Message</i>	<table border="1"> <thead> <tr> <th>Address</th> <th>Name</th> <th>Unit ID</th> <th>Type</th> <th>SW Version</th> <th>Reply Timeout</th> <th>Telegram Error</th> <th>Exception Response</th> <th>Device Response Time(ms)</th> <th>Error/Message</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td>FF1118255930</td> <td>101N2740</td> <td>01.00</td> <td>0</td> <td>0</td> <td>0</td> <td>107</td> <td></td> </tr> </tbody> </table> <p>In this example, no errors or messages appear and the unit is working properly.</p>	Address	Name	Unit ID	Type	SW Version	Reply Timeout	Telegram Error	Exception Response	Device Response Time(ms)	Error/Message	1		FF1118255930	101N2740	01.00	0	0	0	107	
Address	Name	Unit ID	Type	SW Version	Reply Timeout	Telegram Error	Exception Response	Device Response Time(ms)	Error/Message													
1		FF1118255930	101N2740	01.00	0	0	0	107														
11	If the parameter file was already loaded into TOOL4COOL®, a connection should be visible in less than 10 seconds. A red arrow is added before the network name to indicate that a unit is ready.	<p>Click the red arrow to open the menu of the electronic unit.</p>																				