



Operating instructions for commissioning of elevator motors with encoders, which are not conclusive are connected to the shaft



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Remarks

Follow the safety instructions in the Danfoss manuals:

Product manual VLT AutomationDrive FC302

FC 300 Design Manual



Discharge time!

Frequency converters contain DC link capacitors that can remain charged even when disconnected from the AC mains!

When operating with permanent-magnet synchronous machines, there is a risk of reverse feeding via the motor connection!

Spannung (V)	Wartezeit (Minuten)	
Voltage	Discharge (minutes)	
	4	15
200-240	0,25-3,7 kW	5,5 - 37 kW
380-480	0,25-7,5 kW	11 - 75 kW
525-600	0,25-7,5 kW	11 - 75 kW
525-690	-	11 - 75 kW
Siehe Danfoss Sicherheitsmaßnahmen		
See Danfoss safety precaution		



Qualified personnel!

All project planning, commissioning and maintenance work must only be carried out by qualified personnel.

Qualified personnel are persons who, due to their training, experience and knowledge of the relevant standards and regulations, accident prevention regulations and operating conditions, are able to carry out activities and are able to identify and avoid possible hazards.

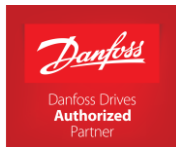


Danger!

Incorrect settings, defective or faulty components or incorrect connection can lead to unexpected and dangerous conditions!

The operator must ensure that neither persons nor property are endangered before each lift is moved.

The emergency stop functions and the mechanical safety systems must be installed and functional.



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Disclaimer

Despite careful examination of the content of this manual, deviations from the described hardware may be and software. IBA Lift Components does not assume any liability for the correctness of the content of this manual. IBA Lift Components GmbH is not liable for damages due to improper use or as a result of unauthorized repairs or modifications.

The intended use also includes:

- Observing and adhering to the Danfoss manuals
- Statutory accident prevention and environmental regulations
- Elevator regulations
- Technical data and environmental conditions
- Requirement for trained and qualified personnel for connection, commissioning and maintenance of the drive
- available documentation

Objective

In elevator machines with e.g. friction wheel encoders, the encoder count values can be affected by slippage. Therefore, the motor control must compensate for a discrepancy between the actual motor shaft and the encoder.

The VLT LiftDrive LD302 and VLT AutomationDrive FC302 devices have a compensation function for this behavior. The inverter adjusts the actual rotor position to the internal motor model.

In the further documentation, this function is referred to as "**PM Mode 2**". This functionality provides excellent performance and requires minimal effort during commissioning.

However, for physical reasons, there are restrictions with regard to the speed range. It is not possible to operate the elevator at very low speed for long distances. Therefore, the inspection speed must be adjusted to be above the model switching frequency defined in P1-53. The value for P1-53 depends on the respective engine data and is automatically adjusted to the internal engine model.

The minimum speed for normal operation, including the inspection speed, shall be calculated as follows:

$$\text{Minimum Speed} = \frac{(P1-53 + 0.5 \text{ Hz}) * P19-10[m] * \pi * 2}{P1-39 \text{ (Engine Pole Number)} * P19-12 \text{ (Suspension)}}$$

Please note that according to EN81-20, the inspection speed is limited to 0.63 m/s. If your calculation results in minimum speeds above 0.63 m/s, this system may not be suitable for this function, and it is highly recommended that you install an encoder on the shaft and operate the installation as a standard PM motor. Please follow the instructions to set up such systems.

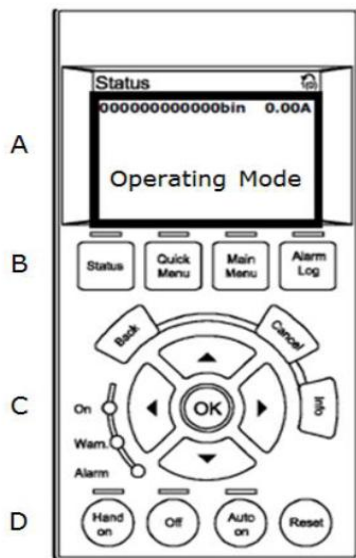


This document contains only the technical aspect of a specific function. Please always refer to the **LD302/FC302 Quick Start Guide**, which contains important safety information and links to other relevant documents.

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Initial commissioning

Inverter control unit



The graphical LCP is divided into the four functional areas A, B, C and D:

LCP Area A:
Display area

LCP Area B:
Menu buttons to change the status display, program or access the alarm and fault memory.

LCP Area C:
Navigation keys for programming functions, moving the cursor and adjusting the speed when manually controlled. This is also where the control indicators for the status display are located.

LCP Area D:
Buttons for selecting the operating mode and for acknowledging (reset).

Guide for easy and fast commissioning Recommended steps for initial commissioning.

Basic notes:

1. Wiring the frequency converter to the control system according to the wiring diagram
2. Setting language
3. Parameterization of the inverter

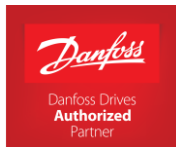
NOTE: Engine data must be entered in the order listed. It is not possible to change just one parameter, as the drive software always ensures the correct values for the following settings. A change from P 1-20, for example, leads to a change in all the engine data mentioned. Therefore, all the settings mentioned for the parameters P1-24 to P1-39 must be repeated! In addition, any change in this data requires a new engine adjustment (P19-63).

0 Setting the engine data

0.1 Enter engine data:

P0-01 <i>Language</i>	Selection of the desired language
P1-20 <i>Engine power (kW)</i>	See engine nameplate
P1-24 <i>Motor current (A)</i>	See engine nameplate
P1-25 <i>Engine Speed (rpm)</i>	See engine nameplate
P1-26 <i>Motor Rated Torque (Nm)</i>	See engine nameplate
P1-39 <i>Number of engine poles</i>	See engine nameplate

Note: It may happen that the S1 engine data for continuous operation is indicated on the nameplate. These must not be used for the design of the frequency converter, as the motor currents are higher in S3 intermittent operation. This means that an inverter that has been designed with the S1 data is too small. For parameterized S1 engine data, adjust P4-17 *torque limit*, P4-18 *current limit* and P1-66 *min. current at low speed*. In this case, contact Iba Lift Components GmbH.



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0.2 Calculation of any missing data on PM motors:

0.2.1 Number of motor poles

If the number of motor poles is not indicated by the nameplate, the value can be calculated by using the rated frequency and the rated speed in rpm of the motor with the following formula

$$p = \frac{2 \cdot f_{nom}[Hz] \cdot 60}{n_{nom}[rpm]}$$

0.2.2 Nominal torque

The rated torque can be calculated by using the rated power of the motor and the rated speed with the following formula

$$T_{nom} = \frac{P_{nom}[W] \cdot 9,55}{n_{nom}[rpm]}$$

1 Setting the mechanical data:

P32-00 Increment Signal Type	[1] Set TTL (5V, RSS422)
P19-10 Diameter traction sheave	See nameplate
P19-12 Rope suspension	See nameplate
P19-20 maximum speed	(usually the same as the rated speed)
P19-21 Rated speed	See nameplate

In the case of terminal control (**not DCP or CANopen**), the parameters for the individual speeds must still be entered. **In the parameter P19-50 (usually [0]) the interface logic can be set, see Danfoss manual.**

P19-22 Slow Speed	V0 / Vevac.
P19-23 Inspection Speed Fast	Vi
P19-24 Intermediate Speed 1	V1
P19-25 Intermediate Speed 2	V2
P19-26 Catch-up speed	Vn
P19-28 Intermediate Speed 3	V3

2 Setting the special function "PM Mode 2":

P19-86 Special functions	[4x]
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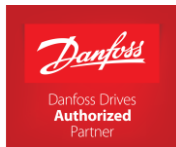
For PM Mode 2, set the value of the 2nd digit from the right to [4], see Danfoss manual.

3 Setting the control interface:

3.1 Setting up the control interface (examples):

P19-66 Digital Serial, Communication with Elevator Control:	
	[0] Control via terminals
	[1] Bus control DCP3
	[2] Bus control DCP4
	[3] CanOpen DSP417

Perform an off and on cycle of the frequency converter.



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4 Engine tuning:

4.1 Automatic Engine Adjustment (AMA):

After all settings have been made, an engine tuning must be carried out.

- Set the parameter P19-63 *Engine Adjustment* to [1] and give a start command, in revision mode (retrieve/inspection slow).
- The drive now performs the AMA at a **standstill (brake not released)**. Once this is complete, the drive automatically shuts down the inverter. Let the drive command stand until the parameter P19-63 is automatically set to [0].

If the value in parameter P19-63 does not change from [1] to [0], the engine tuning did not work.

The following reasons can be considered:

- Monitoring of the control system leads to shutdown
- Check the motor data entered into the inverter
- Check the shields of the motor, encoder and brake resistor for correct connection. **The umbrellas must be placed on both sides over a large area.** Use clamps with metal pressure pan. Do not twist or cut off any protruding ends.

Note: For some elevator controllers, a new drive command is automatically sent to the inverter after the AMA if the revision mode drive buttons are still active. This triggers a movement of the system!

4.2 Method of propulsion without encoder:

Now the cabin can be moved without an encoder by means of retrieval.

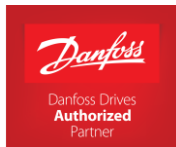
- Set the parameter P19-62 *encoder lot* to [1].
- Move the cab in both directions.
- If the drive does not run smoothly, check the engine data for correct input and repeat the engine tuning

Note: In encoderless operation, the cab may drive in the wrong direction. In this case, set the parameter P19-04 *Driving Directions* to [1].

5 Encoder tuning

In encoder tuning, the resolution of the encoder is determined.
Parameter P19-62 *Transducer lot* must be set to [0]!

- P 19-03 *Set Encoder Autotune* to [-2].
- Move the drive down at least one floor with retrieval. It is recommended to proceed to the lowest floor. After the end of the journey, the measured resolution is displayed in parameter P19-03.
- Now the parameter P19-09 *encoder offset* must be set to [1].
This reduces starting noise.



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6 Fine-tuning of encoder resolution and engine data

6.1 Perform fine-tuning.

- To do this, set the P19-03 *engine adjustment* to [4]
- Perform multiple normal trips

Note! When the fine-tuning is complete, the P19-63 parameter is automatically changed from [4] to [0] .

6.2 Activation of necessary monitoring functions if necessary.

Now the necessary monitoring (e.g. brake ventilation or engine temperature monitoring, etc.) can be activated by means of parameter 19-65 *monitoring* . A description of this can be found in the Danfoss manual.

6.3 Optimization:

Once the monitoring functions have been activated, the driving behaviour (e.g. the brake release and incidence time) can now be optimised. A description of this can be found in the Danfoss manual in the chapter Monitoring.

7 Data storage and data recovery:

The engine must be at a standstill during the entire process.

7.1 Data storage in LCP (control unit):

To store data in the LCP, do the following:

1. Go to Parameter 0-50 *LCP Copy*.
2. Press the [OK] button.
3. Select [1] *Save to LCP*.
4. Press the [OK] button.

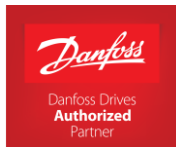
All parameter settings are now stored in the LCP. The progress of the task is indicated by the progress bar. The process is complete when *Copy done* is displayed.

7.2 Data transmission from LCP to frequency converter:

To load data from the LCP, do the following:

1. Go to Parameter 0-50 *LCP Copy*.
2. Press the [OK] button.
3. Select [2] *Load from LCP, All*.
4. Press the [OK] button.

The parameter settings stored in the LCP are now stored in the frequency converter. The progress of the task is indicated by the progress bar. The process is complete when *Copy done* is displayed.



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8 Restoring the factory setting:

If parameters are accidentally changed that cause the inverter to stop running, the inverter can be reset to the factory setting. All settings are lost.

By storing the data in the LCP, it can be saved before initialization. (See Chapter 5)

The initialization of the frequency converter restores the factory setting of all parameters before commissioning.

Manual initialization:

1. Disconnect the AC drive from the mains supply and wait for the LCP display to turn off.
2. Press the LCP buttons [Status] + [MainMenu] + [OK] at the same time and turn the power supply back on.
3. Hold down the buttons and release the LCP keys when "Initialization" appears on the display.
4. When language selection comes, do nothing!
5. "Please wait" appears.
6. When the copy bar has gone through, the main menu will appear --> press the Status button once.
7. Wait until "no motor data" is shown in the display --> converter is now completely booted.

The factory setting of the default parameters has been restored. All parameters and settings have to be reset!