NORD Gear

NORDAC *trio*

SK 250/1 TR ... SK 750/1 TR
SK 370/3 TR ... SK 1500/31 TR
SK 1500/3 TR ... SK 7500/3 TR

Operation Instructions

Contents

BU 6010/99 GB
01.03.00

1. SAFETY AND CE COMPLIANCE

Before installing and operating this equipment read these safety instructions **and** warnings carefully. Also read and obey all the warning signs attached to the equipment. Make sure that the warning labels are kept in a legible condition and replace any missing or damaged labels.

⚠WARNING

This equipment must be installed, operated and maintained by suitably qualified personnel only.

Use only permanently-wired input power connections. The equipment must be grounded (IEC 536 Class 1, NEC and other applicable standards).

Wait at least five minutes after the power has been turned off, before opening the equipment. The dc-link capacitor remains charged to dangerous voltages even when the power is removed. When working on open equipment, note that live parts are exposed and do not touch these parts.

Some parameter settings can start the motor automatically when power is restored after a mains failure.

Do not connect machines with a three-phase power supply, fitted with EMC filters, to a supply via an ELCB (Earth Leakage Circuit Breaker - see EN50178, section 6.5).

Obey all general and regional installation and safety regulations relating to work on high voltage installations, as well as regulations covering correct use of tools and personal protective equipment.

Note that the following terminals can carry dangerous voltages even when the inverter is stopped:
Power supply terminals L1, L2 and L3
Motor terminals U, V and W.

When using the analogue input, the jumpers must be correctly set and the analogue input type selected (P023) before enabling the analogue input with P006. If this is not done the motor may start inadvertently.

This equipment is capable of providing internal motor overload protection in accordance with UL508C section 42.

This equipment is suitable for use in a circuit capable of delivering not more than 10,000 symmetrical amperes (rms), for a maximum voltage of 240V/480V/500V when protected by a time delay fuse (see Electrical Data for details).

Do not operate the equipment in direct sunlight.

This equipment must not be used as an ‘emergency stop’ mechanism *(see EN 60204, 9.2.5.4).*

⚠WARNING

Take note of the general and regional installation and safety regulations regarding work on high voltage installations (e.g. VDE). Adhere to relevant regulations regarding correct use of tools and protective gear.

Do not paint over the black case finish of the inverter as this will affect the units thermal performance.

⚠CAUTION

Do not allow children or the general public to access or approach this equipment.

Do not install the inverter where ambient conditions exceed the specified protection rating. IP ratings: COMBIMASTER – IP55; MICROMASTER Integrated – IP65.

Keep operating instructions within easy reach and give them to all users.

Use this equipment only for the purpose specified by the manufacturer. Do not carry out any modifications, or fit any spare parts which are not sold or recommended by the manufacturer; this could cause fires, electric shock or other injuries.

CE

EUROPEAN LOW VOLTAGE & EMC DIRECTIVES

The COMBIMASTER product complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

The units are certified for compliance with the following standards:

EN 60204-1 Safety of machinery - Electrical equipment of machines

EN 60146-1-1 Semiconductor converters - General requirements and line commutated converters

BS EN50081-2 1995 General Emission Standard - Industrial Environment

BS EN50082-2 1995 General Immunity Standard - Industrial Environment.

The MICROMASTER Integrated product complies with the requirements of the Low Voltage Directive 73/23/EEC.

The units are certified for compliance with the following standards:

EN 60204-1 Safety of machinery - Electrical equipment of machines

EN 60146-1-1 Semiconductor converters - General requirements and line commutated converters.

EUROPEAN MACHINERY DIRECTIVE

The MICROMASTER Integrated / COMBIMASTER products are suitable for incorporation into machinery.

The MICROMASTER Integrated / COMBIMASTER must not be put into service until the machinery into which it is incorporated has been certified to be in compliance with the provisions of the European Directive 89/392/EEC.

Only valid for machinery to be operated in the European Community.

COMBIMASTER – UL CERTIFICATION

UL cUL listed power conversion equipment type 5B33 in accordance with UL508C.

For use in pollution degree 2 environment.

(Applies to the Inverter only)

MICROMASTER Integrated – UR CERTIFICATION

UR cUR recognised power conversion equipment in accordance with UL508C.

For use in pollution degree 2 environment.

This equipment must be externally cooled by a fan, the rating of which depends on the unit Case Size. For Case Sizes A and B, the fan must provide 0.42m^3/min and 1.25m^3/min respectively.

2. OVERVIEW

The inverter is microprocessor controlled and uses state of the art IGBT(Insulated Gate Bipolar Transistor) technology for reliability and flexibility. A special pulse-width modulation method with ultrasonic pulse frequency permits extremely quiet motor operation. Inverter and motor protection is provided by comprehensive protective functions.

Key design features include:

- Easy to install and commission.
- Closed loop control using a proportional, Integral (PI) control loop function.
- High starting torque with programmable starting boost.
- Remote control capability via RS485 serial link using the USS protocol.
- Ability to control up to 31 COMBIMASTERS via the USS protocol.
- Optional remote control capability via RS485 serial link using PROFIBUS-DP.
- Output frequency (and hence motor speed) can be controlled by one of four methods:
  - **1** Built in potentiometer.
  - **2** High resolution analogue setpoint (voltage or current input).
  - **3** Fixed frequencies via binary inputs.
  - **4** Serial interface.
- Built-in dc injection braking.
- Acceleration/deceleration times with programmable smoothing.
- Single signal relay output incorporated.
- External connection for optional Clear Text Display (CBV) or for use as external RS485 interface.
- Fast Current Limit (FCL) for reliable trip-free operation.
- Optional factory-fitted resistive braking unit –Case Size B only (also available as a separate post-sale option).
- Optional motor brake and interface.
- Integral class A.

3. ELECTRICAL INSTALLATION

> ⚠ **WARNING**
>
> Take note of the general and regional installation and safety regulations regarding work on high voltage installations (e.g. VDE). Adhere to relevant regulations regarding correct use of tools and protective gear.

3.1 General Wiring Guidelines

The Case size BG1 and Case Size BG2 is designed to operate in an industrial environment where a high level of Electro-Magnetic Interference (EMI) can be expected. Usually, good installation practices will ensure safe and trouble-free operation. However, if problems are encountered, the following guidelines may prove useful. In particular, grounding of the system 0V at the inverter, as described below, may prove effective.

1 All equipment must be well earthed using short, thick earthing cable connected to a common star point or busbar. It is particularly important that any control equipment connected to the inverter (such as a PLC) is connected to the same earth or star point as the inverter via a short, thick link. Flat conductors (e.g. metal brackets) are preferred as they have lower impedance at high frequencies.

2 Use screened leads for connections to the control circuitry. Terminate the ends of the cable neatly, ensuring that long strands of unscreened wire are not left visible.

3 Separate the control cables from the power connections as much as possible, using separate trunking, etc. If control and power cables cross, arrange the cables so that they cross at 90°.

4 Ensure that contactors are suppressed, either with R-C suppressers for AC contactors or 'flywheel' diodes for DC contactors, fitted to the coils. Varistor suppressers are also effective.

Safety regulations must not be compromised when installing the NORDAC *trio!*

3.2 Electrical Installation

Procedure

Remove the four cross-head screws on the inverter's cover to access the electrical terminals.

For details of cable sizes, refer to the Electrical Data (section 7.2) of this document.

A 'drip loop' is recommended when connecting the mains and control cables (*see Fig. 6*).

> ⚠ **CAUTION**
>
> The printed circuit boards contain CMOS components that are particularly sensitive to static electricity. For this reason avoid touching the boards or components with your bare hands or metal objects.

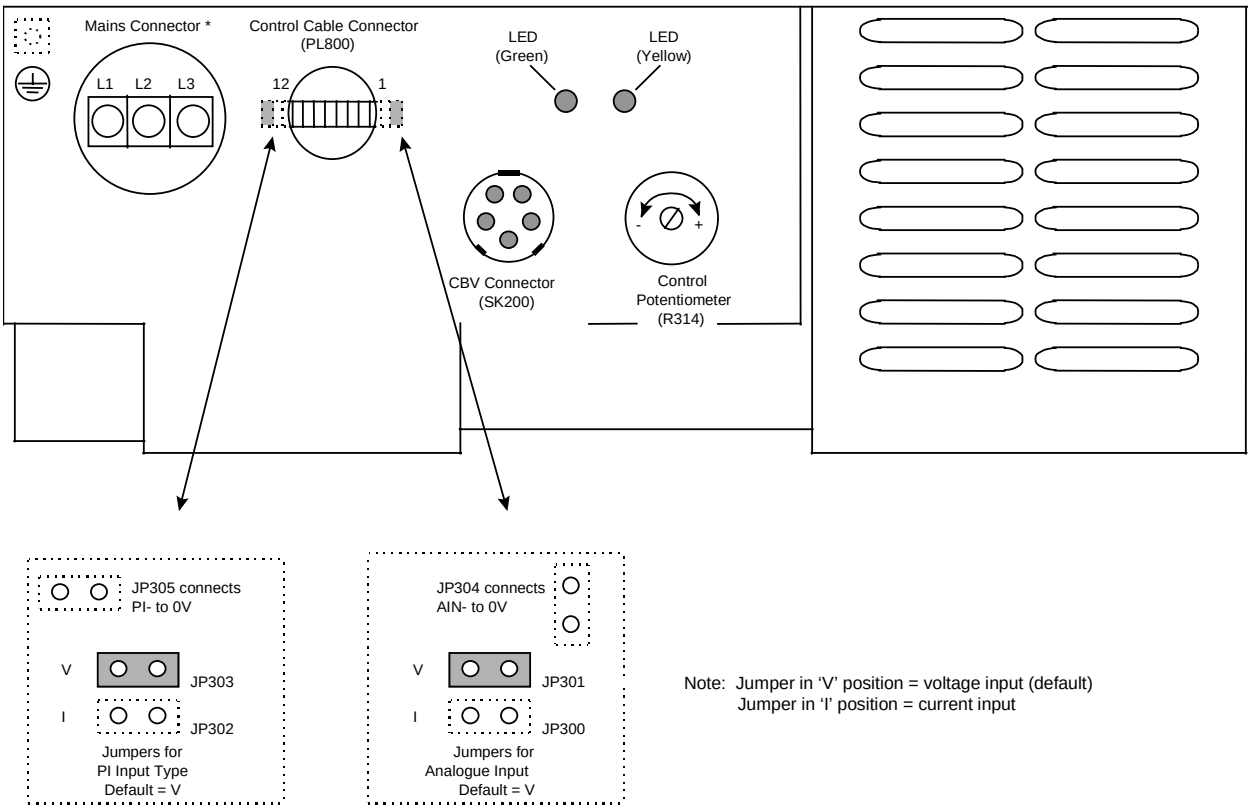
3.3 Mains Cable Connections

Ensure that the power source supplies the correct voltage and is designed for the rated current. Use the appropriate circuit-breakers with the specified current rating between the power supply and inverter.

Use Class 1 60/75°C copper wire only. Use a 4-core screened cable. If crimp terminals are used they must be insulated. If crimps are not used, the strip length must not exceed 5mm.

Feed the power cable into the inverter via the gland hole nearest to the motor shaft. Connect the power leads to terminals L1, L2, L3 (L1, L2 for single phase units) and the separate earth.

Use a 4 - 5 mm cross-tip screwdriver to tighten the terminal screws



Check that the supply voltage is correct for the inverter used by referring to the rating label.

Cable Glands: (BG2)

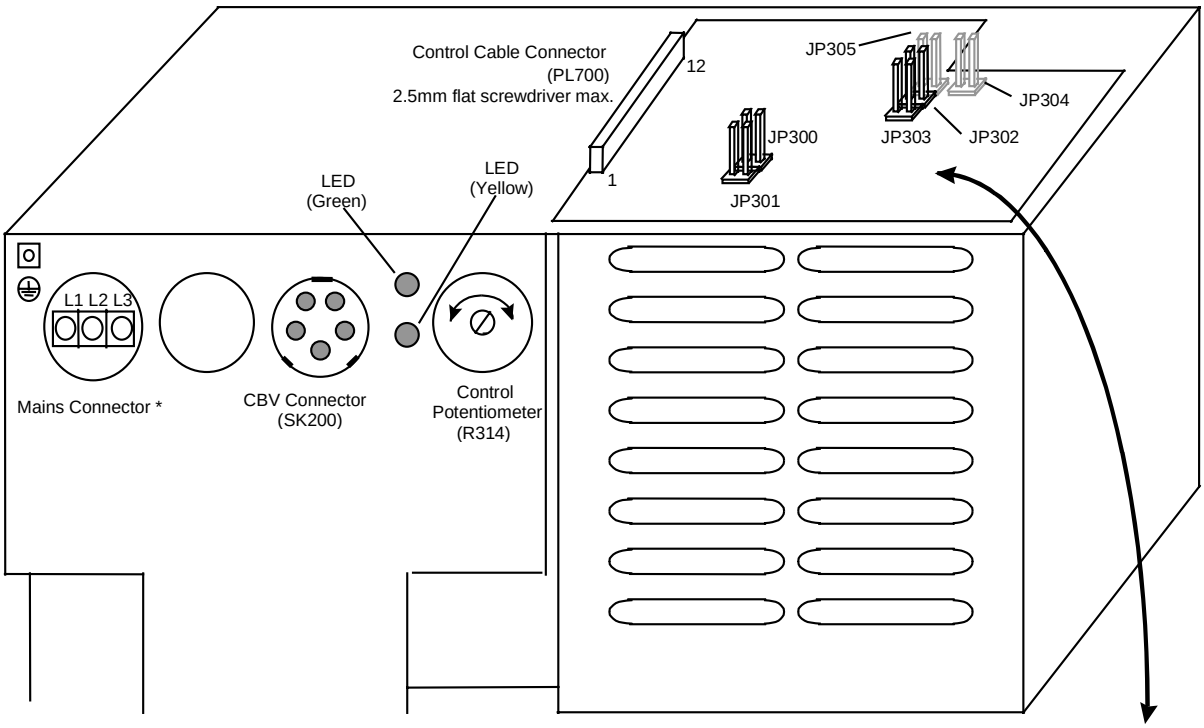
PG21 – Mains
PG16 - Signal

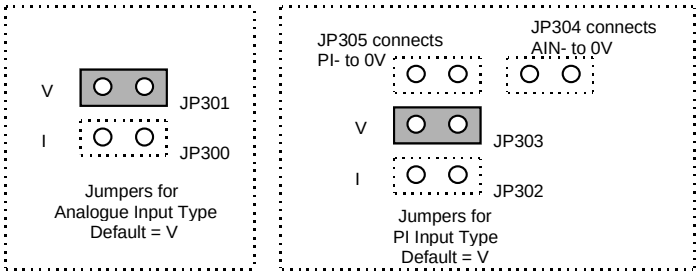
IMPORTANT

Ensure that the following tightening torques are used:

Access cover retaining screws	4.0 Nm
Gland hole covers	1.0 Nm
Main connector screws	1.0 Nm
Earth connection	1.5 Nm.

Figure 2 Electrical Connection (BG2)





* Check that the supply voltage is correct for the inverter used by referring to the rating label.

Note: Jumper in 'V' position = voltage input (default)
Jumper in 'I' position = current input

Cable Glands : (BG1)

PG16 – Mains & Signal

IMPORTANT

Ensure that the following tightening torques are used:

Access cover retaining screws	4.0 Nm
Gland hole covers	1.0 NM
Main connector screws	1.0 Nm
PL700 screws	0.5 Nm
Earth connection	1.5 Nm.

Figure 3 Electrical Connection (BG1)

3.4 Control Cable Connections

CAUTION

The control and power supply cables must be laid separately. They must not be fed through the same cable conduit / trunking.

Use screened cable for the control lead.

Feed the control cable into the inverter via the appropriate gland hole. Connect the control wires in accordance with the information in Figures 4, 5 and 6, having first unplugged connector block PL800 from the PCB (BG 2 only).

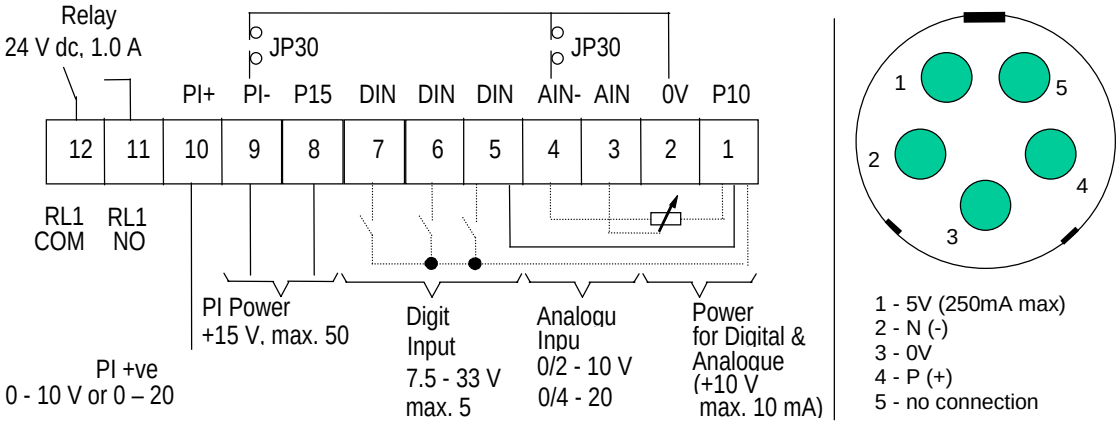
IMPORTANT: A wire link **must** be fitted between control terminals 5 (DIN1) and 1 (P10+) if it is required to start the inverter from the control potentiometer R314, or the analogue input.. The wire link must be removed when operation via a run/stop switch is required.

COMBIMASTER Control Terminal Cabling Information		
	BG1 (PL700):	**BG2 (PL800)**
Cable AWG	22 – 18	28 – 20
= approx. mm^2	0.35 – 0.82	0.08 – 0.50
Strip Length (mm)	5 – 6	5 – 6
Strip Length (inch)	0.22	0.22

Note that the optional potentiometer fitted as an analogue set point shown in Figure 4 & 5 assumes that jumper JP304 is connecting 0V (pin 2) to AIN- (pin 4).

+15V can be used as an alternative to P10+ for the digital inputs.

Plug the connector block back into the PCB (BG 2 only), refit the cover and tighten the four securing screws.



PL800 (BG2) / PL700 (BG1) **SK200 Socket**

Fig. 2: Control Terminal Connections

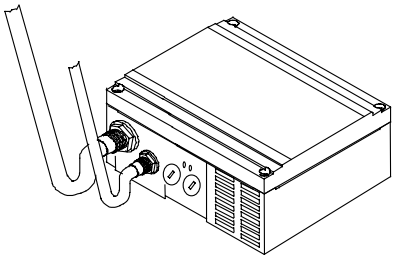


Fig. 4: Cable Connections with Drip Loop

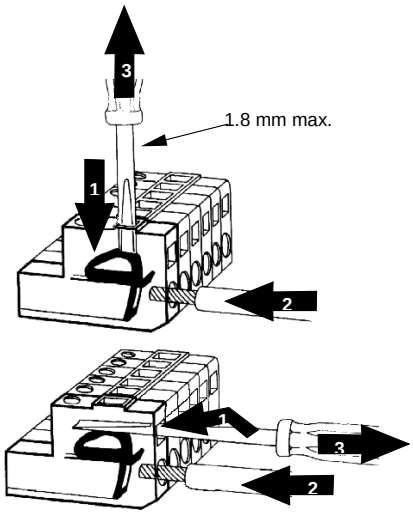
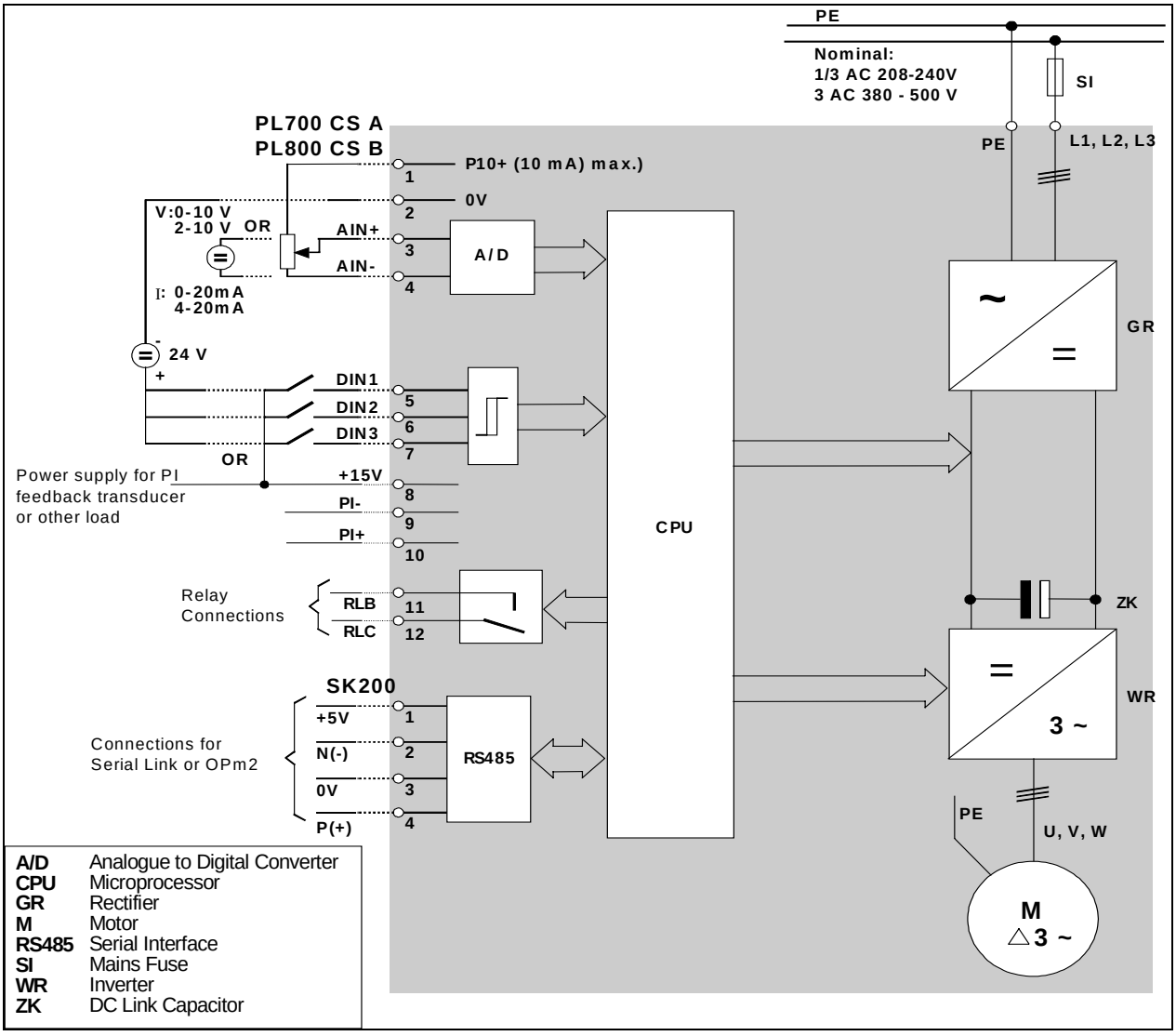


Fig. 3: Connecting Control Wires to PL800



4. OPERATING INFORMATION

> ⚠ **WARNING**
>
> The equipment must not be switched on until after its cover has been fitted and the cover screws have been tightened to the correct torque.
>
> After the power has been turned off, you must always wait five minutes so that the dc link capacitors can discharge. Do not remove the cover until this time has elapsed.
>
> All settings must only be entered by qualified personnel, paying particular attention to the safety precautions and warnings.

4.1 General

For basic operation of COMBIMASTER & MICROMASTER Integrated, no additional equipment is required. However, for more complex operation, CBV – Clear Text Display is required (CBV is available as an option, but must be ordered separately).

The inverter does not have a mains power switch and is therefore live when the mains supply is connected.

When delivered, the inverter has a frequency setpoint range of between 0 Hz and 50 Hz. Regardless of its initial position, internal potentiometer R314 must be turned fully counter-clockwise before it can be used to start the NORDAC *trio*.

R314 can be accessed by removing the right-hand gland hole cover *(see Fig. 2 & 3)*.

Connecting a serial link or the CBV to the serial interface is made using the circular connector SK200 (see fig. 2 & 3)

Parameter settings can only be changed by using either the serial interface (SK200) or an optional Clear Text Display (CBV). Refer to the parameter list section in this document for a full description of each available parameter.

Analogue input type is selected by jumpers JP300 and JP301. JP300 closed selects current input, JP301 closed (default) selects voltage input. These jumpers can only be accessed when the cover is removed *(see Fig. 2 & 3)*.

If the motor is run unloaded (e.g. for test purposes) and vibration or trip conditions occur, change P077 from 0 to 3 (requires CBV).

4.2 Basic Operation

There are two basic modes of operation for the inverter.

1 Using the internal potentiometer only:

a For forward rotation, ensure that a link is fitted between DIN1 (pin 5) and P10+ (pin 1) on PL800/PL700 *(see Fig. 4)*. For reverse rotation, connect the link to DIN2 (pin 6) instead of DIN1.

b Apply mains power. The green and yellow LEDs will illuminate to show that power is applied. Turn potentiometer R314 fully counter-clockwise. Turn the potentiometer clockwise until the yellow LED extinguishes. This indicates that power is now applied to the motor. Continue turning clockwise to increase the speed of the motor.

c Turn the potentiometer counter-clockwise to reduce the speed of the motor. Turning the potentiometer fully counter-clockwise causes the motor to slow to a complete stop. Check that both LEDs are illuminated (STANDBY mode).

2 Using a combination of the internal potentiometer and a run/stop switch:

a Connect a run/stop switch between DIN1 (pin 5) and P10+ (pin 1) on PL700 (see Fig. 4) if forward rotation is required. If reverse rotation is required instead, connect the switch to DIN2 (pin 6) instead of DIN1 (pin 5).

IMPORTANT: Remove the link, if fitted, between pins 5 and 1 before the run/stop switch is fitted.

b Apply mains power. The green and yellow LEDs will illuminate to show that power is applied.

c Set the external run/stop switch to ON.

d Turn potentiometer R314 clockwise to set the required motor speed.

e Stop the motor by setting the external on/off switch to OFF. When the switch is set to ON again, it will run at the speed previously set using the potentiometer.

4.3 Operation – External Analogue Control

1 Connect a 4.7 kΩ potentiometer to the control terminals as shown in Fig.4 or apply a 0 - 10 V signal between pin 2 (0V) and pin 3 (AIN+). In both cases, position jumper JP304 to connect 0V to AIN-.

2 Ensure that a link is fitted between pin 5 (DIN1) and pin 1 (P10+).

3 Check that voltage input is selected by ensuring that the jumper is fitted to JP301.

4 Refit the cover, tighten the cover screws to the correct torque and then apply mains power to the inverter.

5 Turn the external potentiometer (or adjust the analogue control voltage) until the desired frequency is achieved. The unit will not switch on until a minimum of 2 V has been applied.

The frequency set by the external voltage is added to the frequency set by the internal potentiometer. Refer to Parameter P331 , Section 5.

As with Basic Operation, a run/stop switch can be used to start and stop the motor, or the direction of rotation can be changed by connecting the link to DIN2 instead of DIN1.

4.4 Operation – Digital Control

This method of operation requires either a Clear Text Display (CBV) or a serial link connection. The use of the Clear Text Display module is described in the Options section of this document. For a basic start-up configuration using digital control, proceed as follows:

1 Remove the link that connects control terminal 5 to terminal 1 (if one has been fitted).

2 Connect control terminal 5 to terminal 1 via a simple on/off switch. This sets up the inverter for clockwise rotation (default). If counter-clockwise operation is required, connect a switch between control terminals 6 and 1.

3 Connect the CBV or serial link to SK200. Refit the cover, tighten the cover screws to the correct torque and then apply mains power to the inverter.

4 Set parameter P006 to 0 to specify digital setpoint(see Section 6).

5 Set parameter P005 to the desired frequency setpoint.

6 Set the external on/off switch to ON or press the ON button on the CBV (set P007 = 001 to use the CBV). The inverter will now run at the frequency set by P005.

4.5 Stopping the Motor

Via the external on/off switch:

Setting the switch to OFF overrides the setting on the potentiometer and causes the motor to come to a controlled stop.

Via the potentiometer:

Turning the potentiometer counter-clockwise until the input voltage drops below 2 V causes the motor to slow to a stop. If an external potentiometer is applied, the input voltage must also be below 2V to stop.

4.6 If the Motor Does Not Start Up

Check the LEDs on the side of the inverter:

LED State	**NORDAC *trio Status***	
Green	**Yellow**	
ON	ON	Mains power on, inverter not running (STANDBY)
ON	OFF	Inverter running, as per control commands (ON)
Flashing	Flashing	Current limit warning
Flashing	ON	Inverter overtemperature
ON	Flashing	Motor overtemperature
OFF	ON	Other fault (e.g. tripped)
OFF	Flashing	Mains undervoltage
OFF	OFF	Mains supply fault (e.g. faulty external switch)

If a fault occurs:

Switch off, disconnect and then reconnect the power, and then switch on again. Switch off if the fault condition persists. Trips can be reset by using DIN3.

If a warning occurs:

Switch off, disconnect and reconnect the power and then switch on again.

If the fault/warning persists, further investigation requires an CBV or a serial link connection.

4.7 Local and Remote Control

The inverter can be controlled either locally (default), or remotely via a USS data line connected to the RS485 connector (SK200).

When local control is used (P910 = 0), the motor can only be controlled via the internal potentiometer or the control terminals. Control commands, setpoints or parameter changes received via the RS485 interface have no effect.

For remote control, the serial interface is designed as a 2-wire connection for bi-directional data transmission. Refer to parameter P910 in System Parameters for the available remote control options.

When operating via remote control the inverter will not accept control commands from the terminals. *Exception: OFF2 or OFF3 can be activated via parameter P051 to P053 (refer to parameters P051 to P053 in System Parameters).*

31 NORDAC *trio* can be connected to an external control unit at the same time and can be addressed individually.

4.8 Closed Loop Control

Closed loop control is only possible when an CBV or a serial link is connected to the NORDAC *trio*.

4.8.1 General Description

The NORDAC *trio* provides a Proportional/Integral (PI) control function for closed loop control *(see Figure 8)*. PI control is ideal for temperature or pressure control, or other applications where the controlled variable changes slowly or where transient errors are not critical. This control loop is **not** suitable for use in systems where fast response times are required.

Note: The closed loop function is not designed for speed control, but can be used for this provided that fast response times are not required.

When closed loop PI control is enabled (P201 = 002), all setpoints are calibrated between zero and 100%, i.e. a setpoint of 50.0 = 50%. This allows general purpose control of any process variable that is actuated by motor speed and for which a suitable transducer is available.

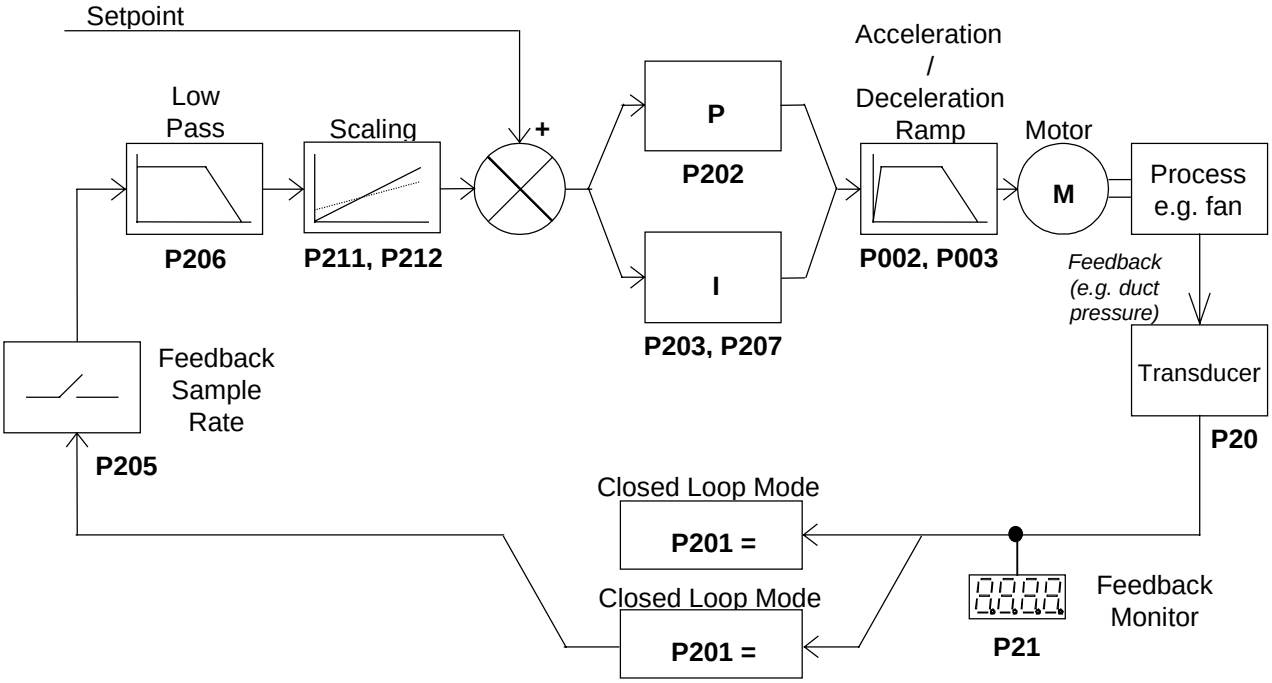


Figure 8: Closed Loop Control

4.8.2 Hardware Setup

Connect the signal wire from the external feedback transducer to control terminal 10. Set jumper JP303 if voltage input type is required (default) or set JP302 if current input type is required.

15 V dc power for the feedback transducer can be supplied from control terminal 8.

4.8.2 Parameter Settings

Closed loop control cannot be used unless P201 is first set to 002. Most of the parameters associated with closed loop control are shown in Figure 8. Other parameters which are also associated with closed loop control are as follows:

P001 (value = 007)
P061 (value = 012 or 013)
P210
P220.

5. SYSTEM PARAMETERS

5.1 Systems Parameters Table

The parameters listed here can only be accessed via the CBV or a serial link to the NORDAC *trio*. (see Section 7.1 for details)

If the *NORDAC trio* is to be operated only using analogue control within the 0 - 50 Hz frequency range then access to these parameters is not required.

The control buttons on the CBV (RUN, REVERSE and JOG) are disabled by default and cannot be used until P007 has been set to '1'.

Access to parameters is determined by the value set in P009. Check that the key parameters necessary for your application have been programmed.

P009 options are:

- **0** = Only the parameters from P001 to P009 can be read and set.
- **1** = Parameters P001 to P009 can be set and all other parameters can only be read.
- **2** = All parameters can be set, but P009 resets to 0 the next time power is removed from the inverter.
- **3** = All programmed parameters can always be set.

In the following parameter table:

Software Versions : Where indicated, some parameter descriptions are dependent on the software version installed, which can be checked using Parameter P922.

- V 3.00 is planned for release 2nd Quarter 1999.
- Includes references to CANbus– not available at time of writing (05.99)

'•' Indicates parameters that can be changed during operation.

'**' fmax This value is software version dependent.

V2.37: NORDAC *trio* – fmax = 120Hz

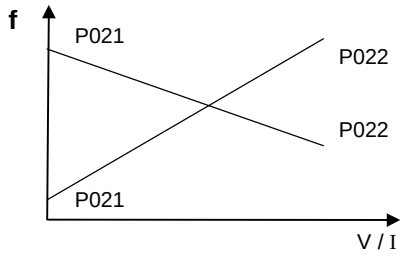
V 3.00: NORDAC *trio* – Motor dependent

[☆☆☆] Indicates that the value of this factory setting depends on the rating of the motor.

Parameter	Function	Range [Default]	Description / Notes
P000	Operating display	-	This displays the output selected in P001 on the second line of the LCD screen. If output frequency has been selected (P001 = 0) and the inverter is OFF, the display alternates between the current frequency (F) and the frequency that the inverter will run at when the RUN button is pressed (S). If P001 is set to any other value then only the actual value is displayed on this line of the display. In the event of a fault, the relevant fault code (Fxxx) is displayed (see section 6.3). In the event of a warning the display flashes.
P001 ●	Display mode	0 - 8 [0]	Display selection: **0** = Output frequency (Hz) **1** = Frequency setpoint (i.e. speed at which inverter is set to run) (Hz) **2** = Motor current (A) **3** = DC-link voltage (V) **4** = Motor torque (% nominal) **5** = Motor speed (RPM) **6** = Not used **7** = Closed loop control setpoint (% of full scale) **8** = Output voltage
P002 ●	Ramp up time (seconds)	0.50-650.00 [10.00] -- -- -- -- -- ***(SW Version : 3.00 onwards)*** 0.10 - 650.00 [10.00]	This is the time taken for the motor to accelerate from standstill to the maximum frequency as set in P013. Setting the ramp down time too short can cause the inverter to trip (fault code F001 – overvoltage, or F002 - overcurrent). **Fehler! Es ist nicht möglich, durch die Bearbeitung von Feldfunktionen Objekte zu erstellen.**
P003 ●	Ramp down time (seconds)	0.00–650.00 [25.00]	This is the time taken for the motor to decelerate from maximum frequency (P013) to standstill. Setting the ramp down time too short can cause the inverter to trip (fault code F001 – overvoltage, or F002 - overcurrent). This is also the period for which DC injection braking is applied (see P073). **Fehler! Es ist nicht möglich, durch die Bearbeitung von Feldfunktionen Objekte zu erstellen.**

Parameter	Function	Range [Default]	Description / Notes
P004 ●	Smoothing (seconds)	0 - 40.0 [0.0]	Used to smooth the acceleration/deceleration of the motor (useful in applications where it is important to avoid 'jerking', e.g. conveyor systems, textiles, etc.). Smoothing is only effective if the ramp up/down time exceeds 0.3 s. **Fehler! Es ist nicht möglich, durch die Bearbeitung von Feldfunktionen Objekte zu erstellen.** The smoothing curve for deceleration is based on the ramp up gradient (P002) and is added to the ramp down time set by P003. Therefore, the ramp down time is affected by changes to P002.
P005 ●	Digital frequency setpoint (Hz)	0 – fmax** [50.00]	Sets the frequency that the inverter will run at when operated in digital mode. Only effective if P006 set to '0'. Actual limit: 120 Hz. -- ***SW Version : 3.00 onwards:*** CBV display will be 650.00. Actual limit: : 90 – 140 Hz (power rating dependent).
P006	Frequency setpoint source selection	0 - 2 [1]	Sets the control mode of the inverter. **0** = Digital. The inverter runs at the frequency set in P005. If P007 is set to zero, the frequency may be adjusted by setting any two of digital inputs P051 - P053 to values of 11 and 12. **1** = Analogue. The frequency is set via an analogue input signal or the internal potentiometer. **2** = Fixed frequency or motor potentiometer. one binary input (P051 - P053) = 6, 17 or 18. If P006 = 1 and the inverter is set up for remote control operation, the analogue inputs remain active (added to the serial setpoint). Motor potentiometer setpoints via digital inputs are stored when P011 = 1.
P007	Keypad control	0 – 1 [0]	**0** = The RUN, REVERSE and JOG buttons are disabled. Control is via digital inputs (see parameters P051 - P053). Δ and ∇ may still be used to control frequency provided that P124 = 1 and a digital input has not been selected to perform this function. **1** = CBV buttons are enabled (can be individually disabled depending on the setting of parameters P121 - P124). The digital inputs for RUN, JOG and Δ / ∇ are disabled. If P121 – P123 are disabled, digital inputs for RUN, JOG and REVERSE are enabled.

Parameter	Function	Range [Default]	Description / Notes
P009 ●	Parameter protection setting	0 - 3 [0]	Determines which parameters can be adjusted: **0** = Only parameters from P001 to P009 can be read/set. **1** = Parameters from P001 to P009 can be set and all other parameters can only be read. **2** = All parameters can be read/set but P009 automatically resets to 0 when power is removed. **3** = All parameters can be read/set.
P011	Frequency setpoint memory	0 - 1 [0]	**0** = Disabled. **1** = Enabled. The setpoint alterations made with the Δ / ∇ buttons or digital inputs are stored even when power has been removed from the inverter.
P012 ●	Minimum motor frequency (Hz)	0 - 400.00 [0.00]	Sets the minimum motor frequency (must be less than the value of P013).
P013 ●	Maximum motor frequency (Hz)	0 – fmax** [50.00]	Sets the maximum motor frequency.
P014 ●	Skip frequency 1 (Hz)	0 – fmax** [0.00]	A skip frequency can be set with this parameter to avoid the effects of mechanical resonance. Frequencies within +/- (value of P019) of this setting are suppressed. Stationary operation is not possible within the suppressed frequency range - the range is just passed through.
P015 ●	Automatic restart after mains failure	0 - 1 [0]	Setting this parameter to '1' enables the inverter to restart automatically after a mains break or 'brownout', provided the run/stop switch is still closed or the link is fitted, P007 = 0 and P910 = 0, 2 or 4. **0** = Disabled. **1** = Automatic restart.
P016 ●	Start on the fly	0 - 2 [0]	Allows the inverter to start onto a spinning motor. Under normal circumstances the inverter runs the motor up from 0 Hz. However, if the motor is still spinning or is being driven by the load, it will undergo braking before running back up to the setpoint - this can cause an overvoltage trip. By using a flying restart, the inverter ramps up the output voltage at the setpoint for the period defined by P020. **0** = Normal restart. **1** = Flying restart after power up, fault or OFF2 (if P018 = 1). **2** = Flying restart every time (useful in circumstances where the motor can be driven by the load). -- ***(SW Version : 3.00 onwards)*** **-**Current Limit is defined by P845
P017 ●	Smoothing type	1 - 2 [1]	**1** = Continuous smoothing (as defined by P004). **2** = Discontinuous smoothing. This provides a fast unsmoothed response to STOP commands and requests to reduce frequency.  P004 must be set to a value > 0.0 for this parameter to have any effect.

Parameter	Function	Range [Default]	Description / Notes
P018 ●	Automatic restart after fault	0 - 1 [0]	Automatic restart after fault: **0** = Disabled. **1** = The inverter will attempt to restart up to 5 times after a fault. If the fault is not cleared after the 5th attempt, the inverter will remain in the fault state until reset. There is an increasing time delay between each restart attempt.
P019 ●	Skip frequency bandwidth (Hz)	0 - 10.00 [2.00]	+/- the value of P019 centred on frequencies set by P014, P027, P028 or P029 are suppressed.
P020	Flying start ramp time (seconds)	0.50-650.00 [25.00] -- -- -- -- -- ***(SW Version : 3.00 onwards)*** 0.1-650.00 [25.00]	Used in conjunction with P016 (set longer times if persistent F002 trips occur).
P021 ●	Minimum analogue frequency (Hz)	0-fmax** [0.00]	Frequency corresponding to the lowest analogue input value, i.e. 0 V / 0 mA or 2 V / 4 mA. This can be set to a higher value than P022 to give an inverse relationship between analogue input and frequency output (see diagram in P022).
P022 ●	Maximum analogue frequency (Hz)	0-fmax** [50.00]	Frequency corresponding to the highest analogue input value, i.e. 10 V / 20 mA, determined by P023. This can be set to a lower value than P021 to give an inverse relationship between analogue input and frequency output. i.e.  The output frequency is limited by values entered for P012/P013.
P023 ●	Analogue input type	0 - 2 [2]	Selects analogue input type according to the setting of jumpers JP300/JP301: JP301 closed **OR** JP300 closed **0** = 0 V to 10 V — 0 mA to 20 mA **1** = 2 V to 10 V — 4 mA to 20 mA **2** = [2 V* to 10 V] — 4 mA* to 20 mA * The inverter will come to a controlled stop if V < 1 V or I < 2 mA. The motor can automatically run without a potentiometer or voltage source connected between pins 3 and 4. With P023=2, the motor will automatically start when V exceeds 2 V. This equally applies to analogue and digital control (i.e. P006 = 0 or 1).

Parameter	Function	Range [Default]	Description / Notes
P024 ●	Analogue setpoint addition	0 – 2 [0]	If the inverter is not in analogue mode (P006 = 0 or 2), setting this parameter to '1' causes the analogue input value to be added. **0** = No addition. **1** = Addition of the analogue setpoint (defined by P023) to the fixed frequency or the motor potentiometer frequency. **2** = Scaling of digital/fixed setpoint by analogue input (P023) in the range 0 - 100%. By selecting a combination of reversed negative fixed frequency settings and analogue setpoint addition, it is possible to configure the inverter for 'centre zero' operation with a 0 - 10 V potentiometer so that the output frequency can be 0 Hz at any position, including the centre position.
P027 ●	Skip frequency 2 (Hz)	0 – fmax** [0.00]	See P014.
P028 ●	Skip frequency 3 (Hz)	0 - fmax** [0.00]	See P014.
P029 ●	Skip frequency 4 (Hz)	0- fmax** [0.00]	See P014.
P031 ●	Jog frequency right (Hz)	0 - fmax** [5.00]	Jogging is used to advance the motor by small amounts. It is controlled via the JOG button or with a non-latching switch on one of the digital inputs (P051 to P053). If jog right is enabled (DINn=7), this parameter controls the frequency at which the inverter will run when the switch is closed. Unlike other setpoints , it can be set lower than the minimum frequency.
P032 ●	Jog frequency left (Hz)	0 - fmax** [5.00]	If jog left is enabled (DINn=8), this parameter controls the frequency at which the inverter will run when the switch is closed. Unlike other setpoints , it can be set lower than the minimum frequency.
P033	Jog ramp up time (seconds) ***(SW Version : 3.00 onwards)***	0.00 – 650.00 [10]	This is the time taken to accelerate from 0Hz to maximum frequency (P013) for jog functions. It is **not** the time taken to accelerate from 0Hz to the jog frequency. If DINn =16 *(see P051 to P053)* then this parameter can be used to override th normal Ramp-up time set by P002.
P034	Jog ramp down time (seconds) ***(SW Version : 3.00 onwards)***	0.00 – 650.00 [10]	This is the time taken to decelerate from maximum frequency 0Hz to (P013) for jog functions. It is **not** the time taken to decelerate from the jog frequency to 0Hz. If DINn =16 *(see P051 to P053)* then this parameter can be used to override th normal Ramp-down time set by P003.
P035	Reverse motor direction	0 – 1 [0]	**0** = Normal direction control. **1** = Direction control is reversed.
P041 ●	Fixed frequency 1 (Hz)	0 - fmax** [5.00]	Valid if P006 = 2 and P053 = 6 or 18 or P051 = P052 = P053 = 17.
P042 ●	Fixed frequency 2 (Hz)	0 - fmax** [10.00]	Valid if P006 = 2 and P052 = 6 or 18 or P051 = P052 = P053 = 17.
P043 ●	Fixed frequency 3 (Hz)	0 - fmax** [15.00]	Valid if P006 = 2 and P051 = 6 or 18 or P051 = P052 = P053 = 17.
P044 ●	Fixed frequency 4 (Hz)	0 - fmax** [20.00]	Valid if P006 = 2 and P051 = P052 = P053 = 17.

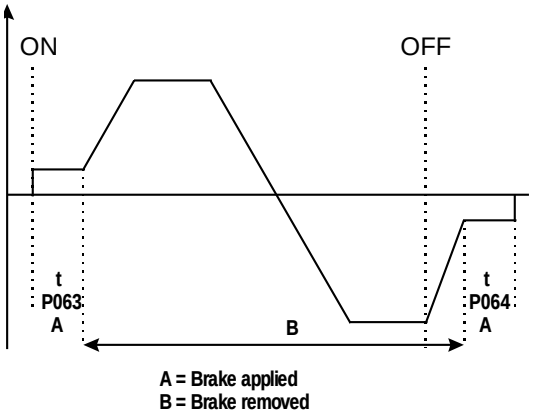
<table>
<tr><th>Parameter</th><th>Function</th><th>Range
[Default]</th><th>Description / Notes</th></tr>
<tr><td rowspan="11">P045</td><td rowspan="11">Inversion fixed setpoints for fixed frequencies 1 - 4</td><td rowspan="11">0 - 7
[0]</td><td>Sets the direction of rotation for the fixed frequency.</td></tr>
<tr><td>
<table>
<tr><th></th><th>FF1</th><th>FF2</th><th>FF3</th><th>FF4</th></tr>
<tr><td>P045 = 0</td><td></td><td></td><td></td><td></td></tr>
<tr><td>P045 = 1</td><td>⇐</td><td></td><td></td><td></td></tr>
<tr><td>P045 = 2</td><td></td><td>⇐</td><td></td><td></td></tr>
<tr><td>P045 = 3</td><td></td><td></td><td>⇐</td><td></td></tr>
<tr><td>P045 = 4</td><td></td><td></td><td></td><td>⇐</td></tr>
<tr><td>P045 = 5</td><td>⇐</td><td>⇐</td><td></td><td></td></tr>
<tr><td>P045 = 6</td><td>⇐</td><td>⇐</td><td>⇐</td><td></td></tr>
<tr><td>P045 = 7</td><td>⇐</td><td>⇐</td><td>⇐</td><td>⇐</td></tr>
</table>
</td></tr>
<tr><td>Fixed setpoints not inverted.
⇐ Fixed setpoints inverted.</td></tr>
<tr><td>P046 ●</td><td>Fixed frequency 5 (Hz)</td><td>0 - fmax**
[25.00]</td><td>Valid if P006 = 2 and P051 = P052 = P053 = 17.</td></tr>
<tr><td>P047 ●</td><td>Fixed frequency 6 (Hz)</td><td>0 - fmax**
[30.00]</td><td>Valid if P006 = 2 and P051 = P052 = P053 = 17.</td></tr>
<tr><td>P048 ●</td><td>Fixed frequency 7 (Hz)</td><td>0 - fmax**
[35.00]</td><td>Valid if P006 = 2 and P051 = P052 = P053 = 17.</td></tr>
<tr><td rowspan="11">P050</td><td rowspan="11">Inversion fixed setpoints for fixed frequencies 5 – 7</td><td rowspan="11">0 - 7
[0]</td><td>Sets the direction of rotation for the fixed frequency:</td></tr>
<tr><td>
<table>
<tr><th></th><th>FF5</th><th>FF6</th><th>FF7</th></tr>
<tr><td>P050 = 0</td><td></td><td></td><td></td></tr>
<tr><td>P050 = 1</td><td>⇐</td><td></td><td></td></tr>
<tr><td>P050 = 2</td><td></td><td>⇐</td><td></td></tr>
<tr><td>P050 = 3</td><td></td><td></td><td>⇐</td></tr>
<tr><td>P050 = 4</td><td></td><td></td><td></td></tr>
<tr><td>P050 = 5</td><td>⇐</td><td>⇐</td><td></td></tr>
<tr><td>P050 = 6 or 7</td><td>⇐</td><td>⇐</td><td>⇐</td></tr>
</table>
</td></tr>
<tr><td>Fixed setpoints not inverted.
⇐ Fixed setpoints inverted.</td></tr>
</table>

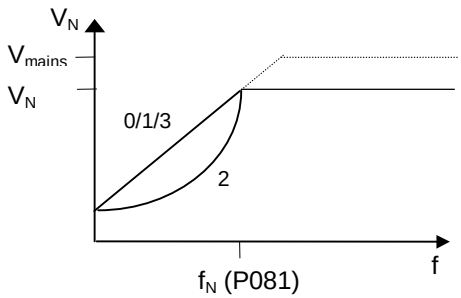
Parameter	Function	Range [Default]	Description / Notes			
P051	Selection control function, DIN 1 (terminal 5), fixed frequency 3 or binary fixed frequency bit 0	0-19 [1]	**Value**	**Function of P051 to P053**	**Function low state**	**Function high state**
			0	Input disabled	-	-
			1	ON right	Off	On Right
			2	On Left	Off	On Left
			3	Reverse	Normal	Reverse
P052	Selection control function, DIN 2 (terminal 6), fixed frequency 2 or binary fixed frequency bit 1	0-19 [2]	4	OFF 2	OFF 2	On
			5	OFF 3	Off 3	On
			6	Fixed Frequencies 1 – 3	Off	On
			7	Jog Right	Off	Jog right
			8	Jog left	Off	Jog left
			9	Remote operation	Local	Remote
P053	Selection control function, DIN 3 (terminal 7), fixed frequency 1 or binary fixed frequency bit 2	0-19 [10]	10	Fault code reset	Off	Reset on rising edge
			11	Increase frequency *	Off	Increase
			12	Decrease frequency*	Off	Decrease
			13	Disable analogue input (setpoint is 0.0 Hz)	Analogue on	Analogue disabled
			14	Disable the ability to change parameters	'P' Enabled	'P' disabled
			15	Enable dc brake	Off	Brake on
			16	Use jog ramp times instead of normal ramp times ***(SW Version : 3.00 onwards)***	Normal	Jog Ramp Times
			17	Binary fixed frequency control (fixed frequencies1-7)	Off	On
			18	As 6, but input high will also request RUN	Off	On
			19	External trip / PTC	Trip (F012)	No Trip
			* Only effective when P007 = 0.			

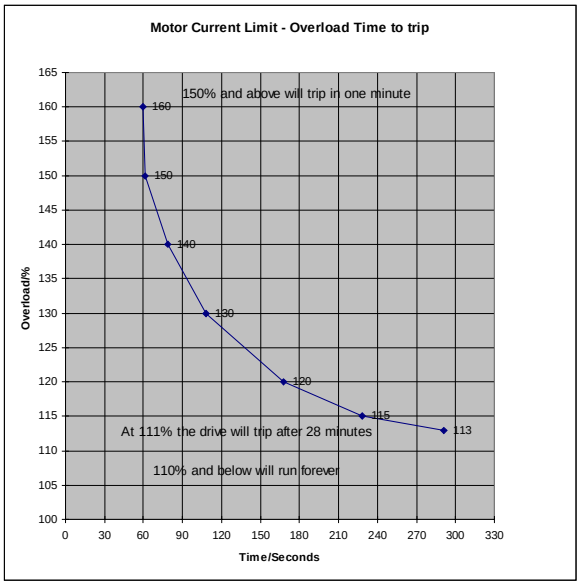
Binary Coded Fixed Frequency Mapping (P051, P052, P053 = 17)

	DIN3 (P053)	DIN2 (P052)	DIN1 (P051)
STOP	0	0	0
Run to FF1 (P041)	0	0	1
Run to FF2 (P042)	0	1	0
Run to FF3 (P043)	0	1	1
Run to FF4 (P044)	1	0	0
Run to FF5 (P046)	1	0	1
Run to FF6 (P047)	1	1	0
Run to FF7 (P048)	1	1	1

<table>
<tr><th>Parameter</th><th>Function</th><th>Range [Default]</th><th>Description / Notes</th></tr>
<tr><td>P056</td><td>Digital input debounce time</td><td>0 – 2
[0]</td><td>Use a fast response time only when a ‘clean’ input signal is used, e.g. from a PLC. Use a slow response time to allow filtering of the signal if a noisy input (e.g. a switch) is used.
0 = 12.5 ms
1 = 7.5 ms
2 = 2.5 ms</td></tr>
<tr><td>P058 •</td><td>RUN command delay (seconds)</td><td>0.0 - 650.0
[0.0]</td><td>Sets a time delay before the RUN command takes effect. This parameter affects run commands from all sources except the RUN button on the CBV (this starts the drive immediately).</td></tr>
<tr><td>P061</td><td>Selection relay output RL1</td><td>0 - 13
[6]</td><td>
<table>
<tr><th>Value</th><th>Relay Function</th><th>Active[4]</th></tr>
<tr><td>0</td><td>No function assigned (relay not active)</td><td>Low</td></tr>
<tr><td>1</td><td>Inverter is running</td><td>High</td></tr>
<tr><td>2</td><td>Inverter Frequency 0.0 Hz</td><td>Low</td></tr>
<tr><td>3</td><td>Motor run right has been selected</td><td>High</td></tr>
<tr><td>4</td><td>External brake on (see parameters P063/064)[1]</td><td>Low</td></tr>
<tr><td>5</td><td>Inverter Frequency less than or equal to minimum frequency</td><td>Low</td></tr>
<tr><td>6</td><td>Fault indication[2]</td><td>Low</td></tr>
<tr><td>7</td><td>Inverter frequency greater than or equal to setpoint</td><td>High</td></tr>
<tr><td>8</td><td>Warning active[3]</td><td>Low</td></tr>
<tr><td>9</td><td>Output current greater than or equal toP065</td><td>High</td></tr>
<tr><td>10</td><td>Motor current limit (warning)[3]</td><td>Low</td></tr>
<tr><td>11</td><td>Motor over temperature (warning)[3]</td><td>Low</td></tr>
<tr><td>12</td><td>Closed loop, motor LOW speed limit</td><td>High</td></tr>
<tr><td>13</td><td>Closed loop, motor HIGH speed limit</td><td>High</td></tr>
</table>
1 External brake requires 24 V (max.) dc slave relay.
2 Inverter switches off (see parameter P930)
3 Inverter does not switch off (see parameter P931).
4 ‘Active low’ = relay OPEN. ‘Active high’ = relay CLOSED.
</td></tr>
<tr><td>P062</td><td>Electro-mechanical brake option control</td><td>0 - 4
[0]</td><td>This enables or disables the electro-mechanical brake option.
Operation is the same as for P061 = 4, except that the brake control voltage is supplied directly.
0 = Disabled
1 - 3 = Do not use
4 = Enabled</td></tr>
<tr><td>P063</td><td>External brake release delay (seconds)</td><td>0 - 20.0
[1.0]</td><td>Only effective if the relay output is set to control an external brake (P061 = 4) or the electro-mechanical brake option is used (P062 = 4). In this case when the inverter is switched on, it will run at the minimum frequency for the time set by this parameter before releasing the brake control relay and ramping up (see illustration in P064).</td></tr>
</table>

Parameter	Function	Range [Default]	Description / Notes
P064	External brake stopping time (seconds)	0 - 20.0 [1.0]	As P063, only effective if the relay output is set to control an external brake (P061 = 4) or the electro-mechanical brake option is used (P062 = 4). This defines the period for which the inverter continues to run at the minimum frequency after ramping down and while the external brake is applied.  **A = Brake applied** **B = Brake removed** Settings for P063 and P064 should be slightly longer than the actual time taken for the external brake to apply and release respectively. Setting P063 or P064 to too high a value, especially with P012 set to a high value, can cause an overcurrent warning or trip as the inverter attempts to move a locked motor shaft.
P065	Current threshold for relay (A)	0 - 99.9 [1.0]	This parameter is used when P061 = 9. The relay switches on when the motor current is greater than the value of P065 and switches off when the current falls to 90% of the value of P065 (hysteresis).
P066			Do not use!
P071 ●	Slip compensation (%)	0 - 200 [0]	The inverter can estimate the amount of slip in an asynchronous motor at varying loads and increase its output frequency to compensate. This parameter `fine tunes' the compensation for different motors in the range 0 - 200% of the inverter's nominal estimate.
P072 ●	Slip limit (%)	0 - 500 [500]	This limits the slip of the motor to prevent `pull-out' (stalling), which can occur if slip is allowed to increase indefinitely. When the slip limit is reached, the inverter reduces the frequency until the level of slip is acceptable.
P073 ●	DC injection braking (%)	0 - 150 [0]	This stops the motor by applying a DC current. This causes heat to be generated in the motor rather than the inverter and holds the shaft stationary until the end of the braking period. Braking is effective for the period of time set by P003. CAUTION: If a start signal is given during this time, the motor will restart at the end of the braking period. The DC brake can be activated using DIN1 - DIN3 *(braking is active for as long as the DIN is high - see P051 - P053)*. Frequent use of long periods of dc injection braking can cause the motor to overheat. If DC injection braking is enabled via a digital input then DC current is applied for as long as the digital input is high. This causes heat in the motor.

Parameter	Function	Range [Default]	Description / Notes
P074 ●	I^2t motor de-rating	0 - 1 [0]	0 = Disabled 1 = Enabled. Causes an F074 trip if the motor I^2t calculation reaches its limit. The time taken to trip is dependent on the difference between the overload current and the nominal motor current rating stored in P083 - typically a 150% overload will result in a switch-off in 1-2 minutes. For safety-critical applications, it is recommended that a motor PTC is used to protect the motor from overheating.
P076 ●	Pulse frequency	0 – 3 [0 or 2] [2]	Sets the pulse frequency (from 8 to 16kHz). If silent operation is not absolutely necessary, the losses in the inverter can be reduced by selecting lower pulse frequencies. **0 & 1** = 16 kHz (- Default for 230 V inverters) **2 & 3** = 8 kHz (- Default for 400V inverters). Derating required and EMC performance is affected on selection of non-default frequency
P077	Control mode	0- 3 [0]	Controls the relationship between the speed of the motor and the voltage supplied by the inverter. **0** = Linear voltage/frequency. **1** = Flux current control(FCC) **2** = Quadratic voltage/frequency relationship. This is suitable for centrifugal pumps and fans.  **3** = Linear voltage/frequency with energy saving. Output voltage is reduced at low load (not recommended for dynamic loads).
P078 ●	Continuous boost (%)	0 - 250 [50]	Operates continuously over the whole frequency range. For many applications it is necessary to increase low frequency torque. This parameter sets the start-up voltage at 0 Hz to adjust the available torque for low frequency operation. 100% setting will produce rated motor current at low frequencies. If P078 is set too high, overheating of the motor and/or an overcurrent trip (F002) can occur.
P079 ●	Starting boost (%)	0 - 250 [0]	For drives which require a high initial starting torque, it is possible to set an additional current (added to the setting in P078) during ramping. This is only effective during initial start up and until the frequency setpoint is reached. This increase is in addition to P078, but the total is limited to 250%.

Parameter	Function	Range [Default]	Description / Notes
P081	Nominal frequency for motor (Hz)	0 - fmax** [☆☆☆]	NORDAC *trio*: These parameters are set in the factory and should not be changed under normal circumstances. .
P082	Nominal speed for motor (RPM)	0 - 9999 [☆☆☆]	
P083	Nominal current for motor (A)	0.1 - 99.9 [☆☆☆]	
P084	Nominal voltage for motor (V)	0 – 1000 [☆☆☆]	
P085	Nominal power for motor (kW/hp)	0-100.0 [☆☆☆]	
P086 ●	Motor current limit (%)	0 - 250 [150]	The motor current can be limited with this parameter. If the set value is exceeded, the output frequency is reduced until the current falls to this limit. During this process, both LEDs will flash *(see Operating Information, Section 5)*. 
P087	Motor PTC enable	0 - 1 [0]	Change this parameter only when the PTC option is fitted. **0** = Disabled **1** = Motor PTC enabled If P087 = **1** and the Motor PTC input goes high then the inverter will trip (fault code F004). Note that if the internal PTC gets too hot, the inverter will trip (fault code F005). PTC Thresholds : Not tripped : <1k5Ω Typical Trip : >9kΩ Guaranteed trip : >25kΩ
P089 ●	Stator resistance (Ω)	0.01-100.00 [☆☆☆]	NORDAC *trio*: Set in the factory. *Do not adjust!*
P091 ●	Serial link slave address	0 - 30 [0]	Up to 31 NORDAC *trio* can be connected via the serial link and controlled by a computer or PLC using the USS protocol. This parameter sets a unique address for the inverter.

Parameter	Function	Range [Default]	Description / Notes
P092 ●	Serial link baud rate	3 – 7 [6]	Sets the baud rate of the RS485 serial interface (USS protocol): **3** = 1200 baud **4** = 2400 baud **5** = 4800 baud **6** = 9600 baud **7** = 19200 baud Some RS232 to RS485 converters are not capable of baud rates higher than 4800.
P093 ●	Serial link timeout (seconds)	0 - 240 [0]	This is the maximum permissible period between two incoming data telegrams. This feature is used to turn off the inverter in the event of a communications failure. Timing starts after a valid data telegram has been received and if a further data telegram is not received within the specified time period, the inverter will trip and display fault code F008. Setting the value to zero switches off the control.
P094 ●	Serial link nominal system setpoint (Hz)	0 - fmax** [50.00]	Setpoints are transmitted to the inverter via the serial link as percentages. The value entered in this parameter represents 100% (HSW = 4000H). – refer to USS reference document (see Section 5.7)
P095 ●	USS compatibility	0 - 2 [0]	**0** = Compatible with 0.1 Hz resolution **1** = Enable 0.01 Hz resolution **2** = HSW is not scaled but represents the actual frequency value to a resolution of 0.01 Hz (e.g. 5000 = 50 Hz). Note : Unit will only output 0.05Hz resolution
P099 ●	Communication adapter type	0 - 2 [0]	**0** = Option module not present **1** = PROFIBUS module (enables parameters relating to PROFIBUS) **2** = CANBUS ***(SW Version : 3.00 onwards)***
P101 ●	Operation for Europe or USA	0 - 1 [0]	This changes the power display between kW and HP: **0** = Europe (kW) **1** = USA (HP)
P111	Inverter power rating (kW/hp)	0.0-10.00 [☆☆☆]	Read-only parameter that indicates the power rating of the inverter in kW. e.g. 0.55 = 550 W If P101 = 1 then the rating is displayed in hp.
P112	Inverter type	1 - 8 [8]	Read-only parameter. **1** = NORDAC compact Baureihe 2 **2** = NORDAC *trio* **3** = - **4** = NORDAC *smart* **5** = NORDAC compact Baureihe 3 (basic) **6** = NORDAC compact Baureihe 3 (vector) **7** = - **8** = NORDAC *trio* Baureihe 2
P113	NORDAC *trio* model	10-29 [-]	Read only parameter **10** = - **20** = 370/3TR **25** = 2200/3TR **11** = 250/1TR **21** = 550/3TR **26** = 3000/3TR **12** = 370/1TR **22** = 750/3TR **27** = 4000/3TR **13** = 550/3TR **23** = 1100/3TR **28** = 5500/3TR **14** = 750/1TR **24** = 1500/3TR **29** = 7500/3TR

Parameter	Function	Range [Default]	Description / Notes
P121	Enable/disable RUN button	0 - 1 [1]	**0** = RUN button disabled. **1** = RUN button enabled (only possible if P007=1).
P122	Enable/disable FORWARD/REVERSE button	0 - 1 [1]	**0** = FORWARD/REVERSE button disabled. **1** = FORWARD/REVERSE button enabled (only possible if P007 = 1).
P123	Enable/disable JOG button	0 - 1 [1]	**0** = JOG button disabled. **1** = JOG button enabled (only possible if P007=1).
P124	Enable/disable Δ and ∇ buttons	0 - 1 [1]	**0** = Δ and ∇ buttons disabled. **1** = Δ and ∇ buttons enabled (only possible if P007 = 1). This applies for frequency adjustment only. The buttons can still be used to change parameter values.
P125	Reverse direction inhibit	0 - 1 [1]	**0** = Reverse direction disabled. Inhibits reverse commands from ALL sources (reverse RUN commands result in forward rotation) **1** = Normal operation (FORWARD/REVERSE operation allowed)
P131	Frequency setpoint (Hz)	0.0-fmax [-]	
P132	Motor current (A)	0.0 - 99.9 [-]	**Read-only parameters. These are copies of the values selected by P001 but can be accessed directly via the serial link.**
P133	Motor torque(% nominal torque)	0-250 [-]	
P134	DC link voltage (V)	0 - 1000 [-]	
P135	Motor RPM	0 - 40000 [-]	
P137	Output voltage (V)	0 - 1000 [-]	
P140	Most recent fault code	0 - 9999 [-]	The last recorded fault code *(see section 5)* is stored in this parameter. It is cleared when the inverter is reset (P944 =1). This is a copy of the code stored in P930.
P141	Most recent fault code -1	0 - 9999 [-]	This parameter stores the last recorded fault code prior to that stored in P140/P930.
P142	Most recent fault code -2	0 - 9999 [-]	This parameter stores the last recorded fault code prior to that stored in P141.
P143	Most recent fault code -3	0 - 9999 [-]	This parameter stores the last recorded fault code prior to that stored in P142.
P151 ●	Green LED function	0 - 5 [4]	**0** = Off **1** = On **2** = Fault mode: On = Tripped, Flashing = Warning **3** = Running mode: On = Motor running, Flashing = Inverter on but motor stationary **4** = Default mode (see table in Operating Information, Section 5). **5** = *Not used*

Parameter	Function	Range [Default]	Description / Notes
P152 ●	Yellow LED function	0 - 5 [5]	**0** = Off **1** = On **2** = Fault mode: On = Tripped, Flashing = Warning **3** = Running mode: On = Motor running, Flashing = Inverter on but motor stationary **4** = *Not used* **5** = Default mode *(see table in Operating Information Section 5).*
P201	PI closed loop mode	0 - 2 [0]	**0** = Normal operation (closed loop control disabled). **1** = Not used **2** = Closed loop control using PI input for transducer feedback.
P202 ●	P gain	0.0-999.9 [1.0]	Proportional gain.
P203 ●	I gain	0.00 - 99.99 [0.00]	Integral gain. 0.01 corresponds to the longest integral response time.
P205 ●	Sample interval (x 25 ms)	1 - 2400 [1]	Sampling interval of feedback sensor.
P206 ●	Transducer filtering	0 - 255 [0]	**0** = Filter off. **1**-**255** = Low pass filtering applied to transducer.
P207 ●	Integral capture range (%)	0 - 100 [100]	Percentage error above which integral term is reset to zero.
P208	Transducer type	0 - 1 [0]	**0** = An increase in motor speed causes an increase in sensor voltage/current output. **1** = An increase in motor speed causes a decrease in sensor voltage/current output.
P210	Transducer reading (%)	0.0 - 100.0 [-]	Read only. Value is a percentage of full scale of the PI input. (eg.: 100 = 10V / 20mA)
P211 ●	0% setpoint	0.00-100.00 [0.00]	Value of P210 to be maintained for 0% setpoint.
P212 ●	100% setpoint	0.00-100.00 [100.00]	Value of P210 to be maintained for 100% setpoint.
P220 ●	PI frequency cut-off	0 - 1 [0]	**0** = Normal operation **1** = Switch off inverter at or below minimum frequency.
P331	Analogue mode	0 - 4 [2]	**0** = Internal potentiometer only **1** = External analogue input only **2** = Internal potentiometer + external analogue input **3** = Internal potentiometer fine, external input coarse **4** = Internal potentiometer coarse, external input fine
P332	Fine adjustment (%)	0 - 100 [10]	Percentage of fine tuning adjustment for P331 = 3 or 4.
P700			**Specific to PROFIBUS-DP. See PROFIBUS Handbook for further details. (Access only possible with P099 = 1.)**
P701 ●			
P702			

Parameter	Function	Range [Default]	Description / Notes
P723	State of digital inputs	0 - 7 [-]	DIN3 DIN2 DIN1 **0** = 0 0 0 **1** = 0 0 1 **2** = 0 1 0 **3** = 0 1 1 **4** = 1 0 0 **5** = 1 0 1 **6** = 1 1 0 **7** = 1 1 1
P845	Motor current limit for Flying Start (%)	0 - 250 [50] ***(SW Version : 3.00 onwards)***	The motor current can be limited with this parameter. If the set value is exceeded during flying start, the output frequency is reduced until the current falls below this limit. During this process, both LEDs will flash *(see Operating Information section)*. If trip occurs during flying start, this value should be reduced.
P880			**Specific to PROFIBUS-DP. See PROFIBUS Handbook for further details. (Access only possible with P099 = 1.)**
P910 ●	Local/Remote mode	0 - 4 [0]	Sets the inverter for local control or remote control over the serial link: **0** = Local control **1** = Remote control (and setting of parameter values) **2** = Local control (but remote control of frequency) **3** = Remote control (but local control of frequency) **4** = Local control (but remote read and write access to parameters and facility to reset trips)  When operating the inverter via remote control (P910 = 1 or 3), the analogue input remains active when P006 = 1 and is added to the setpoint.
P918 ●	Drive Address	0 - 255 [0]	**Specific to PROFIBUS-DP/CAN. See PROFIBUS / CAN Handbooks for further details. (Access only possible with P099 = 1 or 2).** Each communications object is defined as a combination of base address and offset whereby the offset is referred to the value in P918.
P922	Software version	0.00 – 99.99 [-]	Contains the software version number and cannot be changed.
P923 ●	Equipment system number	0 – 255 [0]	You can use this parameter to allocate a unique reference number to the inverter. It has no operational effect.
P927 ●	Local or Remote Access for Parameters	0 – 1 [0]	**Specific to PROFIBUS-DP/CAN. See PROFIBUS / CAN Handbooks for further details. (Access only possible with P099 = 1 or 2).** Determines which parameter access interface can write to parameters. Note that read access is always allowed. **0** = Parameter write access via keypad. **1** = Parameter write access via Comms module.

Parameter	Function	Range [Default]	Description / Notes
P928 ●	Local or Remote control of drive	0 – 3 [0]	**Specific to PROFIBUS-DP/CAN. See PROFIBUS / CAN Handbooks for further details. (Access only possible with P099 = 1 or 2).** Determines which interface has control of the drive. Note that the drive status can always be monitored. **0** = Drive control and setpoint source is local. **1** = Drive control and setpoint source is via Comms Module. **2** = Drive control is local and setpoint source is via Comms Module. **3** Drive control is via Comms Module and setpoint source is local.
P930	Most recent fault code	0 – 9999 [-]	The last recorded fault code *(see Section 6.3)* is stored in this parameter. It is cleared when the inverter is reset(P944=1).
P931	Most recent warning type	0 – 9999 [-]	The last recorded warning is stored in this parameter until power is removed from the inverter: **002** = Current limit active **004** = Slip limit exceeded **005** = Inverter over temperature (internal PTC) **006** = Motor overtemperature(I^2T) **007** = Undervoltage **010**..=..P10+/P15V/SK200 +5V Power Supply Fault **018** = Auto restart after fault(P018) is pending. The inverter may start at any time.
P944	Reset to factory default settings	0 – 1 [0]	Set to '1' and then press **P** to reset all parameters except P101 to the factory default settings.
P947			**Specific to PROFIBUS-DP. See PROFIBUS Handbook for further details. (Access only possible with P099 = 1).**
P958			**Specific to PROFIBUS-DP. See PROFIBUS Handbook for further details. (Access only possible with P099 = 1).**
P960	Protocol Type	0 – 3 [0] ***(SW Version : 3.00 onwards)***	**Specific to PROFIBUS-DP/CAN. See PROFIBUS / CAN Handbooks for further details. (Access only possible with P099 = 1 or 2).** Selects the CANbus protocol. **0** = CAN communication disabled. **1 =** CANopen communication enabled. **2** =CAN masterdrive commmunication enabled (future). **3** = DeviceNet communication enabled (future).
P962		***(SW Version : 3.00 onwards)***	**Specific to CAN. (Access only possible with P099 = 2).**
P963		***(SW Version : 3.00 onwards)***	**Specific to CAN (Access only possible with P099 = 2).**
P964		***(SW Version : 3.00 onwards)***	**Specific to CAN (Access only possible with P099 = 2).**

Parameter	Function	Range [Default]	Description / Notes
P965	Special Baud Rate 2	0 – 255 ***(SW Version : 3.00 onwards)***	**Specific to CAN (Access only possible with P099 = 2).**
P966	PZD Send Interval Time	0 – 65535 [0] ***(SW Version : 3.00 onwards)***	**Specific to CAN (Access only possible with P099 = 2).** The rate in ms at which PZD is sent is set. **0** = Values sent only after a remote request **1…65534 =** Values sent after a preset time (in ms) or after a remote request**.** **65535** = Values sent whenever the PZD changes or after a remote request.
P967	Last Received Control Word	0 – FFFF Hex	**Specific to PROFIBUS-DP/CAN. See PROFIBUS / CAN Handbooks for further details. (Access only possible with P099 = 1 or 2).** This is the control word which was most recently received and is currently active within the drive.
P968	Last Sent Status Word	0 – FFFF Hex	**Specific to PROFIBUS-DP/CAN. See PROFIBUS / CAN Handbooks for further details. (Access only possible with P099 = 1 or 2).** This is the status word which currently represents the operating state of the drive and which is returned on demand to the requestor.
P969		***(SW Version : 3.00 onwards)***	**Specific to CAN (Access only possible with P099 = 2).**
P971 ●	EEPROM storage control	0 – 1 [1]	**0** = Changes to parameter settings (including P971 are lost when power is removed. **1** = Changes to parameter settings are retained during periods when power is removed. **IMPORTANT** Take care not to exceed the EEPROM write cycle limit of 50,000/parameter (approx.) when using the serial link to update parameters, otherwise data loss or corruption may occur. Read cycles are unlimited.
P986	Relay Output	0 – 3 [0] ***(SW Version : 3.00 onwards)***	**Relay 1 = Fault Relay (RL1)** **Relay 2 = Brake Relay** **0** = Relay 1 & 2 - open. **1** = Relay 1 – closed **2** = Relay 2 – closed **3** = Relay 1 & 2 - closed

5.2 Fault Codes

Fault codes are only available when an CBV is connected to the *NORDAC trio*

In the event of a failure, the *NORDAC trio*switches off and a fault code appears on the LCD screen. The last fault that occurred is stored in parameter P930. e.g. '0003' indicates that the last error was F003.

Fault Code	Cause	Corrective Action
F001	Overvoltage	Check whether supply voltage is within the limits indicated on the rating plate. Increase the ramp down time (P003). Check whether the required braking power is within the specified limits.
F002	Overcurrent	Check motor lead and motor for short-circuits and earth faults. Increase the ramp-up time (P002). Increase the ramp down time (P003) Reduce the boost set in P078 and P079. Check whether the motor is obstructed or overloaded.
F003	Overload	Check whether the motor is overloaded.
F004	Overheating of motor (monitoring with PTC)	Check if motor is overloaded. Check the connections to the PTC. Has P087 been set to 1 without a PTC being connected?
F005	Inverter overtemperature (Heatsink PTC)	Check that the ambient temperature is not too high. The motor speed may be too low for a given load.
F008	USS protocol timeout	Check the serial interface. Check the settings of the bus master and P091 - P093. Check whether the timeout interval is too short (P093).
F009	Undervoltage	Check that the power supply is supplying enough voltage to the inverter.
F010	Initialisation fault / Parameter loss *	Check the entire parameter set. Set P009 to `0000' before power down.
F011	Internal interface fault *	Switch off power and switch on again.
F012	External trip	Source of trip is digital input (configured as an external trip input) going low - check the external source.
F013	Programme fault *	Switch off power and switch on again.
F030	PROFIBUS link failure	Check the integrity of the link.
F031	Option module link failure	Check the integrity of the link.
F033	PROFIBUS configuration error	Check the PROFIBUS configuration.
F036	PROFIBUS module watchdog trip	Replace PROFIBUS module
F074	Motor overtemperature by I^2t calculation	Check that the motor current does not exceed the value set in P083.
F105	*NORDAC trio* internal overtemperature (electronics PTC)	Check that the ambient temperature is not too high. The motor speed may be too low for a given load.
F106	Parameter fault P006	Programme one or more Digital Inputs to be fixed frequencies. Change P006 to 0 or 1.
F112	Parameter fault P012/P013	Set parameter P012 < P013.
F212	Parameter fault P211/P212	Set parameter P211 < P212.

** Ensure that the wiring guidelines described in Electrical Installation have been complied with.*

When the fault has been corrected, restart the inverter and the motor will run if the fault has been cleared.

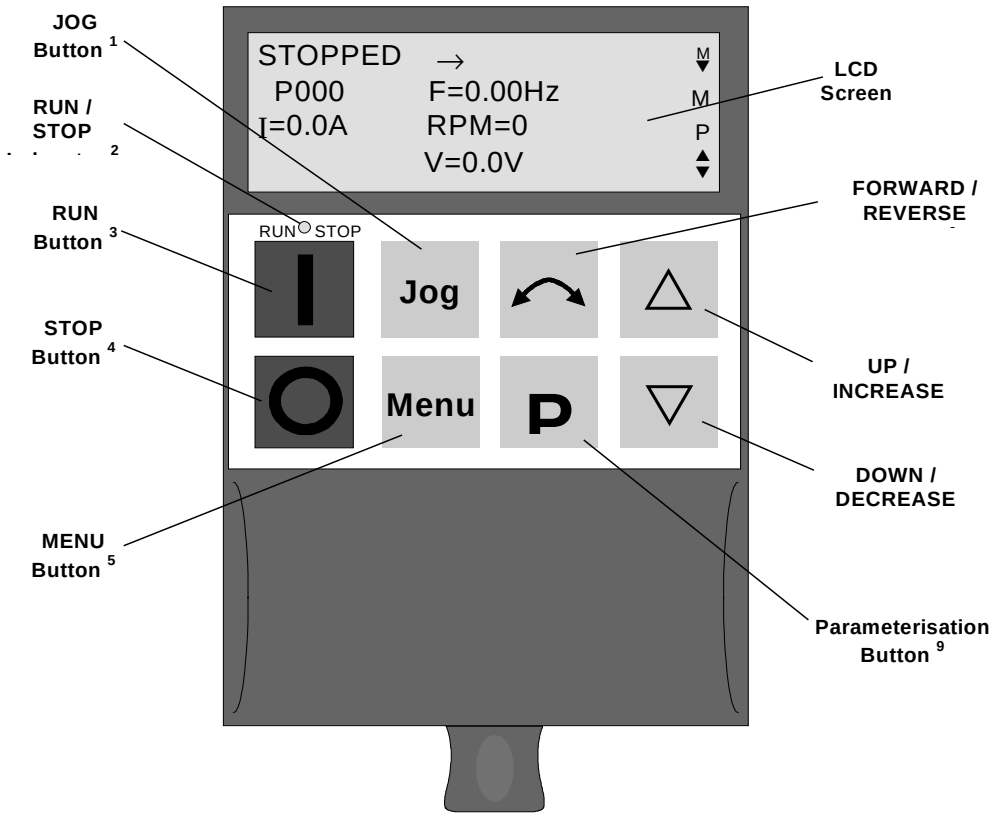
6. OPTIONS AND ACCESSORIES

6.1 Clear Text Display Module (CBV)

This section only applies to users who intend using the optional Clear Text Display module (CBV) to control the operation of the inverter.

The CBV module provides a multi-language user-friendly interface to the inverter.

The display is menu-driven and provides information in simple text form. It also includes built-in context-sensitive Help screens.
As well as enabling direct control of the motor, the CBV extends the functionality of the *NORDAC trio* by providing access to a comprehensive range of adjustable parameters. Setting these parameters will allow you to customise the operation of the *NORDAC trio* to meet almost any application requirement.



1 Pressing this button while the motor is stopped causes it to start and run at the preset jog frequency. The motor stops as soon as the button is released. Pressing this button while the motor is running has no effect. Disabled if P007 or 123 = 0.

2 ***Green*** indicates that the motor is running.
Flashing green indicates that the motor is ramping up or down.
Red indicates that the motor is stationary.
Flashing red indicates a fault condition.

3 Press to start the inverter. Disabled if P007 or P121 = 0.

4 Press to stop the inverter.

5 Changes the display to show the menu options. Pressing and holding this button down and then

6 Press to change the direction of rotation of the motor. REVERSE is indicated by a minus sign (values <100) or a flashing decimal point (values > 100). Disabled if P007 or P122 = 0.

7 Press to INCREASE frequency. Used to change parameter numbers or values to higher settings during the parameterisation procedure. Disabled if P124 = 0.

8 Press to DECREASE frequency. Used to change parameter numbers or values to lower settings during the parameterisation procedure. Disabled if P124 = 0.

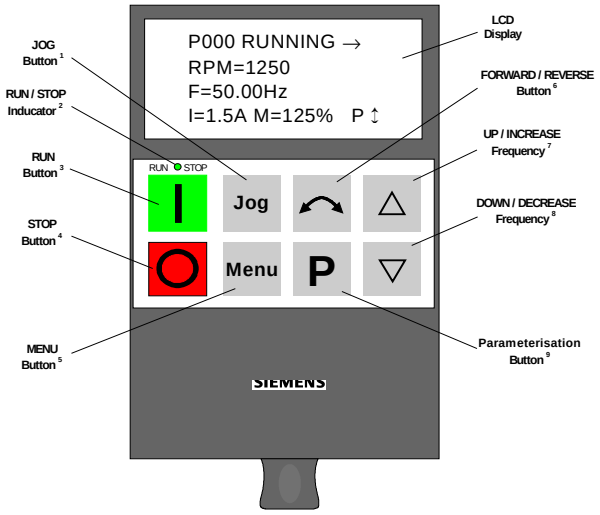
9 Press to access parameters. Disabled if P051 - P053 = 14 when using digital inputs.

The user is offered a text-driven format for commissioning, parameterising, configuring and operating the inverter. The following features are included:

- Illuminated high resolution LCD screen with adjustable contrast.
- 7 languages.
- Central device for up to 31 inverters which are networked together via USS.
- Up to 10 parameter sets can be stored in non-volatile memory for uploading and downloading between the clear text operator panel and the drive.
- Help texts for diagnosing faults.
- Isolated RS232 interface for connecting to a PC.

Dimensions H x W x D	130 mm x 73 mm x 40 mm
Current drain at 5 V	250 mA
Degree of protection	IP 54
Maximum cable length	5m

Table 1: Technical Data



Indications as to which keys to use are shown in the right hand column of the screen.

6.2 Control Set

The control set, available as option, may be used for easily controlling the motor speed and direction of rotation, directly at the NORDAC *trio*. It contains a potentiometer and a toggle switch and has an enclosure protection level of IP 55.

Potentiometer

The potentiometer replaces the right hand gland hole blanking plug covering the internal potentiometer R314. Connect the leads to the control terminals, as shown in the following table.

Lead colour	Function	Terminal
red	P10+	1
black	0V/AIN-	2 / 4
blue	AIN+	3

To complete the option, a bridge between terminal 2 to 4 must be inserted, or the jumper JP 304 must be used. (see diagram opposite)

To use the full range (0-100%) of the new potentiometer, and to switch off the internal potentiometer, the following parameters must be modified:

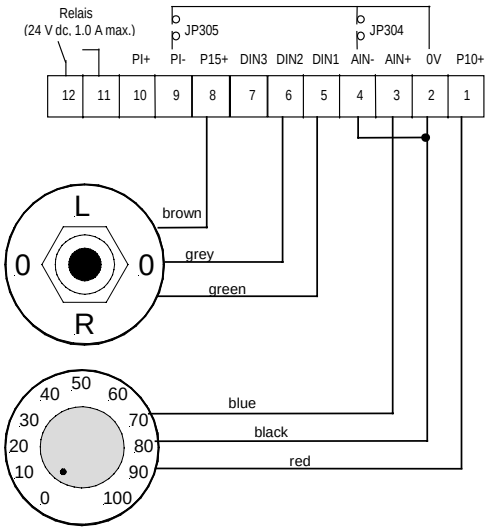
Parameter	Function	value
P023 ●	Analogue input type	0
P331	Analogue mode	1

toggle switch

The toggle switch with the functions clockwise rotation (R), left hand motion (L) and stop (0) is used for the gland hole cover of the control line. The coloured lines should be connected to the control clamps as specified in the following table, in order to implement the function in the factory setting of the frequency inverter.

Lead colour	Function	clamp
green	DIN1	5
grey	DIN2	6
brown	P15+	8

If the option control set is ordered together with the NORDAC *trio,* the drives are delivered, equipped with the option and completely programmed.



PL800 (BG 2) / PL700 (BG 1)

The potentiometer and toggle switch can also be used independently of each other on the NORDAC *trio.*

7. SPECIFICCATIONS

7.1 Electrical Data

General

Feature	Specification
Mains voltage Torque derating required for < 380Vrms	208-240V ± 10% 1/3 Phase 380-480V ± 10% 3 Phase *
	* In case of unearthed mains please contact NORD
Power Ranges 1AC 208-240V 3AC 208-240V 3AC 380-500V	0.12kW – 0.75kW 0.12kW – 0.75kW 0.37kW – 7.5kW
Control Method	V/f
Input frequency:	47 Hz to 63 Hz
Output frequency :	0 Hz to 140 Hz (motor dependent)
Setpoint resolution:	0.05 Hz
Overload capability:	150% for 60 s, related to nominal current
Protection against:	Inverter overtemperature, Motor overtemperature Overvoltage , Undervoltage Locked Rotor, Motor pull-out
Standard Functions	DC Injection braking, also when motor stationary 4 quadrant operation Programmable auto-restart following mains break or fault Flying start for already spinning motor 2 programmable ramp generators (0-650s) each with S-curve capability
Local Setpoint	Built – in potentiometer
Digital Inputs	3
Analogue Input:	0/2 - 10 V 0 - 20 mA/4 - 20 mA
PI Input:	0 - 10 V 0 - 20 mA
Analogue setpoint resolution:	10-bit
Setpoint stability:	Analogue < 1% Digital < 0.02%
Motor temperature monitoring:	I^2t control PTC input
Ramp times:	0 - 650 s
Control outputs:	1 relay 30 V DC / 1 A
	⚠ **WARNING** External inductive loads must be suppressed in an appropriate manner *(see Section 3.1 Electrical Installation – General Wiring Guidelines – Paragraph. 3)*.
Serial Interface:	RS485
Inverter efficiency:	97% typical
Operating temperature:	-10°C to +50°C
Storage/transport temperature:	-40°C to +70°C
Humidity:	99% non-condensing
Installation height above sea level:	< 1000 m
Degree of protection:	IP55
Protective separation of circuits:	Double insulation or protective screening
Electro-magnetic compatibility (EMC):	EMC Filters to EN5.5011 Class A *See section 8.2 - EMC*
Weights	BG1: ca 3.5 Kg (depending on options selected) BG2: ca 5.6 Kg (depending on options selected)

7.2 Technical Data

BG1 Low Voltage Single Phase Units

Model:	250/1 TR	370/1 TR	550/1 TR	750/1 TR
Motor Output Rating:	0.25 kW 0.33 hp	0.37 kW 0.49 hp	0.55 kW 0.73 hp	0.75 kW 1.0 hp
Operating Input Voltage:	1ø AC 208 - 240 V_{rms} ± 10%			
Operating Input Frequency:	47 - 63 Hz			
Output Frequency	0 - 120 Hz	0 - 120 Hz	0 - 120 Hz	0 - 120 Hz
Input Current:	3.2 A_{rms}	4.6 A_{rms}	6.2 A_{rms}	8.2 A_{rms}
Mains fuse:	10 A			16 A
Mains Lead cross-section:	1 mm^2			1.5 mm^2

BG1 High Voltage Three Phase Units

Model:	370/3 TR	550/3 TR	750/3 TR	1100/3 TR	1500/31 TR
Motor Output Rating:	0.37 kW 0.49 hp	0.55 kW 0.73 hp	0.75 kW 1.0 hp	1.1 kW 1.5 hp	1.5 kW 2.0 hp
Operating Input Voltage:	3ø AC 380 - 480 V_{rms} ± 10% (all units)				
Operating Input Frequency:	47 - 63 Hz				
Output Frequency	0 - 120 Hz	0 - 120 Hz	0 - 120 Hz	0 - 120 Hz	0 - 120 Hz
Input Current:	2.2 A_{rms}	2.8 A_{rms}	3.7 A_{rms}	4.9 A_{rms}	5.9 A_{rms}
Mains fuse:	10 A				
Mains Lead cross-section:	1 mm^2				

BG2 High Voltage Three Phase Units

Model:	1500/3 TR	2200/3 TR	3000/3 TR	4000/3 TR	5500/3 TR	7500/3 TR
Motor Output Rating:	1.5 kW 2.0 hp	2.2 kW 2.9 hp	3.0 kW 4.0 hp	4.0 kW 5.3 hp	5.5 kW 7.3 hp	7.5 kW 10.0 hp
Operating Input Voltage:	3ø AC 380 - 480 V_{rms} ± 10% (all units)					
Operating Input Frequency:	47 - 63 Hz					
Output Frequency with	0 - 120 Hz	0 - 120 Hz	0 - 120 Hz	0 - 120 Hz z	0 - 120 Hz	0 - 120 Hz
Input Current:	3.5 A	4.7 A	6.4 A	10.0 A	12.2 A	16.0 A
Mains fuse:	10 A		16 A		20 A	
Mains Lead cross-section:	1 mm^2		1.5 mm^2		2.5 mm^2	

8. SUPPLEMENTARY INFORMATION

8.1 Application Example

Set-up Procedure for a Simple Application

Application requirements: Normal operating frequency set within range 15 - 50 Hz via an external potentiometer. Counter-clockwise rotation required.

COMBIMASTER used: Any model.

Procedure:

1. Remove the link (if fitted) between control terminals 5 and 8.

2. Connect a simple on/off switch to control terminals 6 and 8 for reverse rotation.

3. Connect a 4.7 kΩ potentiometer to the control terminals *(see Figure 4)*.

4. Set jumper JP301 ('V' - voltage) - *see Fig.3(BG1), Fig.2 (BG2)*.

5. Set the internal and external potentiometers fully counter-clockwise and then apply mains power and switch on.

6. Turn the internal potentiometer clockwise until the motor rotates at a speed that approximates to 15 Hz.

7. The external potentiometer now has a range of between 15 Hz at its lowest setting and 50 Hz at its highest setting.

8.2 Electro-Magnetic Compatibility (EMC)

All manufacturers / assemblers of electrical apparatus which performs a complete intrinsic function which is placed on the market as a single unit intended for the end user must comply with the EMC directive EEC/89/336 after January 1996. There are three routes by which the manufacturer/assembler can demonstrate compliance:

1. *Self-Certification*
This is a manufacturer's declaration that the European standards applicable to the electrical environment for which the apparatus is intended have been met. Only standards which have been officially published in the Official Journal of the European Community can be cited in the manufacturer's declaration.

2. *Technical Construction File*
A technical construction file can be prepared for the apparatus describing its EMC characteristics. This file must be approved by a 'Competent Body' appointed by the appropriate European government organisation. This approach allows the use of standards which are still in preparation.

3. *EC Type-Examination Certificate*
This approach is only applicable to radio communication transmitting apparatus.

The NORDAC *trio* Integrated units do not have an intrinsic function until connected with other components (e.g. a motor). Therefore, the basic units are not allowed to be CE marked for compliance with the EMC directive. However, full details are provided below of the EMC performance characteristics of the products when they are installed in accordance with the wiring recommendations in section 3.1 of this document.

Class 2: Filtered Industrial (Class A)

This level of performance will allow the manufacturer/assembler to self-certify their apparatus for compliance with the EMC directive for the industrial environment as regards the EMC performance characteristics of the power drive system. Performance limits are as specified in the Generic Industrial Emissions and Immunity standards EN 50081-2 and EN 50082-2.

EMC Phenomenon	Standard	Level
Emissions:		
Radiated Emissions	EN 55011	Level A1
Conducted Emissions	EN 55011	Level A1
Immunity:		
Supply Voltage Distortion	IEC 1000-2-4 (1993)	
Voltage Fluctuations, Dips, Unbalance, Frequency Variations	IEC 1000-2-1	
Magnetic Fields	EN 61000-4-8	50 Hz, 30 A/m
Electrostatic Discharge	EN 61000-4-2	8 kV air discharge
Burst Interference	EN 61000-4-4	2 kV power cables, 2 kV control
Radio Frequency Electromagnetic Field, amplitude modulated	ENV 50 140	27-1000 MHz, 10 V/m, 80% AM, power and signal lines

The NORDAC *trio* is intended **exclusively for professional applications**. Therefore, it does not fall within the scope of the harmonics emissions specification EN 61000-3-2.

8.3 Environmental Aspects

Transport and Storage

Protect the NORDAC *trio* against physical shocks and vibration during transport and storage. The unit must also be protected against water (rainfall) and excessive temperatures *(see section 7).*

The packaging is re-usable. Retain the packaging or return it to the manufacturer for future use.

Dismantling and Disposal

The component parts can be recycled, disposed of in accordance with local requirements or returned to the manufacturer.

Documentation

This handbook is printed on chlorine-free paper which has been produced from managed sustainable forests. No solvents have been used in the printing or binding process.

8.4 Parameter Suggestion

Inverter case size 1 (BG 1) for 50 Hz curve

Umrichter der Baugröße 1 50 Hz Kennlinie			Motor								
			71 S/4 TF... TR1 250/1 TR	71 L/4 TF... TR1 370/1 TR	80 S/4 TF... TR1 550/1 TR	80 L/4 TF... TR1 750/1 TR	71 L/4 TF... TR2 370/3 TR	80 S/4 TF... TR2 550/3 TR	80 L/4 TF... TR2 750/3 TR	90 S/4 TF... TR2 1100/3 TR	90 L/4 TF... TR2 1500/3 TR
Parameter	Function	default									
P009 ●	Parameter protection setting	0	3	3	3	3	3	3	3	3	3
P081	Nominal motor frequency	☆☆☆	50	50	50	50	50	50	50	50	50
P082	Nominal speed for motor	☆☆☆	1365	1380	1385	1380	1380	1385	1380	1410	1410
P083	Nominal current for motor (A)	☆☆☆	1,71	1,91	2,46	3,24	1,1	1,42	1,87	2,75	3,6
P084	Nominal voltage for motor (V)	☆☆☆	230	230	230	230	400	400	400	400	400
P085	Nominal power for motor	☆☆☆	0,25	0,37	0,55	0,75	0,37	0,55	0,75	1,1	1,5
P087	Motor PTC enable	0	1	1	1	1	1	1	1	1	1
P089 ●	Stator resistance (Ω)	☆☆☆	26,2	15,5	10,4	8,0	46,4	31,4	23,8	15,2	10,3

Inverter case size 2 (BG 2) for 50 Hz curve

Um Inverter case size (BG 2) for 50 Hz curve			Motor								
			90 L/4 TF... TR3 1500/3 TR	100 L/4 TF... TR3 2200/3 TR	100 L/40 TF.. TR3 3000/3 TR	112 M/4 TF... TR3 4000/3 TR	132 S/4 TF... TR3 5500/3 TR	132 M/4 TF... TR3 7500/3 TR			
Parameter	Function	default.									
P009 ●	Parameter protection setting	0	3	3	3	3	3	3			
P081	Nominal motor frequency	☆☆☆	50	50	50	50	50	50			
P082	Nominal speed for motor	☆☆☆	1410	1415	1410	1430	1455	1450			
P083	Nominal current for motor (A)	☆☆☆	3,6	5,0	6,5	9,0	11,5	15,3			
P084	Nominal voltage for motor (V)	☆☆☆	400	400	400	400	400	400			
P085	Nominal power for motor (kW)	☆☆☆	1,5	2,2	3,0	4	5,5	7,5			
P087	Motor PTC enable	0	1	1	1	1	1	1			
P089 ●	Stator resistance (Ω)	☆☆☆	10,3	5,2	3,6	2,5	1,8	1,1			

Inverter for 87 Hz curve

Inverter for 87 Hz curve			Motor								
			71 S/4 TF... TR2D 550/3 TR	71 L/4 TF... TR2D 750/3 TR	80 S/4 TF... TR2D 1100/3 TR	80 L/4 TF... TR3D 1500/3 TR	90 S/4 TF... TR3D 2200/3 TR	90 L/4 TF... TR3D 3000/3 TR	100 L/4 TF... TR3D 4000/3 TR	100 L/40 TF... TR3D 5500/3 TR	112 M/4 TF... TR3D 7500/3 TR
Parameter	Function	default									
P005 ●	Digital frequency setpoint	50,00	90	90	90	90	90	90	90	90	90
P009 ●	Parameter protection setting	0	3	3	3	3	3	3	3	3	3
P013 ●	Maximale Motorfrequenz (Hz)	50,00	90	90	90	90	90	90	90	90	90
P022 ●	Maximalfrequenz, analog	50,00	90	90	90	90	90	90	90	90	90
P081	Nominal motor frequency	☆☆☆	87	87	87	87	87	87	87	87	87
P082	Nominal motor frequency	☆☆☆	2364	2390	2398	2390	2442	2416	2450	2442	2476
P083	Nominal current for motor (A)	☆☆☆	1,71	1,91	2,46	3,24	4,76	6,24	8,7	11,3	15,6
P084	Nominal voltage for motor (V)	☆☆☆	400	400	400	400	400	400	400	400	400
P085	Nominal power for motor (kW)	☆☆☆	0,44	0,64	0,95	1,30	1,9	2,6	4,3	5,2	6,9
P087	Motor PTC enable	0	1	1	1	1	1	1	1	1	1
P089 ●	Stator resistance (Ω)	☆☆☆	26,2	15,4	10,4	8,0	5,1	3,5	1,7	1,4	0,98

8.5 Users Parameter Settings

Parameter	Default	Your setting
P000	-	
P001	0	
P002	10.00	
P003	25.00	
P004	0.0	
P005	50.00	
P006	1	
P007	0	
P009	0	
P011	0	
P012	0.00	
P013	50.00	
P014	0.00	
P015	0	
P016	0	
P017	1	
P018	0	
P019	2.00	
P020	25.00	
P021	0.00	
P022	50.00	
P023	2	
P024	0	
P027	0.00	
P028	0.00	
P029	0.00	
P031	5.00	
P032	5.00	
P033	10.00	
P034	10.00	
P035	0	
P041	5.00	
P042	10.00	
P043	15.00	
P044	20.00	
P045	0	
P046	25.00	
P047	30.00	
P048	35.00	
P050	0	
P051	1	
P052	2	
P053	10	
P056	0	
P058	0.0	
P061	6	
P062	0	
P063	1.0	
P064	1.0	
P065	1.0	
P071	0	
P072	500	
P073	0	
P074	0	
P076	0 or 2	
Parameter	**Default**	**Your setting**
P077	0	
P078	50	
P079	0	
P081	✶✶✶	
P082	✶✶✶	
P083	✶✶✶	
P084	✶✶✶	
P085	✶✶✶	
P086	150	
P087	0	
P089	✶✶✶	
P091	0	
P092	6	
P093	0	
P094	50.00	
P095	0	
P099	0	
P101	0	
P111	✶✶✶	
P112	8	
P113	-	
P121	1	
P122	1	
P123	1	
P124	1	
P125	1	
P131	-	
P132	-	
P133	-	
P134	-	
P135	-	
P137	-	
P140	-	
P141	-	
P142	-	
P143	-	
P151	4	
P152	5	
P201	0	
P202	1.0	
P203	0.00	
P205	1	
P206	0	
P207	100	
P208	0	
P210	-	
P211	0.00	
P212	100.00	
P220	0	
P331	2	
P332	10	
P700	See PROFIBUS handbook	
P701	See PROFIBUS handbook	

Parameter	Default	Your setting
P702	See PROFIBUS handbook	
P723	-	
P845	50	
P880	See PROFIBUS handbook	
P910	0	
P918	See PROFIBUS /CAN handbook [0]	
P922	-	
P923	0	
P927	See PROFIBUS /CAN handbook [0]	
P928	See PROFIBUS /CAN handbook [0]	
P930	-	
P931	-	
P944	0	
P947	See PROFIBUS handbook	
P958	See PROFIBUS handbook	

Parameter	Default	Your setting
P960	See PROFIBUS /CAN handbook [0]	
P962	See CAN handbook	
P963	See CAN handbook	
P964	See CAN handbook	
P965	See CAN handbook	
P966	See CAN handbook [0]	
P967	See PROFIBUS handbook	
P968	See PROFIBUS handbook	
P969	See CAN handbook	
P971	1	
P986	0	

✶✶✶ - Value depends on rating of the inverter

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