Building & Industry
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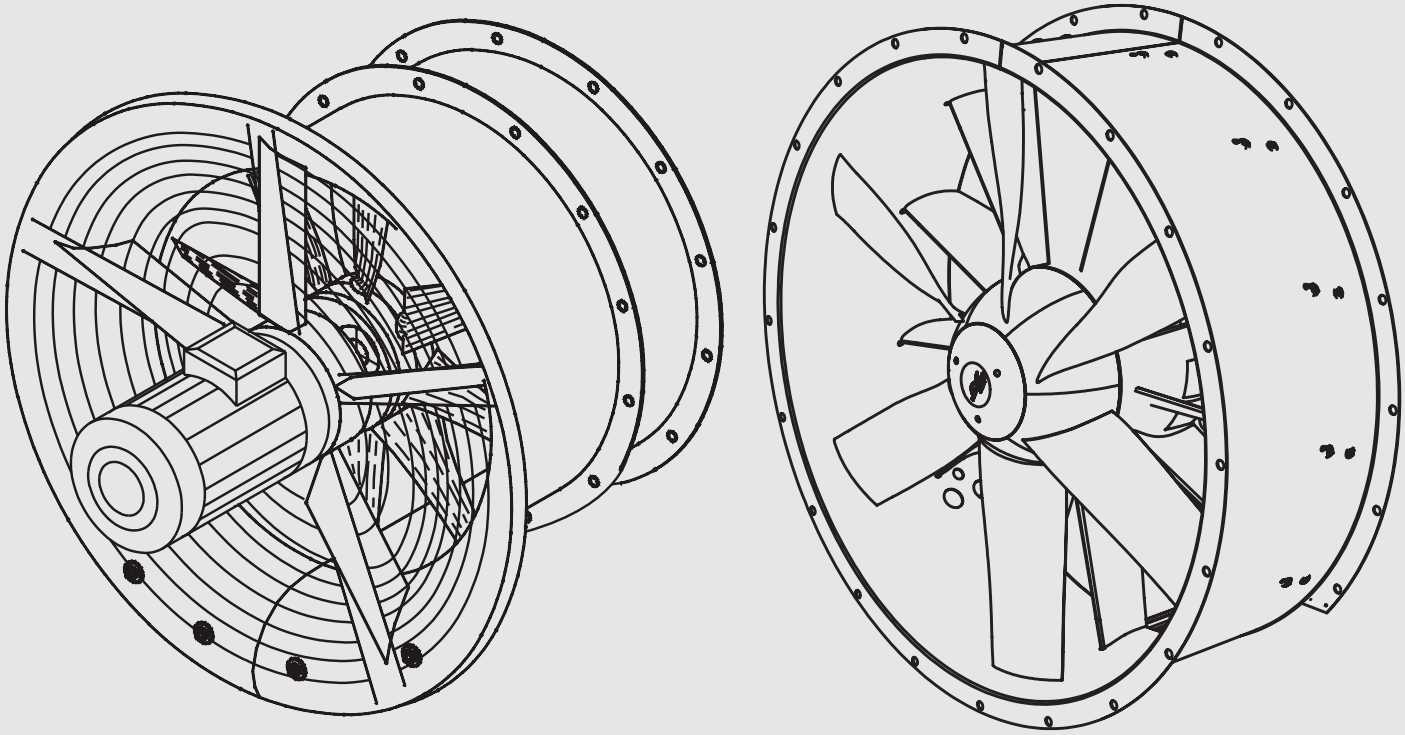

Frequency converters DANFOSS® FC 101 and FC 102 NOVENCO control user guide

English
Original version

927665-0

Frequency converters Danfoss FC 101 and FC 102
Novenco control user guide

Contents

1. General

The procedures in this guide serve as examples of how to control the Danfoss FC 101 and FC 102 frequency converters in combination with Novenco fans.

Please read all relevant parts of this complete guide.

Icons	Description
	Risk of damage to equipment
	Risk of injury or death

Table 1. Icons in guide

Procedures and methods in this guide should be followed for the warranty to remain valid.


The installation must be approved by the responsible installer, before setup can begin.

Available control modes

- Voltage mode
  This is the most common.
- Current mode
  This is most immune to noise.
- Modbus
  This is advanced use with best control.

2. Wire configuration

Check wires are correctly connected

- Check that a wire connects the terminals no. 12 and 27 in the frequency converter.
- Connect a control wire to terminal no. 18 in the frequency converter. The terminal must pull high (24 V) to activate the converter.
- Check the signal wire is connected to terminal no. 53. For voltage control the signal levels are 0 - 10 V and for current control the levels are 4 - 20 mA.
- Check that ground is connected to terminals no. 20 and 55.

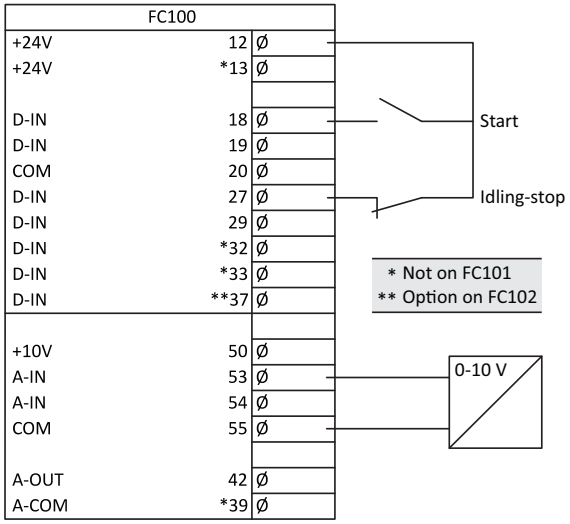

Figure 1 Terminal block set up for voltage control

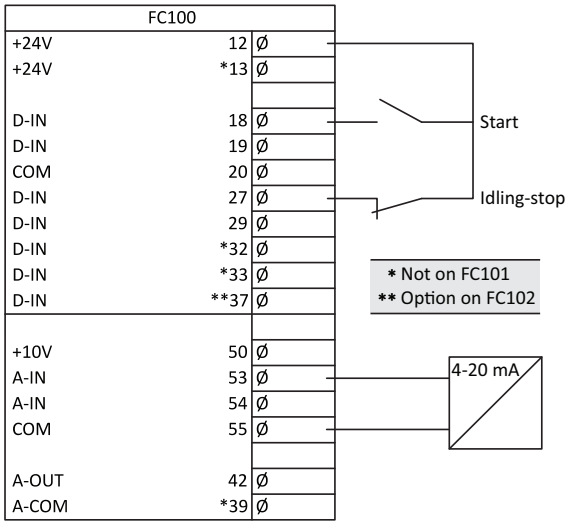

Figure 2 Terminal block set up for current control

3. First time run after installation

How to check the installation is correct

1. Check the installation is powered off on the main switch.
2. Check the fan and frequency converter are installed correctly. Refer to the installation and maintenance guides for the fan and frequency converter.
3. Power on the installation at the main switch. The frequency converter starts in idle mode.
4. Push Hand On on the local control panel (LCP) on the frequency converter. This activates the fan rotor.
5. Check the direction of rotation is consistent with the arrows on the fan casing.
6. Turn off the installation at the main switch.
7. Connect the start signal wire to terminal no. 18.
8. **Voltage or current mode:**
   Connect the reference wire to terminal no. 53.
   Modbus mode:
   Connect the reference wires to terminals no. 68 and 69.

4. Configuration of FC101 converter

The converter is set up for voltage mode as standard. The minimum speed is indicated with 0 V and the maximum speed with 10 V.

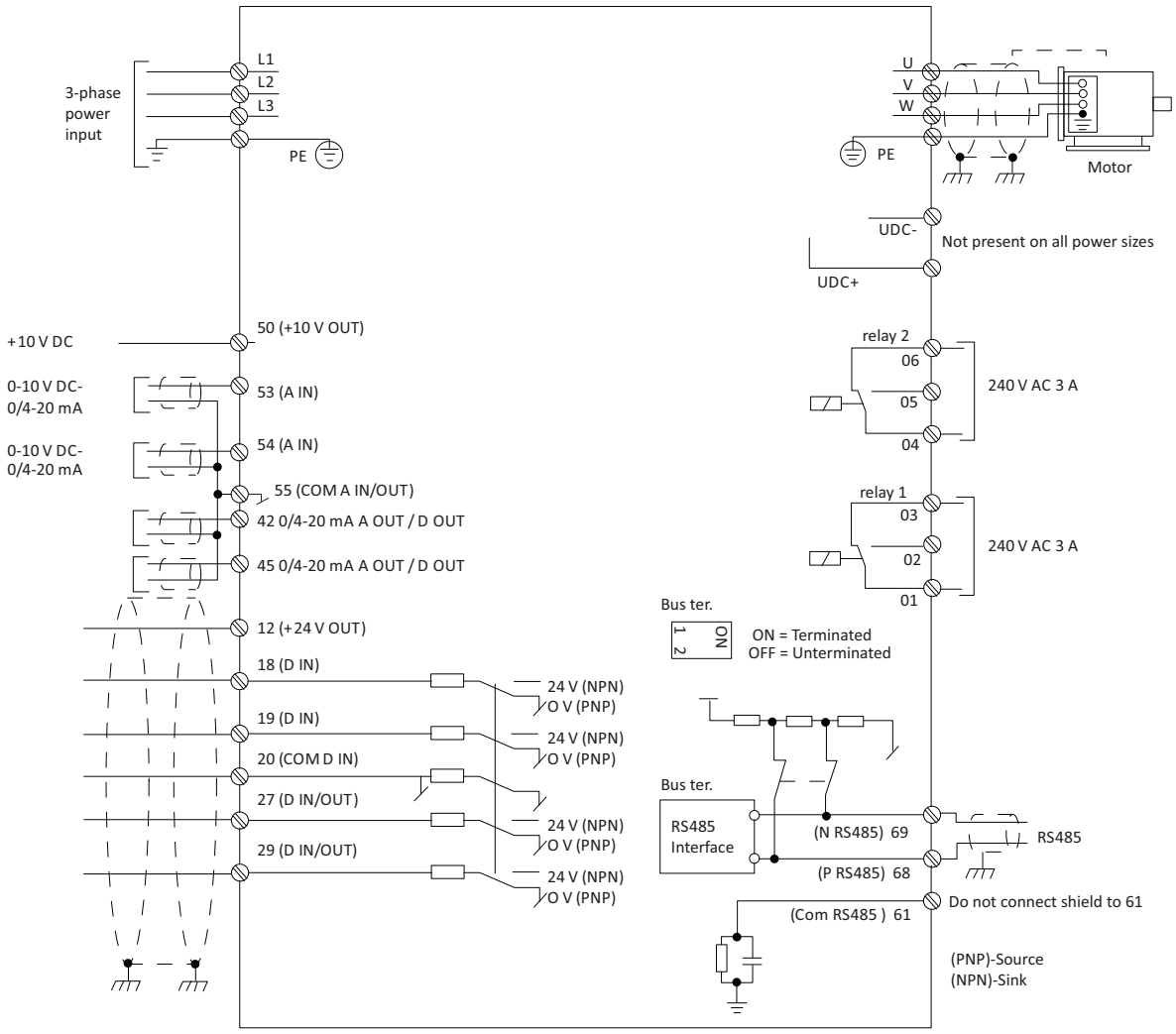

Figure 3 Wire diagram for the FC101

4.1 Change from voltage to current control

How to change the FC101 to current control

1. Push the Menu button on the LCP on the frequency converter.
2. Push the ↓ and ↑ buttons to navigate to the Wizard. Push OK to select.
3. Push ↓ to navigate to the following menu item.
   `6-19 Terminal 53 mode`
   `[1] Voltage mode`
4. Push OK to access and use the ↓ and ↑ to select current mode.
5. Push OK to accept.

The frequency converter now operates in current mode for control signals. The minimum speed is indicated with 4 mA and the maximum speed with 20 mA.

5. Configuration of FC102 converter

The converter is set up for voltage mode as standard. The minimum speed is indicated with 0 V and the maximum speed with 10 V.

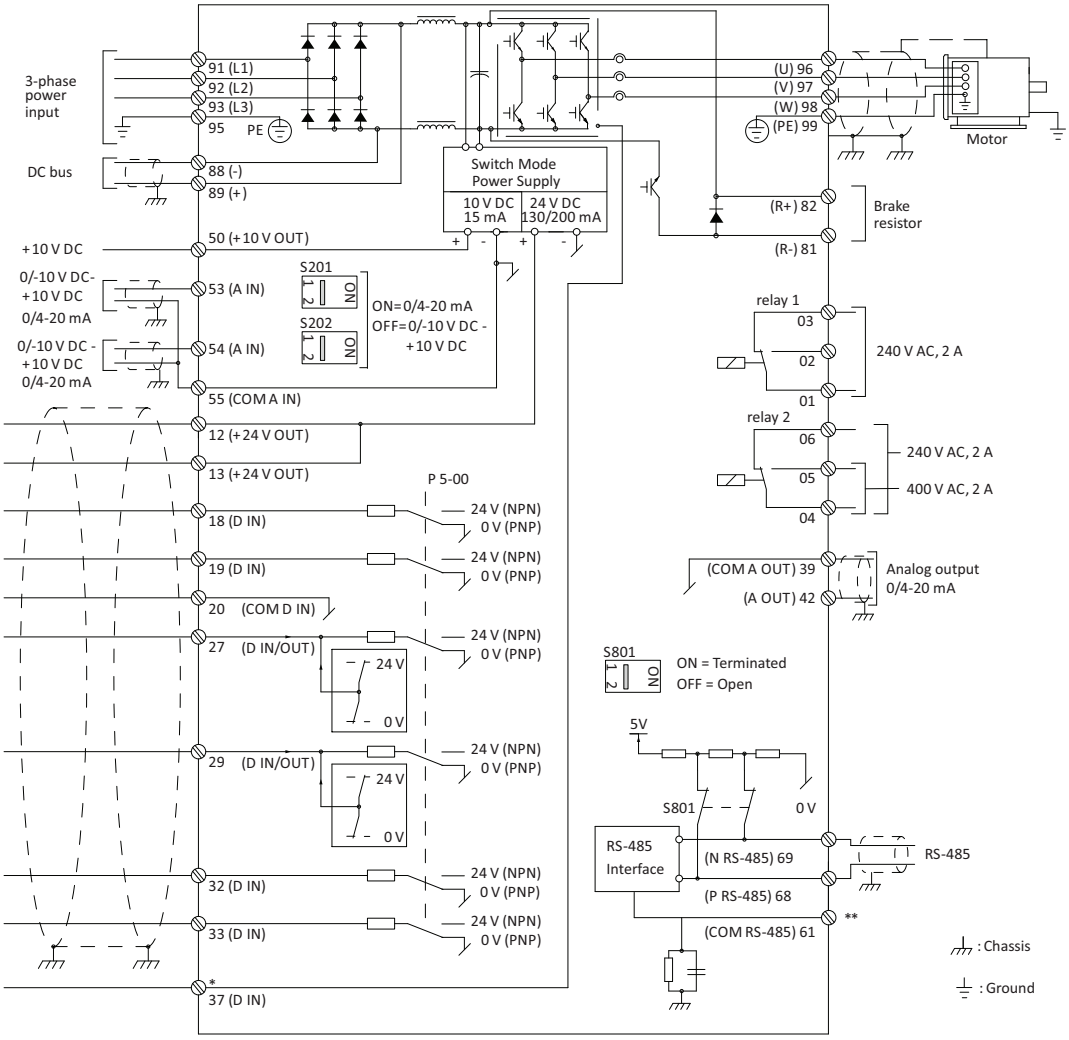

Figure 4 Wire diagram for the FC102

5.1 Change from voltage to current control

How to change the FC102 to current control

1. Remove the screw that holds the lid on the frequency converter.

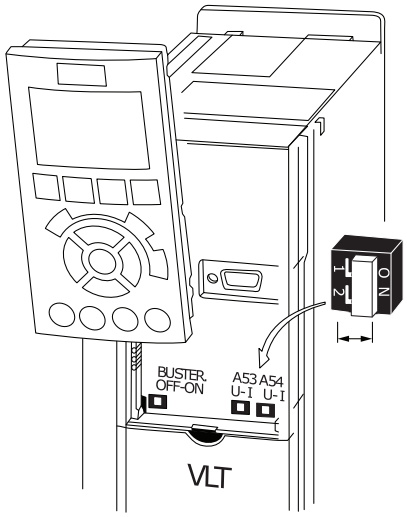

Figure 5 Location of terminal 53

2. Pull out the LCP with a straight pull.
3. Locate the text `A53 U - I`.
4. Push the button from position U to I with a screwdriver.
5. Put the LCP back.
6. Attach the lid and insert the screw.

The frequency converter now operates in current mode for control signals. The minimum speed is indicated with 4 mA and the maximum speed with 20 mA.

6. Modbus configuration

All parameters are accessible through Modbus RTU (Remote Terminal Unit) either directly or via PCD (Process Data).

To setup the Modbus RTU

1. Push the Menu button two times.
2. Push ↓ to navigate to `8-** Comm. and Options`.
3. Push OK.
4. Push ↓ to navigate to `8-3 FC port settings`.
5. Push OK.
6. Push OK again.
7. Push ↓ to navigate to `[2] Modbus RTU`.
8. Push OK to confirm.
9. Push ↓ to navigate down and check the following settings.
   - `Address`
   - `Baud Rate`
   - `Parity / Stop bit`
   - `Minimum Response Delay`
   - `Maximum Inter-char..`
10. Push OK to select, the ↓ and ↑ buttons to change and push OK to confirm settings.

Write and start-stop notes

- PCD: It is possible to configure up to 64 parameters in PCDs.
  Write PCDs in par. 8-42.xx, and read PCDs in par. 8-43.xx. These PCDs are accessible via holding registers 28xx and 29xx.
- Write control word: Par. 8-42.0 and par. 8-42.1 are set to the control word and as reference, respectively. Set par. 8-42[2-63] to the par. no. to write to.
- Start-stop: Write the control word to register 2810 to start or stop the converter.

Bit	Bit value = 0	Bit value = 1
00	Reference value	External selection LSB
01	Reference value	External selection MSB
02	DC brake	Ramp
03	Coasting	No coasting
04	Quick stop	Ramp
05	Hold output frequency	Use ramp
06	Ramp stop	Start
07	No function	Rest
08	No function	Jog
09	Ramp 1	Ramp 2
10	Data invalid	Data valid
11	Relay 01 open	Relay 01 active
12	Relay 02 open	Relay 02 active
13	Parameter set-up	Selection LSB
14	< Not used >	< Not used >
15	No function	Reverse

Table 2. Control word bit positions

Read notes

- The reference register is 2811 with 0 - 4000 hex (0 - 100%).
- Read status word: Par. 8-43.0 and par. 8-43.1 are set to status word and main actual value, respectively. Set par. 8-43[2-63] to the par. no. to read from.

- Read status word: Read the status word from register 2910.

Bit	Bit value = 0	Bit value = 1
00	Control not ready	Control ready
01	Drive not ready	Drive ready
02	Coasting	Enable
03	No error	Trip
04	No error	Error (no trip)
05	Reserved	-
06	No error	Triplock
07	No warning	Warning
08	Speed ≠ reference	Speed = reference
09	Local operation	Bus control
10	Out of frequency limit	Frequency limit ok
11	No operation	On operation
12	Drive ok	Stopped, auto start
13	Voltage ok	Voltage exceeded
14	Torque ok	Torque exceeded
15	Timer ok	Timer exceeded

Table 3. Status word bit positions

Other notes

- Set the speed, i.e. the main actual value, with register 2911.
- Read the configuration of par. 8-43.3 .. with register 2912.
- To configure a PCD to read a 32 bit parameter requires configuration of two consecutive PCDs to the same parameter. For example, the parameter 16-10 Power [kW] is a 32 bit integer, which may be configured in par. 8-43.2 and 8-43-3, or par. 8-43.4 and 8-43.5 and so on.
  The sizes of the different parameters are available in the programming guide.
- To address parameters directly use the register no. = parameter no. x 10. For example, the par. 16-90 is accessible via register no 16900.
- Some PLCs have 0 offsets, which means the value 1 must be subtracted from the register no. For example, reg. 2810 is 2809 etc.

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7. Reference documentation

- Danfoss Operating guide
  VLT® HVAC basic drive FC 101
  Publication no. MG18AA02, 04/2018
- Danfoss Programming guide
  VLT® HVAC basic drive FC 101
  Publication no. MG18B502, 04/2018
- Danfoss Design guide
  VLT® HVAC basic drive FC 101
  Publication no. MG18C802, 04/2018
- Danfoss Operating guide
  VLT® HVAC drive FC 102
  Publication no. MG16O202, 04/2018
- Danfoss Programming guide
  VLT® HVAC drive FC 102
  Publication no. MG11CE02, 03/2015
- Danfoss Design guide
  VLT® HVAC drive FC 102
  Publication no. MG11BC02, 06/2014

Figure 6 QR code to this guide on www.novenco-building.com

8. Patents and trademarks

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The ZerAx® processes of manufacture, technologies and designs are patented by Novenco A/S or Novenco Building & Industry A/S.
Pending patents include Brazil no. BR-11-2012-008607-3, BR-11-2012-008543-3, BR-11-2012-008545-0, BR-11-2014-002282-8 and BR-11-2014-002426-0; India no. 4140/CHENP/2012, 4077/CHENP/2012, 821/CHENP/2014 and 825/CHENP/2014; PCT no. EP2012/064908 and EP2012/064928; South Korea no. 10-2012-7012154.
Granted patents include Canada no. 2.777.140, 2.777.141, 2.777.144, 2.832.131 and 2.843.132; China no. ZL2010800458842, ZL2010800460965, ZL2010800464275 and ZL2012800387210; EU no. 2488759, 2488760, 2488761, 2739860 and 2739861; India no. 312464; South Korea no. 10-1907239, 10-1933724, 10-1980600 and 10-2011515; US no. 8.967.983, 9.200.641, 9.273.696 B2, 9.683.577 and 9.926.943 B2. Granted designs include Brazil no. BR-30-2012-003932-0; Canada no. 146333; China no. 1514732, 1517779, 1515003, 1555664 and 2312963; EU no. 001622945-0001 to 001622945-0009 and 001985391 - 0001; India no. 246293; South Korea no. 30-0735804; US no. D665895S, D683840S, D692119S, D704323S, D712023S, D743018S, D755363S, D756500S, D821560S and D823452S.

The NovAx Basic jet fans manufacturing processes, technologies and designs are patented by Novenco A/S or Novenco Building & Industry A/S.
Granted patents include EU no. 2387670 and United Arab Emirates no. 1372. Granted designs include EU no. 001069884-0003, 001069884-0008, 001069884-0010, 001069884-0013, 001069884-0017, 001069884-0019, 001069884-0022, 001069884-0026 and 001069884-0028; United Arab Emirates no. D223/2009.

The CGF jet fans designs are patented by Novenco A/S or Novenco Building & Industry A/S.
Granted designs include EU no. 001610643-0001 to 001610643-0005.

9. Declaration of conformity

Refer to the declaration information in the documentation for the fans and frequency converters.

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