

Intelligent Drivesystems, Worldwide Services

OPERATING MANUAL BU 0040 GB

**NORDAC SK PAR-2H / SK PAR-2E
SK PAR-3H / SK CSX-3H**

Parameter Boxes for Frequency Inverters



BU 0040 GB

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suitable for frequency inverter series:

NORDAC **SK 200E, SK 300E¹, SK 500E, SK 700E, SK 750E¹**
 NORDAC **vector mc¹**

Version list

Designation of previous issues	Software version	Comments
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¹ Only SK PAR-2H and SK PAR-2E

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1 General

The NORDAC *ParameterBoxes* enable the *parameterisation, control and display* of the operating parameters of the inverter series NORDAC **SK 200E, SK 300E, SK 500E, SK 700E, SK 750E** and **vector mc**.

The ParameterBoxes come in different models. Refer to the tables in chapter 6.2 to identify the box suitable for the respective inverter series.

1. For on-site servicing and commissioning, we recommend the handheld models (**SK PAR-2H, SK PAR-3H and SK CSX-3H**). These **handheld devices** can be used for parameterisation and display.
2. The **built-in device (SK PAR-2E)**, for installation in a control panel, **enables the control and monitoring** of up to 5 inverters in a control cabinet.

Chapters 2 and 3 describe **additional differences** in more detail.

The ParameterBox (SK PAR-xx) has a storage capacity which can store the complete data records for up to 5 inverters.

In order to archive the data, the ParameterBox **SK PAR-2x** can be connected to a PC via an interface converter (SK IC1-232/485). To connect the **SK PAR-3H** you only need a standard USB cable (USB2.0 plug A to plug B) The NORD CON software necessary for this can be downloaded free of charge from the Getriebebau NORD internet page <http://www.nord.com>.

It is also possible to transfer data from the PC to the ParameterBox. The prerequisite for this is a previously stored (see section 4.2.4) data record. This is then recognised by the NORD CON Software.

WARNING



Never connect the SK PAR-3H ParameterBox to the frequency inverter and the PC at the same time since this could result in damages, in particular of the PC.

1.1 Features

1.1.1 ParameterBox (SK PAR-xx)

- Illuminated, high resolution LCD graphics screen
- Communication interface: RS 485 (SK PAR-3H: RS 485 and RS 232)
- Central unit for up to 5 inverters interlinked via RS 485
- Supply voltage 4.5VDC to 30VDC
- 5V(or 24 V) direct current supply from the frequency inverter can be used
- 5 complete inverter data records can be stored in the memory, loaded and processed
- With interface converter (SK IC1-232/485), connection to a standard RS 232 PC interface possible (SK PAR 3H via USB interface, does not require an interface converter)²
- For use as a display for various operating parameters
- Protection class for SK PAR-2x: IP54 (front only with build-in type), SK PAR-3H IP54 (housing only, connector: IP20)
- Automatic inverter detection
- Large-screen display of individual operating parameters
- Standardisation of individual operating parameters to display specific system data
- 6 languages can be selected for operation
- Display of error messages in plain text
- Direct control of an inverter possible
- ControlBox function possible

1.1.2 SimpleBox (SK CSX-3H)

- 4-digit, 7-segment display
- 5 V (or 24 V) DC power can be used directly from the frequency inverter
- For use as a display for a selectable operating parameter
- Protection class IP54 (housing only, connector: IP20)
- Direct control of an inverter possible
- LEDs for parameter set display

1.2 Delivery

Check the equipment **immediately** after delivery/unpacking for transport damage such as deformation or loose parts. If there is any damage, contact the carrier immediately and implement a thorough assessment.

Important! This also applies even if the packaging is undamaged.

1.3 Scope of supply

Standard version:

- | | | | | |
|---------------------------------------|-----------|------------------------|-------------------------------------|----|
| - Built-in model | SK PAR-2E | IP54 - front | (Mat. No. 278910110) | or |
| - Handheld model | SK PAR-2H | IP54 | (Mat. No. 278910100) | or |
| - Handheld model | SK PAR-3H | IP54 (connector: IP20) | (Mat. No. 275281014) ³ , | |
| with connection cable | | | | |
| * RJ12 - RJ12, length approx. 3 m and | | | | |
| * USB, length approx. 1 m | | | | or |
| - Handheld model | SK CSX-3H | IP54 (connector: IP20) | (Mat. No. 275281013), | |
| with connection cable | | | | |
| * RJ12 - RJ12, length approx. 3 m and | | | | |
| - Operating manual BU 0040 GB | | | | |

Available accessories: (Details in Section 6)

- Interface converter for connecting SK PAR-2x to the PC
- Various adapter plugs for connection to NORDAC frequency inverters

² For SK PAR-3H: directly via USB port (USB2.0)

³ Connector: IP20)

2 Installation SK PAR-2H, SK PAR-2E

2.1 Hand-held model SK PAR-2H

The SK PAR-2H ParameterBox is a compact control device for direct connection to a frequency inverter. A suitable connection cable with an M12 plug contact is included with the device. Direct connection of the ParameterBox to NORDAC SK 300E and SK 750E is possible without additional components. Special connection cables are required for connection to other NORDAC inverters or a PC/laptop. For a frequency inverter or a PC/laptop, special connecting cables are required. These are listed in greater detail in the Section 2.1.2 "Connection variants".



2.1.1 Connection to *trio* SK 300E/750E



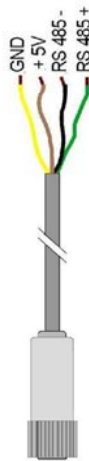

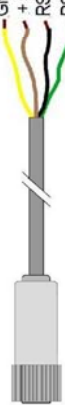

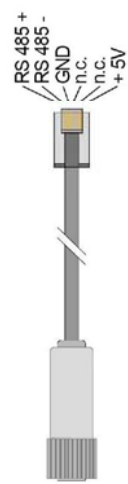

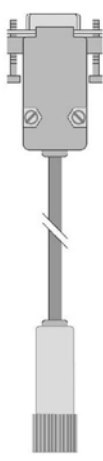
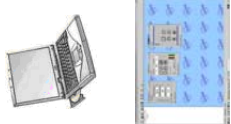

Direct connection to the *trio* SK 300E can be made using the available M12 socket. With the appropriate components the high level of protection (IP54) is retained for the entire unit.

After the mains voltage is switched on the corresponding device type is automatically recognised.

M12 connector	Description	Cable
2 (white)	+ 4.5V... 30V, 160mA	Length 3m 4 x 0.75mm ²
1 (brown)	GND	
4 (b/w)	P+ (A) (RS485 +)	
3 (blue)	P - (B) (RS485 -)	



2.1.2 Connection variants

Connecting cable	Modules/options	NORDAC ... frequency inverter
 <p>ParameterBox SK PAR-2H Mat. No. 278910100</p>	Direct to system connector	 <p>trio SK 300E SK 750 E</p>
	 <p>Direct to terminals (RS485)</p>	 <p>SK 52xE SK 53xE vector mc</p>
	 <p>Connecting cable M12 socket M12 So / wires Mat. No. 278910200</p>	 <p>SK 700E</p>
	 <p>Direct connection to device</p>	 <p>SK 5xxE SK 200E SK 700E (>22KW)</p>
	 <p>Connecting cable M12 socket -> SUB-D M12 So / Sub-D So Mat.No. 278910210</p>	 <p>PC / laptop NORD CON Software</p>
	 <p>SK IC1-232/485 Mat. No. 276970020 + USB 5V Adapter Mat. No. 278910220</p>	

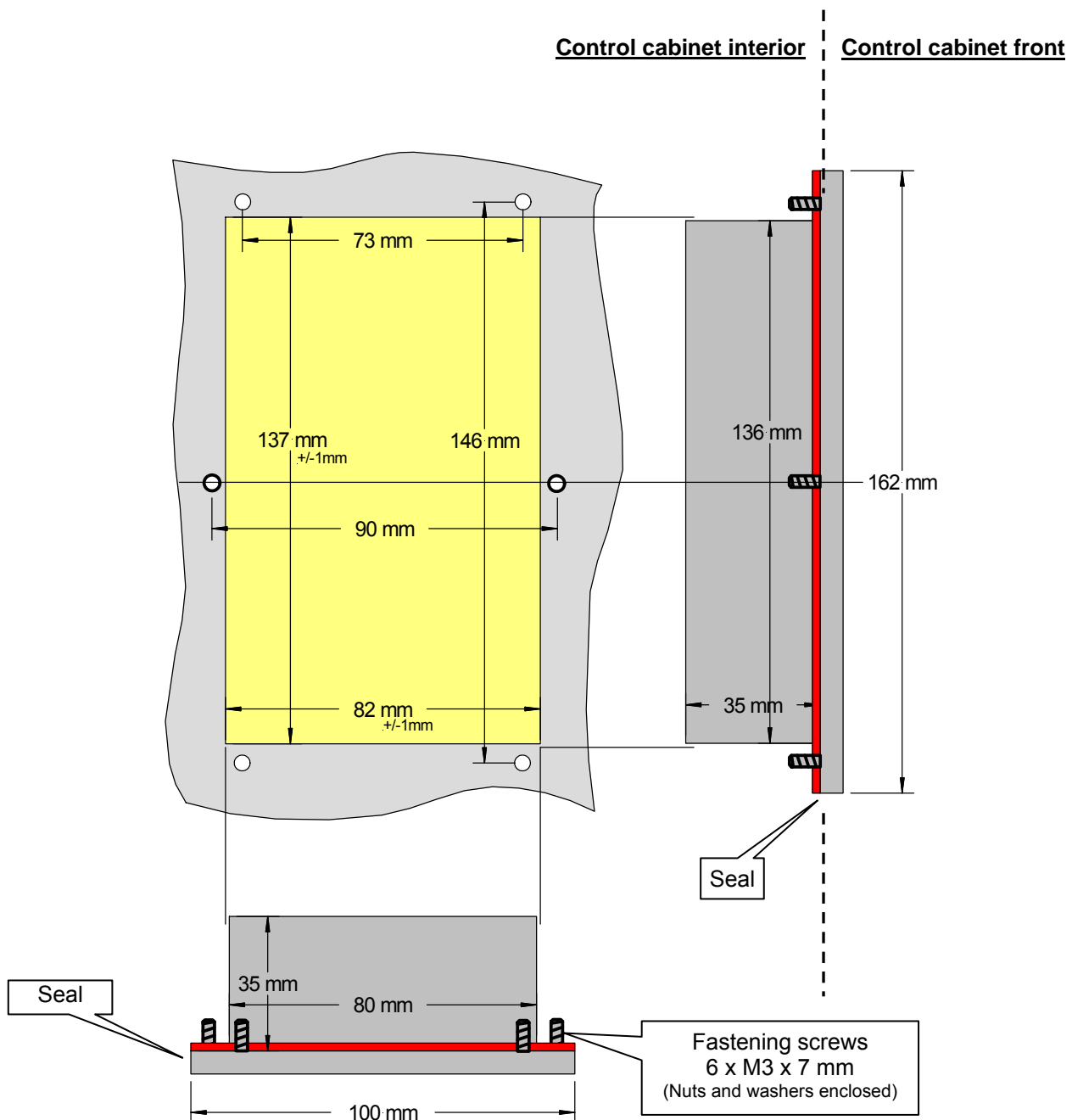
2.2 Built-in model SK PAR-2E

The SK PAR-2E ParameterBox is a compact control device for control panel installation. Up to 5 frequency inverters can be connected via the internal connection terminals. Protection class IP54 is complied with at the front face.

2.2.1 Mechanical installation in a control panel

For installation in the control cabinet door or the control panel, a cut-out of 137mm x 82mm (tolerance +/- 1mm) must be made. The sealed unit must be inserted in the pre-processed cabinet panel. There are 6 screws (M3 x 7mm) for securing the unit to the interior of the control panel. The ParameterBox is now mounted securely on the control cabinet door and has maximum protection class IP54 on the front side, if mounted correctly.

With the built-in model, the electrical connection of the ParameterBox SK PAR-2E can be made via the internal screw terminals 1-4. Exact assignment of the terminals can be seen in the following section.



2.2.2 Electrical connection

The *SK PAR-2E ParameterBox* is connected via the 6 screw terminals or the RJ12 plug. The power supply can either be from the inverter or a separate supply unit. The permissible voltage range is +4.5V to +30V DC.

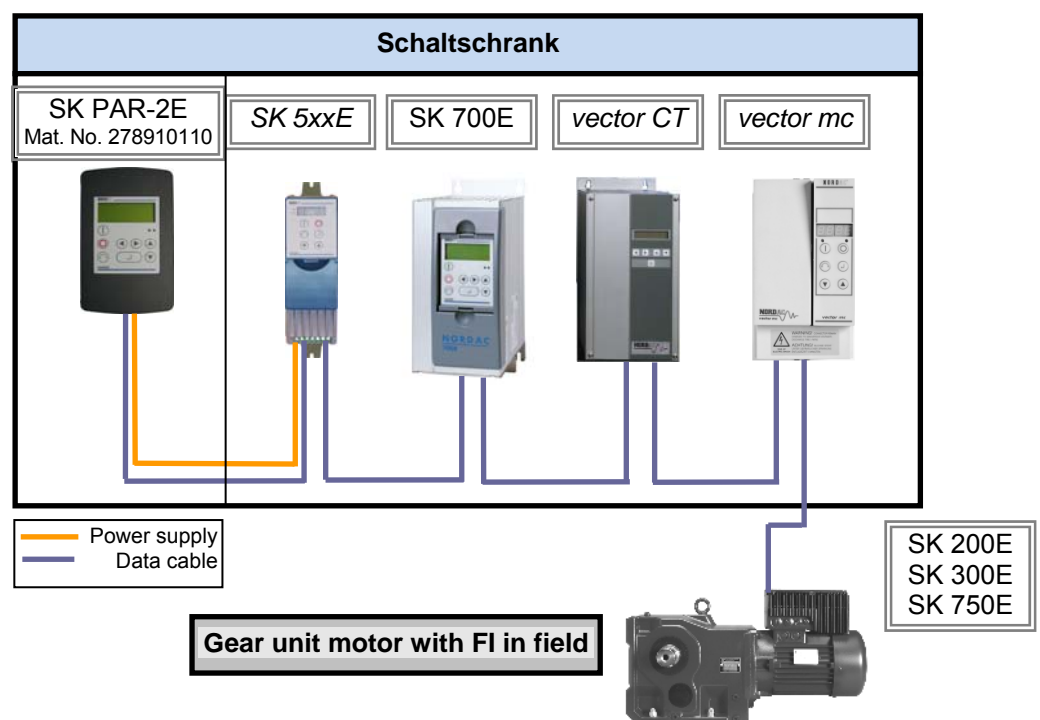


Number	Description	RJ 12	
42	+ 4.5V... 30V, 160mA	6	
40	GND	3	
73	P+ (A) (RS485 +)	1	
74	P - (B) (RS485 -)	2	
-	-	4	
-	-	5	

A termination resistor (220Ω) for the RS485 bus system is integrated into the module. Therefore the ParameterBox should only be connected as the first or last participant.

The terminals are designed for 0.14 mm^2 - 1.5 mm^2 . A flexible cable with a cross section of $4 \times 0.75 \text{ mm}^2$ is recommended.

The maximum possible connection cross section is 1.5 mm^2 . With the use of certain wire end sleeves, the possible cross-section may be reduced.



2.2.3 Connection to inverter

A shielded signal cable should be used for the data cable between the *ParameterBox* and the inverter. The power supply to the *ParameterBox* must be between +4.5V and +30V.

Please use the following connections to connect the *ParameterBox* with the corresponding inverter. The connections apply for the permanent connection to the terminal strip of the particular inverter. However, these must always be compared with the labelling on the *ParameterBox*.

Description	vector mc RS485	vector (CT / VT)	SK 300E	SK 52xE SK 53xE X7:	SK 700E / SK 750E (with option...)	
					SK CU1-STD	SK CU1-USS
+5V / +15V, 160mA	15	-	42	42	42	42
GND	16	-	40	40	40	40
P+ (A), RS485 +	17	21	73	73	73	73
P- (B), RS485 -	18	22	74	74	74	74

Note: Each further frequency inverter which is to be operated simultaneously on the bus cable is only connected in parallel to the cables RS485+ and RS485-. Under no circumstances may the power supplies of the frequency inverters (5V) be connected to each other.

For the following series of devices the RS485 data connection is also possible via a RJ12 plug socket which is integrated into the inverter.

Description	SK 2xxE Integrated 6-pin RJ12 socket	SK 300E Integrated 4-pin M12 connector	SK 5xxE Integrated 6-pin RJ12 socket	SK 700E >22KW Integrated 6-pin RJ12 socket	SK 700E ≤22KW (with option: ...- RS2) Integrated 6-pin RJ12 socket	SK 750E Integrated 4-pin M12 connector
+5V 160mA	6 ("24 V")	2	6	6	(6) [*]	2
GND	3	1	3	3	(3) [*]	1
P+ (A) (RS485 +)	1	4	1	1	1	4
P- (B) (RS485 -)	2	3	2	2	2	3

¹⁾ For inverters SK700E up to 22KW with the option ...-RS2 an external power supply (+4.5V to +30V) must be provided for the *ParameterBox*.

Note: In order to connect the *ParameterBox* to the RJ12 socket of the frequency inverter, a standard RJ12 (6-pole) patch cable with a length of up to 3 m can be used.

If the *ParameterBox* is supplied from an external power source (+4.5 to +30V) the data cables can also be considerably longer, depending on the voltage.

As standard, the 4-pin M12 connector is available for connection of the *ParameterBox* to a decentralised frequency inverter (SK 300E/ SK750E).

Attention! To prevent damage, you must make sure the output voltage of an external power supply is higher than the operating voltage of the inverter (but should not exceed 30 VDC).

(Example: SK520E: 5 V internal voltage → external power supply of *ParameterBox* >5 V!)

3 Installation SK PAR-3H, SK CSX-3H

3.1 SimpleBox model SK CSX-3H

The SK PAR-2H SimpleBox is a compact control device for direct connection to a frequency inverter with RJ12 diagnostics socket. You can use a standard RJ12 patch cable ("**straight RJ12 (6/6) - RJ12 (6/6) modular cable**") with a maximum length of 3 m.

The cable can be considerably longer when a power supply with a higher voltage (e.g. from SK 200E) is used for the SimpleBox.



3.2 ParameterBox model SK PAR-3H

The SK PAR-3H ParameterBox is a compact control device for direct connection to a frequency inverter with RJ12 diagnostics socket. You can use a standard RJ12 patch cable ("**straight RJ12 (6/6) - RJ12 (6/6) modular cable**") with a maximum length of 3 m.

The cable can be considerably longer when a power supply with a higher voltage (e.g. from SK 200E) is used for the ParameterBox.

To connect the unit to the PC/notebook you only need a standard USB cable (USB2.0 plug A to plug B).



WARNING



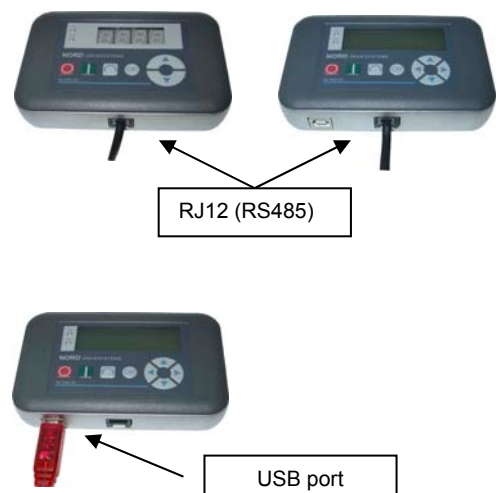
Never connect the SK PAR-3H ParameterBox to the frequency inverter and the PC at the same time since this could result in damages, in particular of the PC.

3.3 Electrical connection

Connection between SK CSX-3H and SK PAR-3H ParameterBoxes and frequency inverter exclusively occurs via the RJ12 socket. This connection also provides power to the box.

A termination resistor (220 Ω) for the RS485 bus system is integrated into the module. Therefore the ParameterBox should only be connected as the first or last participant.

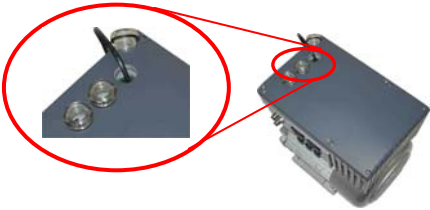
Connection of the SK PAR-3H ParameterBox to a PC occurs via the USB interface integrated in the box. This connection also provides power to the box.



The driver software required for the USB port in the PC comes on the enclosed “EPD” CD-ROM but can also be downloaded free of charge from our website (www.nord.com).

Connection to the respective frequency inverter occurs with the RJ-12 sockets on the units.

Connection to the respective frequency inverter occurs with the RJ-12 sockets on the units



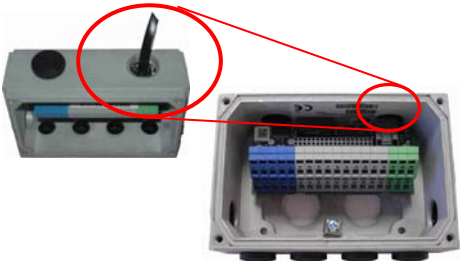
SK200E



SK500E

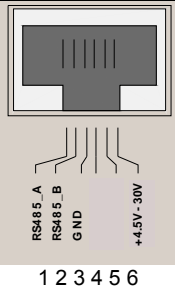


SK700E



SK TI4-TU-BUS

The contact assignment of the RJ-12 socket on the ParameterBox is as follows:

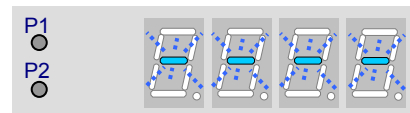
Description	RJ 12	
P+ (A), RS485 +	1	
P- (B) RS 485 -	2	
GND	3	
-	4	
-	5	
+ 4.5 V... 30 V, approx. 1.3 W	6	

4 Functions of the ParameterBoxes

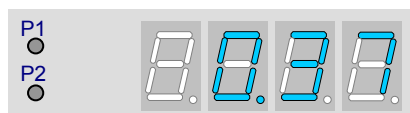
4.1 SimpleBox

4.1.1 Display

After you have connected the SimpleBox and turned on the power (or the 24 VDC control voltage) for the frequency inverter, communication between frequency inverter and SimpleBox is automatically established. All display segments and LEDs on the box light up briefly, and the segments in the middle of the display (4-digit 7-segment display) can flash at a higher frequency during bus scanning.



After successful bus scanning, the display briefly indicates the frequency inverter's power (e.g.: 0.37 = 0.37 kW). This step is omitted when you connect the SimpleBox to an already running frequency inverter.



Underscores now appearing in the display indicate that the frequency inverter is ready.

If a jog frequency value is pre-set in parameter P113, or a minimum frequency is pre-set in P104, the display flashes with this initial value.



If the frequency inverter is enabled, the display changes automatically to the operating value selected in parameter >Selection Display value< P001 (factory setting = current frequency).

The actual parameter set is shown by the 2 LEDs next to the display on the left in binary code.

When you turn off the frequency inverter, the display reads "OFF" before turning completely dark.

"OFF" also appears in the display when you operate the SimpleBox on a frequency inverter with external 24 V control voltage input but with inactive power supply (230 V or 400 V).



In this state, the SimpleBox can be used to set the inverter parameters as described in the following chapter almost without restrictions (no motor resistance testing or parameter identification (P208 / P220) is possible). Control (enable) is not possible because of the missing power supply.

NOTE









































The digital frequency setpoint is factory set to 0 Hz. To check whether the drive is working, a desired frequency value must be input via the ▲ or ▼ key. Otherwise a jog frequency must be input via the appropriate parameter >Jog Frequency< (P113).

Settings should only be implemented by qualified personnel, strictly in accordance with the warning and safety information.

ATTENTION : The motor may start immediately after pressing the START key !

4.1.2 Operation

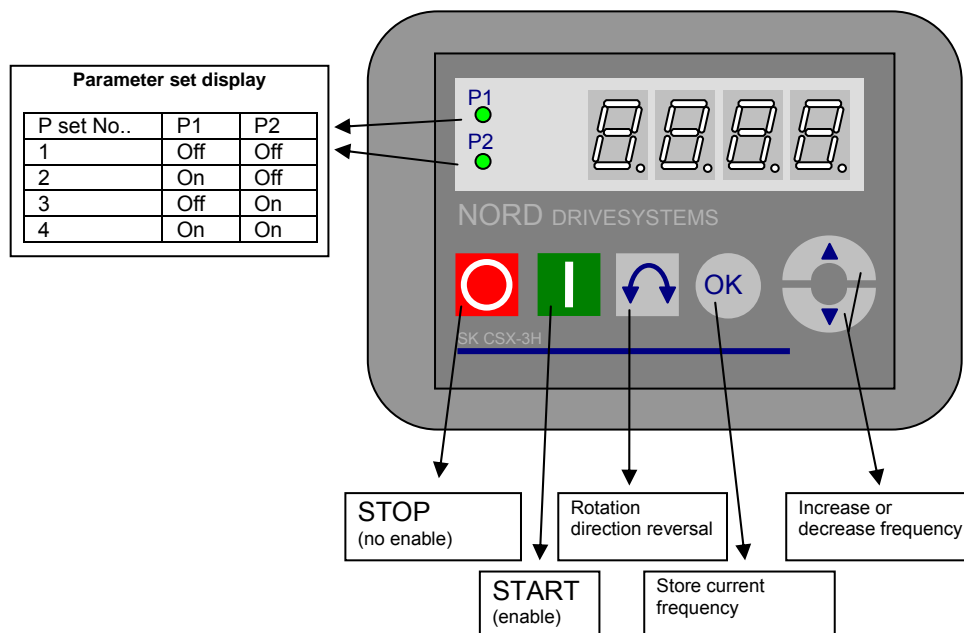
	Switching on the frequency inverter. The frequency inverter is now enabled with the set jog frequency (P113). A preset minimum frequency (P104) may at least be provided. Parameter >Interface< P509 and P510 must = 0.															
	Switching off the frequency inverter. The output frequency is reduced to the absolute minimum frequency (P505) and the frequency inverter shuts down.															
7-segment LED display 4-digit	<table><tr><th>Operating mode</th><th>Display</th><th>Comments</th></tr><tr><td>Ready without present setpoint</td><td></td><td><u>Display of 4 static underscores.</u> When underscores flash slowly: Frequency inverter is not ready (e.g.):<ul style="list-style-type: none">Switch-on block; Function "Safe pulse block" or emergency stop activeEnable signal present before the frequency inverter was ready.</td></tr><tr><td>Ready with present setpoint</td><td></td><td><u>Numbers flash slowly:</u> A present initial setpoint (P104 / P113 in keyboard operation) (e.g.: 5.3 Hz) is indicated. This frequency is immediately used on being enabled.</td></tr><tr><td>In operation</td><td></td><td><u>Display of current frequency.</u></td></tr><tr><td>In case of error</td><td></td><td><u>Display of a current and active error message.</u> A slowly flashing display indicates that the error is no longer present and that the error message can be acknowledged.</td></tr></table>	Operating mode	Display	Comments	Ready without present setpoint		<u>Display of 4 static underscores.</u> When underscores flash slowly: Frequency inverter is not ready (e.g.): <ul style="list-style-type: none">Switch-on block; Function "Safe pulse block" or emergency stop activeEnable signal present before the frequency inverter was ready.	Ready with present setpoint		<u>Numbers flash slowly:</u> A present initial setpoint (P104 / P113 in keyboard operation) (e.g.: 5.3 Hz) is indicated. This frequency is immediately used on being enabled.	In operation		<u>Display of current frequency.</u>	In case of error		<u>Display of a current and active error message.</u> A slowly flashing display indicates that the error is no longer present and that the error message can be acknowledged.
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	Ready with present setpoint		<u>Numbers flash slowly:</u> A present initial setpoint (P104 / P113 in keyboard operation) (e.g.: 5.3 Hz) is indicated. This frequency is immediately used on being enabled.													
	In operation		<u>Display of current frequency.</u>													
In case of error		<u>Display of a current and active error message.</u> A slowly flashing display indicates that the error is no longer present and that the error message can be acknowledged.														
	<table><tr><td>Parameterisation</td><td>  </td><td><u>Display of parameter number or parameter value.</u><ol style="list-style-type: none">Parameter group (e.g.: motor data (P2 - -))Parameter number (e.g.: nominal speed (P202))Parameter value (e.g.: 1360 rpm)</td></tr></table>	Parameterisation	  	<u>Display of parameter number or parameter value.</u> <ol style="list-style-type: none">Parameter group (e.g.: motor data (P2 - -))Parameter number (e.g.: nominal speed (P202))Parameter value (e.g.: 1360 rpm)												
Parameterisation	  	<u>Display of parameter number or parameter value.</u> <ol style="list-style-type: none">Parameter group (e.g.: motor data (P2 - -))Parameter number (e.g.: nominal speed (P202))Parameter value (e.g.: 1360 rpm)														
LEDs  P1  P2	<p>The LEDs indicate the actual operating parameter set in the operating display (P000) and the actual parameter set being parameterised during parameterisation. In this case the display is coded in binary form.</p> <div><div> 1  2 = P1</div><div> 1  2 = P2</div><div> 1  2 = P3</div><div> 1  2 = P4</div></div>															
	<p>The motor rotation direction changes when this key is pressed. "Rotation to the left" is indicated by a minus sign.</p> <p>Attention! Take care when operating pumps, screw conveyors, ventilators, etc. → You can disable the key with parameter P540.</p>															
	Press key to increase the frequency. During parameterisation, the parameter number or parameter value is increased.															
	Press the key to reduce the frequency. During parameterisation, the parameter number or parameter value is reduced.															
	<p>Press "ENTER" to store an altered parameter value, or to switch between parameter number or parameter value.</p> <p>NOTE: If a changed value is not to be stored, the  key can be used to exit the parameter.</p>															

Control with the SimpleBox

The frequency inverter can only be controlled via the SimpleBox if it has not previously been enabled via the control terminals or via a serial interface (P509 = 0 and P510 = 0).

Moreover, no technology box (SK TU3-PAR or SK TU1-PAR) must be fitted on the inverter for the SK 500E and SK 700E series.

If the "START" key is pressed, the frequency inverter changes to the Ready display (selection P001). The frequency inverter supplies 0 Hz or the set higher minimum frequency (P104) or jog frequency (P113).



Parameter set display:

The LEDs indicate the actual operating parameter set in the operating display (P000) and the current parameter set being parameterised (\neq P000). There, the display appears in binary form.

The parameter set can also be changed during operation via the parameter P100 (control via SimpleBox).

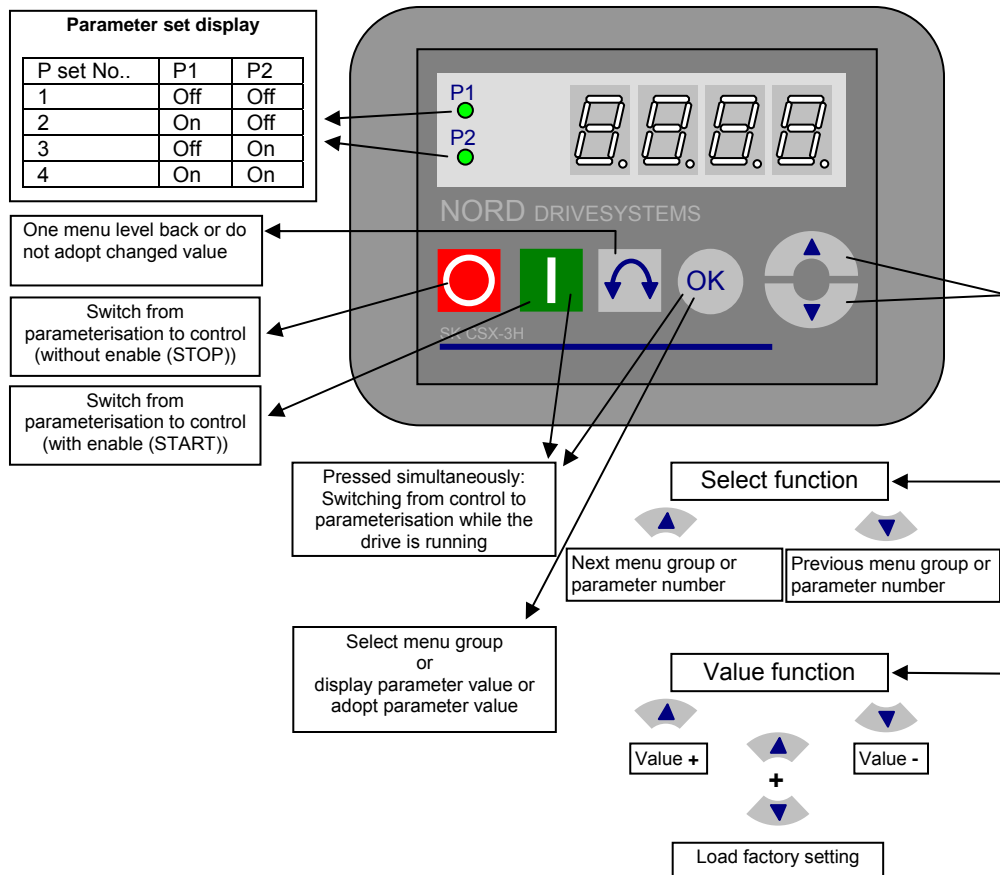
Frequency setpoint:

The current frequency setpoint depends on the setting in the parameters jog frequency (P113) and minimum frequency (P104). This value can be altered during keyboard operation with the value keys ∇ and \blacktriangle , and permanently stored in P113 as the jog frequency by pressing the ENTER key.

Parameterisation with SimpleBox

The **parameterisation** of the frequency inverter can be performed in various operating states. All parameters can always be changed online. Switching to the parameter mode occurs in different ways depending upon the operating states and the enabling source.

1. If there is no enable (if necessary, press the STOP key ⏻) via the SimpleBox, control terminals or a serial interface, it is still possible to switch to the parameterisation mode directly from the operating value display with the value keys ∇ or \blacktriangle . \rightarrow $\boxed{p0_}$ / $\boxed{p7_}$
2. If an enable is present via the control terminals or a serial interface and the frequency inverter is producing an output frequency, it is also possible to switch to the parameterisation mode directly from the operating value display using the value keys ∇ or \blacktriangle . \rightarrow $\boxed{p0_}$ / $\boxed{p7_}$
3. If the inverter is enabled via the ControlBox (START key ⏻), the parameterisation mode can be reached by pressing the START and ENTER keys ⏻ + OK simultaneously.
4. Switching back to the control mode is achieved by pressing the START key ⏻ .



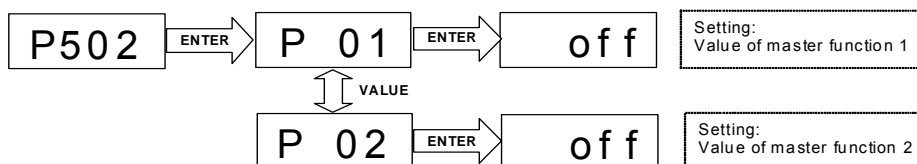
Changing parameter values

To access the parameter section, one of the value keys, ∇ or \blacktriangle must be pressed. The display changes to the menu group display $\boxed{p0_}$... $\boxed{p7_}$. After pressing the ENTER key OK , access to the menu group is obtained and the required parameter can be selected with the value keys.

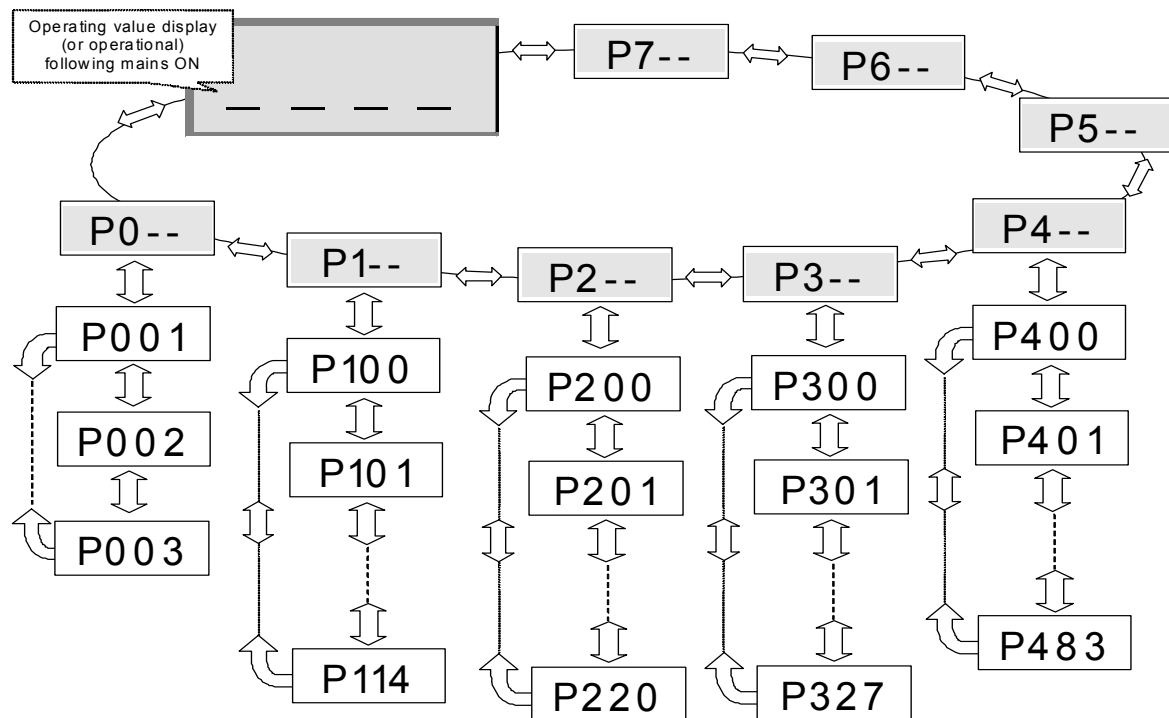
All parameters are arranged in order in the individual menu groups in a continuous scroll pattern. It is therefore possible to scroll forwards and backwards within this section.


Each parameter has a parameter number $\rightarrow \boxed{p\ x\ x\ x}$. The significance and description of the parameters starts in Section 5 "Parameterisation"




NOTE: Some parameters like P465, P475, P480...P483, P502, P510, P534, P701...P706, P707, P718, P740/741 and P748 have – depending on the frequency inverter series - additional levels (arrays), in which further adjustments can be made, e.g.:



Menu structure with the SimpleBox



To **change a parameter value**, the ENTER key  must be pressed when the relevant parameter number is displayed.

Changes can then be made using the VALUE keys  or  and must be confirmed with  to save them and leave the parameter.

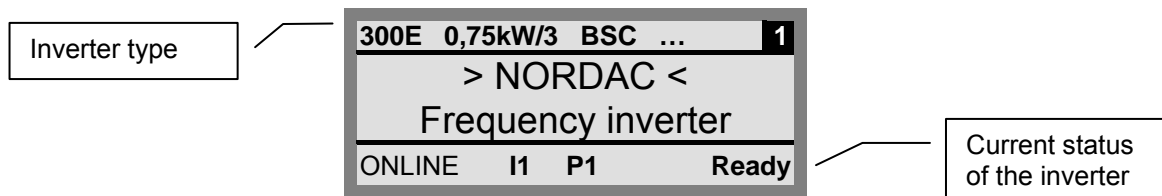
As long as a changed value has not been confirmed by pressing ENTER, the value display will flash; this value has not yet been stored in the frequency inverter.

If a change is not to be saved, the "DIRECTION" key  can be pressed to leave the parameter.

4.2 ParameterBox

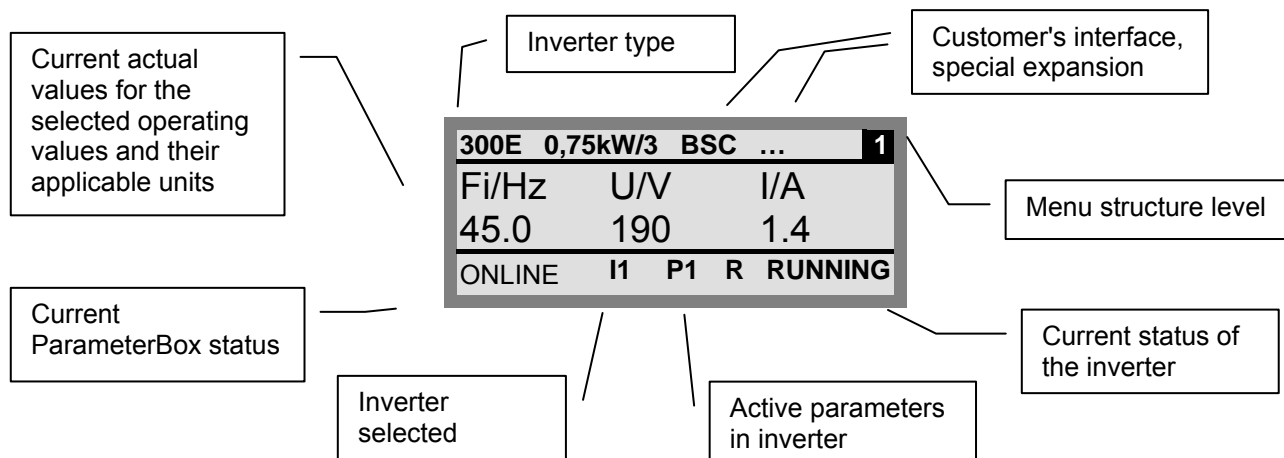
4.2.1 Display

After the ParameterBox is connected and the mains voltage for the inverter is switched on, an automatic "**Bus scan**" is performed. The ParameterBox identifies the connected frequency inverter(s). The frequency inverter type and its current operating status can be seen in the following display.



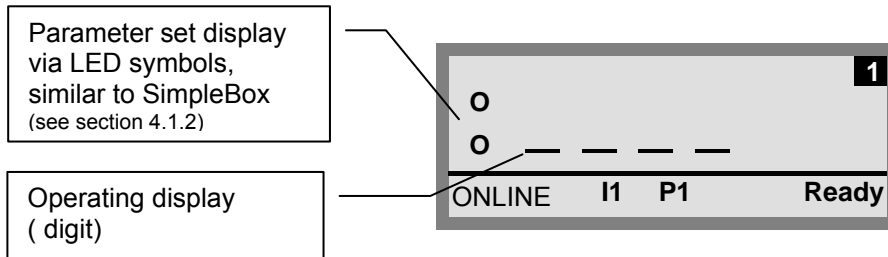
In the standard display mode, 3 operating values and the current frequency inverter status can be displayed simultaneously.

The operating values displayed can be selected from a list of 8 possible values (in Menu>Display</>Values for display<).



4.2.2 ControlBox mode

Above firmware version 3.7 a further display mode (ControlBox) can be selected. If this mode is selected by the user, the displays for the ControlBox (LED display of active parameter set and 4-digit "7-segment display") are shown on the screen. This mode also enables access to new parameters of an inverter, even if these parameters have not yet been implemented in the firmware of the ParameterBox. (Example: an inverter with current firmware version is to be parameterised with a ParameterBox with an older firmware version)



NOTE


















The digital frequency setpoint is factory set to 0 Hz. To check whether the drive is working, a desired frequency value must be input via the ▲ or ▼ key. Otherwise a jog frequency must be input via the appropriate parameter >Jog Frequency< (P113).

Settings should only be implemented by qualified personnel, strictly in accordance with the warning and safety information.

ATTENTION: The motor may start immediately after pressing the START key !

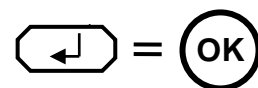
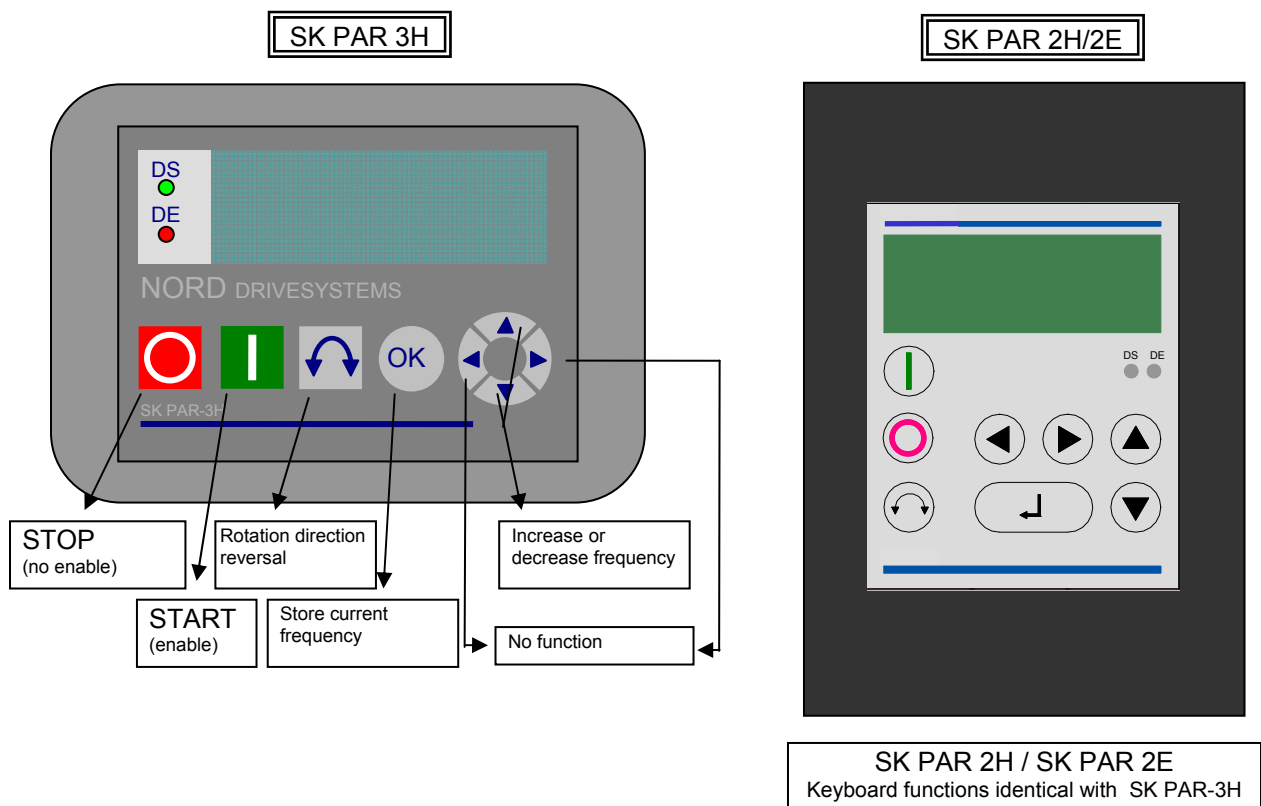
4.2.3 Operation

LCD display	Graphic-capable, backlit LCD display for displaying operational values and parameters for the connected frequency inverter(s) and ParameterBox parameters.	
	Use the Selection keys to move through the menu levels and within the individual menu items. Press the  and  keys together to go back one level.	
		
	The contents of individual parameters can be altered with the VALUES keys . Press the  and  keys together to load the default values of the parameter selected.	
	When controlling the inverter using the keyboard, the frequency setpoint is set using the VALUE keys.	
 or 	Press the ENTER key to select a menu group or accept the changed menu items or parameter values. Note: If a parameter is exited without a new value being stored, then one of the SELECTION keys can be used for this purpose. If the inverter is to be controlled directly from the keyboard (not control terminals), then the actual setpoint frequency can be stored under the Jog Frequency parameter (P113).	
	START key for switching on the frequency inverter.	Note: Can only be used if this function has not been disabled in parameter P509 or P540.
	STOP key for switching off the frequency inverter.	
	The rotational direction of the motor is changed by pressing the Direction key . Rotation direction left is indicated by a minus sign. Attention! Take care when operating pumps, screw conveyors, ventilators, etc. → You can disable the key with parameter P540.	
 DS  DE	The LED's signal the current status of the ParameterBox. DS (ON (green)) The ParameterBox is connected to the power supply and is operational. Device State DE (ERROR (red)) An error has occurred when processing or transferring data or in the Device Error connected frequency inverter.	

Control of the inverter

The speed and direction of rotation of the inverter can be fully controlled via the ParameterBox. Depending on the inverter series, this requires different settings.

Series	Setting of parameter (P509)	Comments
SK 200E	{0} "Control terminals or keyboard"	Control via ParameterBox is only possible if there is no release via the control terminals. (The interface used first takes priority.)
Sk 300E	{0} "Control terminals or keyboard"	Control via ParameterBox is only possible if there is no release via the control terminals. (The interface used first takes priority.)
SK 500E	{2} "USS"	Control via control terminals or keyboard of a plugged technology box no longer possible.
SK 700E	{4} "USS"	Control via control terminals or keyboard of a plugged technology box no longer possible.
SK 750E	{4} "USS"	Control via control terminals or keyboard of a plugged technology box no longer possible.
vector mc	{0} "Control terminals or keyboard"	Control via ParameterBox is only possible if there is no release via the control terminals. (The interface used first takes priority.)

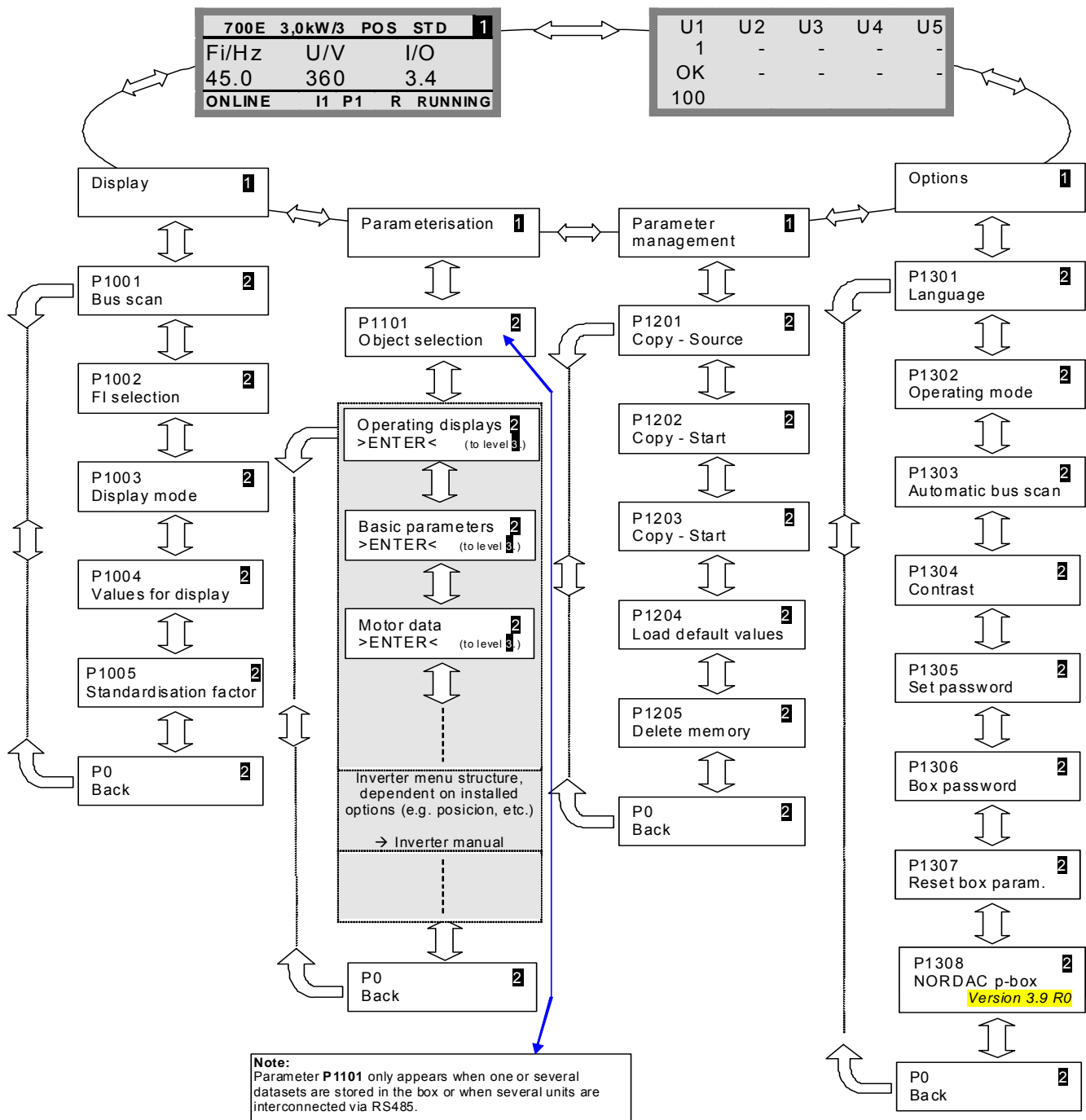


Note: If the frequency inverter is enabled in this mode, then the parameter set selected for this frequency inverter in the Menu >Parameterisation< >Basic parameters< in the >Parameter set< parameter (P100) is used. After changing the parameter set during operation, you must activate it with the buttons or . However, it is safer to carry out the switchover at a standstill.

Attention: Following the START command, the frequency inverter may start up immediately with a pre-programmed frequency (minimum frequency P104 or jog frequency P113).

Menu structure with the ParameterBox

The menu structure consists of various levels that are each arranged in a ring structure. The ENTER key moves the menu on to the next level. Simultaneous operation of the SELECTION keys moves the menu back a level. Menu Structure ParameterBox

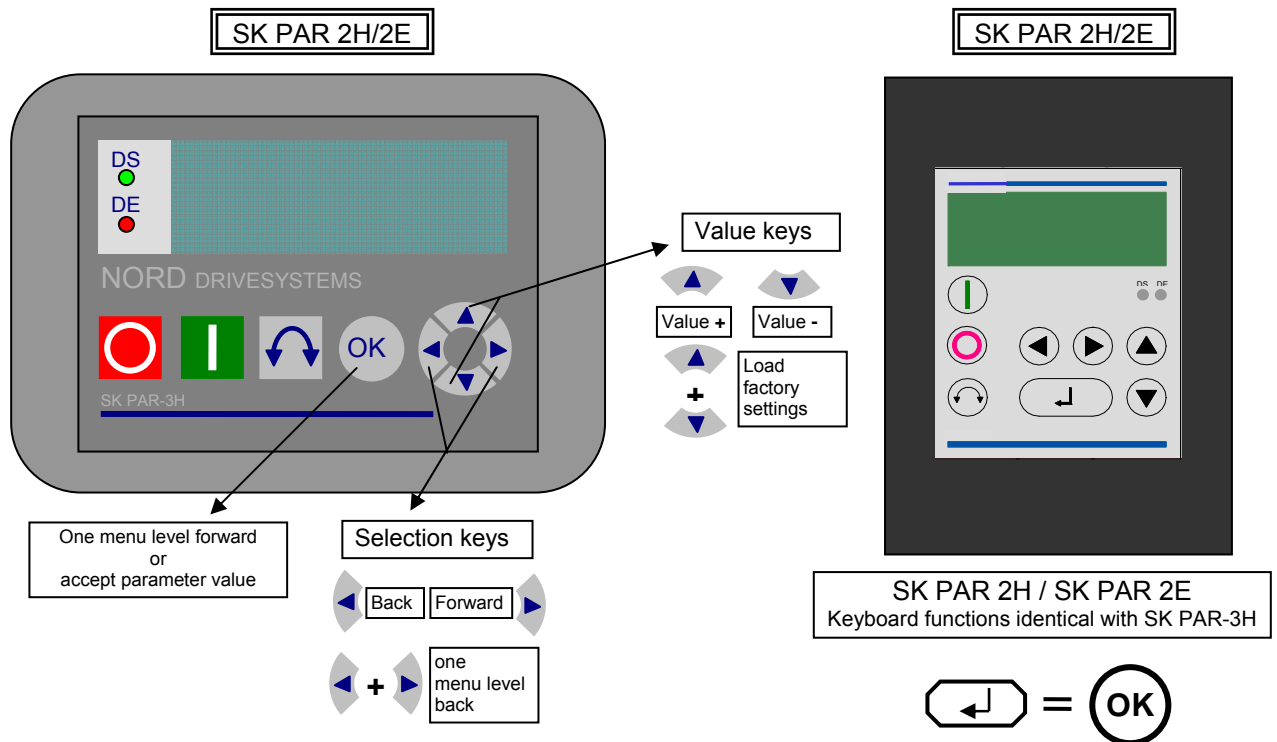


>Display< (P11xx), >Administer Parameters< (P12xx) and >Options< (P13xx) are purely ParameterBox-parameters and do not have any direct influence on frequency inverter parameters.

Access to the frequency inverter menu structure is gained via the >Parameterisation< menu. The details depend on the equipment of the frequency inverter with customer interfaces (SK CU1-...) and/or special expansions (SK XU1-...). For the description of the parameterisation and the parameters, please refer to the particular inverter manual.

Parameterising with the ParameterBox

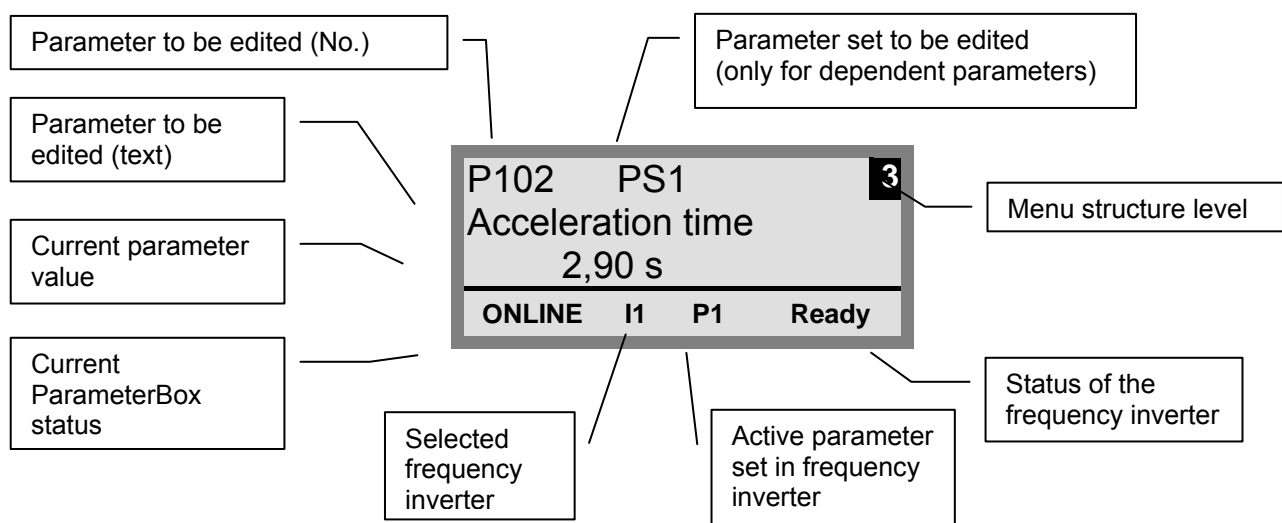
The parameterisation mode is accessed by selecting the menu item >Parameterisation< in level 1 of the ParameterBox. The parameter level of the connected inverter is accessed with the ENTER key. The following diagram illustrates the control elements of the ParameterBox for parameterisation.



Screen layout during parameterisation

If the setting of a parameter is changed, then the value flashes intermittently until confirmed with the ENTER key. In order to retain the factory settings for the parameter being edited, both VALUE keys must be operated simultaneously. Even in this case, the setting must be confirmed with the ENTER key in order for the change to be stored.

If the change is not to be stored, then pressing one of the SELECTION keys will call up the previously stored value and pressing a SELECTION key again will exit the parameter.



Note: The lowest line in the display is used to display the current status of the box and the frequency inverter being controlled.

Parameterisation in ControlBox mode

Parameterisation of the frequency inverter in ControlBox mode occurs similarly to the parameterisation of the SimpleBox. A detailed description is given in section 4.1.2 “Operation”, “**Parameterisation with the SimpleBox**”.

Menu structure in ControlBox mode

The menu structure in ControlBox mode matches that of the SimpleBox. A detailed description is given in section 4.1.2 “Operation”, “**Menu structure with the SimpleBox**”.

4.2.4 Data transfer with NORD CON

The NORDAC ParameterBox S1 to S5 storage elements can be managed using the **NORD CON** control and parameterisation software.

In order to transfer the data between inverter and **SK PAR-2x**, the serial interface of the PC (RS232) must be connected to the ParameterBox via an interface converter (RS232/485) (see also section 2.1.2). We recommend the interface converter SK IC1-232/485. The converter and the ParameterBox are powered by an external power supply (5V/300mA). Connection is made to the 3mm socket at the side of the interface converter, using an **adapter from the USB port**,

Please make sure that the USB port is suitable for *high power* devices.

To transfer data between inverter and **SK PAR-3H** you only need a standard USB cable (USB2.0 plug A to plug B). This connection also provides power to the box.

The driver software required for the USB port in the PC comes on the enclosed "EPD" CD-ROM but can also be downloaded free of charge from our website (www.nord.com).

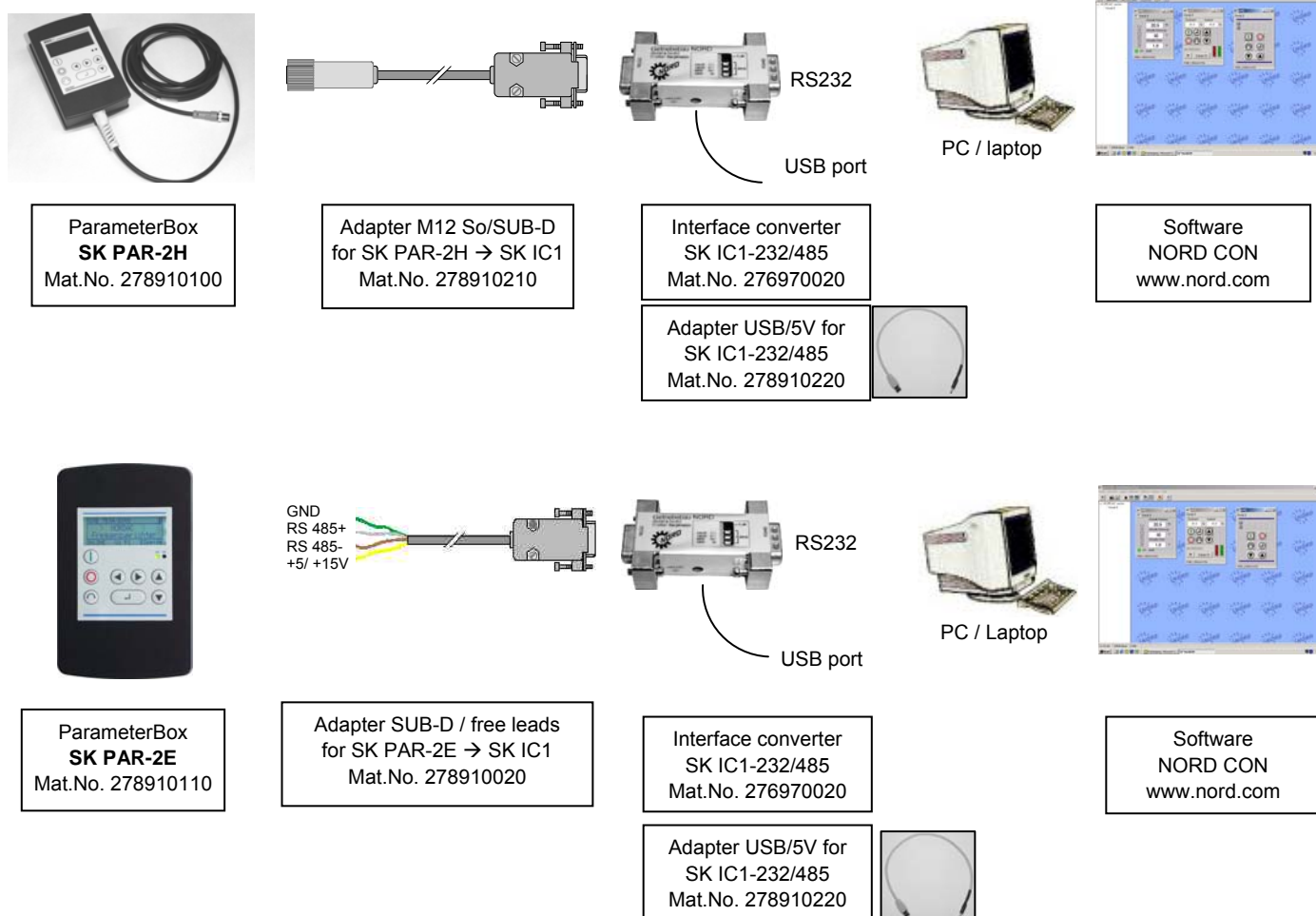
Please make sure that the USB port is suitable for *high power* devices. A USB2.0 interface on your PC is required.

WARNING



Never connect the SK PAR-3H ParameterBox to the frequency inverter and the PC at the same time in order to prevent potential damages, in particular of the PC.

The following components are required for the ParameterBox → PC/laptop connection:





ParameterBox
SK PAR-3H
Mat.No. 275281014



USB 2.0 cable plug A to plug B
for SK PAR-3H → PC



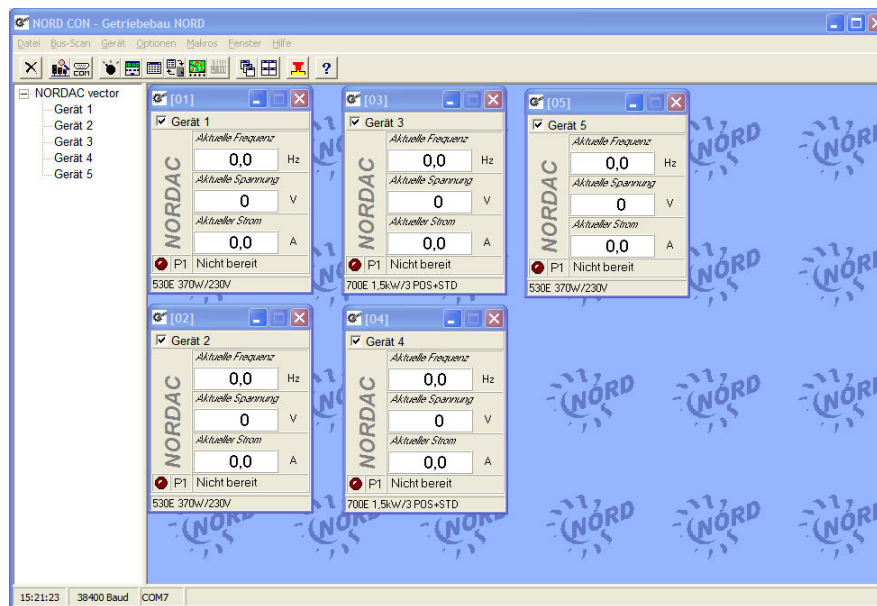
PC / Laptop



Software
NORD CON
www.nord.com

In this set-up, communication is controlled by the PC. For this, in the menu group >Options<, Parameter >Operating mode< (P1302), the ParameterBox must be set to the value **PC slave**. (SK PAR-3H: automatic switching). After a bus scan, the **NORD CON** program will then detect the filed storage objects S1 to S5 as separate frequency inverters with bus addresses 1 to 5 and display them onscreen.

Note: Only frequency inverters (datasets) already saved in the storage objects can be detected and edited by the **NORD CON** parameterisation software. To edit the dataset of a new frequency inverter (i.e. to **create** a new **dataset**), the inverter type must first be set via the >Load factory settings (P1204)< parameter. By means of a new bus scan the software identifies the new storage object, which can then be edited with the familiar tools.



All NORD CON parameterisation functions are now available.

5 System parameters

The description of system parameters below only applies to the ParameterBox (SK PAR-2H/ -2E/ -3H).

5.1 Description of parameters

The menu structure of the ParameterBox is described in section 4.2.3 "Operation", "**Menu structure with the ParameterBox**".

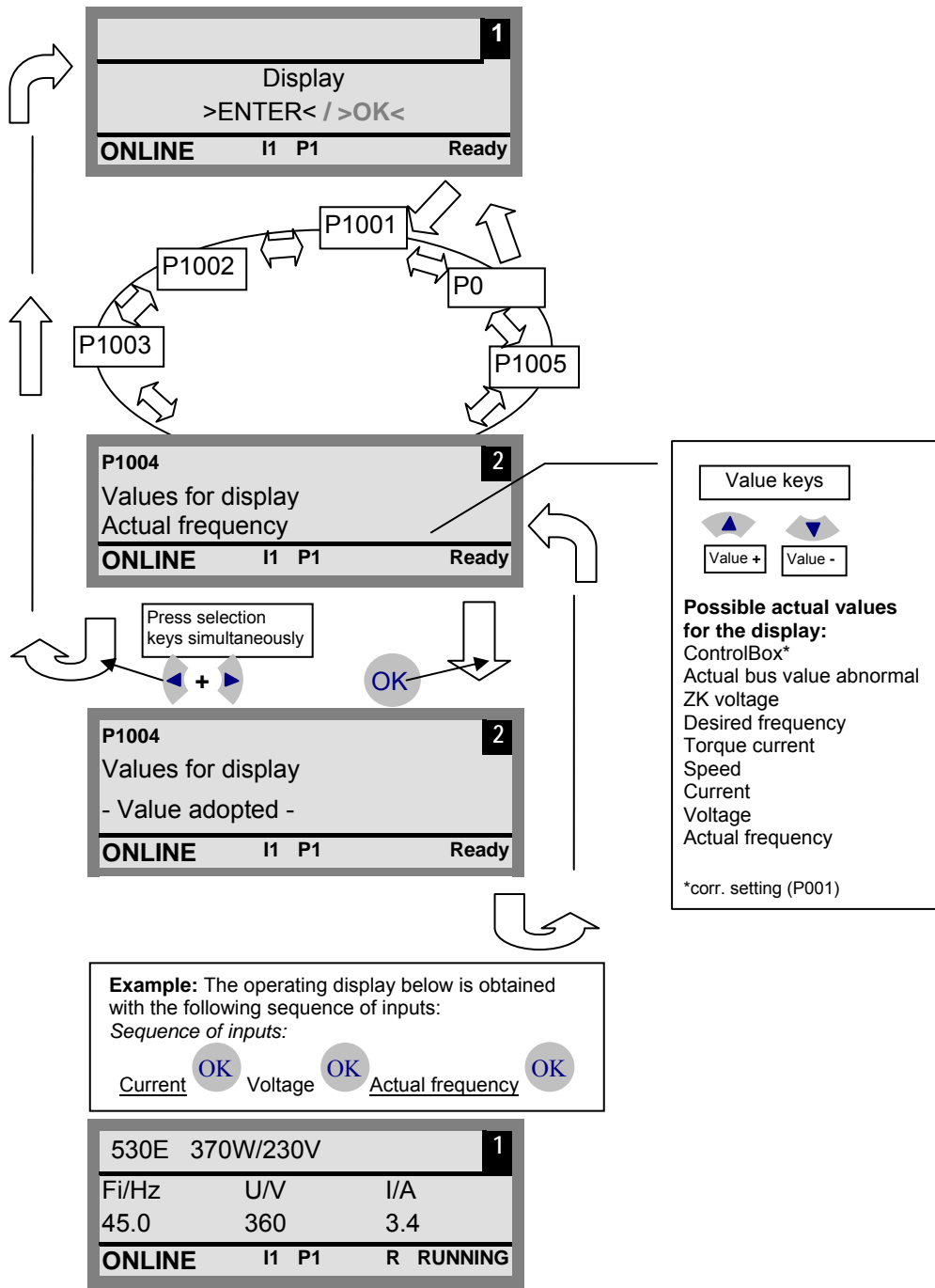
The following main functions are assigned to the menu groups:

Menu group	No.	Master function
Display	(P10xx):	Selection of operating values and display layout
Parameterisation	(P11xx):	Programming of all connected inverters and storage objects
Parameter administration	(P12xx):	Copying and storage of complete parameter sets from storage objects and inverters
Options	(P13xx):	Setting the ParameterBox functions and all automatic processes

5.1.1 Parameter display

Parameter	Setting value / Description / Note									
P1001	Bus scan									
Off / Start [Off]	<p>A bus scan is initiated with this parameter. During this process a progress indicator is shown in the display.</p> <p>Following a bus scan, the display changes to the basic menu. Parameter P1001 is reset to “Off”.</p> <p>Depending on the result of this process, the ParameterBox goes into the "ONLINE" or "OFFLINE" operating mode.</p>									
P1002	FI selection									
U1 ... I5 [U1]	<p>Selection of the current item to be parameterised/controlled.</p> <p>The display and further operating actions refer to the item selected. In the inverter selection list, only those devices detected during the bus scan are shown. The actual object appears in the status line.</p> <p>Note: If an error has occurred in a connected frequency inverter, it can be acknowledged by selecting the frequency inverter.</p>									
P1003	Display mode									
Value range: see right column [Standard]	<p>Selection of the operating values display for the <i>ParameterBox</i></p> <table><tr><td>Standard</td><td>3 values next to each other</td><td></td></tr><tr><td>List</td><td>Any 3 values with units below each other</td><td>1 value with unit</td></tr><tr><td>ControlBox</td><td>1 value without unit</td><td></td></tr></table>	Standard	3 values next to each other		List	Any 3 values with units below each other	1 value with unit	ControlBox	1 value without unit	
Standard	3 values next to each other									
List	Any 3 values with units below each other	1 value with unit								
ControlBox	1 value without unit									
P1004	Values for display									
Value range: see right column [Actual frequency]	<p>Selection of a display value for the actual value display of the ParameterBox.</p> <p>The value selected is placed in the first position of an internal list for the display value and is then also used in the “Large Display” mode.</p> <p>Depending on the settings in Parameter (P1003), you can select up to 3 operating display values. The display occurs consecutively with the value selected last being inserted into the display from the left or from the top.</p>									

Parameter	Setting value / Description / Note
-----------	------------------------------------



P1005	Standardisation factor
-327,67 ... +327,67 [1.00]	The first value on the display list is scaled with the standardisation factor. Should this standardisation factor deviate from 1.00, the unit of the scaled value is no longer displayed.

5.1.2 Inverter parameterisation

Parameter	Setting value / Description / Note
P1101	Object selection
U1 ... U5 and S1 ... S5 [...]	<p>Selection of the object to be parameterised.</p> <p>The ongoing parameterisation process relates to the object selected. Only the devices and storage objects recognised during the bus scan are available in the selection list.</p> <p>This parameter is not shown if only one device is recognised and there is no storage object available.</p>

5.1.3 Parameter administration

Parameter	Setting value / Description / Note
P1201	Copy - Source
U1 ... U5 and S1 ... S5 [...]	<p>Selection of the actual source object to be copied.</p> <p>In the selection list, only the frequency inverters and storage objects detected during the bus scan are shown.</p>
P1202	Copy - Target
U1 ... U5 and S1 ... S5 [...]	<p>Selection of actual target object to copy.</p> <p>In the selection list, only the frequency inverters and storage objects detected during the bus scan are shown.</p>
P1203	Copy - Start
Start, Off [Off]	<p>This parameter triggers an action transferring all the parameters selected in >Copy – Source< to the object specified in the >Copy – Target< parameter.</p> <p>When data could be overwritten (e.g. when transferring data from a memory location to a connected inverter), a message window appears where you can acknowledge the action. The transfer starts after acknowledgement.</p>
P1204	Load default values
U1 ... U5 and S1 ... S5 [...]	<p>In this parameter, the default settings are written to the parameters of the selected item.</p> <p>This function is particularly important when editing storage objects. Fictitious inverters can only be loaded and edited with the ParameterBox by means of this parameter (see also: 4.2.4 Data exchange with NORD CON).</p>
P1205	Delete memory
S1 ... S5 [S1]	<p>In this parameter the data in the selected memory medium is deleted.</p>

5.1.4 Options

Parameter	Setting value / Description / Note						
P1301	Language						
Value range: see right column [...]	<p>Selection of languages for operation of the ParameterBox</p> <p>Available languages:</p> <table> <tr> <td>German</td><td>English</td></tr> <tr> <td>Dutch</td><td>French</td></tr> <tr> <td>Spanish</td><td>Swedish</td></tr> </table>	German	English	Dutch	French	Spanish	Swedish
German	English						
Dutch	French						
Spanish	Swedish						
P1302	Operating mode						
Value range: see right column [Online]	<p>Selection of the operating mode for the NORDAC <i>ParameterBox</i>.</p> <ul style="list-style-type: none"> • Offline: The <i>ParameterBox</i> is operated autonomously. No PC or frequency inverter is connected. The storage objects of the ParameterBox can be parameterised and administrated. • Online: One or more inverters are located at the interface of the <i>ParameterBox</i>. The frequency inverter can be parameterised and controlled. When changing to the "ONLINE" operating mode, a bus scan is started automatically. • PC slave: A PC is located at the interface of the ParameterBox. The ParameterBox can be addressed as a slave by the NORD CON software. The storage objects declare themselves as separate inverters S1 ⇒ USS address 1 S2 ⇒ USS address 2 S3 ⇒ USS address 3 S4 ⇒ USS address 4 S5 ⇒ USS address 5 <p>Note: When there is no storage object, NORD CON will not be able to find an object.</p>						
P1303	Automatic bus scan						
On, Off [On]	<p>Setting the switch-on characteristics.</p> <ul style="list-style-type: none"> • Off No bus scan is carried out, the frequency inverters connected before the switch-off are located after switching on. When the wiring configuration was changed (e.g. a different inverter was connected), error 223 is generated. • On A bus scan is automatically carried out when the ParameterBox is switched on. 						
P1304	Contrast						
0 ... 100 % [50]	Contrast setting of the ParameterBox display						
P1305	Set password						
0 ... 9999 [0]	<p>The user can set up a password in this parameter.</p> <p>If a value other than 0 has been entered in this parameter, then the settings of the ParameterBox or the parameters of the connected frequency inverter cannot be altered.</p>						
P1306	Box password						
0 ... 9999 [0]	<p>If the "Password" function is to be reset, the password selected in the >Set Password< parameter must be entered here. If the correct password has been selected, then all functions of the ParameterBox can be used again.</p> <p>NOTE: Please contact our Technical Support if you do not know the password but still need to access the inverter's parameters.</p>						
P1307	Reset Box parameter						

Parameter	Setting value / Description / Note
Start, Off [Off]	In this parameter the <i>ParameterBox</i> can be reset to the factory setting. All <i>ParameterBox</i> settings and the data in the memory objects will be deleted.
P1308	NORDAC p-box
Version ... R ... [...]	Displays the software version of the <i>ParameterBox</i> . Please keep at hand.

5.2 Table of possible error messages

All possible error messages of the ParameterBox are described below. Error messages referring to the connected frequency inverter (E xx.x) are described in the manual for the respective inverter or in an appropriate additional instruction manual.

Display Error number	Fault Text in the Parameter Box	Cause • Remedy
Communication errors		
200	Invalid parameter number	These error messages are due to EMC interference or differing software versions of the participants. <ul style="list-style-type: none"> Check the software version of the ParameterBox and that of the connected frequency inverter. Check the cabling of all components regarding possible EMC interference
201	Parameter value cannot be changed	
202	Parameter outside value range	
203	Faulty SUB index	
204	No Array parameter	
205	Incorrect parameter type	
206	Incorrect response identifier of USS interface	
207	Checksum error of USS interface	Communication between frequency inverter and ParameterBox is faulty (EMC), safe operation cannot be guaranteed. <ul style="list-style-type: none"> Check the connection to the frequency inverter. Use a shielded cable between the devices. Route the BUS leads separately from the motor cables.
208	Incorrect status identifier of USS interface	Communication between frequency inverter and ParameterBox is faulty (EMC), safe operation cannot be guaranteed. <ul style="list-style-type: none"> Check the connection to the frequency inverter. Use a shielded cable between the devices. Route the BUS leads separately from the motor cables.
209	Inverter not responding	The ParameterBox is waiting for a response from the connected frequency inverter. The waiting time has elapsed without a response being received. <ul style="list-style-type: none"> Check the connection to the frequency inverter. The settings of the USS parameters for the frequency inverter were changed during operation.
Identification errors		
220	Unknown device	Device ID not found. The connected inverter is not listed in the database of the ParameterBox; no communication can be established. <ul style="list-style-type: none"> Please contact your Getriebebau Nord Representative.
221	Software version not recognised	The software of the connected frequency inverter is not listed in the ParameterBox database, no communication can be established. <ul style="list-style-type: none"> Please contact your Getriebebau Nord Representative.
222	Inverter extension level not recognised	An unknown module has been detected in the frequency inverter (customer interface / special extension). <ul style="list-style-type: none"> Please check the modules installed in the frequency inverter If necessary, check the software version of the ParameterBox and the frequency inverter.
223	Bus configuration has changed	After restoring the last Bus configuration, a device is reported that is different from the one stored. This error can only occur if the parameter >Auto. Bus Scan< is set to OFF and another device has been connected to the ParameterBox. <ul style="list-style-type: none"> Activate the automatic Bus scan function.
224	Device is not supported	The inverter type entered in the ParameterBox is not supported! The ParameterBox cannot be used with this frequency inverter.
225	The connection to the inverter is blocked	Access to a device that is not online (previous Time Out error).

Display Error number	Fault Text in the Parameter Box	Cause • Remedy
		<ul style="list-style-type: none">Carry out a bus scan via the parameter >Bus Scan< (P1001).
ParameterBox operating errors		
226	Source and target are different devices	Copying objects of different types (from / to different inverters) is not possible.
227	Source is empty	Copying of data from a deleted (empty) storage medium
228	This combination is not permitted	Target and source for the copying function are the same. The command cannot be carried out.
229	Object selected is empty	Attempt to parameterise a deleted storage object
230	Different software versions	Warning Copying objects with different software versions can lead to problems when transferring parameters.
231	Invalid password	Attempt to alter a parameter without a valid Box password being entered in parameter >Box Password< P 1306.
232	Bus scan only during operation: online	A bus scan (search for a connected frequency inverter) is only possible when in ONLINE mode.
Warnings		
240	Overwrite data? → Yes No	These warnings indicate that there is a possibly significant change which needs additional confirmation. Once the next procedure has been selected, it must be confirmed with the "ENTER" key.
241	Delete data? → Yes No	
242	Move SW version? → Continue Cancel	
243	Move series? → Continue Cancel	
242	Delete all data? → Yes No	
Inverter control errors		
250	This function is not enabled	The function requested is not enabled at the frequency inverter parameter interface. <ul style="list-style-type: none">Change the value of the parameter >Interface< of the connected inverter to the required function. More detailed information can be obtained from the operating instructions for the frequency inverter.
251	Control command was not successful	The control command cannot be implemented by the frequency inverter, as a higher priority function, e.g. Quick stop or an OFF signal to the control terminals of the frequency inverter is present.
252	Control is not possible OFFLINE	Call up of a control function in Offline mode. <ul style="list-style-type: none">Change the operating mode of the ParameterBox in the parameter >Operating Mode< P1302 to Online and repeat the action.
253	Error acknowledgement not successful	The acknowledgement of an error at the frequency inverter was not successful, the error message remains.
Error message from inverter		
Inverter error number	Inverter error text	A fault has occurred in the inverter with the number displayed. The inverter error number and text are displayed.

6 Accessories for NORDAC ParameterBoxes

6.1 SK IC1-232/485 interface converter

The **SK IC1-232/485** interface converter converts signals from RS485 to RS232. This converter is used for connecting a PC or a laptop to a NORDAC frequency inverter (RS485) or to the ParameterBox of the PAR-2x series.

With the aid of the NORD CON software the frequency inverter or the ParameterBox can be controlled and parameterised. In addition, the software provides a convenient diagnostic tool with an oscilloscope function in order to enable the optimisation of drive solutions. (SK IC1-232/485, Mat. No. 276970020)



Note: An adapter can be supplied for the power supply (5V/250mA) from the PC USB port to the converter. Please make sure that the USB port is suitable for *high power* devices. A connected ParameterBox is also supplied via this 5V.

6.2 Cable-to-adapter allocation

The following table lists the adapters required for use of the various ParameterBoxes. For the allocation of adapters to each of the inverter series and ParameterBoxes used, refer to the second table in this chapter.

Adapter list

Cons. No.	Illustration	Name	Article number
1		"Modular cable Straight RJ12 (6/6) - RJ12 (6/6) cable"	No NORD article <i>freely available</i>
2		"Connection cable M12 socket → RJ12"	Mat.-No: 278910230
3		"Connection cable M12 plug → RJ12" SK TIE4-M12-RJ12	Mat.-No: 275274600
4		"Connection cable M12 socket → free leads"	Mat.-No: 278910200
5		"Connection cable SUB-D 9 → free leads"	Mat.-No: 278910020
6		"Connection cable M12 socket → SUB-D 9"	Mat.-No: 278910210
7		"Connection cable USB2.0 plug A to plug B"	No NORD article <i>freely available</i>
8		Interface converter "SK IC1-232/485"	Mat.-No: 276970020
9		"Connection cable USB/5V ### SK IC1-232/485"	Mat.-No: 278910220

Allocation ParameterBox – frequency inverter

ParameterBox		ParameterBox			SimpleBox
		SK PAR-2E	SK PAR-2H	SK PAR-3H	SK CSX-3H
Frequency inverter	Interface	RS485	RS485	RS485 / RS232 (USB)	RS485
SK 200E		1*	2*	1	1
SK TI4-TU-BUS (BUS interface unit)		1	2	1	1
SK 300E		Wiring to screw terminals, 4 leads	Direct connection with system plug	3	3
SK 500E		1	2	1	1
SK 700E >22KW or with option -RS2		1**	2**	1**	1
SK 700E with customer interface SK CU1-STD		Wiring to screw terminals, 4 leads	4	Not possible	Not possible
SK 750E		Not possible	Direct connection with system plug	3	3
SK 750E with customer interface SK CU1-STD		Wiring to screw terminals, 4 leads	Direct connection with system plug	3	3
Vector mc		Wiring to screw terminals, 4 leads	4	Not possible	Not possible
Nord Con		5 + 8 + 9	6 + 8 + 9	7	Not possible
					

* ParameterBox series **SK PAR-2x** can address SK 200E only after its hardware has been modified.
The revised ParameterBox series is scheduled to be launched in Q3, 2009.

** SK 700E < 30 kW: Safe operation is ensured with external power supply of the ParameterBox only .

For further details on SK PAR 2H see Section 2.1.2 *Connection variants*

7 Maintenance and servicing information

In normal use, NORDAC frequency inverters are maintenance free if used correctly.

The device must be sent to the following address if it needs repairing:

NORD Electronic DRIVESYSTEMS GmbH
Tjüchkampstrasse 37
26605 Aurich, Germany

For queries about repairs, please contact:

Getriebebau NORD GmbH & Co. KG
Telephone: 04532 / 401 -515
Fax: 04532 / 401 -555

If a NORDAC ParameterBox is sent in for repair, no liability can be accepted for any added components, e.g. power supply, connection cables, etc.!

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