

Quick installation guide

for motor operation with analogue set point

For full instructions please see the *Operating and installation manual*.

NFO Sinus[®]
G2

1. Connection of power supply and motor

See *Safety Aspects* and *Installation and Ventilation*

- Connect the power cable's phase conductors to terminals L1, L2 and L3 in the inverter. The earth must be connected to PE. See Recommended fuses.
- Connect the motor cable to terminals U, V and W in the inverter. The earth is connected to PE. Note if motor is Y or D-connected. A 400V Y/ 230V D motor must be Y-connected and a 690V Y/400V D must be D-connected.
- Any thermo contact or thermistor should be connected to terminals 25 and 21. A resistance of 10 k Ω , min 1/4W, must also be connected between terminals 25 and 20.

2. Connecting control signals

- Connect the analogue control signal to terminal 3 and ground reference to terminal 23 for set point 0/2-10 V, or terminals 10 and 2 for set point 0/4-20 mA.
- Close terminals 5 and 1 for the start/run signal.
- The main alarm signal is connected to the fault relay output, terminals 8, 17 and 28. Terminals 17 and 28 are closed upon alarm.
- Any run indicator is connected to terminals 7, 16 and 27. Terminals 16 and 7 are closed during operation.
- The factory setting for the inverter's set point is 0-10 V. To alter the set point, change the *AinSet* parameter as per table 7 in the user manual.

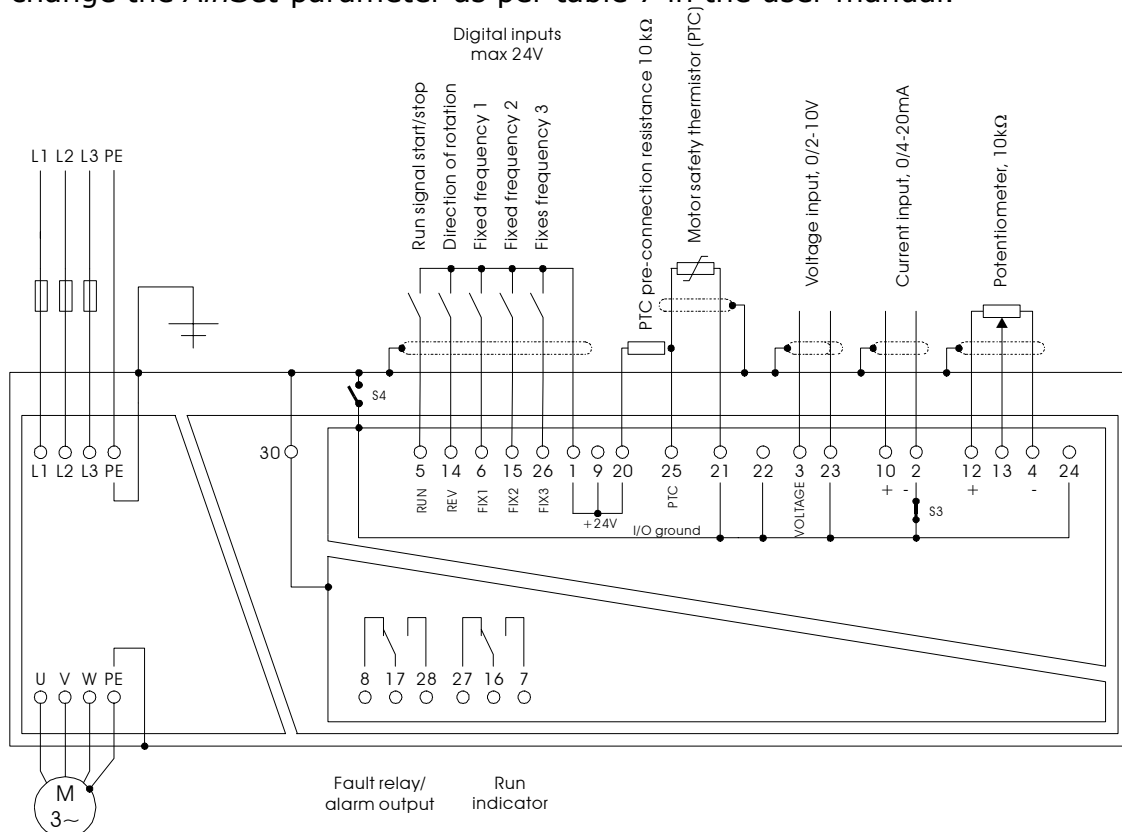


Figure 1. Example of connection



WARNING! If there is a run signal to the inverter (terminals 5 and 1 connected), the inverter will start at power up. This can be avoided by changing the *AutoSt* parameter.

3. Tune motor parameters

NOTE: This step is needed in order to run the motor correctly.

- Have motor data *P-Nom* (kW), *U-Nom* (V), *f-Nom* (Hz), *N-nom* (rpm), *I-Nom* (A) and $\cos \varphi$ ready. Motor data can usually be found marked on the motor otherwise contact your motor supplier. Use correct data for Y or D-connection.
- Press **PROG** to enter program mode.
- Scroll (if necessary) with **FWD** or **REV** until it reads **ParGroup / Motor**, then select parameter group with **ENTER**.
 - Use **FWD** or **REV** to scroll between motor parameters
 - Change value by pressing **up/down** button or **SHIFT + up/down** button (change occurs more rapidly). Press **ENTER** to set value.
 - Repeat until *P-Nom*, *U-Nom*, *f-Nom*, *N-Nom*, *I-Nom* and $\cos \varphi$ all match motor data.
- Scroll until it reads **Tuning** in display.
 - Press **up**-button and when asked **Tuning full?** Press **ENTER**.
 - Wait until display reads **Tuning Ready**, otherwise consult operating manual.
 - *R-stat*, *R-rot*, *L-main*, *Sigma*, *I-magn* and *I-limit* are now tuned.

4. Motor start

- Press **PROG** twice, once to exit parameter group, twice to exit program mode. Press **STOP** to enter local mode (see *Operating/Programming mode*).
- Check the motor's direction of rotation by pressing **FWD** (motor rotates whilst the button is pressed). If the motor moves in the wrong direction, change two of the output motor phases on the inverter, e.g. U – V.
- By pressing **SHIFT + FWD** in local mode, the inverter continues to run at the frequency shown in the display without the button needing to be held in. The frequency can be changed during use with the **up/down** button or **SHIFT + up/down** button (change occurs more rapidly). To stop the motor, press **STOP**.
- Change to external mode, i.e. normal operating mode by first holding down **SHIFT** and then pressing **STOP** at the same time. (Please note that the motor will start if other start conditions are met) To stop the motor and change to local mode, press **STOP**.
- The motor current can be controlled by the *I-rms* parameter under the Status parameter group.
- If the motor rotates upon start up due to natural draught, adjust the DC current brake function before start with the *DC-Brk* parameter.
- If the motor is run with low load at certain frequencies (e.g. fan operation) the *EnergySave* function will reduce the motor's power consumption.

Recommended fuses

Recommended slow blowing fuses for 3-phase supply, 400V:									
0.37kW	0.75kW	1.5kW	2.2kW	3kW	4kW	5.5kW	7.5kW	11kW	15kW
6 A	6 A	6 A	10 A	10 A	16 A	16 A	25 A	35 A	35 A

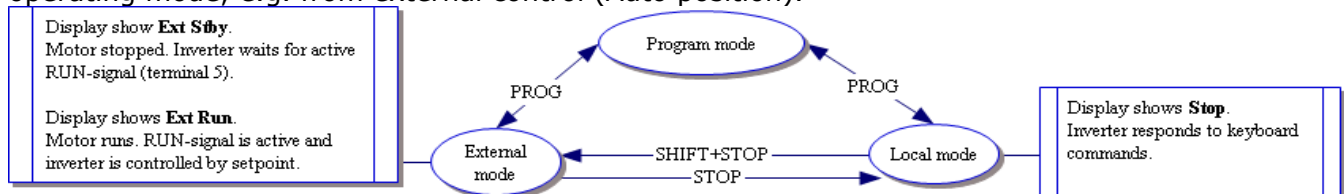
Figure 2. Recommended fuse sizes

Operating/Programming mode

There are three modes (operating methods):

- Programming mode
- Local mode
- External mode.

Programming mode is used when altering parameters in NFO Sinus, Local mode is used to run the controller from the front panel (Manual position) and External mode is for running in normal operating mode, e.g. from external control (Auto position).



Programming

The parameters are divided into parameter groups. To access the parameters, press the **PROG**-button once. To move through the parameter groups, use the **FWD** (right) and **REV** (left) buttons. Confirm the desired parameter group using **ENTER**. Move between the parameters using the **FWD** (down) and **REV** (up) buttons. Change the parameter value with the **up/down** arrow. Once the parameter has been changed a star will light. Save the change by pressing **ENTER** (the star will out). Once all adjustments have been made, press **PROG** twice to exit the programming position.

Parameters

For a complete parameter list, see table 9 in the manual.

Checklist for parameter settings

Parameter group	Parameter	Setting	Own setting	Comments/description
Motor	P-Nom	Enter nominal motor data, see motor rating plate		Motor's nominal power
	U-Nom			Motor's nominal voltage
	f-Nom			Motor's nominal frequency
	N-Nom			Motor's nominal speed
	I-Nom			Motor's nominal current
	cos φ			Motor's cos φ
	Tuning			
Control	Accel	30s = factory setting		Ramp up time, 30-60s is recommended for fan operation
	Retard	30s = factory setting		Ramp down time, 30-60s is recommended for fan operation
	DC-Brk	Adjust in the time it takes to break the motor due to natural draught		Motor braking before start to counteract natural draught, etc.
	EnergySave	OFF = factory setting ON = enabled		Energy saving function; reduces motor's energy consumption if the motor is run with low load at certain frequencies, e.g. fan operation.
Freque	Fr-min	0.0Hz = factory setting		Gives analogue min frequency at 0.0V
	Fr-max	50.0Hz = factory setting		Gives analogue min frequency at 10.0V

Installation and ventilation

The IP20 inverter is intended to be built into a cabinet with sufficient cooling, e.g. with flowing cool air. It is important to ensure that there is no air re-circulation in the cabinet. The IP54 inverter can be mounted stand-alone. The cool air temperature must not exceed 40°C.

There must be 80 mm free space above and below the inverter to allow sufficient air passage through the inverter.

If several inverters are installed side by side, there must be a distance of at least 20 mm between the inverters to ensure air exchange.



The inverter must not be installed so that the expelled air from another inverter or other equipment blows directly into the inverter's air intake!



Please note! During installation it is important that no foreign object, such as borings or screws, fall into the inverter as a short circuit may occur.

Safety aspects

The inverter must always be disconnected from the supply voltage before any work is performed on any electrical or mechanical section of the installation.

Installation, maintenance and repair must always be performed by personnel with appropriate expertise and training for the job.

Alteration or change of inverter parts or its accessories will invalidate the inverter's guarantee. Always contact NFO Drives AB if alterations or changes are necessary.

Please note: The components in the power unit and certain components in the signal unit are powered when the inverter is connected to the power supply.



Contact with some components when the power supply is connected is dangerous!

Always disconnect the power supply before removing the front plate. The inverter's side plate must not be opened.



WARNING! Voltage may remain in the inverter once the power supply has been turned off due to its buffer capacitors. Always wait at least 5 minutes and measure between the + and - terminals to check that no voltage remains before starting work on the inverter.

The inverter must always be earthed when the voltage is connected.



Turning on and off the mains supply too frequently can damage the inrush circuit of the inverter. Wait at least 1 min between each power up. Don't use the mains supply for frequent on/off control of the motor!

Software called **NFO Sinus Manager** is available for download from our web site www.nfodrives.se.

Features:

- Change the parameters
- Easy manage of multiple parameter settings in multiple inverters
- Backup and update parameter settings
- Control and monitor inverter through serial communication

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