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FREQUENCY CONVERTER DANFOSS FC101
NOVENCO CONFIGURATION USER GUIDE

Building & Industry
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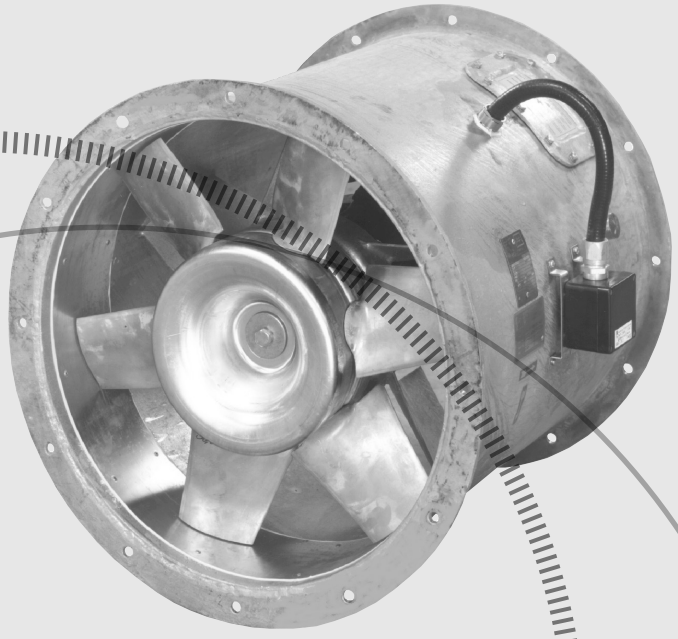

ENGLISH

926867-0

Frequency converter Danfoss FC 101
Novenco configuration user guide

Contents

1 General

The procedures in this guide serve as examples of how to setup and configure the Danfoss FC101 frequency converter drives in combination with Novenco fans driven by permanent magnet motors.

400 VAC motors covered by guide

- Domel 10 pole, 2.2 kW
  Novenco item no. 926418-0
- Domel 10 poles, 4.1 kW
  Novenco item no. 926478-0
- Domel 10 poles, 4.7 kW
  Novenco item no. 926479-0
- Domel 10 poles, 7.2 kW
  Novenco item no. 926480-0
- Domel 10 poles, 7.9 kW
  Novenco item no. 926481-0
- Domel 12 poles, 12.1 kW
  Novenco item no. 926482-0
- Lafert 8 poles, 3 kW
  Novenco item no. 926526-0
- Lafert 8 poles, 5.5 kW
  Novenco item no. 926528-0
- Lafert 8 poles, 7.5 kW
  Novenco item no. 926529-0
- Domel 12 poles, 11.7 kW
  Novenco item no. 926984-0
- Domel 12 poles, 18.8 kW
  Novenco item no. 926985-0
- Domel 12 poles, 13.2 kW
  Novenco item no. 926986-0
- Domel 12 poles, 13.9 kW
  Novenco item no. 926987-0
- Domel 12 poles, 19.3 kW
  Novenco item no. 926988-0
- Domel 12 poles, 21.7 kW
  Novenco item no. 926989-0
- Domel 12 poles, 31 kW
  Novenco item no. 926990-0
- Domel 10 poles, 7.2 kW
  Novenco item no. 927116-0
- Domel 12 poles, 8.3 kW
  Novenco item no. 927125-0
- Domel 10 poles, 7.9 kW
  Novenco item no. 927207-0

The guide is a supplement to the installation and maintenance guide delivered with the Novenco fans. Refer also to the motor manufacturers documentation. See appendix A. Literature list.

Procedures and methods in this guide should be followed to maintain the validity of the warranty.

The guide applies to Novenco fans type NovAx™ ACL-ACN-ACW and ZerAx® AZL-AZN-AZW.

The installation of the system must be complete and approved by the responsible installer, before setup can begin.

2 Installation and connection

The premise of this guide is the correct installation and connection of the fans, motors and frequency converters. The wire specifications must comply with the quality prescribed in the documentation for the frequency converters.

3 Setup with start-up wizard

Please refer to the Danfoss FC101 documentation for information on how to navigate and operate the display.

Basis for the setup are the factory defaults of the FC101. Reset the frequency converter to factory defaults, if it is unsure what the settings are. This is done by setting parameter 14-22 to 2. The converter is then reset at the next power up.

The wizard is re-entered via the Quick Menu.

Setting up the FC101

1 Power up the frequency converter.

2 Choose the preferred language.

3 Launch the wizard.

4 Set the control fields.

Identify the motor type, motor size and Novenco item no. in the below tables and complete the steps.

Refer to the motor and fan nameplates. In case of differences between the values in this guide and the nameplates, those from the nameplates must be used.

If the Automatic Motor Adaption (AMA) test (parameter 1-29) fails, try running it again as a minimum test.

Parameters	Field names	Motor types				Comments
		Domel 10p, 2.2 kW, 926418-0	Domel 10p, 4.1 kW, 926478-0	Domel 10p, 4.7 kW, 926479-0	Domel 10p, 7.2 kW, 926480-0	
0-03	Regional settings	0	0	0	0	International
0-06	Grid type	380-440 V/50 Hz	380-440 V/50 Hz	380-440 V/50 Hz	380-440 V/50 Hz	Set voltage level
1-10	Motor construction/ Motor type	1	1	1	1	PM, non-salient SPM
1-22	Motor voltage	400 V AC	400 V AC	400 V AC	400 V AC	Nominal value
1-24	Motor current	4.6 A	9.1 A	11.4 A	16.6 A	Full-load current
1-25	Motor nominal speed	3160 RPM	1980 RPM	1700 RPM	1410 RPM	
1-26	Motor construction rated torque	6 Nm	18 Nm	24 Nm	44 Nm	
1-30	Stator resistance (Rs)	1.41 Ω	0.68 Ω	0.32 Ω	0.18 Ω	
1-39	Motor poles	10 poles	10_poles	10 poles	10 poles	
1-40	Back EMF at 1000 RPM	95 V	144 V	157 V	192 V	
1-37	d-axis inductance (Ld)	14.0 mH	13.0 mH	11.4 mH	10.0 mH	
30-22	Locked rotor	0	0	0	0	0 = Off
30-23	Locked rotor detection time	0.1 s	0.1 s	0.1 s	0.1 s	
4-19	Max output freq.	400 Hz	400 Hz	208 Hz	400 Hz	
1-42	Motor cable length	[In meters]	[In meters]	[In meters]	[In meters]	
4-12	Motor speed low lim.	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz = 600 RPM
4-14	Motor speed high lim.	No. [Hz]	No. [Hz]	No. [Hz]	No. [Hz]	See technical specifications from AirBox calculation
3-41	Ramp 1 ramp up time	10 s	10 s	10 s	10 s	Avoid too fast ramp
3-42	Ramp 1 ramp down time	10 s	10 s	10 s	10 s	Avoid too fast ramp
1-73	Flying start	1	1	1	1	1 = Enabled
6-19	Terminal 53 mode	1	1	1	1	1 = Voltage control signal
6-10	Terminal 53 low volt	0.07 V	0.07 V	0.07 V	0.07 V	
6-11	Terminal 53 high volt	10 V	10 V	10 V	10 V	
3-02	Minimum ref.	50	50	50	50	50 Hz = 600 RPM
3-03	Maximum ref.	No. [Hz]	No. [Hz]	No. [Hz]	No. [Hz]	Same as step 21., parameter 4-14
5-40	Function relay 1	No.	No.	No.	No.	Alarm relay
5-40	Function relay 2	No.	No.	No.	No.	Warning relay
1-29	Automatic motor adaption (AMA)	1	1	1	1	1 = Enable AMA This optimises motor performance and exits the wizard.

Table 1 Parameter settings for 1st group of motors

Parameters	Field names	Motor types				Comments
		Domel 10p, 7.9 kW, 926481-0	Domel 12p, 12.1 kW, 926482-0	Lafert 8p, 3 kW, 926526-0	Lafert 8p, 5.5 kW, 926528-0	
0-03	Regional settings	0	0	0	0	International
0-06	Grid type	380-440 V/50 Hz	380-440 V/50 Hz	380-440 V/50 Hz	380-440 V/50 Hz	Set voltage level
1-10	Motor construction/ Motor type	1	1	1	1	PM, non-salient SPM
1.22	Motor voltage	400 V AC	400 V AC	400 V AC	400 V AC	Nominal value
1-24	Motor current	18.6 A	23.0 A	5.8 A	11.4 A	Full-load current
1-25	Motor nominal speed	1730 RPM	1600 RPM	4500 RPM	4500 RPM	
1-26	Motor construction rated torque	40 Nm	66 Nm	19.1 Nm	35 Nm	
1-30	Stator resistance (Rs)	0.15 Ω	0.26 Ω	0.78 Ω	0.33 Ω	
1-39	Motor poles	10 poles	12 poles	8 poles	8 poles	
1-40	Back EMF at 1000 RPM	156 V	197 V	65 V	66 V	
1-37	d-axis inductance (Ld)	6.4 mH	3.77 mH	7.74 mH	4.0 mH	
30-22	Locked rotor	0	0	0	0	0 = Off
30-23	Locked rotor detection time	0.1 s	0.1 s	0.1 s	0.1 s	
4-19	Max output freq.	400 Hz	400 Hz	400 Hz	400 Hz	
1-42	Motor cable length	[in meters]	[in meters]	[in meters]	[in meters]	
4-12	Motor speed low lim.	50 Hz	25 Hz	25 Hz	25 Hz	
4-14	Motor speed high lim.	No. [Hz]	No. [Hz]	No. [Hz]	No. [Hz]	See technical specifications from AirBox calculation
3-41	Ramp 1 ramp up time	10 s	10 s	30 s	30 s	Avoid too fast ramp
3-42	Ramp 1 ramp down time	10 s	10 s	30 s	30 s	Avoid too fast ramp
1-73	Flying start	1	1	1	1	1 = Enabled
6-19	Terminal 53 mode	1	1	1	1	1 = Voltage control signal
6-10	Terminal 53 low volt	0.07 V	0.07 V	0.07 V	0.07 V	
6-11	Terminal 53 high volt	10 V	10 V	10 V	10 V	
3-02	Minimum ref.	50	25	25	25	
3-03	Maximum ref.	No. [Hz]	No. [Hz]	No. [Hz]	No. [Hz]	Same as step 21., parameter 4-14
5-40	Function relay 1	No.	No.	No.	No.	Alarm relay
5-40	Function relay 2	No.	No.	No.	No.	Warning relay
1-29	Automatic motor adaption (AMA)	1	1	1	1	1 = Enable AMA This optimises motor performance and exits the wizard.

Table 2 Parameter settings for 2nd group of motors

Parameters	Field names	Motor types				Comments
		Lafert 8p, 7.5 kW, 926529-0	Domel 12p, 11.7 kW, 926984-0	Domel 12p, 18.8 kW, 926985-0	Domel 12p, 13.2 kW, 926986-0	
0-03	Regional settings	0	0	0	0	International
0-06	Grid type	380-440 V/50 Hz	380-440 V/50 Hz	380-440 V/50 Hz	380-440 V/50 Hz	Set voltage level
1-10	Motor construction/ Motor type	1	1	1	1	PM, non-salient SPM
1-22	Motor voltage	400 V AC	400 V AC	400 V AC	400 V AC	Nominal value
1-24	Motor current	15.1 A	21.7 A	35 A	23.2 A	Full-load current
1-25	Motor nominal speed	4500 RPM	2600 RPM	2790 RPM	1860 RPM	
1-26	Motor construction rated torque	47.8 Nm	40 Nm	60 Nm	60 Nm	
1-30	Stator resistance (Rs)	0.25 Ω	0.22 Ω	0.1 Ω	0.24 Ω	
1-39	Motor poles	8 poles	12 poles	12 poles	12 poles	
1-40	Back EMF at 1000 RPM	69 V	123 V	115 V	172 V	
1-37	d-axis inductance (Ld)	3.22 mH	2.7 mH	1.3 mH	3.2 mH	
30-22	Locked rotor	0	0	0	0	0 = Off
30-23	Locked rotor detection time	0.1 s	0.1 s	0.1 s	0.1 s	
4-19	Max output freq.	400 Hz	400 Hz	400 Hz	400 Hz	
1-42	Motor cable length	[in meters]	[in meters]	[in meters]	[in meters]	
4-12	Motor speed low lim.	25 Hz	20 Hz	20 Hz	20 Hz	
4-14	Motor speed high lim.	No. [Hz]	No. [Hz]	No. [Hz]	No. [Hz]	See technical specifications from AirBox calculation
3-41	Ramp 1 ramp up time	30 s	30 s	30 s	30 s	Avoid too fast ramp
3-42	Ramp 1 ramp down time	30 s	30 s	30 s	30 s	Avoid too fast ramp
1-73	Flying start	1	1	1	1	1 = Enabled
6-19	Terminal 53 mode	1	1	1	1	1 = Voltage control signal
6-10	Terminal 53 low volt	0.07 V	0.07 V	0.07 V	0.07 V	
6-11	Terminal 53 high volt	10 V	10 V	10 V	10 V	
3-02	Minimum ref.	25	20	20	20	
3-03	Maximum ref.	No. [Hz]	No. [Hz]	No. [Hz]	No. [Hz]	Same as step 21., parameter 4-14
5-40	Function relay 1	No.	No.	No.	No.	Alarm relay
5-40	Function relay 2	No.	No.	No.	No.	Warning relay
1-29	Automatic motor adaption (AMA)	1	1	1	1	1 = Enable AMA This optimises motor performance and exits the wizard.

Table 3 Parameter settings for 3rd group of motors

Parameters	Field names	Motor types				Comments
		Domel 12p, 13.9 kW, 926487-0	Domel 12p, 19.3 kW, 926988-0	Domel 12p, 21.7 kW, 926489-0	Domel 12p, 31 kW, 926990-0	
0-03	Regional settings	0	0	0	0	International
0-06	Grid type	380-440 V/50 Hz	380-440 V/50 Hz	380-440 V/50 Hz	380-440 V/50 Hz	Set voltage level
1-10	Motor construction/ Motor type	1	1	1	1	PM, non-salient SPM
1-22	Motor voltage	400 V AC	400 V AC	400 V AC	400 V AC	Nominal value
1-24	Motor current	27.5 A	36 A	42.9 A	54 A	Full-load current
1-25	Motor nominal speed	1660 RPM	2170 RPM	2070 RPM	1990 RPM	
1-26	Motor construction rated torque	80 Nm	80 Nm	100 Nm	130 Nm	
1-30	Stator resistance (Rs)	0.17 Ω	0.11 Ω	0.09 Ω	0.07 Ω	
1-39	Motor poles	12 poles	12 poles	12 poles	12 poles	
1-40	Back EMF at 1000 RPM	193 V	148 V	155 V	161 V	
1-37	d-axis inductance (Ld)	2.8 mH	1.6 mH	1.51 mH	1.2 mH	
30-22	Locked rotor	0	0	0	0	0 = Off
30-23	Locked rotor detection time	0.1 s	0.1 s	0.1 s	0.1 s	
4-19	Max output freq.	400 Hz	400 Hz	400 Hz	400 Hz	
1-42	Motor cable length	[in meters]	[in meters]	[in meters]	[in meters]	
4-12	Motor speed low lim.	20 Hz	20 Hz	20 Hz	20 Hz	
4-14	Motor speed high lim.	No. [Hz]	No. [Hz]	No. [Hz]	No. [Hz]	See technical specifications from AirBox calculation
3-41	Ramp 1 ramp up time	30 s	30 s	30 s	30 s	Avoid too fast ramp
3-42	Ramp 1 ramp down time	30 s	30 s	30 s	30 s	Avoid too fast ramp
1-73	Flying start	1	1	1	1	1 = Enabled
6-19	Terminal 53 mode	1	1	1	1	1 = Voltage control signal
6-10	Terminal 53 low volt	0.07 V	0.07 V	0.07 V	0.07 V	
6-11	Terminal 53 high volt	10 V	10 V	10 V	10 V	
3-02	Minimum ref.	20	20	20	20	
3-03	Maximum ref.	No. [Hz]	No. [Hz]	No. [Hz]	No. [Hz]	Same as step 21., parameter 4-14
5-40	Function relay 1	No.	No.	No.	No.	Alarm relay
5-40	Function relay 2	No.	No.	No.	No.	Warning relay
1-29	Automatic motor adaption (AMA)	1	1	1	1	1 = Enable AMA This optimises motor performance and exits the wizard.

Table 4 Parameter settings for 4th group of motors

Parameters	Field names	Motor types			Comments
		Domel 10p, 7.2 kW, 927116-0	Domel 12p, 8.3 kW, 927125-0	Domel 10p, 7.9 kW, 927207-0	
0-03	Regional settings	0	0	0	International
0-06	Grid type	380-440 V/50 Hz	380-440 V/50 Hz	380-440 V/50 Hz	Set voltage level
1-10	Motor construction/ Motor type	1	1	1	PM, non-salient SPM
1-22	Motor voltage	400 V AC	400 V AC	400 V AC	Nominal value
1-24	Motor current	16.9 A	15.4 A	18.6 A	Full-load current
1-25	Motor nominal speed	1410 RPM	620 RPM	1730 RPM	
1-26	Motor construction rated torque	44 Nm	120 Nm	40 Nm	
1-30	Stator resistance (Rs)	0.19 Ω	0.66 Ω	0.15 Ω	
1-39	Motor poles	10 poles	12 poles	10 poles	
1-40	Back EMF at 1000 RPM	192 V	518 V	156 V	
1-37	d-axis inductance (Ld)	10 mH	12 mH	6.4 mH	
30-22	Locked rotor	0	0	0	0 = Off
30-23	Locked rotor detection time	0.1 s	0.1 s	0.1 s	
4-19	Max output freq.	400 Hz	400 Hz	400 Hz	
1-42	Motor cable length	[in meters]	[in meters]	[in meters]	
4-12	Motor speed low lim.	50 Hz	50 Hz	50 Hz	
4-14	Motor speed high lim.	No. [Hz]	No. [Hz]	No. [Hz]	See technical specifications from AirBox calculation
3-41	Ramp 1 ramp up time	10 s	10 s	10 s	Avoid too fast ramp
3-42	Ramp 1 ramp down time	10 s	10 s	10 s	Avoid too fast ramp
1-73	Flying start	1	1	1	1 = Enabled
6-19	Terminal 53 mode	1	1	1	1 = Voltage control signal
6-10	Terminal 53 low volt	0.07 V	0.07 V	0.07 V	
6-11	Terminal 53 high volt	10 V	10 V	10 V	
3-02	Minimum ref.	50	50	50	
3-03	Maximum ref.	No. [Hz]	No. [Hz]	No. [Hz]	Same as step 21., parameter 4-14
5-40	Function relay 1	No.	No.	No.	Alarm relay
5-40	Function relay 2	No.	No.	No.	Warning relay
1-29	Automatic motor adaption (AMA)	1	1	1	1 = Enable AMA This optimises motor performance and exits the wizard.

Table 5 Parameter settings for 5th group of motors

5 Optional step
Set the following parameters.

Parameters	Field names	Settings	Comments
4-41	Warning freq. high	No. [Hz]	Same as step 21., parameter 4-14
6-15	Terminal 53 high ref./feedb. value	No. [Hz]	Same as step 21., parameter 4-14
14-22	Operating mode	2	Converter resets at next power up.

Table 6 Common parameters

6 Restart the frequency converter.

This enters normal operation.

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4 Patents and trademarks

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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; Canada no. 2.843.131 and 2.843.132; EU no. 12740606.4 and 12740612.2; India no. 4140/CHENP/2012, 4077/CHENP/2012, 4073/CHENP/2012, 821/CHENP/2014 and 825/CHENP/2014; PCT no. EP2012/064908 and EP2012/064928; South Korea no. 10-2012-7012252, 10-2012-7012154, 10-2012-7012155 and 10-2014-7005746.
Granted patents include Canada no. 2.777.140, 2.777.141 and 2.777.144; China no. ZL2010800458842, ZL2010800460965, ZL2010800464275 and ZL2012800387210; EU no. 2488759, 2488760 and 2488761; South Korea no. 10-1907239; 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.
Pending patents include United Arab Emirates no. 723/2011. Pending designs include United Arab Emirates no. 223/2009.
Granted patents include EU no. 2387670. Granted designs include EU no. 001069884-0003, 001069884-0008, 001069884-0010, 001069884-0013, 001069884-0017, 001069884-0019, 001069884-0022, 001069884-0026 and 001069884-0028.

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5 Declaration of conformity

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

Appendices

A. Literature list

- Danfoss Programming guide
  VLT® HVAC basic drive FC101
  Publication no. MG18B302, 04/2018
- Danfoss Design guide
  VLT® HVAC basic drive
  Publication no. MG18C302

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