

  
10210 Series Starting  
ice Electronic Unit



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## Danfoss 101N0210 Series Starting Device Electronic Unit



## Specifications

The Electronic Unit is designed for BD35/50F Compressors, models 101N0210/220/240 and 101N0300/320, operating on a 12- 24V DC power supply.

## Features

- Optional battery protection settings
- Compressor speed adjustment
- Motor speed control
- Error type indications
- Compatible with specific BD Compressor models

## Product Usage Instructions

### Battery Protection Settings

The Electronic Unit offers optional battery protection settings to ensure safe operation. Refer to Fig. 4 for resistor values corresponding to cut-out and cut-in voltages for both 12V and 24V systems.

### Connecting a Fan (optional)

If desired, a fan (5) can be connected to the Electronic Unit. Connect the fan between the terminals + and F, ensuring proper polarity for both 12V and 24V systems.

### Error Type Indications

The Electronic Unit provides error codes for various issues like thermal cut-out, minimum motor speed error, motor start error, fan over-current cut-out, and battery protection cut-out. Refer to the manual for troubleshooting steps.

### Optional battery protection settings

Resistor (9) kΩ	12V cut-out V	12V cut-in V	12V max. Volt age	24V cut-out V	24V cut-in V	24V max. Volt age
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
8.2	10.4	11.7	17.0	22.8	24.2	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

## Wire dimensions

Size		Max l ength * 12V DC opera tion		Max l ength * 24V DC opera tion			
A G	C r o s s s e c t i o n  m m 2						
		Ft	m	ft.	m		
1 2	2.5	8	2.5	1 6	5		
1 2	4	1 3	4	2 6	8		
1 0	6	2 0	6	3 9	1 2		
8	1 0	3 3	1 0	6 6	2 0		

**Standard battery protection settings**

12V cut-out V	12V cut-in V	24V cut-out V	24V cut-in V
10.4	11.7	22.8	24.2

**Compressor speed**

Electronic unit	Resistor (8) Ω (calculated)	Motor speed rpm	Contr. circ. current mA
<b>101N0210</b>	0	2,000	5
<b>101N0220</b>	277	2,500	4
<b>101N0240</b>	692	3,000	3
	1523	3,500	2
	0	AEO	6
<b>101N0300</b>	173	2,000	5
<b>101N0320</b>	450	2,500	4
<b>with AEO</b>	865	3,000	3
	1696	3,500	2

- 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 volt-age is 17V for a 12V system and 31.5V for a 24V power supply system. Max. ambient temperature is 55°C. The electronic unit has a built-in thermal protection which is actuated and stops compres-sor operation if the electronic unit temperature gets too high.

#### Installation (Fig. 1)

- Connect the terminal plug from the electronic unit to the compressor terminal. Mount the elec tro nic unit on the compressor by snapping the cover over the screw head (1).

#### Power supply (Fig. 1)

- The electronic unit must always be con nec ted directly to the battery poles (2). Con nect the plus to + and the minus to -, otherwise the elec tronic unit will not work. The electronic unit is pro tec ted against reverse battery connection.
- For protection of the installation, 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 for a minimum current of min. 20A.
- The wire dimensions in Fig. 2 must be observed.
- Avoid extra junctions in the power supply system to prevent voltage drop from affecting the battery protection setting.

#### Battery protection (Fig. 1)

- The compressor stops and restarts again according to the designated voltage limits meas-ured on the + and – terminals of the electronic unit. The standard settings for 12V and 24V power supply systems appear from Fig.

3.

- Other settings (Fig. 4) are optional if a connection that includes a resistor (9) is established between terminals C and P.
- In solar applications without a battery, a 220 k $\Omega$  resistor is recommended. In AEO (Adaptive Energy Optimizing) speed mode, the BD compressor will always adapt its speed to the actual cooling demand within a random operation voltage of 9.6 to 31.5V.

#### **Thermostat (Fig. 1)**

- The thermostat (7) is connected between the terminals C and T. Without any resistor in the control circuit, the compressor with electronic unit 101N0210, 101N0220, or 101N0240 will run with a fixed speed of 2,000 rpm when the thermostat is switched on. With the thermostat directly connected to terminal C, the electronic unit 101N0300 or 101N0320 will adjust its speed to the actual cooling demand.
- Other fixed compressor speeds in the range between 2,000 and 3,500 rpm can be obtained when a resistor (8) is installed to adjust the current (mA) of the control circuit. Resistor values for various motor speeds appear from Fig. 5.

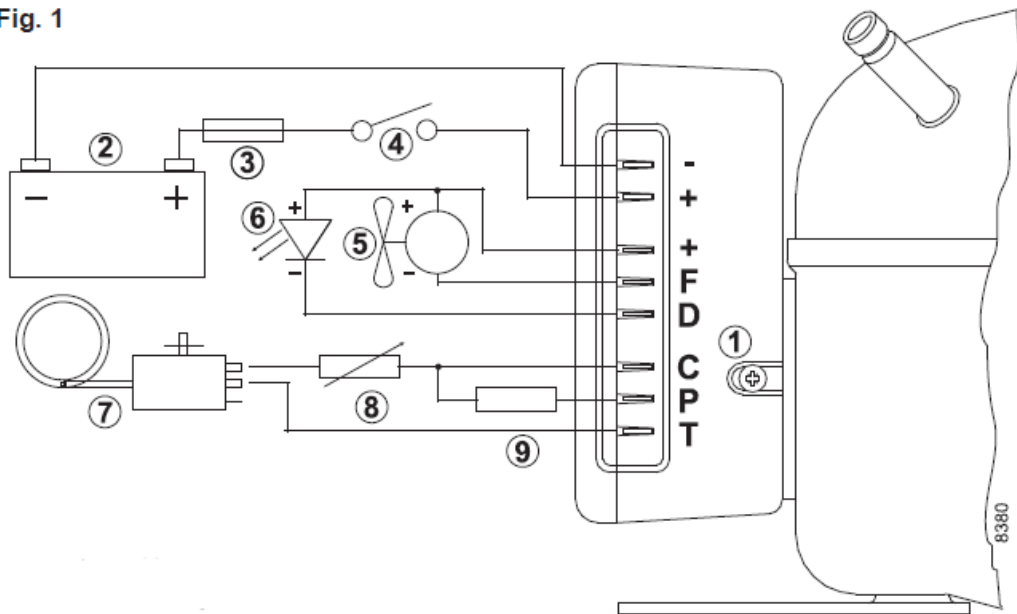
#### **Fan (optional, Fig. 1)**

- A fan (5) can be connected between the terminals + and F. Connect the plus to + and the minus to F. Since the output voltage between the terminals + 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 current of 0.5Aavg. A higher current draw is allowed for 2 seconds during start.

#### **LED (optional, Fig. 1)**

- 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 several times. The number of flashes depends on what kind of operational error was recorded. Each flash will last 1/4 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.

Fig. 1



Number of lashes	Error type
5	<b>Thermal cut-out of electronic unit</b> (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	<b>Minimum motor speed error</b> (If the refrigeration system is too heavily loaded, the motor cannot maintain a minimum speed of 1,850 rpm.)
3	<b>Motor start error</b> (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).
2	<b>Fan over-current cut-out</b> (The fan loads the electronic unit with more than 1A peak).
1	<b>Battery protection cut-out</b> (The voltage is outside the cut-out setting.)

VDE/UL Approvals for BD Compressors

Approved Compressor – Electronic Unit Combinations

Compressors		Electronic nits					
		<i>Standard</i>	<i>EMI</i>	<i>High start</i>	<i>High speed</i>	<i>AEO</i>	<i>AEO EMI</i>
		101N0210	101N0220	101N0230	101N0290	101N0300	101N0320
<b>BD35F mm</b>	101Z0 200	<b>L</b>	<b>L</b>			<b>L</b>	
<b>BD35F inch</b>	101Z0 204	<b>L</b>	<b>L</b>			<b>L</b>	
<b>BD35K (R6 00a)</b>	101Z0 211						
<b>BD50F mm</b>	101Z1 220	<b>L</b>	<b>L</b>	<b>L</b>		<b>L</b>	
<b>BD50F inch</b>	101Z0 203	<b>L</b>	<b>L</b>	<b>L</b>		<b>L</b>	
<b>BDB0F mm</b>	101Z0 280						
<b>BD250GH</b>	101Z0 400						
<b>BD250GH T win</b>	101Z0 500						
<b>BD100CN (R290)</b>	101Z0 401						

Compressors		Electronic nits					
		<i>Solar</i>	<i>AC/DC converter</i>	<i>Automotive</i>	<i>Automotive</i>	<i>Telecommunication</i>	<i>Extended EMI</i>
		101N0400	101N0500	101N0600	101N0630	101N0730	101N0900
<b>BD35F mm</b>	101Z0 200	<b>L</b>	<b>VDE/ L</b>				
<b>BD35F inch</b>	101Z0 204	<b>L</b>	<b>VDE/ L</b>				
<b>BD35K (R6 00a)</b>	101Z0 211						
<b>BD50F mm</b>	101Z1 220		<b>VDE/ L</b>				
<b>BD50F inch</b>	101Z0 203		<b>VDE/ L</b>				
<b>BD250GH (4BV)</b>	101Z0 402					<b>L</b>	

- = Combination possible, VDE or UL approval
- = Combination possible, but no approval



- = Combination not possible

VDE/UL	= Combination possible, VDE or UL approval
	= Combination possible, but no approval
	= Combination not possible

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## FAQs

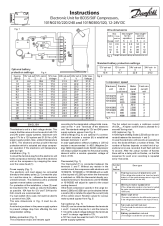
- **What should I do if the Electronic Unit displays a battery protection cut-out error?**

If the voltage is outside the specified cut-out setting, check the power supply and adjust the settings accordingly.

- **How can I adjust the compressor speed?**

Refer to Fig. 5 for resistor values corresponding to different compressor models to adjust the compressor speed as needed.

## Documents / Resources

	<p><a href="#">Danfoss 101N0210 Series Starting Device Electronic Unit [pdf]</a> Instructions  101N0210, 101N0220, 101N0300, 101N0320, 101N0210 Series Starting Device Electronic Unit, 101N0210 Series, Starting Device Electronic Unit, Device Electronic Unit, Electronic Unit</p>
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## References

- [Compressors for refrigeration, A/C and heating | Danfoss](#)
- [User Manual](#)

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