Intelligent Drivesystems, Worldwide Services

GB

BU 0040

Control and Parameter Boxes for NORD Frequency Inverters

NORD DRIVESYSTEMS

Intended use of the frequency inverter

The **compliance** with the operating instructions is **necessary for fault-free operation** and the acceptance of possible warranty claims. **These operating instructions must be read** before working with the device!
These operating instructions contain important information about service. They must therefore be kept **close to the device**.
The control and parameter boxes are only intended for use with NORD frequency inverters or their accessories (optional modules).
All details regarding technical data and permissible conditions at the installation site must be complied with.
Commissioning (implementation of the intended use) is not permitted until it has been ensured that the machine complies with the EMC directive 2004/108/EEC and that the conformity of the end product meets the machine directive 2006/42/EEC (note EN 60204).

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Documentation

Designation: BU 0040 DE
Part No.: 607 04 01
Device types: SK PAR-2H, SK PAR-2E,
SK PAR-3H, SK PAR-3E
SK CSX-3H, SK CSX-3E
SK SSX-3A[1]
SK POT1-1
SK TU3-CTR, SK TU3-PAR

Suitable for frequency inverter series:
NORD **SK 200E, SK 300E[2], SK 500E, SK 700E, SK 750E[2]**
NORD **vector mc[2]**

Version list

Designation of previous versions	Software Version	Comments
BU 0300 DE, August 2008 Part No. 607 0801 / 3208	V 3.9 R0	Revised version of issue 4907 (December 2007)
BU 0300 DE, March 2009 Part No. 607 0801 / 1009	V 4.0 R3	Addition of the products SK PAR-3H and SK CSX-3H
BU 0040 DE, April 2011 Part No. 607 0801 / 1611	V 4.2 R1	Restructuring of manual, addition of the products SK PAR-3E, SK CSX-3E, SK SSX-3A and SK POT1-1
BU 0040 GB, January 2013 Part No. 607 0401 / 0113	V 4.4 R0	Supplement of SK TU3-CTR and SK TU3 PAR Supplement of adapter kit for attachment of an SK SSX 3A to an SK 2xxE frequency inverter Revision of warnings and information notes

Publisher

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ATTENTION **Supplementary Operating Instructions**

This supplementary operating manual is only valid in conjunction with the operating manual supplied for the respective frequency inverter. This is an essential prerequisite for the availability of all the relevant information required for the safe commissioning of the frequency inverter.

[1] Not for "vector mc"

[2] Only SK PAR-2H and SK PAR-2E

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1 General and safety information

DANGER! **Danger due to electricity**

Installation must be carried out by qualified personnel only, paying particular attention to safety and warning instructions (refer to the manual for the drive electronics (e.g. frequency inverter).

Insertion or removal of modules or electrical connections must only be carried out when no voltage is present. Detailed information can be found in the relevant manual for the drive electronics.

NORD control and parameter boxes enable *parameterisation, control and display* of the operating parameters of the inverter series NORD **SK 200E, SK 300E, SK 500E, SK 700E, SK 750E** and ***vector mc***.

Various versions of the control and parameter boxes are available. The box to be used with a particular inverter series can be obtained by reference to the overview tables in Sections 2.4.2, 3.1.2 and 3.2.1.

1. For service and commissioning directly on the system the **handheld versions** of the parameter boxes **(SK PAR-2H, SK PAR-3H and SK CSX-3H)** are recommended. These **handheld units** can be used for parameterisation and display.
2. The **built-in versions** of the parameter boxes **(SK PAR-2E, SK PAR-3E and SK CSX-3E)**, for installation in a control panel enable control and monitoring of up to 5 frequency inverters (SK CSX-… 1 frequency inverters) in a control cabinet.
3. The Simple Setpoint Box **SK SSX-3A** is primarily intended to control SK 200E series frequency inverters and can be sued both as a handheld unit and a wall-mounted unit.
4. The **SK POT1-1** control box is a simple manual control unit for the control of NORD frequency inverters with an enabling signal and setpoint. The control box can also be used as a wall-mounted unit.
5. The ControllBox **SK TU3-CTR** and the ParameterBox **SK TU3-PAR** are exclusively designed for use with the SK 5xxE frequency inverter series and are plugged directly into the technology unit slot of the frequency inverter.

The ParameterBox (SK PAR-xx or SK TU3-PAR) 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). In order to connect the **SK PAR-3H**, only a common USB connection cable (USB2.0 connection cable, A-series plug to B-series plug) is required. 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. For this, a previously saved or created data set is required (see Section 2.2.2.4). This is then recognised by the NORD CON Software.

1.1 Features

1.1.1 ParameterBox (SK PAR-xx and SK TU3-PAR)

- Illuminated, high resolution LCD graphics screen
- Central unit for up to 5 inverters interlinked via RS 485
- 5 complete inverter data records can be stored in the memory, loaded and processed
- For use as a display for various operating parameters
- Automatic inverter detection
- Large-screen display of individual operating parameters
- Standardisation of individual operating parameters to display specific system data
- Control in various languages (see parameter (P1301))
- Error message display in plain language
- Direct control of an inverter possible
- ControlBox function possible

only SK PAR-xx:

- RS 485 communication interface (SK PAR-3H: RS 485 and RS 232)
- Supply voltage 4.5VDC to 30VDC
- 5V (or 24 V) direct current supply from the frequency inverter can be used
- SK PAR-2x: with interface converter (SK IC1-232/485) connection to a standard RS 232 PC interface; SK PAR3H via USB interface. In this case no interface converter is required[3]
- Protection class IP 54. For information, see Technical Data, Section 2.3.

1.1.2 SimpleBox (SK CSX-3x und SK TU3-CTR)

- 4-digit, 7-segment display
- For use as a display for various operating parameters
- Direct control of an inverter possible
- LEDs for parameter set display
- Saving of a complete inverter data set (only SK TU3-CTR)

only SK CSX-xx:

- 5V (or 24V) direct current supply directly from the frequency inverter can be used
- Protection class IP 54. For information, see Technical Data, Section 2.3.

1.1.3 SetpointBox (SK SSX-3A)

- 4-digit, 7-segment display
- 24V direct current supply direct from the frequency inverter can be used
- 3 operating modes with automatic detection (depending on the connection)
  - RS485 in control mode (SK 2xxE, SK 300E, SK 5xxE, SK 700E*, SK 750E*)
  - IO communication in control mode (SK 2xxE only)
  - IO communication in setpoint mode (SK 2xxE only)
- Protection class IP 54
- Wall-mounting possible

* only with optional RS485 interface

1.1.4 Control box (SK POT1-1)

- Direction switch with "0" position for selection of the direction of rotation of the drive unit
- 10kOhm potentiometer for the continuous setting of setpoints between 0 and 100%
- Approx. 3m long connecting cable with open ends for permanent connection to the relevant digital and analog input terminals of the frequency inverter
- The box can be wall-mounted
- Protection class IP 66

[3] For SK PAR-3H directly via USB port (USB2.0)

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 carry out a thorough assessment.

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

1.3 Scope of supply

Standard version:
The scope of supply includes one of the following devices,

Type	Version	IP protection class	Part Number	Comments
SK PAR-2E	Installation	IP 54 - front panel	278910110	
SK PAR-2H	Handheld	IP 54	278910100	Incl. connection cable: M12 plug connector, length approx. 3m
SK PAR-3E	Installation	IP 54 - front panel	275281414	
SK PAR-3H	Handheld	IP 54, IP 20 on plug	275281014	Incl. connection cable: * RJ12-RJ12, length approx. 2m * USB, length approx. 1m
SK CSX-3E	Installation	IP 54 - front panel	275281413	
SK CSX-3H	Handheld	IP 54, IP 20 on plug	275281013	Incl. connection cable: * RJ12-RJ12, length approx. 2m
SK SSX-3A	Handheld (wall-mounting possible)	IP 54	275281513	Incl. M12 screw cable connector
SK POT1-1	Handheld (wall-mounting possible)	IP 66	278910120	Incl. connection cable: length approx. 3m Incl. M16 screw cable connector for SK 2xxE, SK 300E, SK 750E
SK TU3-CTR	Direct mounting on FI	IP 20	275900090	Only SK 5xxE
SK TU3-PAR	Direct mounting on FI	IP 20	275900100	Only SK 5xxE

Available accessories: (For details see Section 2.4)

- Interface converter for connecting SK PAR-2x to a PC
- Various adapter plugs for connecting the parameter boxes to NORD frequency inverters
- Operating instructions as PDF file on CD ROM including NORD CON, (PC-based parameterisation software)
- also available free of charge under www.nord.com

1.4 Certifications

1.4.1 European EMC Directive

If the control and parameter boxes are installed according to the recommendations in this instruction manual, they meet all of the requirements of the EMC directive according to the EMC product standard for motor-operated systems EN 61800-3.

1.4.2 RoHS compliance

NORD control and parameter boxes are designed to be RoHS compliant according to Directive 2002/95/EEC.

2 Parameter boxes

With the aid of parameter boxes it is possible to control or adapt the parameterisation of a frequency inverter or its intelligent optional modules (e.g field bus modules). The SimpleBox versions only allow access to the frequency inverter.

2.1 Installation

2.1.1 SK PAR-2H - Handheld Version

The SK PAR-2H ParameterBox is a compact control device for direct connection to the frequency inverter. A suitable connection cable with an M12 plug contact is included with the device. Direct connection of the ParameterBox to the NORD SK 300E and the SK 750E is possible without additional components. Special connection cables are required for connection to other NORD frequency inverters. These are described in further detail in Section 2.1.1.2 "Connection variants".

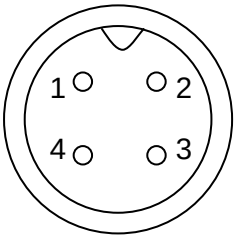
2.1.1.1 Connection to trio SK 300E/750E

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 plug	Description	Cable
2 (white)	+ 4.5V… 30V, approx. 1.3 W	Length 3m 4 x 0.75mm^2
1 (brown)	GND	
4 (black)	P+ (A) (RS485 +)	
3 (blue)	P- (B) (RS485 -)	

M12 - socket
Frequency inverter



2.1.1.2 Connection variants

NORDAC Frequency inverter	Modules/options	Connecting cable
***trio* SK 300E** **SK 750 E**		
SK 52xE **SK 53xE** ***vector mc***	**Direct to terminals** (RS485)	**Connection cable M12 socket–> wires** M12 So / wires Part. No. 278910200
SK 700E	**SK CU1-STD** **SK CU1-USS**	
SK 5xxE **SK 200E** **SK 700E** (>22KW)	**Direct connection to device**	**Connection cable M12 socket -> RJ12** RH12 / M12 So Part. No. 278910230
PC / laptop	**SK IC1-232/485** Part. No. 276970020 + USB 5V Adapter Part. No. 278910220	**Connection cable M12 socket -> SUB-D** M12 So / Sub-D So Part. No. 278910210
NORD CON Software		
Direct to system connector		

ParameterBox

SK PAR-2H

Part. No. 278910100

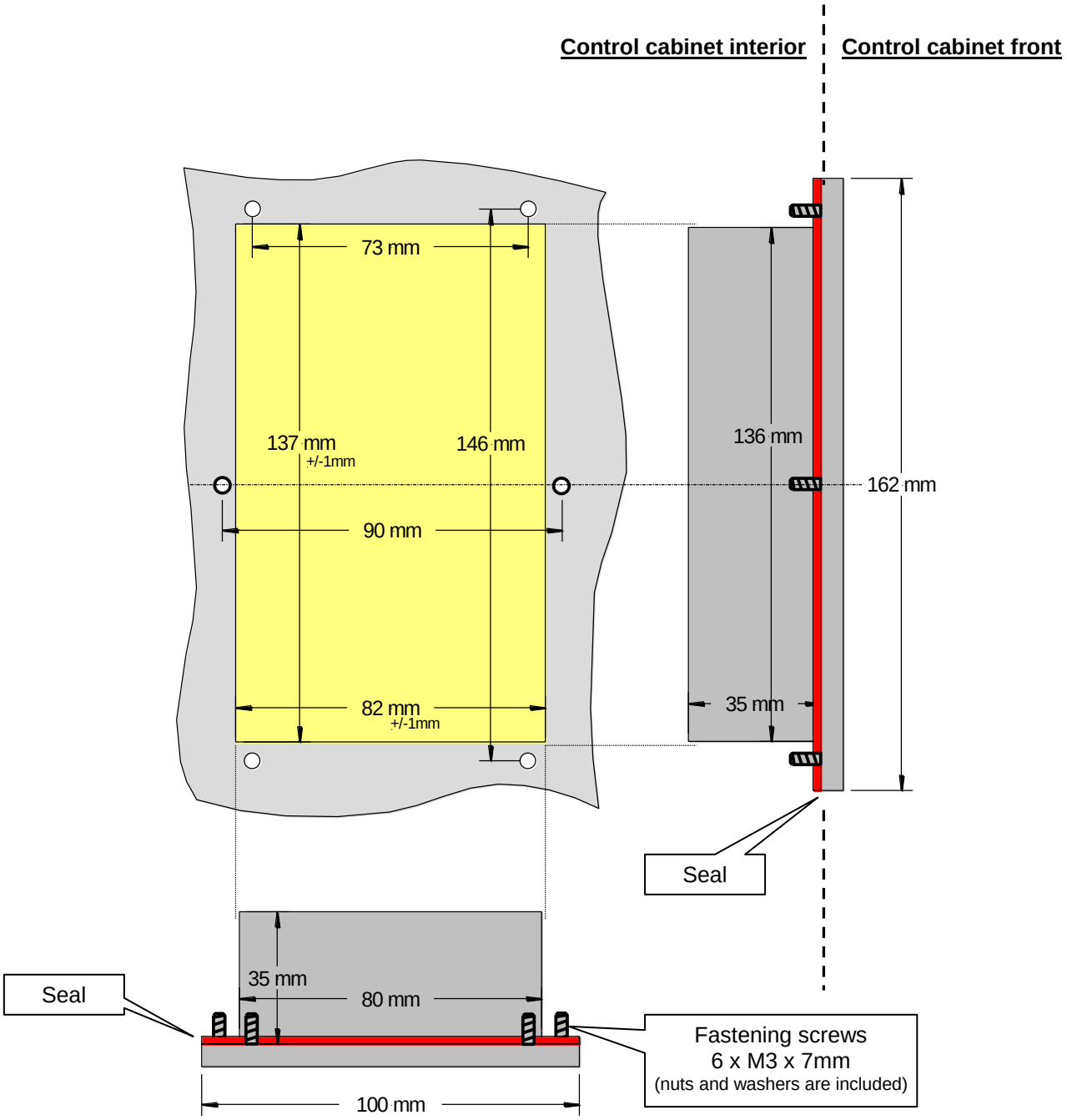
2.1.2 SK PAR-2E - built-in version

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 on the front panel.

2.1.2.1 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.

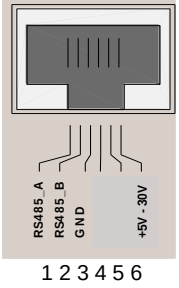
With the built-in model, the electrical connection of the ParameterBox SK PAR-2E can be made via the internal screw terminals 14. The precise assignment of the terminals can be seen in the following section.



2.1.2.2 Electrical connection

The SK PAR-2E ParameterBox is connected via the 6-pin screw connector 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.

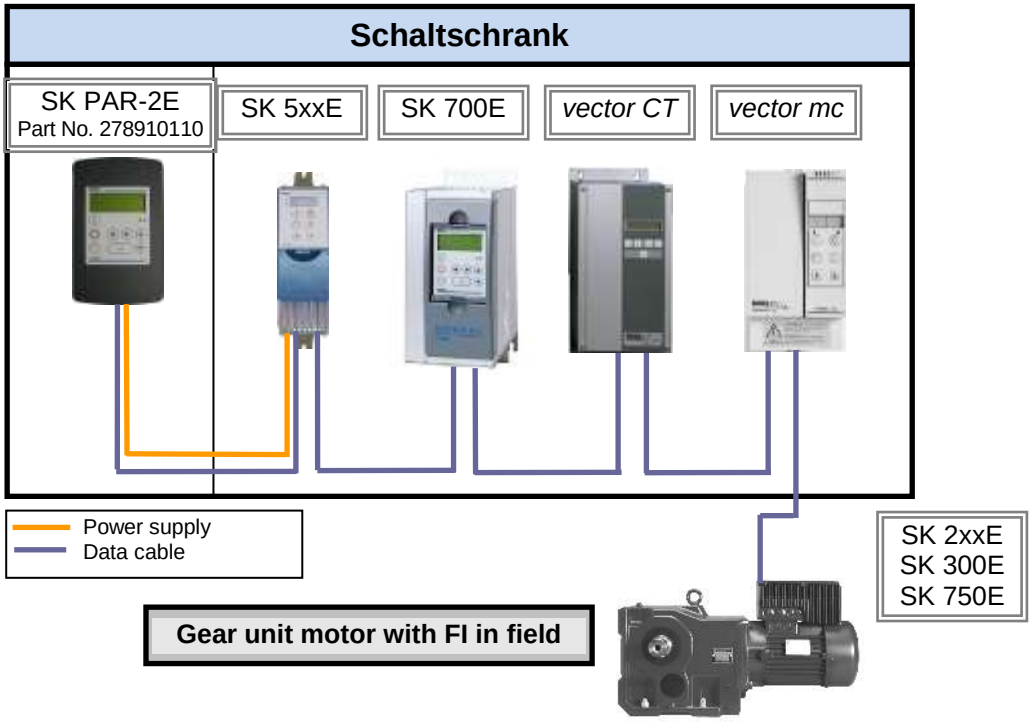
Number	Description	RJ 12
42	+ 4.5V… 30V / 1.3W	6
40	GND	3
73	P+ (A) (RS485 +)	1
74	P- (B) (RS485 -)	2
-	-	4
-	-	5



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 mm² - 1.5 mm^2. A flexible cable with a cross section of 4 x 0,75mm^2 is recommended.

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



2.1.2.3 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 fixed connection to the particular inverter via the terminal bar. However, these must always be compared with the labelling on the ParameterBox.

Description	***vector mc*** RS485	***vector*** *(CT / VT)*	**SK 300E**	**SK 52xE and higher X7:**	**SK 700E / SK 750E (with option…)**	
					SK CU1-STD	SK CU1-USS
+5V / +15V	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

ATTENTION **Damage to the RS485**

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 the 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	6 ("24V")	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

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

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.
As standard, the 4-pin M12 connector (plug) is available for connection of the ParameterBox to a decentralised frequency inverter (SK 300E/ SK750E).
If the ParameterBox is supplied from an external power source (+4.5 to +30V) according to the voltage, the data cables can also be considerably longer.

ATTENTION **Voltage level of external supply**

In order to avoid damage, if an external power supply to the ParameterBox is used, care must be taken that the output voltage of this external source is higher than that of the inverter voltage (however, max. 30V DC).

(E.g.: SK520E: 5V internal supply→ External supply for the ParameterBox **>5V**!)

2.1.3 SK …-3H – Handheld Version

2.1.3.1 SimpleBox SK CSX-3H – Handheld Version

The SK CSX-3H SimpleBox is a compact control device for direct connection to the frequency inverter via the RJ12 diagnostic socket. A normal RJ12 -patch cable ("Modular cable RJ12 (6/6) - RJ12 (6/6), 1:1 assignment") with a length of up to 3m can be used for connection.

If the SimpleBox is supplied from a power source with a higher voltage (e.g. $24V_{DC}$ from SK 200E), the cable can be considerably longer.

2.1.3.2 ParameterBox SK PAR-3H – Handheld Version

The SK PAR-3H ParameterBox is a compact control device for direct connection to the frequency inverter via the RJ12 diagnostic socket. A normal RJ12 -patch cable ("Modular cable RJ12 (6/6) - RJ12 (6/6), 1:1 assignment") with a length of up to 3m can be used for connection.
If the ParameterBox is supplied from a power source with a higher voltage (e.g. $24V_{DC}$ from SK 200E), the cable can be considerably longer.

A normal USB device connection cable (USB2.0 connection cable, Series A plug to Series B plug) is required to connect a PC or laptop.

ATTENTION	**Damage to PC**

The SK PAR-3H ParameterBox must *never* be connected *simultaneously* to the frequency inverter and the PC, as otherwise this may cause damage, especially to the PC.

2.1.3.3 Electrical Connection

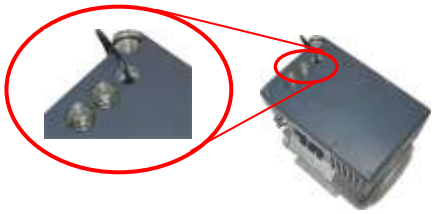
The parameter boxes SK CSX-3H and SK PAR-3H are only connected to a frequency inverter via the RJ12 socket. This connection also provides the power supply to the box.

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.

Connection of the SK PAR-3H ParameterBox to a PC is made via the USB interface integrated into the box. This connection also provides the power supply to the box.

The necessary driver software for the USB interface on the PC is supplied with the enclosed CD "EPD", but is also available free of charge on our Internet page (www.nord.com).

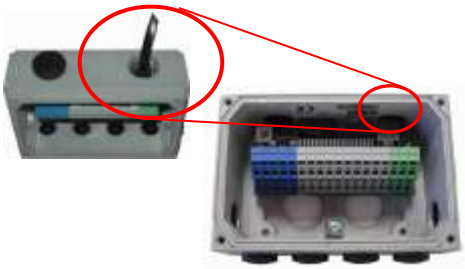
Connection to the particular frequency inverter is made via the RJ12 connection sockets on the device. The SimpleBox SK CSX-3H can only communicate with frequency inverters.



SK200E

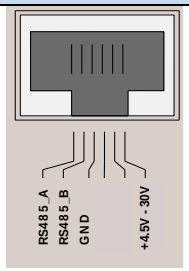
SK500E

SK700E



SK TI4-TU-BUS

The contact assignment of the RJ-12 connection on the parameter box is as follows:

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

2.1.4 SK …-3E - built-in version

The SK CSX-3E and SK PAR3E are built-in versions of the parameter boxes described in Section 2.1.3. If they are correctly installed in the front of the control panel they comply with protection class IP 54.

2.1.4.1 SimpleBox SK CSX-3E – Built-in Version

The SK CSX-3E SimpleBox is a compact control device for installation in a control panel and direct connection to the frequency inverter via the RJ12 diagnostic socket. A normal RJ12 -patch cable ("Modular cable RJ12 (6/6) - RJ12 (6/6), 1:1 assignment") with a length of up to 3m can be used for connection.

If the SimpleBox is supplied from a power source with a higher voltage (e.g. $24V_{DC}$ from SK 200E), the cable can be considerably longer.

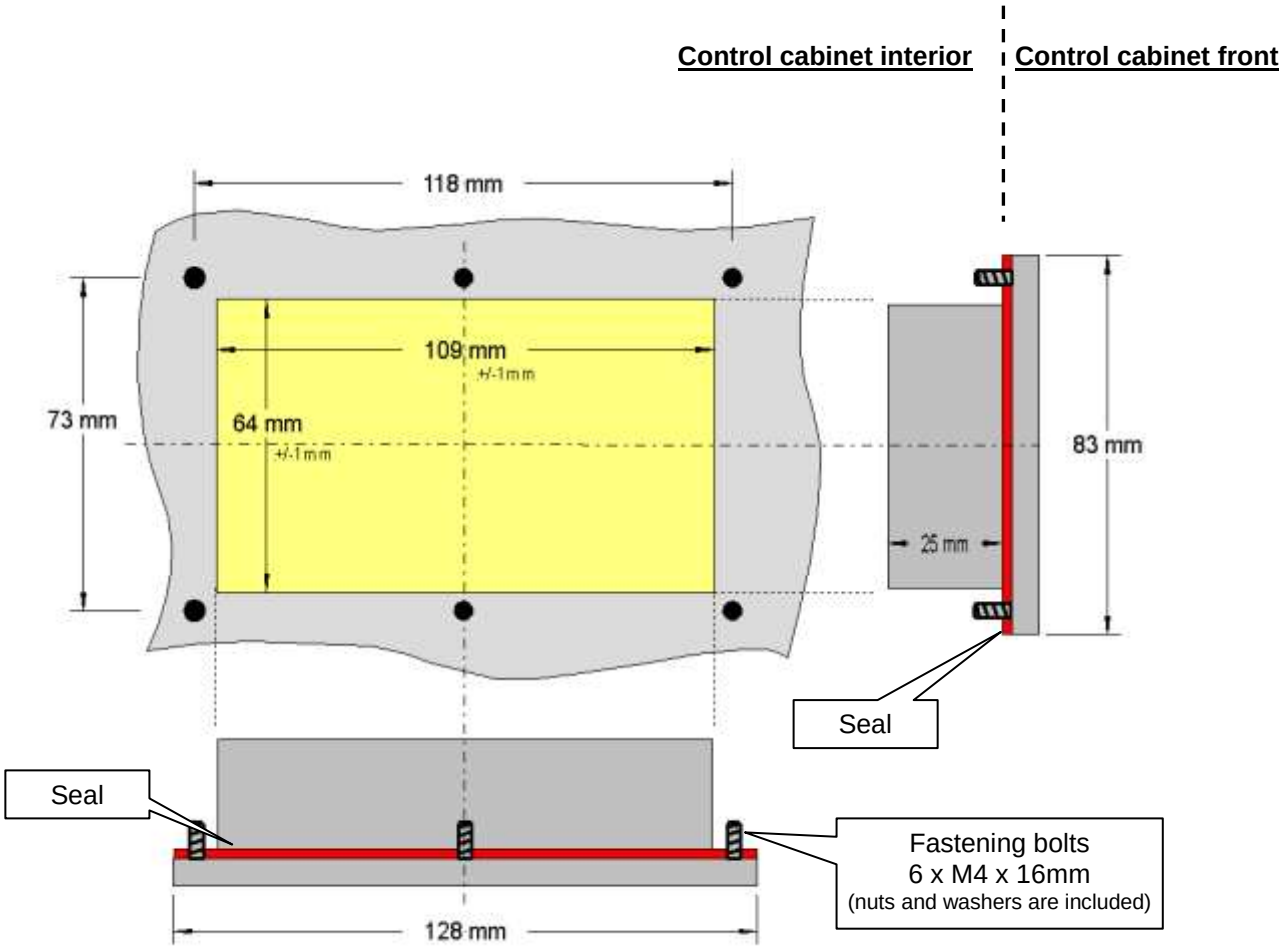
2.1.4.2 ParameterBox Version SK PAR-3E– Built-in Version

The SK CSX-3H ParameterBox is a compact control device for installation in a control panel and direct connection to the frequency inverter via the RJ12 diagnostic socket. A normal RJ12 -patch cable ("Modular cable RJ12 (6/6) - RJ12 (6/6), 1:1 assignment") with a length of up to 3m can be used for connection.
If the ParameterBox is supplied from a power source with a higher voltage (e.g. $24V_{DC}$ from SK 200E), the cable can be considerably longer.

2.1.4.3 Mechanical installation in a control panel

For installation in the control cabinet door or the control panel, a cut-out of 109mm x 64mm (tolerance +/- 1mm) must be made. The sealed unit must be inserted in the pre-processed cabinet panel. For attachment to the inside of the control panel, 6 threaded pins (M4 x 16 mm) (approx. 7 mm projection in installed condition) and the corresponding nuts are provided. The ParameterBox is now mounted securely on the control cabinet door and has maximum protection class IP54 on the front side, if mounted correctly.

Electrical connection of the SK CSX-3E or SK PAR-3E parameterisation boxes is made via the RJ12 socket which is accessible from the rear. The precise assignment of the terminals can be seen in the following section.



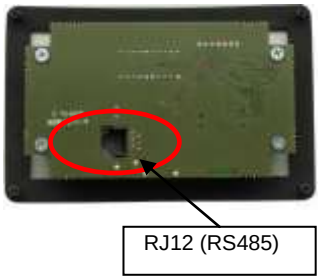
2.1.4.4 Electrical Connection SK …-3E

The parameter boxes SK CSX-3E and SK PAR-3E are only connected to a frequency inverter via the RJ12 socket. This connection also provides the power supply to the box.

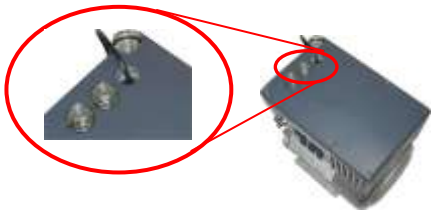
A termination resistor (220Ω) for the RS485 bus system is integrated into the module. Therefore the ParameterBox should only be connected as the first or last participant.

In contrast to the handheld version SK PAR-3H, connection of the SK PAR-3E ParameterBox to a PC is not possible.

Connection to the particular frequency inverter is made via the RJ12 connection sockets on the device. The SimpleBox SK CSX-3E can only communicate with frequency inverters.



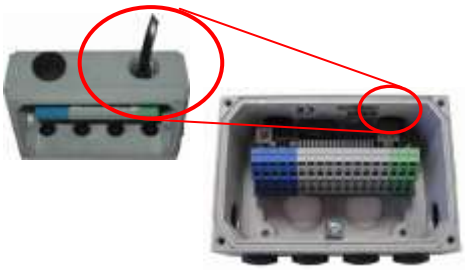
Rear of parameterisation box
Similar to illustration



SK200E

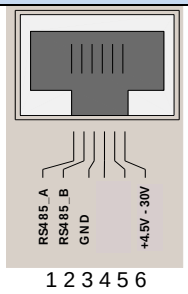
SK500E

SK700E



SK TI4-TU-BUS

The contact assignment of the RJ-12 connection on the parameter box is as follows:

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

2.1.5 SK TU3-… – (only for SK 5xxE)

2.1.5.1 ControlBox SK TU3-CTR

The SK TU3-CTR ControlBox is used for the commissioning, configuration and control of the SK 5xxE frequency inverter. It is mounted directly on the slot for the technology units. Communication with the inverter and the power supply of the module are provided by a contact strip The module cannot be used independently from the inverter.
The display is via a 4-digit, 7-segment display. Control is via 6 control buttons.
The parameters of an inverter can be saved.

2.1.5.2 ParameterBox SK TU3-PAR

The SK TU3-PAR ParameterBox is used for the commissioning, configuration and control of the SK 5xxE frequency inverter. It is mounted directly on the slot for the technology units. Communication with the inverter and the power supply of the module are provided by a contact strip The module cannot be used independently from the inverter.
The display is via a 4-line LED display. Control is via 8 control buttons.
The parameters of 5 inverters can be saved.

2.1.5.3 Installing the technology unit

Modules must not be inserted or removed unless the device is free of voltage. The slots may only be used for the intended modules.
Installation of a technology unit **separate** from the frequency inverter is <u>not</u> possible. It must be connected directly to the frequency inverter.

The **Installation** of the technology units must be carried out as follows:

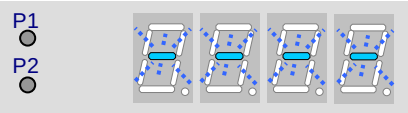
1. Switch off the mains voltage, observe the waiting period.
2. Push the control terminals cover down slightly or remove.
3. Remove the **blank cover**, by releasing the catch at the lower edge and turning it upwards.
4. Hook the **technology unit** onto the upper edge slots and press in lightly until it engages. Ensure full contact with the connector strip and fasten with the screws if necessary.
5. Close the control terminal cover again.

2.2 Functions of the Parameter Boxes

2.2.1 SimpleBox / ControlBox

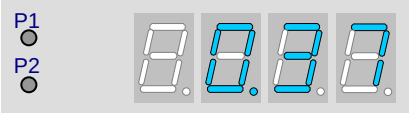
2.2.1.1 Display

After connection/installation of the Box and switching on the mains voltage (or the 24V DC control voltage) of the frequency inverter, communication between the frequency inverter and the Box commences automatically.

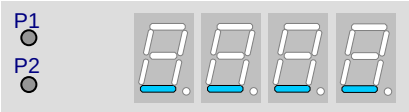


After brief illumination of all he display segments and diodes of the box a bus scan is carried out while the middle bars of the display (4-digit, 7-segment display) may flash rapidly.

If the bus scan is completed successfully, the frequency inverter power appears briefly in the display (e.g.: 0.37 = 0.37 KW). This step is skipped if the Box is connected to a frequency inverter which is already in operation.

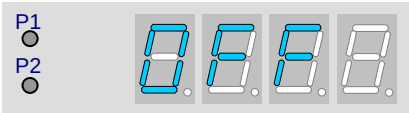


The horizontal bars which then appear in the display indicate that the frequency inverter is ready for operation.
If a jog frequency value is pre-set in parameter P113, or a minimum frequency is pre-set in P104, the display flashes with this initial value.



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.

After the frequency inverter is switched off, an "OFF" appears briefly in the display before the display is completely switched off.
"OFF" is also shown in the display if the SimpleBox is operated via an external 24V control voltage, although the power supply (230V or 400V) is inactive.



In this state, almost unrestricted parameterisation of the inverter (no measurement of motor resistance or parameter identification is possible (P208 / P220)) can be carried out as described in the following section. However, control (enabling) is not possible due to the lack of the power supply.

Information — **Setpoint**

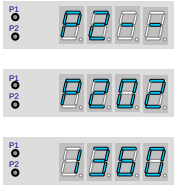
The digital frequency setpoint is factory set to 0Hz. To check whether the motor is working, a frequency setpoint must be entered with the ▲ or ▼ keys or a jog frequency via the respective parameter >Jog frequency< (P113).

WARNING — **Danger of injury if motor starts**

The motor may start immediately after pressing the START key I!

2.2.1.2 Operation

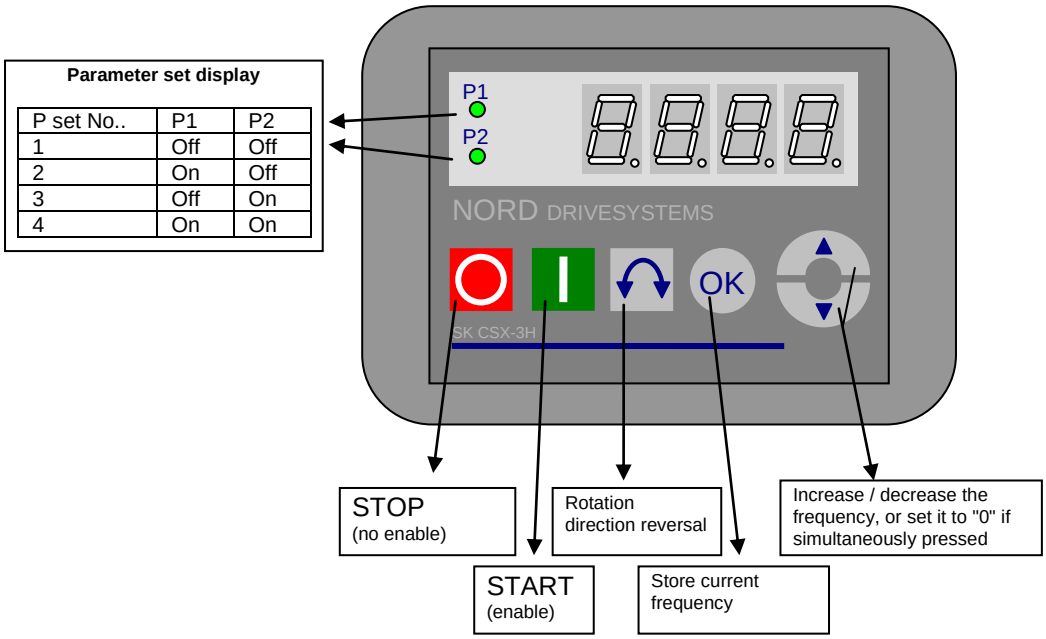
I	Switching on the frequency inverter. The frequency inverter is now enabled with the set jog frequency (P113). A preset minimum frequency (P104) may at least be provided. Parameter >Interface< P509 and P510 must = 0.
O	Switching off the frequency inverter. The output frequency is reduced to the absolute minimum frequency (P505) and the frequency inverter shuts down.
7-segment LED display 4-digit	

Operating mode	Display	Comments
Ready for operation without setpoint present		Display of 4 static underscores. If the underscores flash slowly: the frequency inverter is not ready for operation (e.g.:) • Starting disabled: Function "Safe pulse block" or Fast stop active • enable signal before the frequency inverter is ready for operation.
Ready for operation with setpoint present		Numbers flash slowly: A starting setpoint (P104 / P113 in keyboard operation) (e.g.: 5.3Hz) is indicated. This frequency is immediately used on being enabled.
In operation		Display of actual frequency.
In case of fault		Display of an actual and active error message. Slow flashing of the display indicates that the fault is no longer present and the error message can be acknowledged.
Parameterisation		Display of parameter number or parameter value. 1. Parameter group (e.g.: Motor data (P2 - -)) 2. Parameter number (e.g.: Nominal speed (P202)) 3. Parameter value (e.g.: 1360min^{-1}))

LEDs P1 P2	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. = P1 = P2 = P3 = P4
↺	The motor rotation direction changes when this key is pressed. "Rotation to the 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.
▲	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.
OK	Press "ENTER" to store an altered parameter value, or to switch between parameter number or parameter value. **NOTE**: If a changed value is not to be stored, the ↺ key can be used to exit the parameter without storing the change.

Control with the SimpleBox / ControlBox

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).
As well as this, with the series SK 500E and SK 700E no technology unit (SK TU3-PAR or SK TU1-PAR) may be plugged into the inverter.
If the "START" key is pressed, the frequency inverter in the operating display changes (selection P001). The frequency inverter supplies 0Hz or the minimum frequency (P104) or jog frequency (P113) which has been set.
The following illustration is for the SimpleBox and applies accordingly for the ControlBox.



P set No..	P1	P2
1	Off	Off
2	On	Off
3	Off	On
4	On	On

Parameter set display:
The LEDs indicate the actual operating parameter set in the operating display (P000) and the current parameter set being parameterised (≠ P000). In this case, 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 ⊕ permanently stored in P113 as the jog frequency by pressing the ENTER key.

Frequency addition (only SK 5xxE):
If the parameter “PotentiometerBox Function” (P549) has been set to function {4}”Frequency addition” or function {5} “Frequency subtraction”, as of software version 1.7 of the inverter a setpoint can be added via the Box, even if enabling and other setpoints are provided from another source (control terminals, BUS).
However, after the drive unit has been shut down, this additive setpoint is reset to zero.
By pressing the ENTER key however, the set value is permanently stored in parameter P113 as the jog frequency, and continues to be available as a setpoint value on re-enabling after shutdown.

Emergency stop (only SK TU3-CTR):
By simultaneously pressing the STOP key ⊙ and the "Change direction key” ⟲ , an emergency stop can be initiated.

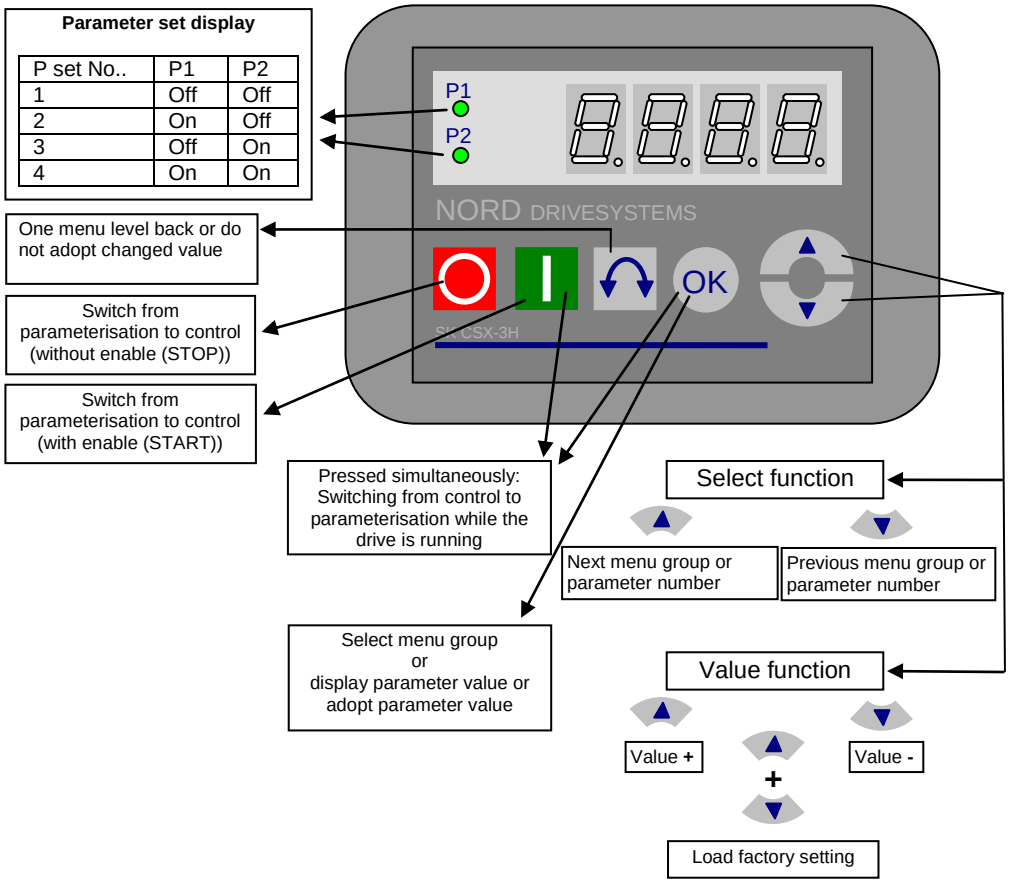
Information for the SimpleBox (SK CSX-3x)
No technology unit (SK TUx-PAR) may be plugged in if SK 500E and SK 700E series inverters are used. Otherwise, communication errors can be expected.

Parameterisation with the SimpleBox / ControlBox

The **parameterisation** of the frequency inverter can be performed in the 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, the 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 . → p0_ ... 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 . → p0_ ... p7_
3. If the inverter is enabled via the ControlBox (START key), the parameterisation mode can be accessed by pressing the START and ENTER keys (+ or) simultaneously.
4. Switching back to the control mode is achieved by pressing the START key .

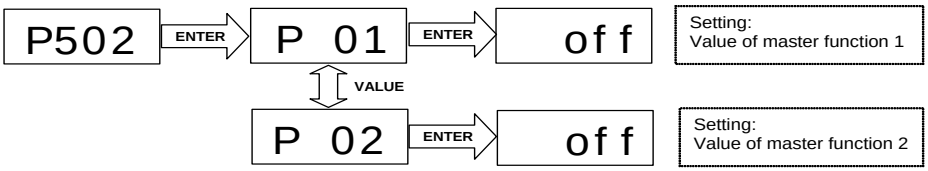
The following illustration is for the SimpleBox and applies accordingly for the ControlBox.



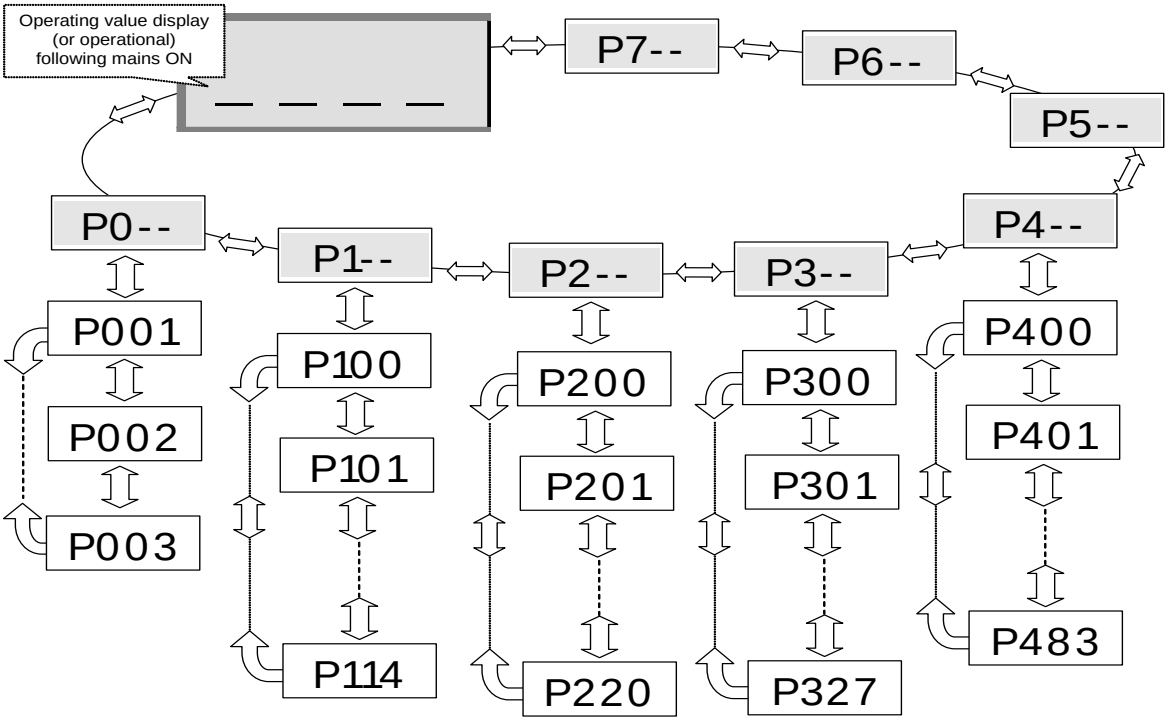
Changing parameter values

To access the parameter section, one of the value keys, or must be pressed. The display changes to the menu group display p0_ ... p7_ . After pressing the ENTER key or , 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 → pxxx . The significance and description of the parameters starts in Section 5 "Parameterisation"

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



Menu structure with the SimpleBox



To **change a parameter value**, the ENTER key ↵ or OK 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 OK 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.

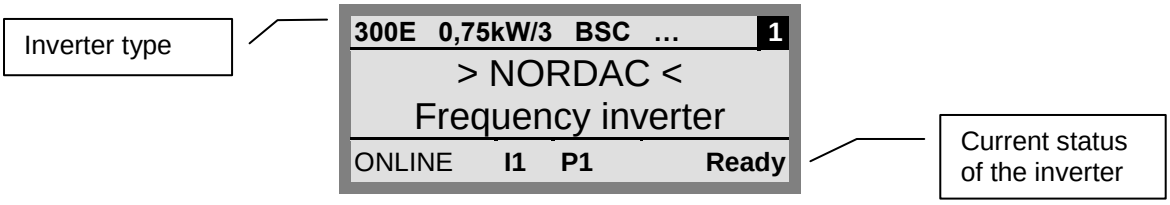
If a change is <u>not</u> to be saved, the "DIRECTION" key ↺ can be pressed to leave the parameter.

2.2.2 ParameterBox

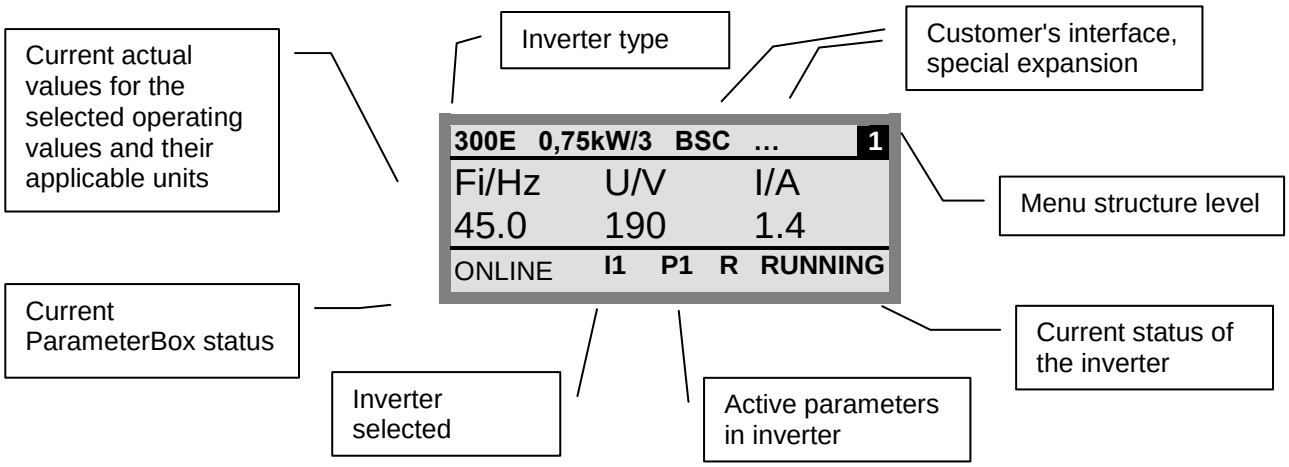
2.2.2.1 Display

After the initial commissioning of the ParameterBox, a query is made as to whether the menu language should be German or English

Then, or after each new commissioning of the Box 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.

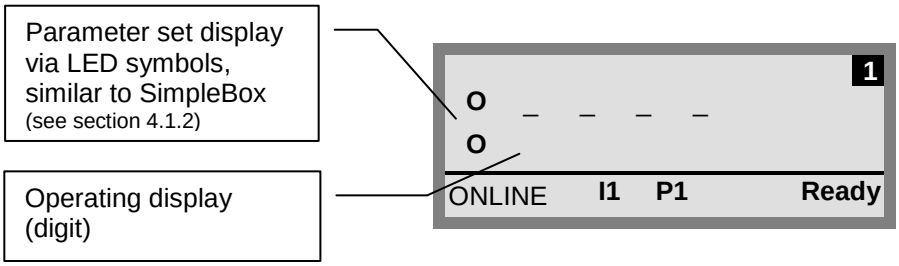


In the standard display mode, 3 operating values and the current frequency inverter status can be displayed simultaneously.
The operating values displayed can be selected from a list of 8 possible values (in Menu>Display</>Values for display<(P1004)).



2.2.2.2 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)



Information — **Setpoint**

The digital frequency setpoint is factory set to 0Hz. To check whether the motor is working, a frequency setpoint must be entered with the ▲ or ▼ keys or a jog frequency via the respective parameter >Jog frequency< (P113).

WARNING — **Danger of injury if motor starts**

The motor may start immediately after pressing the START key !

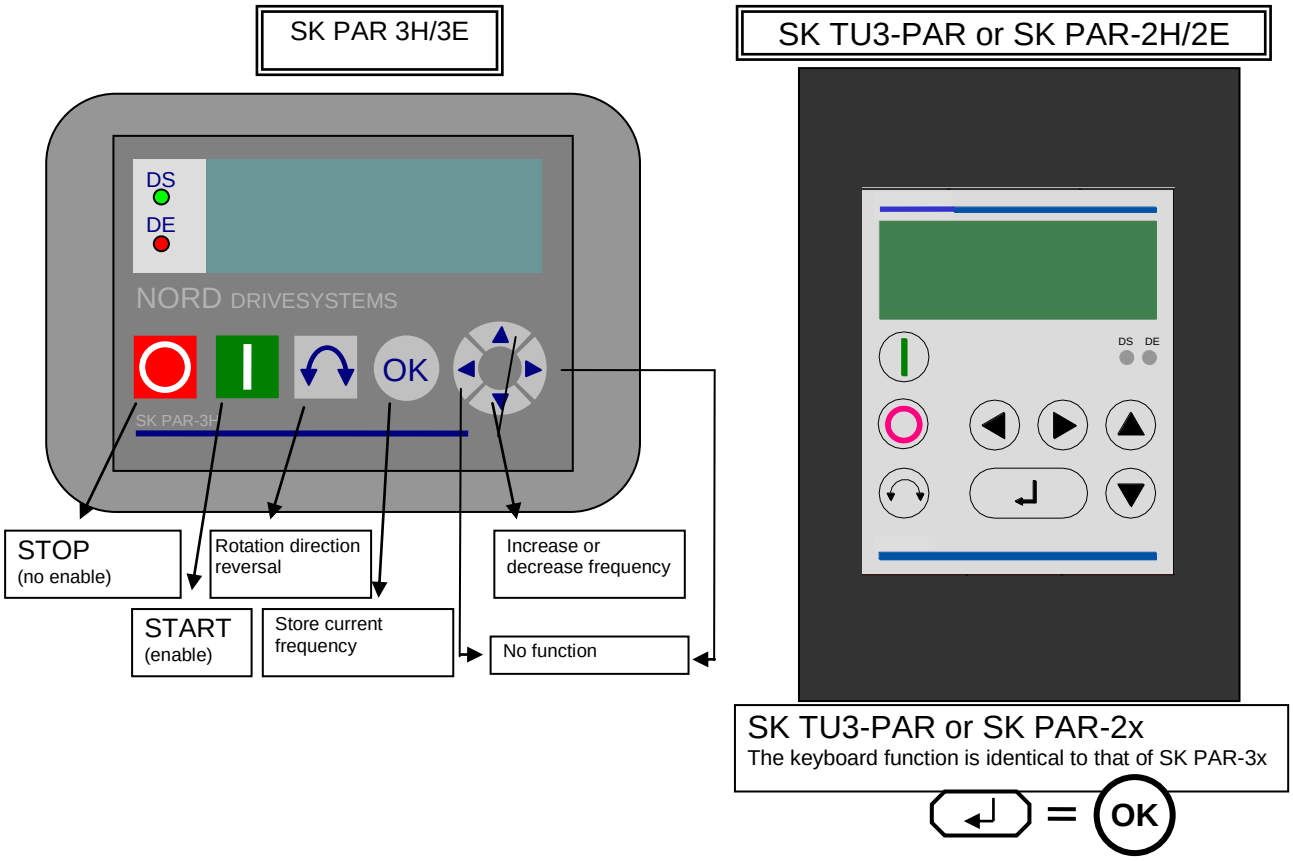
2.2.2.3 Operation

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 OK	Press the **ENTER key** to select a menu group or accept the changed menu item or parameter value. **Note**: If a parameter is to remain, without a new value being stored, then one of the SELECTION keys can be used for the 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).	
I	**START key** for switching on the frequency inverter.	**Note**: Can only be used if this function has not been blocked in parameter P509 or P540.
O	**STOP key** for switching off the frequency inverter.	
↻	The direction of rotation of the motor changes when the **DIRECTION key** is operated. 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 indicate the actual status of the ParameterBox. DS (ON (green)) Device State — The ParameterBox is connected to the power supply and is operational. DE (ERROR (red)) Device Error — An error has occurred in the processing or communication of the data or in the connected frequency inverter.	

Control of the inverter

The speed and direction of rotation of the inverter can be fully controlled via the ParameterBox. Different settings are necessary according to the inverter series.

Series	Parameter setting (P509)	Comments
SK 200E	{0} "Control terminal or keyboard"	Control with the ParameterBox is only possible if no enable has been carried out via the control terminals. (The interface which is used first has priority.)
SK 300E	{0} "Control terminal or keyboard"	Control with the ParameterBox is only possible if no enable has been carried out via the control terminals. (The interface which is used first has priority.)
SK 500E	For the use of an **SK PAR-2x** or **SK PAR-3x**:	
	{2} "USS"	No further control via the control terminals or the keyboard of a plugged in technology unit is possible.
	For the use of an **SK TU3-PAR**:	
	{0} "Control terminal or keyboard"	Control with the ParameterBox is only possible if no enable has been carried out via the control terminals. (The interface which is used first has priority.)
SK 700E	{4} "USS"	No further control via the control terminals or the keyboard of a plugged in technology unit is possible.
SK 750E	{4} "USS"	No further control via the control terminals or the keyboard of a plugged in technology unit is possible.
Vector mc	{0} "Control terminal or keyboard"	Control with the ParameterBox is only possible if no enable has been carried out via the control terminals. (The interface which is used first has priority.)



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.

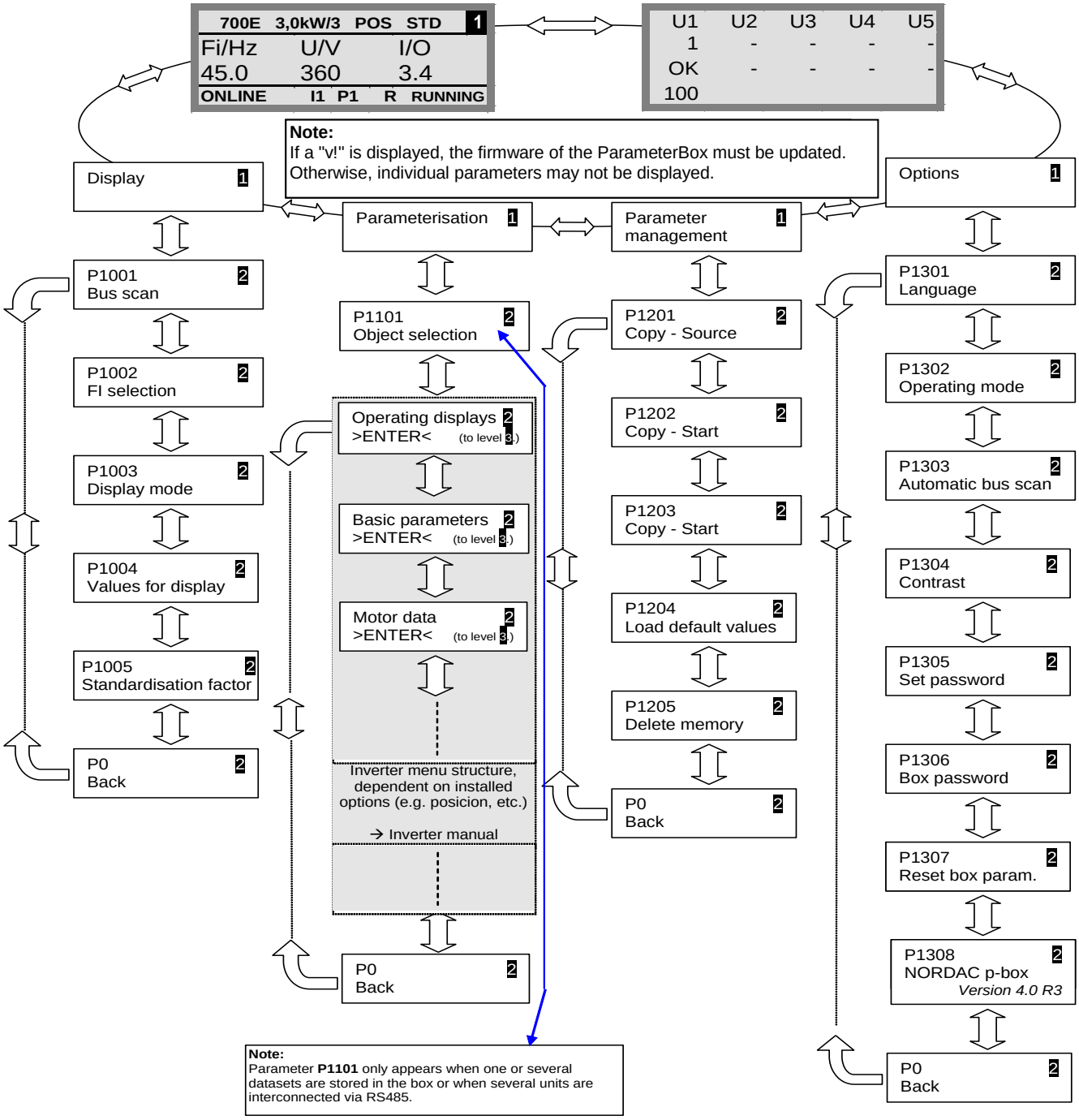
After changing the parameter set during operation, this must be activated with the buttons or . However, it is safer to carry out the switchover at a standstill.

WARNING **Danger of injury if motor starts**

The drive may start immediately after pressing the START key !

Menu structure of the ParameterBox

The menu structure consists of various levels which 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.

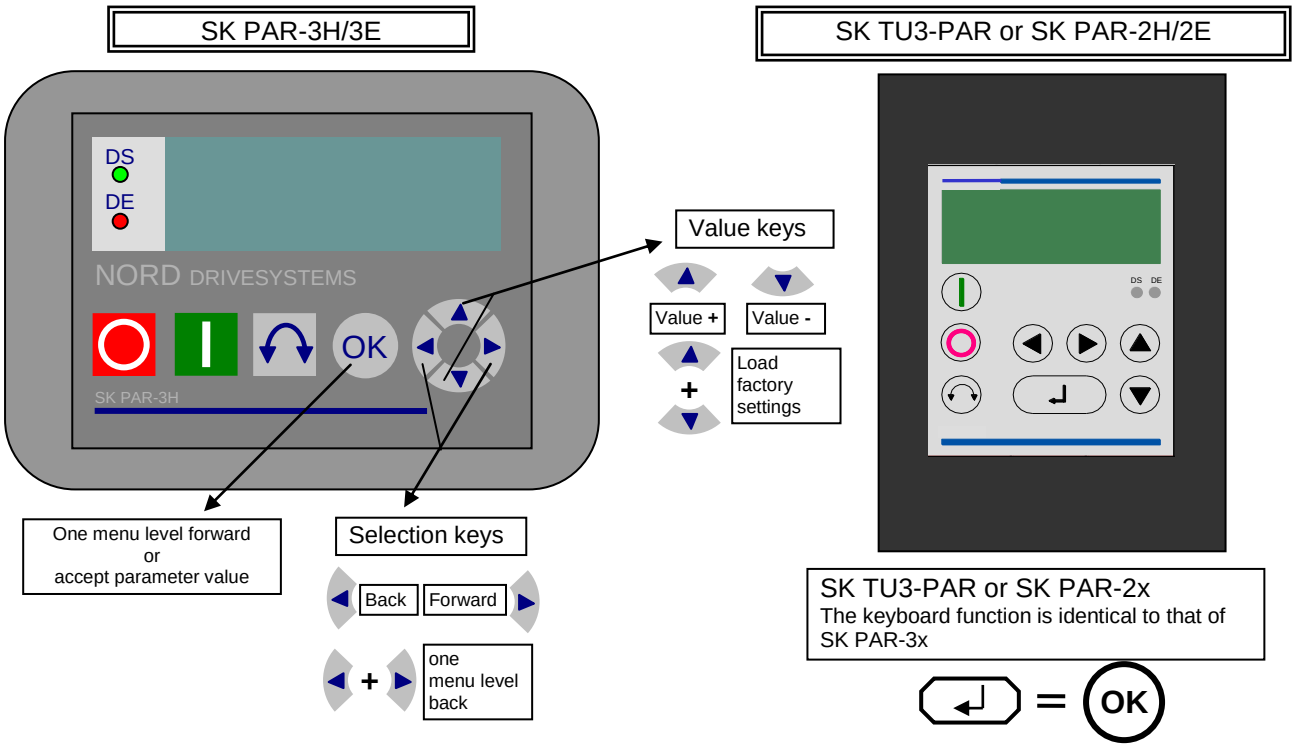


>Display< (P11xx), **>Administer Parameters<** (P12xx) and **>Options<** (P13xx) are purely ParameterBox-parameters and do not have any direct influence on frequency inverter parameters.

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.

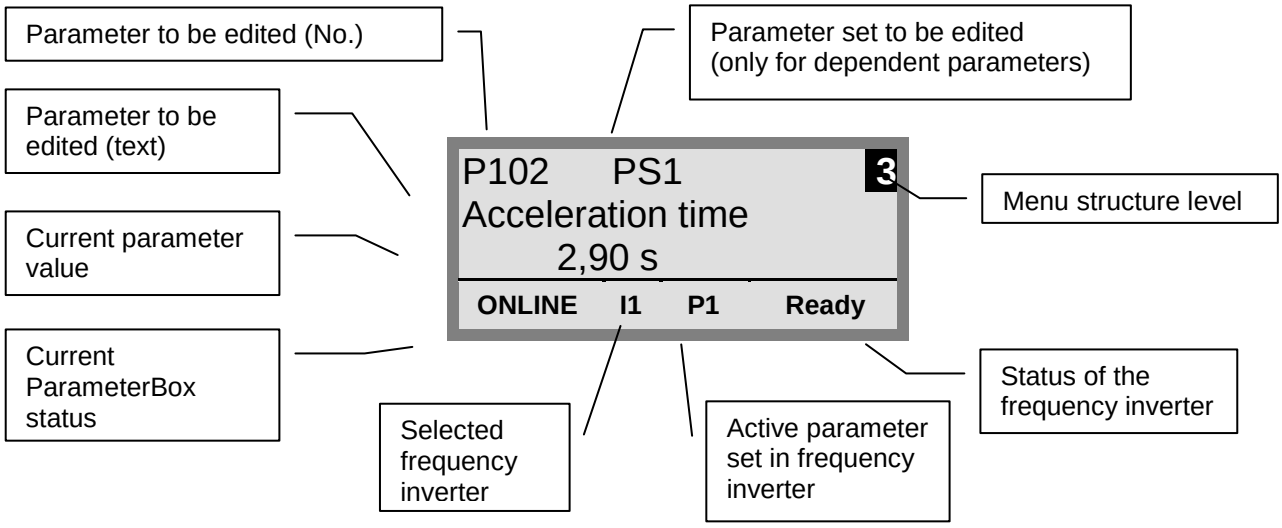
Parameter setup with the ParameterBox

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.



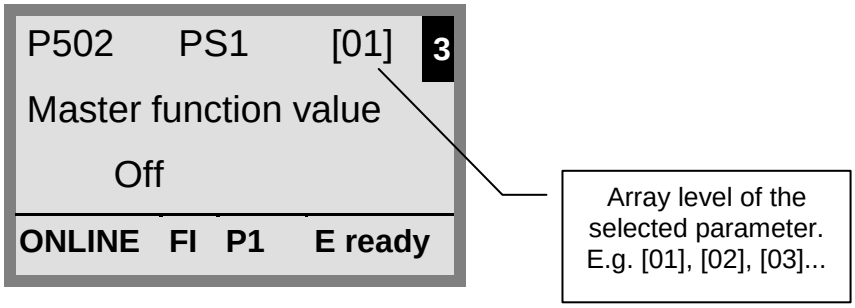
Screen layout during parameterisation

If the setting of a parameter is changed, then the value flashes until it is 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.

NOTE: Some parameters, e.g.: P465, P475, P480…P483, P502, P510, P534, P701…P706, P707, P718, P740/741 and P748 (depending on the inverter series) have additional levels (arrays), in which further settings can be made. After the parameter has been reached, the required array must be selected with the arrow keys ⊛ or ⊛ and confirmed with ENTER.



Parameterisation in ControlBox mode

Parametrisation of the frequency inverter in ControlBox mode is carried out in the same way as for parameterisation with the SimpleBox / ControlBox. A detailed description can be found in Section 2.2.1 under "**Parameterisation with the SimpleBox / ControlBox** ".

Menu structure in ControlBox mode

The menu structure in ControlBox mode corresponds to that of the SimpleBox / ControlBox. A detailed description can be found in Section 2.2.1 under "**Menu structure with the SimpleBox / ControlBox** ".

Visualisation mode PLC (firmware version V4.3 or higher, available from about the 3th quarter of 2011)

From firmware version V4.3 (Parameter (P1308)) the ParameterBox is equipped with the visualisation mode "PLC display". This mode is activated in parameter (P1003).
In this mode, communication of the ParameterBox with the PLC (SPS) of a suitably equipped NORD frequency inverter (e.g. SK 540E / SK 545E) is possible so that the PLC can use the entire display can be used as a display interface.
Further information regarding the PLC is described in the manual BU0550.

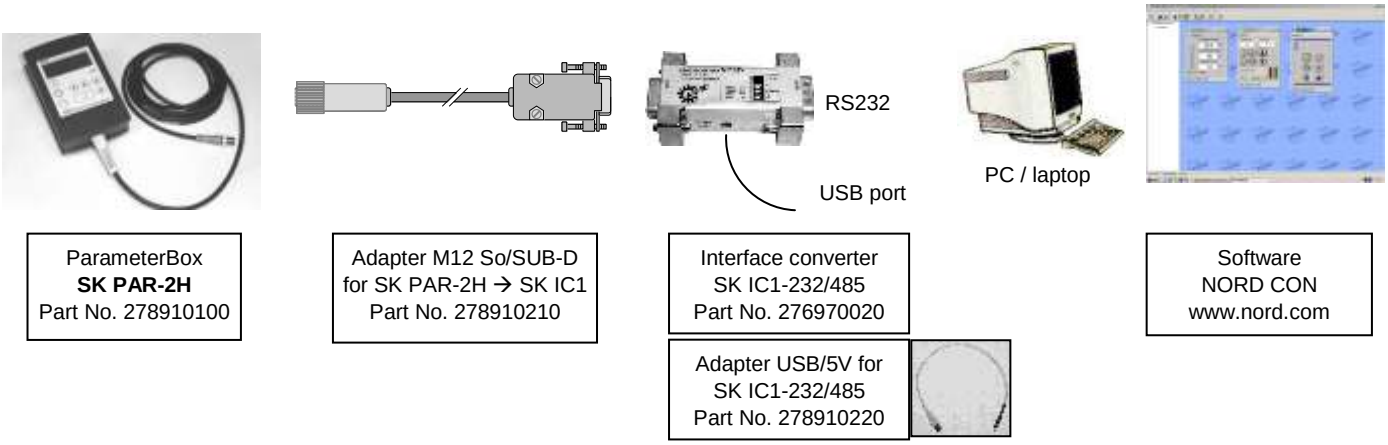
2.2.2.4 Data transfer with NORD CON (except for, SK TU3-PAR)

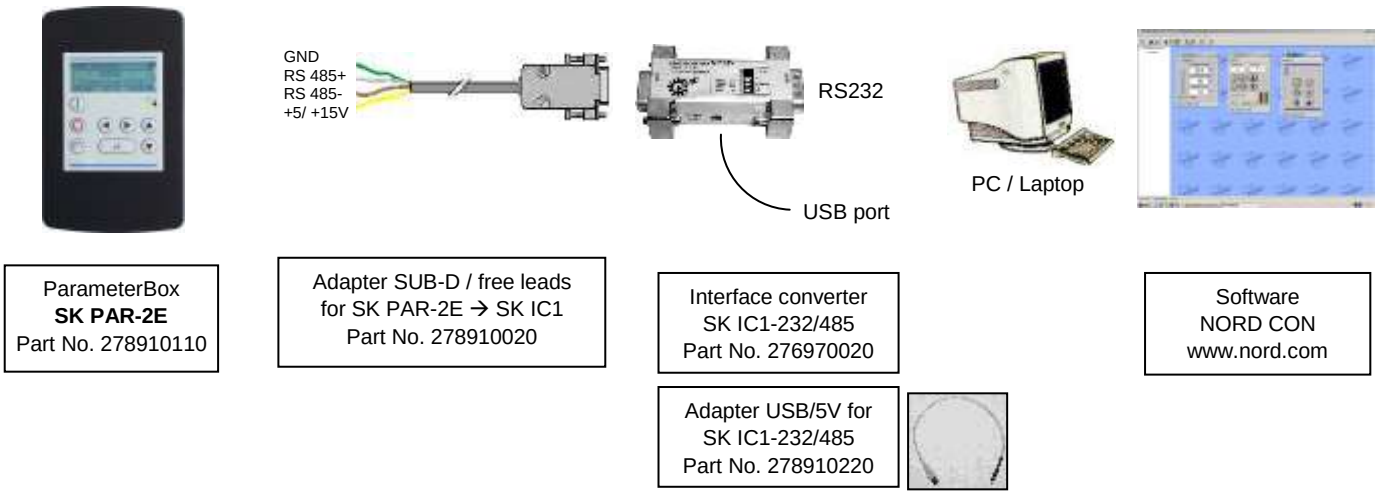
The NORD ParameterBox S1 to S5 storage elements can be managed using the **NORD CON** control and parameterisation software.
In order to achieve transfer or the data between the inverter and **SK PAR-2x**, the serial interface of the PC (RS232) must be connected to the ParameterBox via an interface converter (RS232/485) (see also Section 2.1.1.2). We recommend the interface converter SK IC1-232/485. The converter and the ParameterBox are powered by an external power supply (5V/250mA). Connection is made to the 3mm socket at the side of the interface converter, using an **adapter from the USB port,**
Please ensure that the USB port is suitable for *high power* devices.

In order to transfer data between the inverter and **SK PAR-3H**, only a normal USB connection cable (USB2.0 connection cable, A-series plug to B-series plug) is required. The power supply to the box is also via this connection.
The necessary driver software for the USB interface on the PC is supplied with the enclosed CD "EPD" (in folder **Disk13** of the NORD CON installation file), but is also available free of charge on our Internet page (www.nord.com).
Please ensure that the USB port is suitable for *high power* devices. A USB2.0 port is required on the PC.

ATTENTION	**Damage to PC**
The SK PAR-3H ParameterBox must never be connected simultaneously to the frequency inverter and the PC, as otherwise this may cause damage, especially to the PC.	

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





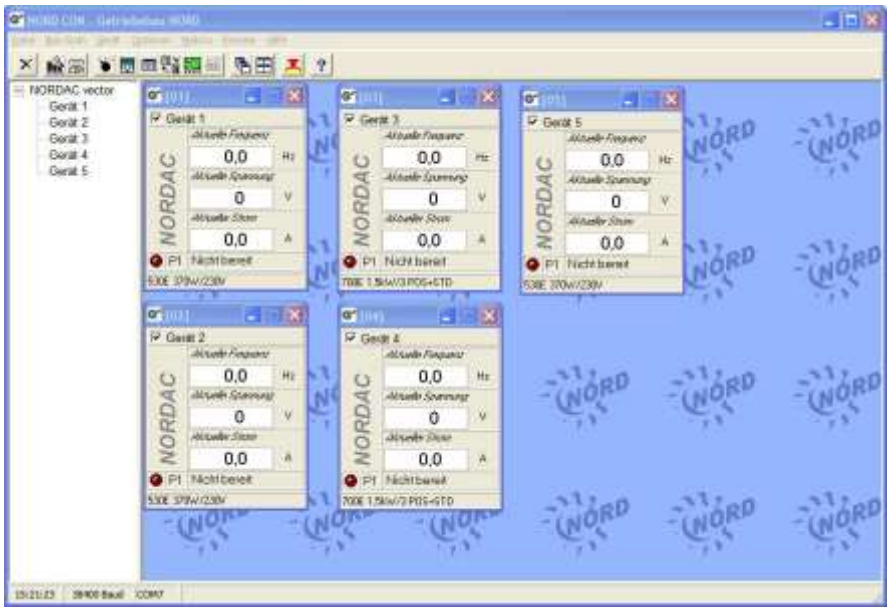
PC / Laptop

ParameterBox **SK PAR-3H** Part No. 275281014	USB2.0 cable plug A to plug B for SK PAR-3H → PC	Software NORD CON www.nord.com

In this configuration, 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 switchover). 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 on-screen.

Information **Pre-assembly of an inverter data set**

Only frequency inverter storage objects (data sets) can be detected and processed by the **NORD CON** parameterisation software. To edit the data record of a new frequency inverter (i.e. a new **data set** is to be **created**), the inverter type must first be set via the >Load default values (P1204)< parameter. By means of a new bus scan the software identifies the new storage object, which can then be edited with the usual tools.



All NORD CON parameterisation functions are now available.

2.2.2.5 Description of the system parameters

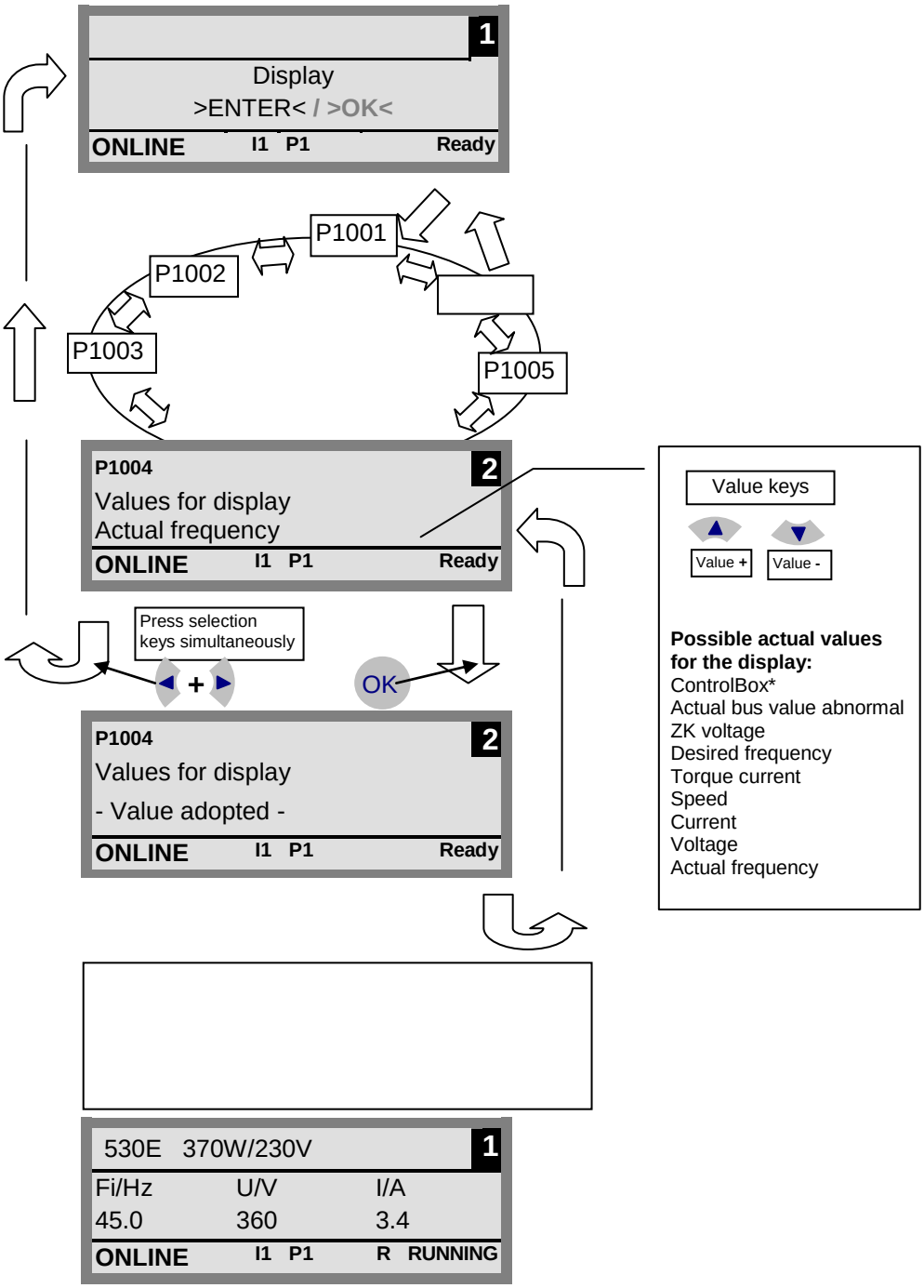
The menu structure of the ParameterBox is described in Section 2.2.2 "Control" under "**Menu structure of the ParameterBox**".
The following main functions are assigned to the menu groups:

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

2.2.2.6 Parameter display

Parameter	Setting value / Description / Note
P1001	**Bus scan**
Off / Start [Off]	A bus scan is initiated with this parameter. During this process a progress indicator is shown in the display. After a bus scan, the display reverts to the basic menu. Parameter P1001 is reset to “Off”. Depending on the result of this process, the ParameterBox goes into the "ONLINE" or "OFFLINE" operating mode.
P1002	**FI selection**
FI1 ... FI5 [FI1]	Selection of the current item to be parameterised/controlled. 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. **Note:** If an error has occurred in a connected frequency inverter, it can be acknowledged by selecting the frequency inverter.
P1003	**Display mode**
Value range: *see right hand column* [Standard]	Selection of the operating values display for the ParameterBox Standard: Any 3 values next to each other List: Any 3 values listed with units Large size display: 1 value (any) with unit ControlBox: 1 value without unit PLC display: Display mode for PLC functionality ((above Version 4.3), available from about the 3rd quarter 2011)
P1004	**Values for display**
Value range: *see right column* [Actual frequency]	Selection of a display value for the actual value display of the ParameterBox. 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. 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.

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.

2.2.2.7 Inverter parameterisation

Parameter	Setting value / Description / Note
P1101	**Object selection**
FI1 ... FI5 and S1 … S5 […]	Selection of the object to be parameterised. 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. This **parameter is not shown** if only one device is recognised and there is no storage object available.

2.2.2.8 Parameter administration

Parameter	Setting value / Description / Note
P1201	**Copy - Source**
FI1 ... FI5 and S1 … S5 […]	Selection of the actual source object to be copied. In the selection list, only the frequency inverters and storage objects detected during the bus scan are shown.
P1202	**Copy - Target**
FI1 ... FI5 and S1 … S5 […]	Selection of actual target object to copy. In the selection list, only the frequency inverters and storage objects detected during the bus scan are shown.
P1203	**Copy - Start**
Start, Off [Off]	This parameter triggers a process, whereby all the parameters selected in >Copy – Source< are transferred to the object specified in the >Copy – Target< parameter. If there is a possibility of overwriting data (e.g. for the transfer of data from a memory to a connected inverter) an additional confirmation window is displayed. The transfer starts after acknowledgement.
P1204	**Load default values**
FI1 ... FI5 and S1 … S5 […]	In this parameter, the default settings are written to the parameters of the selected item. 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 Section 2.2.2.4 data exchange with NORD CON).
P1205	**Delete memory**
S1 ... S5 [S1]	With this parameter the data in the selected storage medium is deleted.

2.2.2.9 Options

Parameter	Setting value / Description / Note
P1301	**Language**
Value range: *see right hand column* […]	Selection of languages for operation of the ParameterBox Available languages: German, English, Polish, Finnish, Dutch, French, Italian, Czech, Spanish, Swedish, Danish, Russian
P1302	**Operating mode**
Value range: *see right hand column* [Online]	Selection of the operating mode for the NORD ParameterBox • **Offline:** The ParameterBox 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 ParameterBox. 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 log on as separate frequency inverters S1 → USS address 1 S2 → USS address 2 S3 → USS address 3 S4 → USS address 4 S5 → USS address 5 **Note:** If no storage object is saved, no object can be found by NORD CON.
P1303	**Automatic bus scan**
On, Off [On]	Setting the switch-on characteristics. • **Off** No bus scan is carried out, the frequency inverters connected before the switch-off are located after switching on. If the connection configuration has been changed (e.g. a different inverter has been connected), error 223 is generated. • **On** A bus scan is automatically implemented when the ParameterBox is switched on.
P1304	**Contrast**
0 ... 100 % [50]	Contrast setting of the ParameterBox display
P1305	**Set password**
0 ... 9999 [0]	The user can set up a password in this parameter. 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.

Parameter	Setting value / Description / Note
P1306	**Box password**
0 ... 9999 [0]	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, than all functions of the ParameterBox can be used again. **NOTE:** In case the password is not known and parameterisation of the inverter needs to be carried out, please contact our Technical Support.
P1307	**Reset Box parameter**
Start, Off [Off]	In this parameter the ParameterBox can be reset to the default setting. All ParameterBox settings and the data in the storage media will be deleted.
P1308	**NORDAC p-box**
Version ... R … […]	Displays the software version of the ParameterBox. Please keep to hand.

2.2.3 Table of possible error messages

The following describes all possible error messages of the ParameterBox. Error messages which relate to the connected frequency inverter (E xx.x) are described in the frequency inverter manual or one of the relevant supplementary instructions.

Display Error number	Fault Text in the ParameterBox	Cause • Remedy
Communication error		
200	Illegal parameter number	These error messages are due to EMC interference or differing software versions of the participants. • Check the software version of the ParameterBox and that of the connected frequency inverter. • Check the cabling of all components, regarding possible EMC interference • Plug-in EEPROM on the frequency inverter (Memory module) not recognised (Error: 201) →Check for firm connection
201	Parameter value cannot be changed	
202	Parameter value out of range	
203	Faulty SUB Index	
204	No Array parameter	
205	Incorrect parameter type	
206	Incorrect response identifier USS interface	
207	Checksum error of USS interface	Communication between frequency inverter and ParameterBox is faulty (EMC), safe operation cannot be guaranteed. • 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 USS interface	Communication between frequency inverter and ParameterBox is faulty (EMC), safe operation cannot be guaranteed. • 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. • Check the connection to the frequency inverter. The settings of the USS parameters for the frequency inverter were changed during operation.

Display Error number	Fault Text in the ParameterBox	Cause • Remedy
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. • 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 set up. • 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). • 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. • 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). • Carry out a bus scan via the parameter >Bus Scan< (P1001).
ParameterBox operating error		
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	Parameterisation attempt of a deleted storage medium
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.

Display Error number	Fault Text in the ParameterBox	Cause • Remedy
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	Different SW version? → Next Cancel	
243	Different series? → Next Cancel	
244	Delete all data? → Yes No	
Inverter control error		
250	This function is not enabled	The function requested is not enabled at the frequency inverter parameter interface. • 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. • 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 in effect.
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.

2.3 Technical data

Name	SK TU3-PAR	SK PAR-2H	SK PAR-2E	SK PAR-3H	SK PAR-3E	SK CSX-3H	SK CSX-3E	SK TU3-CTR
Control voltage	$4.5V_{DC}$ … $30V_{DC}$							
Power consumption	approx. 1.3 W	approx. 1.3 W	approx. 1.3 W	approx. 1.3 W	approx. 1.3 W	approx. 1.0 W	approx. 1.0 W	approx. 1.0 W
Display	Plain text display				4-digit, 7-segment display			
Interfaces	SPI-Bus	RS485	RS485	RS485 and	RS485	RS485	RS485	SPI-Bus
Ambient temperature	0°C … 40°C							
Protection class	IP20	IP54[1)]	IP54[2)]	IP54[3)]	IP54[2)]	IP54[3)]	IP54[2)]	IP20
Dimensions (L x W x D)	(73 x 100 x 20) mm	(90 x 145 x 27) mm	(100 x 162 x 38) mm	(117 x 73 x 24) mm	(128 x 83 x 32) mm	(117 x 73 x 24) mm	(128 x 83 x 32) mm	(73 x 100 x 20) mm
Weight approx.	0,2 kg	0.7 kg	0.5 kg	0.2 kg	0.6 kg	0.2 kg	0.6 kg	0,2 kg
Connection cable length	Not possible	approx. 3m		approx. 2m		approx. 2m		Not possible

[1)] with plug inserted
[2)] on the front side
[3)] on plug socket IP20

2.4 Accessories for NORD parameterisation boxes *(except SK TU3-xxx)*

2.4.1 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 NORD frequency inverter (RS485) or to a series PAR-2x ParameterBox.

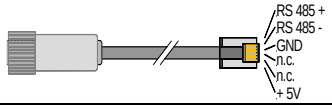
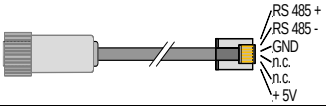
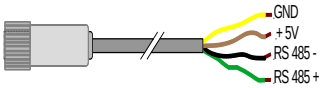
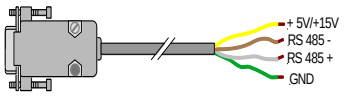
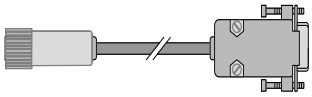
With the aid of the NORD CON software the frequency inverter or the ParameterBox can be controlled and parameterised. In addition, the software provides a convenient diagnostic tool with an oscilloscope function in order to enable the optimisation of drive solutions. (*SK IC1-232/485, Part No. 276970020*)

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.

2.4.2 Cable-Adapter assignment

The following table shows the necessary adapters for use with the various parameter boxes. The assignment of the adapters to individual inverter series and the parameter boxes to be used can be obtained from the other table in this section.

2.4.2.1 Adapter list

Serial No.	Illustration	Name	Article number
1		"Modular cable Straight RJ12 (6/6) - RJ12 (6/6) cable"	Not a NORD item *generally available*
2		"Connection cable M12 socket → RJ12"	Part No.: 278910230
3		"Connection cable M12 plug → RJ12" *SK TIE4-M12-RJ12*	Part No.: 275274600
4		"Connection cable M12 socket → free leads"	Part No.: 278910200
5		"Connection cable SUB-D 9 → free leads"	Part No.: 278910020
6		"Connection cable M12 socket → SUB-D 9"	Part No.: 278910210
7		"Connection cable USB2.0 plug A to plug B"	Not a NORD item *generally available*
8		Interface converter "SK IC1-232/485"	Part No.: 276970020
9		„Connection cable USB/5V → SK IC1-232/485"	Part No.: 278910220

2.4.2.2 Assignment of parameterisation box - frequency inverter

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

* The ParameterBox series **SK PAR-2x** can only access the SK 200E after a modification to the hardware. The launch of the modified ParameterBox series was in the 4th quarter of 2009.

** SK 700E < 30KW: safe operation is only ensured with an external power supply to the ParameterBoxes.

Further details of the SK PAR 2H can be found in Section 2.1.1.2 *Connection variants*

3 ControlBoxes

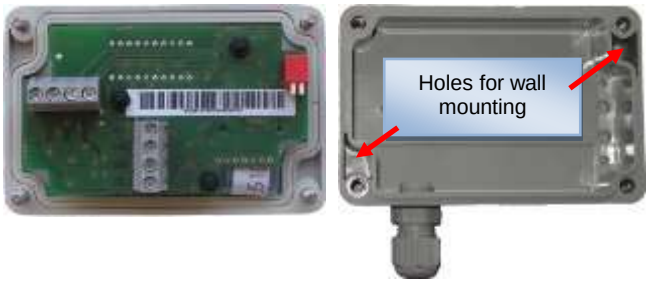
With the aid of ControlBoxes it is possible to control a frequency inverter with regard to speed and direction of rotation.

3.1 SK SSX-3A – Simple Setpoint Box

The "Simple Set Point Box" SK SSX-3A is a compact control unit with a 4-digit, 7-segment display, which is primarily intended for fixed connection to the terminal bar of the frequency inverter.
The control unit can be used as a handheld or attached version (wall-mounted). A maximum cable length of 20m must be observed.
Three operating modes are available, which are automatically activated according to the connection variant and the inverter series.
The entire range of functions can be used with the SK 2xxE series.
If an RS 485 interface is available, the box can also be used with SK 300E, SK 5xxE, SK 700E and SK 750E inverters. However, in this case only the 485C mode (control mode via RS 485) is available.

3.1.1 Installation

The box can be opened by opening the screw fastenings at the front. The connection terminals for the electrical connections and a 2-part DIP switch element are located inside the box on the rear side of the cover.
In addition to an M12 cable gland, the other section of the housing contains 2 holes for optional wall mounting.



Mounting on an SK 2xxE frequency inverter
An adapter kit is available for the direct mounting of the SK SSX-3A onto an SK 2xxE series frequency inverter.

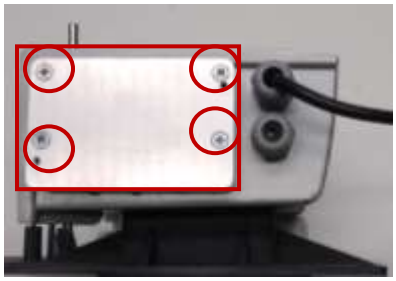
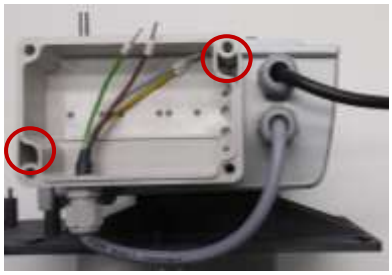
Designation:	SK TIE4-SSX-3A-adapter kit
Part No.:	275274910

Scope of supply:

1x	Mounting plate
1x	M16 x1.5 cable gland
4x	SW7-M4 spacer bolts
4x	M4 x 8 countersink screw
2x	M4 x 8 cylindrical-head screw
1x	SK 200E connection cable SSX_3A

Illustration: Installation material, without connection cable and cable gland.

The SK 2xxE is installed with the following steps:

Step	Description	Illustration
1	• Screw in the four hexagon-head spacer bolts into the four threaded holes of the frequency inverter connection unit, which are used to mount an SK TU4-xxx.	
2	• Fasten the mounting plate onto the spacer bolts with the countersink screws. • **NB:** The countersink must be on the upper surface, so that the countersink screws are flush with the surface after fitting..	
3	• Fasten the base housing of the SK SSX-3A to the mounting plate with two cylindrical-head screws and lead the connecting cable from the SK SSX-3A to the connection unit of the frequency inverter. • Recommendation: Insert the cable via the bottom M16 opening using the enclosed cable gland.	
4	• Make the connections (see Section 3.1.2 and 3.1.3) • Place the SK SSX-3A on the base housing and close it with the four screws.	

3.1.2 Connection

The Simple Setpoint Box provides various operating modes. The connection of the data or supply cables must be made in different ways, depending on the required operating mode. Connection is made to the terminal bar by means of a 3 or 4 wire cable. For a description of the terminal connections, please refer to Section 3.1.3 .

Connection data:

Name	Value
Rigid cable cross-section	0.14 … 2.5mm²
Flexible cable cross-section	0.14 … 1.5mm²
AWG standard	AWG 26-14
Tightening torque for screw terminals	0.5…0.6Nm

The connection cable must be fed out of the device via a cable gland (supplied). The cable gland must be screwed into the rear section of the housing.
It is recommended that the length of the connection cable is limited to 20 m. The cable should be laid separately from other cables to avoid interference.

For connection to the frequency inverter, the cable can be provided with open ends, screw or plug connectors.

Type of connection	Function	Frequency inverter
Open ends	Fixed wiring to the terminal bar	SK 2xxE, SK 300E, SK 5xxE*, SK 7x0E*
M12 plug connector	Permanent, detachable connection of SK 2xxE to flange coupling of SK TIE-M12-INI	SK 2xxE
RJ12 plug connection	Temporary plug connection	SK 2xxE, SK 5xxE, SK 700E to RJ12 socket
* only for types with RS485 interface on the terminal bar		

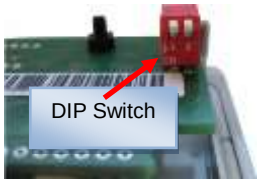
3.1.3 Operating modes

The Simple Setpoint Box provides 3 operating modes:

- 485C (Control mode via RS485)
- IO-C (Control mode via IO communication)
- IO-S (Setpoint mode via IO communication)

Selection of the operating mode is performed automatically by the box. However, with versions with firmware version V1.2 or higher and from week of manufacture 20L (Week 20 2011) it can be pre-set via 2 DIP switches.

Operating mode	DIP1	DIP2
Auto Scan	OFF	OFF
485C	ON	OFF
IO-C	OFF	ON
IO-S	ON	ON



If the DIP switches are configured to *Auto Scan* and no participant is detected during the scanning process, the box automatically changes to the operating mode IO-S.
If the operating mode was pre-set to 485C or IO-C via the DIP switches and a suitable connection to the frequency inverter can be established, the Simple Setpoint Box goes into Fault mode after a short time (Error E009).

Information **Firmware version**

The version number of the SK SSX-3A firmware is displayed by holding the OK key pressed when the box is switched on (Power UP).

3.1.3.1 Operating mode 485C (Control mode via RS485)

With the 485C operating mode, communication with the connected frequency inverter is carried out via the RS485 interfaces of the Simple Setpoint Box. Here, all the features provided by the SimpleBox SK CSX-3H/ -3E (Section 2.2) are also available.

Field of use

In this operating mode, the box can communicate with the series SK 2xxE, SK 300E, SK 5xxE, SK 700E and SK 750E. The prerequisite for this is that the relevant frequency inverters are equipped with a suitable interface (RS485) (on the terminal bar or RJ 12 socket.

Functions

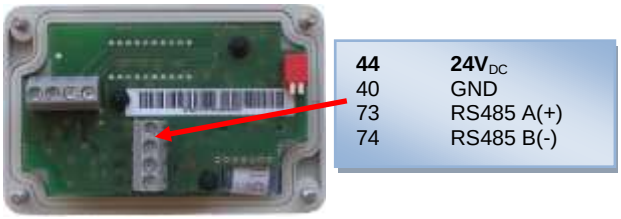
In this operating mode the functions

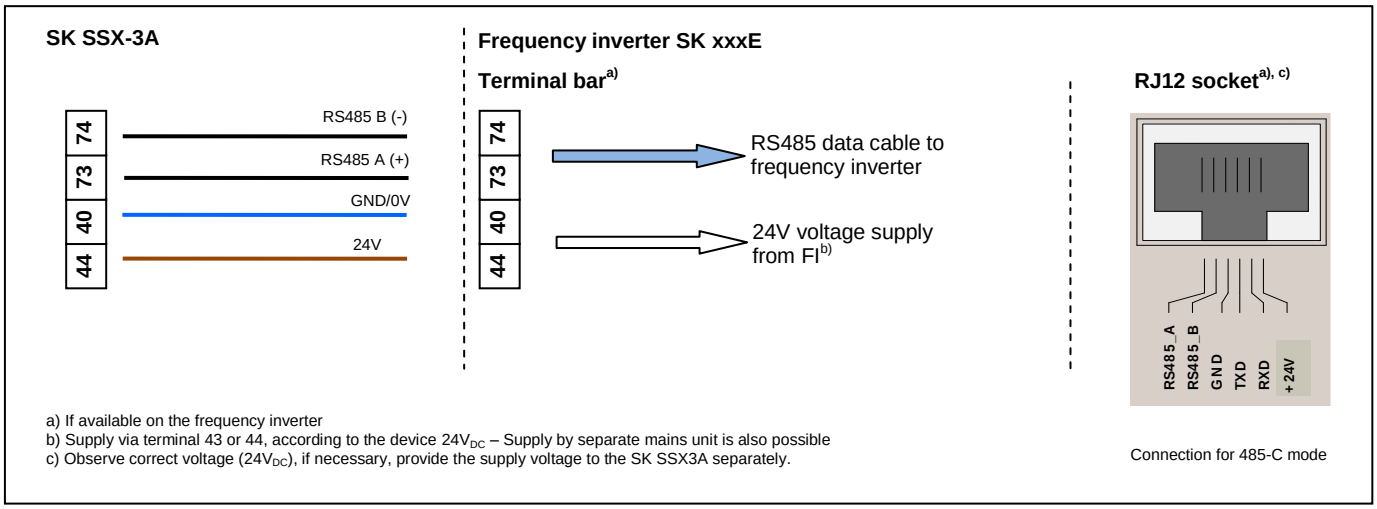
- Parameterisation
- Control
- Display of operating values

are available without restriction and correspond to those of the SimpleBox SK CSX-3H/ -3E.

Connections

Connection to the vertical terminal bar is by means of a 4-wire cable.
An integrated 270Ω termination resistor is provided for RS485 communication.





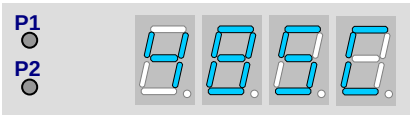
Settings on the frequency inverter

Name	Parameter number	Value	Notes
Control word source	P509	0	Corresponds to default value
Setpoint source(s)	P510	0	Corresponds to default value
USS Baud rate	P511	3 (38400 Baud)*	Corresponds to default value
USS address	P512	0	Corresponds to default value

* Lower baud rates can also be set, however the SK SSX-3A (temporarily) configures the frequency inverter to the setting {3} = 38400Baud, if this was parameterised to the value <19200Baud. After the mains are switched off at the frequency inverter, the original setting is once again active.

Boot UP display

After switching on, the lettering briefly appears in the display



Operation

Control of the Simple Setpoint Box SK SSX-3A in this mode is identical to that of the SimpleBox SK CSX-3H/ -3E (see Section 2.2).

Control commands (enable/stop/direction of rotation) and setpoints from the box are only recognised by the frequency inverter if it has not been enabled from other sources (e.g. digital input of the FI). (Priority switching). This also means that the drive of the source from which it was started must also be set back to Stop.

The setpoint value from the Simple Setpoint Box is only processed as a master setpoint. However, as usual, setpoints from other sources can be taken into account in the form of auxiliary setpoints (e.g. frequency addition).

ATTENTION	The drive unit does not stop automatically

If the SK SSX-3A is disconnected from an enabled frequency inverter, the drive will continue to run. In order to stop the drive, the SK SSX-3A must be reconnected to the frequency inverter.

The parameter (P513) "Telegram timeout" can be set in order to monitor communication.

Interruption of communication

An interruption of communication (disconnection of the plug, individual cables) has various effects on the frequency inverter and the Simple Setpoint Box.

Disconnection of one or both data cables (RS485)

The error **E009** appears in the box display. The frequency inverter does not react and maintains its operating condition. If the frequency inverter was started with the SK SSX-3A, it must also be stopped with the SK SSX-3A. As an alternative, it is also possible to stop it with the SimpleBox (SK CSX-3x), NORD CON or the ParameterBox in ControlBox mode.

The parameter (P513) "Telegram timeout" provides an optional monitoring of communication on the inverter side. If the communication cannot be restored after interruption within the time set, the drive is stopped without an error message.

If the data connection is restored, the SK SK SSX-3A starts a scan process and switches online again immediately after this is completed. The error message is no longer displayed.

Loss of supply voltage

Except for the fact that the Simple Setpoint Box switches off without an error message, the box and the frequency inverter behave identically with regard to the behaviour described above under "Disconnection of data cables".

3.1.3.2 Operating mode IO-C (Control mode via DI1/DO1 of the SK 2xxE)

In the operating mode IO-C, communication is via digital input "1" and digital output "1" of the frequency inverter. Here, all the features provided by the SimpleBox SK CSX-3H/ -3E (Section 2.2) are also available.

Field of use

In this operating mode, the box can communicate with SK 2xxE series frequency inverters with firmware version V 1.3 or higher (see parameter (P707[-01])).

Functions

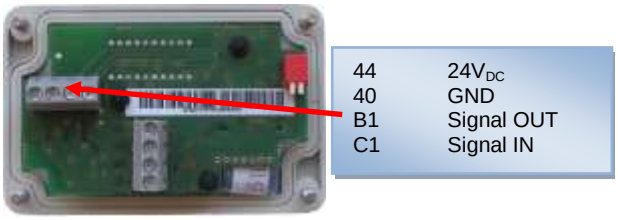
In this operating mode the functions

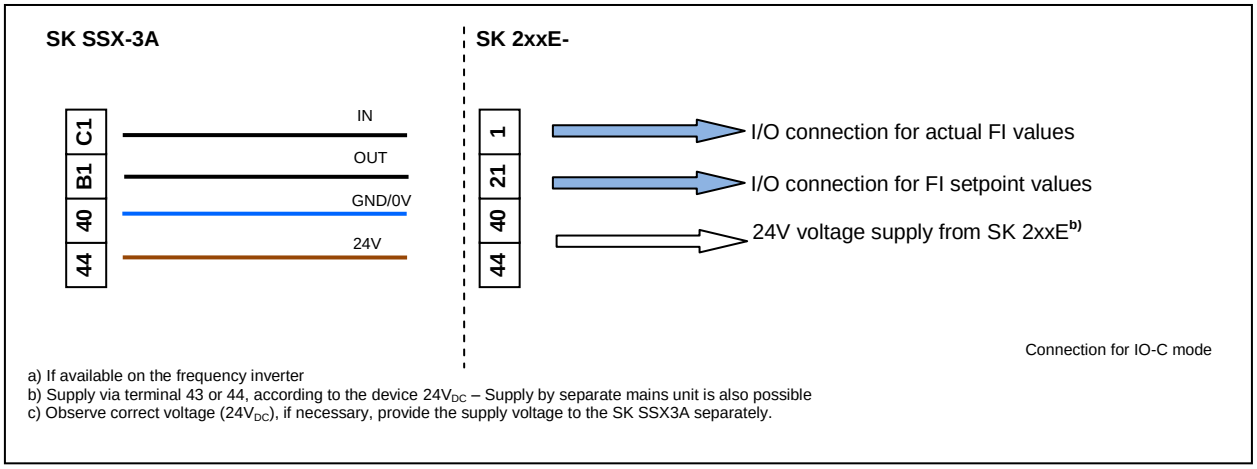
- Parameterisation
- Control
- Display of operating values

are available without restriction and correspond to those of the SimpleBox SK CSX-3H/ -3E. For technical reasons, the display and the key reaction times are somewhat increased.

Connections

Connection to the horizontal terminal bar is by means of a 4-wire cable.





a) If available on the frequency inverter
b) Supply via terminal 43 or 44, according to the device 24V$_{DC}$ – Supply by separate mains unit is also possible
c) Observe correct voltage (24V$_{DC}$), if necessary, provide the supply voltage to the SK SSX3A separately.

Settings on the frequency inverter

Name	Parameter number	Value	Notes
Function, digital output 1	P434 [-01]	{00} or {07}*	Setting {07} corresponds to the default value
* Other settings are not permissible and result in the loss of communication between the Simple Setpoint Box and the frequency inverter in IO-C mode.			

Information — **Deactivation of the IO functions**

In "IO-C" mode, the parameterised functions of the IOs "Digital Input 1 (parameter (P420[-01])) and "Digital Output 1" (parameter (P434[-01])) are deactivated. The condition for this is that Digital Output 1 is parameterised either to "No function" {00} or the default setting "Fault" {07}.

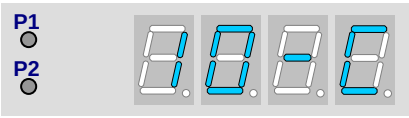
The DIP switch S1: 3 … 5 of the frequency inverter ("BUS" / "IO") must be left in the factory setting ("OFF" or"0") in order to prevent communication faults on the frequency inverter.

Information — **Parameter P434[-01] – Disabling the IO-C mode**

If the parameter (P434[-01]) is set to values ≠ {00} or ≠ {07}, the IO-C mode of the SK SSX-3A is barred when the frequency inverter restarts.

Boot UP display

After switching on, the lettering briefly appears in the display



Operation

Control of the Simple Setpoint Box SK SSX-3A in this mode is identical to that of the SimpleBox SK CSX-3H/ -3E (see Section 2.2).

Control commands (enable/stop/direction of rotation) and setpoints from the box are only recognised by the frequency inverter if it has not been enabled from other sources (e.g. digital input of the FI) (priority switching). This also means that the drive of the source from which it was started must also be set back to Stop.

The setpoint value from the Simple Setpoint Box is only processed as a master setpoint. However, as usual, setpoints from other sources can be taken into account in the form of auxiliary setpoints (e.g. frequency addition).

ATTENTION	The drive unit does not stop automatically

If the SK SSX-3A is disconnected from an enabled frequency inverter, the drive will continue to run. In order to stop the drive, the SK SSX-3A must be reconnected to the frequency inverter.
The parameter (P513) "Telegram timeout" can be set in order to monitor communication.

Information	Timeout monitoring (P513)

With the use of the timeout function (P513) settings >{6s} should be avoided. Otherwise, if only the actual value channel (Terminal C1 to Terminal 1) is interrupted, monitoring does not function.

Interruption of communication

An interruption of communication (disconnection of the plug, individual cables) has various effects on the frequency inverter and the Simple Setpoint Box.

Disconnection of the actual value channel (Connection Terminal C1 (SK SSX-3A) to Terminal 1 (SK 2xxE))

The error **E009** appears in the box display after a delay. The frequency inverter does not react and maintains its operating condition. If the frequency inverter was started with the SK SSX-3A, it must also be stopped with the SK SSX-3A. As an alternative, it is also possible to stop it with the SimpleBox (SK CSX-3x), NORD CON or the ParameterBox in ControlBox mode.

The parameter (P513) "Telegram timeout" provides an optional monitoring of communication on the inverter side. If the communication cannot be restored after interruption within the time set (max. 6 sec) the drive is stopped with the error message **E010** (10.0).

If the data connection is restored, the SK SSX-3A starts a scan process and switches online again immediately after this is completed. The error messages are no longer displayed.

Disconnection of the setpoint value channel (Connection Terminal B1 (SK SSX-3A) to Terminal 21 (SK 2xxE))

The error **E009** appears in the box display after a delay. The frequency inverter does not react and maintains its operating condition. If the frequency inverter was started with the SK SSX-3A, it must also be stopped with the SK SSX-3A. As an alternative, it is also possible to stop it with the SimpleBox (SK CSX-3x), NORD CON or the ParameterBox in ControlBox mode.

The parameter (P513) "Telegram timeout" provides an optional monitoring of communication on the inverter side. If the communication cannot be restored after interruption within the time set (max. 6 sec) the drive is stopped with the error message **E010** (10.0).

If the data connection is restored, the SK SK SSX-3A starts a scan process and switches online again immediately after this is completed. The error messages are no longer displayed.

Loss of supply voltage

Except for the fact that the Simple Setpoint Box switches off without an error message, the box and the frequency inverter behave identically with regard to the behaviour described above under "Disconnection of the setpoint channel".

3.1.3.3 Operating mode IO-S (Setpoint mode via DI1 of the frequency inverter)

In the operating mode IO-S, communication is via digital input "1" of the frequency inverter. The frequency inverter does not return any operating or parameter values to the box.

Field of use

In this operating mode the box can communicate with SK 2xxE series frequency inverters.

Functions

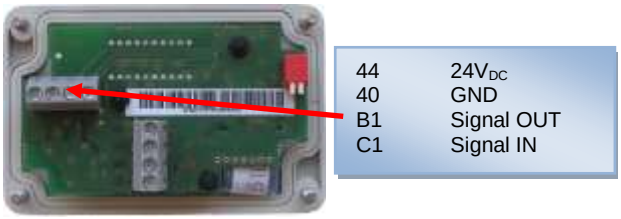
In this operating mode the functions

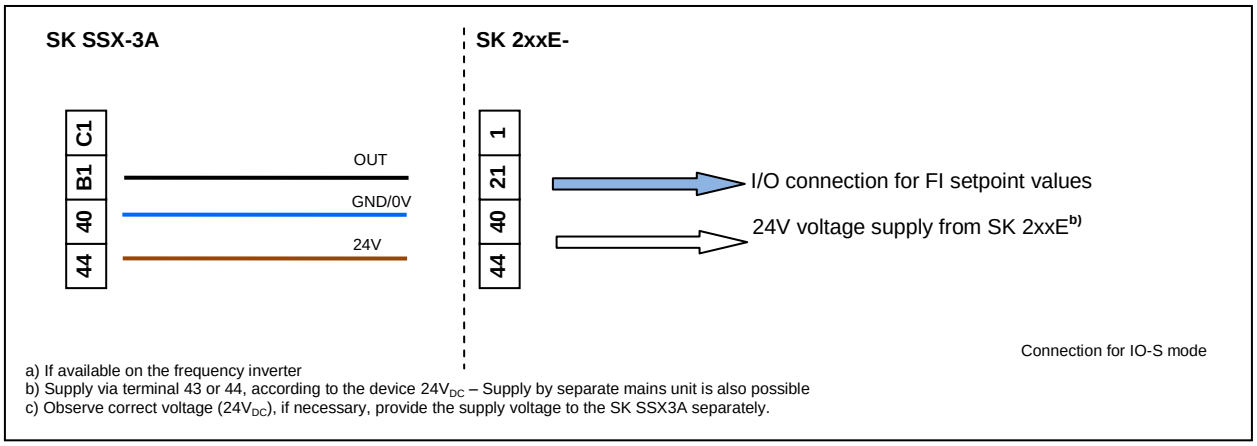
- Control
- Setpoint display

are available. The setpoint display is scaleable, the setpoint value is continuously transferred to the frequency inverter.

Connections

Connection to the horizontal terminal bar is by means of a 3-wire cable.





Settings on the frequency inverter

Name	Parameter number	Value	Notes
Function, setpoint input	P400 [-05]	{01}*	Corresponds to default value
Function of digital input 1	P420 [-01]	{29}**	The function {29} "Enable Setpoint Box" must be previously set with the aid of a parameterisation tool or in the IO-C mode.

* The function can be re-parameterised as required (e.g. as an auxiliary setpoint ("Frequency addition")). For this, the SK SSX-3A must temporarily be set to IO-C mode, or a different parameterisation tool (e.g. NORD CON, ParameterBox etc.) must be used.
** The control commands from the Simple Setpoint Box (Enable/Stop) are only processed by the frequency inverter with this setting.

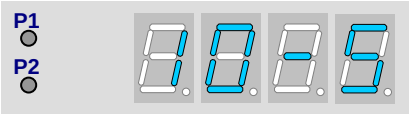
Information — **Deactivation of the IO functions**

In "IO-S" mode the parameterised functions of Digital Input 1 (parameter (P420[-01])) are deactivated.

The DIP switch S1: 3 … 5 of the frequency inverter ("BUS" / "IO") must be left in the factory setting ("OFF" or"0") in order to prevent communication faults on the frequency inverter.

Boot UP display

After switching on, the lettering briefly appears in the display



Operation

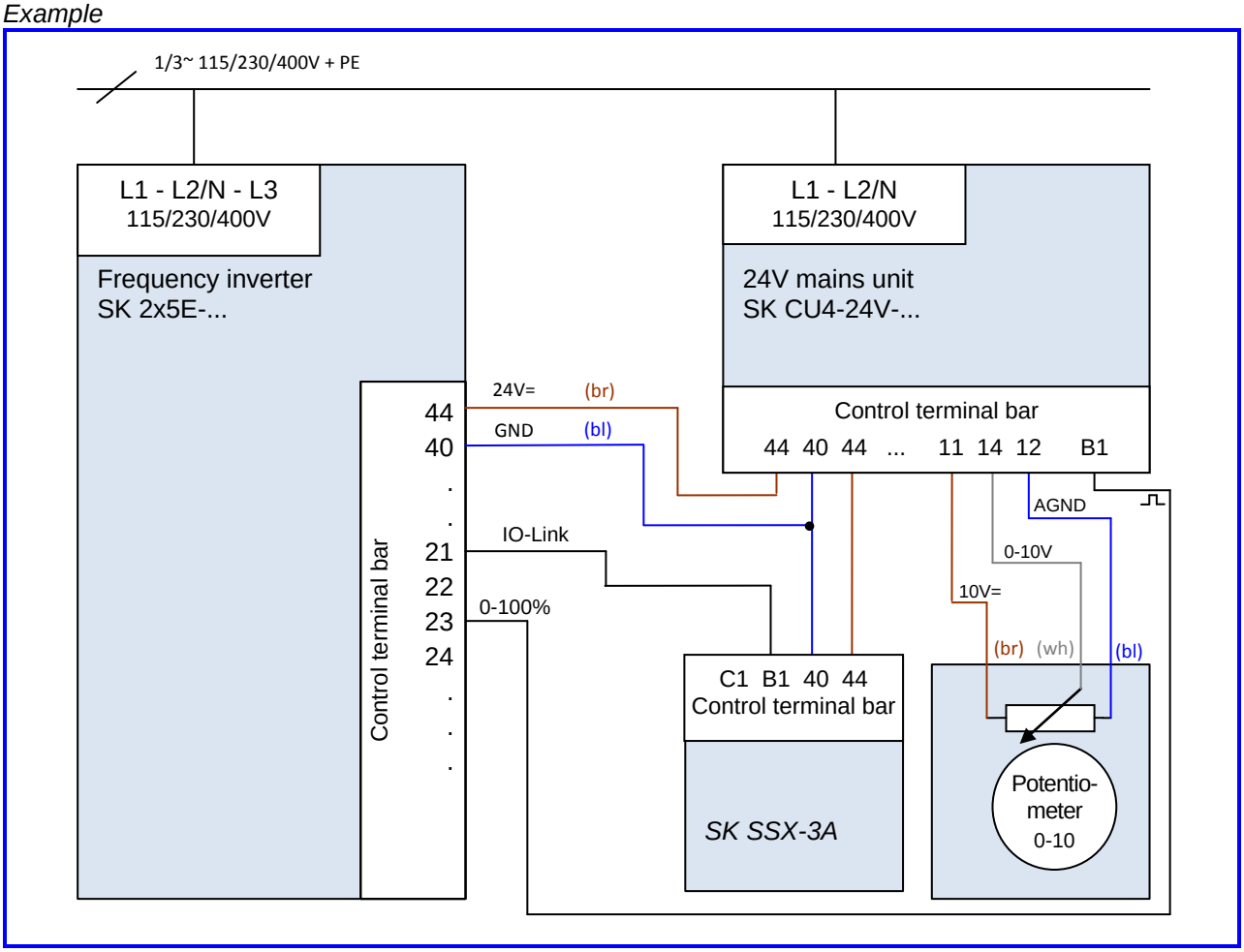
Control of the Simple Setpoint Box SK SSX-3A in this mode is the same as that of the SimpleBox SK CSX-3H/ -3E (see Section 2.2), however with the following differences:

- No access to frequency inverter parameters is possible.
- The display does not show the actual operating value of the frequency inverter, but rather the setpoint value transferred from the SK SSX-3A.
- The setpoint is displayed as a percentage (-100.0% … 0.0 … 100.0%) and is scaleable (P050).
- Pressing the "OK" key during operation does not save the displayed value as the "jog frequency" of the frequency inverter (P113), but rather as the "Starting value" within the box (P051).

Control commands (Enable/Stop/Direction of rotation) from the box are processed additively by the frequency inverter. An enable command from the box corresponds to an "Enable right".
If, for example, the frequency inverter is enabled by the box and also receives a parallel enable command ("Enable left") via a digital input, the two enable commands cancel each other out. The drive runs down its braking ramp to speed "0" and switches to the state "Ready for switch-on".

Processing of setpoint values is carried out according to the settings in parameter (P400[-05]). In the factory setting of the parameter, the setpoint value of the SK SSX-3A has the properties of a master setpoint value. If setpoint values from other sources are to be taken into account, these must be defined as auxiliary setpoints.

Example



In addition to the Simple Setpoint Box, a potentiometer is connected to an SK 2x5E type frequency inverter. Its analog signal is converted into pulses in the SK CU4-24V…mains unit and passed to Digital Input 3 of the frequency inverter. After conversion of the function of Digital Input 3 (P420 [-03]) to the function {26} "Analog

function", the parameter (P400 [-07])must be parameterised to {02} "Frequency addition". In this configuration, the analog signal is processed additively to the setpoint value of the SK SSX-3A.

Information **Display**

The display on the SK SSX-3A does not provide any information about the actual speed of the drive. Only the currently set setpoint value of the Simple Setpoint Box is displayed.

Parameterisation

The Simple Setpoint Box has its own parameters.

The parameters can only be accessed if the SK SSX-3A is in IO-S mode and is not currently sending an enable signal.
As with the SimpleBox (see Section 2.2), the parameters are selected by pressing the VALUE keys ▼ or ▲. By confirming with the "OK" key, the actual setting becomes visible and can be changed with the VALUE keys. New values are adopted and permanently stored in the SK SSX-3A by pressing the "OK" key again. With the keys ◎ or ↺ the display returns to the initial display or one level backwards. Changes which have not been confirmed with "OK" are not saved.
During parameterisation the two LEDs of the SK SSX-3A (P1 and P2) illuminate continuously.

Parameter	Setting value / Description / Note
P050	**Scaling factor**
0.01 … 99.99 [1.00]	With this parameter, the scaling of the SK SSX-3A display in IO-S mode can be changed. It is therefore possible to display system-specific operating such as e.g. the throughput quantity. The setting 1.00 corresponds to a displayed value from -100% to 100%. **Note:** Only values which are sent by the SK SSX-3A are taken into account in the display.
P051	**Starting value**
(-100 ... 100)x(P050) [0.0]	Storage of the starting value. The value set here is used as the starting value for the frequency inverter when it is enabled. The starting value is not stored in the frequency inverter. The starting value can also be written into the parameter from the currently set setpoint value of the box by pressing the "OK" key. The value range of the starting value depends on the scaling (P050). From a starting value < -999 (possible with scaling factors ≥ 10.00) the prefix is no longer displayed.

Interruption of communication

An interruption of communication (disconnection of the plug, individual cables) has various effects on the frequency inverter and the Simple Setpoint Box.

Disconnection of the setpoint value channel (Connection Terminal B1 (SK SSX-3A) to Terminal 21 (SK 2xxE))

The Simple Setpoint Box does not report an error and remains in operation. Setpoints and enabling can be changed on it. On the other hand, the drive is stopped unless it is provided with an enable signal and a setpoint value from another source.

The parameter (P513) "Telegram timeout" provides an optional monitoring of communication on the inverter side. If the communication cannot be restored after interruption within the time set (max. 6 sec) the drive is stopped with the error message **E010** (10.0).

If the data connection is restored, the error must first be acknowledged (sequential pressing of the ⏻ and ◎ keys) in order to restart the drive.

Loss of supply voltage

Except for the fact that the Simple Setpoint Box switches off without an error message, the box and the frequency inverter behave identically with regard to the behaviour described above under "Disconnection of the setpoint channel".

3.1.4 Technical data

Name	Value
Control voltage	$24V_{DC}$ ± 20%
Power consumption	approx. 35 mA
Display	4-digit, 7-segment display
Interfaces	RS232 or RS485
Operating modes	485C / IO-C / IO-S
Ambient temperature	0°C … 40°C
Protection class	IP54
Dimensions (L x W x D)	(98 x 64 x 37)mm
Weight	0.3 kg
Wall-mounting	possible with 2 holes at the rear
Connection cable length	max. 20 m (not included in scope of delivery)

3.2 Control box (SK POT1-1)

The **SK POT1-1** control box is a simple manual control unit for the control of NORD frequency inverters with an enabling signal and setpoint.
The control box is designed for permanent connection to the frequency inverter. According to the model, appropriate interfaces are available on the frequency inverter, or are available as options. Further information about the interfaces can be found in the relevant manual for the frequency inverter.

The control unit can be used as a handheld or attached version (wall-mounted). An approx. 3m long cable is included.

3.2.1 Installation

The **SK POT1-1** control box is a hand-held unit with integrated connection cable. The connection cable has open ends and is intended for permanent connection to a NORD frequency inverter.

The control box can also be screwed to a wall via the four holes in the rear of the housing (Distance approx: X direction: 106.5mm, Y direction: 66.5mm). The fixing material is not included in the scope of delivery.

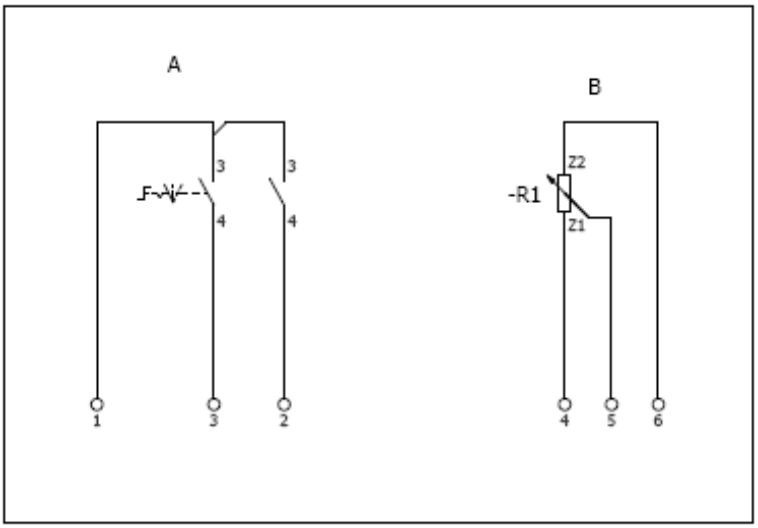
3.2.1.1 Overview

The **SK POT1-1** control box can be used with the following devices.

Frequency inverter series	Option required	Comments*
SK 2x0E	None	**DIP switch** (2-pole) under central inspection window (front side of inverter) for analog input 1 / 2to **{OFF}** position.
SK 2x5E	SK CU4-IOE	**DIP- switch** (8-pole) on Technology UnitNo: 1, 2, 3 for analog input 1in setting **{OFF}**
	SK TU4-IOE with SK TIE4-TU-BUS (optionally with wall-mounting kit)	**DIP- switch** (8-pole) on Technology UnitNo: 1, 2, 3 for analog input 1in setting **{OFF}**
	SK CU4-24V-…	See following section (Control connections) or manual BU0200
	SK TU4-24V with SK TIE4-TU-NET (optionally with wall-mounting kit)	
SK 300E	SK CU2-BSC	**DIP switch S1-1** (Burden resistor) in setting **{OFF}** <u>and</u> **DIP switch S1-2** ("0-10V - Signal processing") in setting **{ON}**
	SK CU2-STD	**DIP switch S1-1** (Burden resistorfor analog input 1) in setting **{OFF}**
SK 5xxE	None	*<u>Up to size 4</u>* **DIP switch AIN1** (Burden resistorfor analog input 1) in setting **{OFF}** <u>Above size 5</u> **DIP switch S1 and S3** (Burden resistor foranalog input 1 and "0-10V signal processing") to setting **{OFF}**
SK 700E	SK CU1-BSC (Similar to illustration)	Set **bridge** between **X3.2-12** and **X3.2-13**
	SK CU1-STD	**DIP- Switch** (Burden resistor, analog input) to setting **{OFF}** <u>and</u> set **bridge** between **X1.2-12** and **X1.2-13**
	SK CU1-MLT (Similar to illustration)	**DIP switch** (Burden resistor, analog input 1) to setting **{OFF}**
SK 750E	As for SK 700E	As for SK 700E
* It is assumed that the connection is made to Analog Input 1.		

3.2.1.2 Control connections

Illustration of the function of the **SK POT1-1** control box



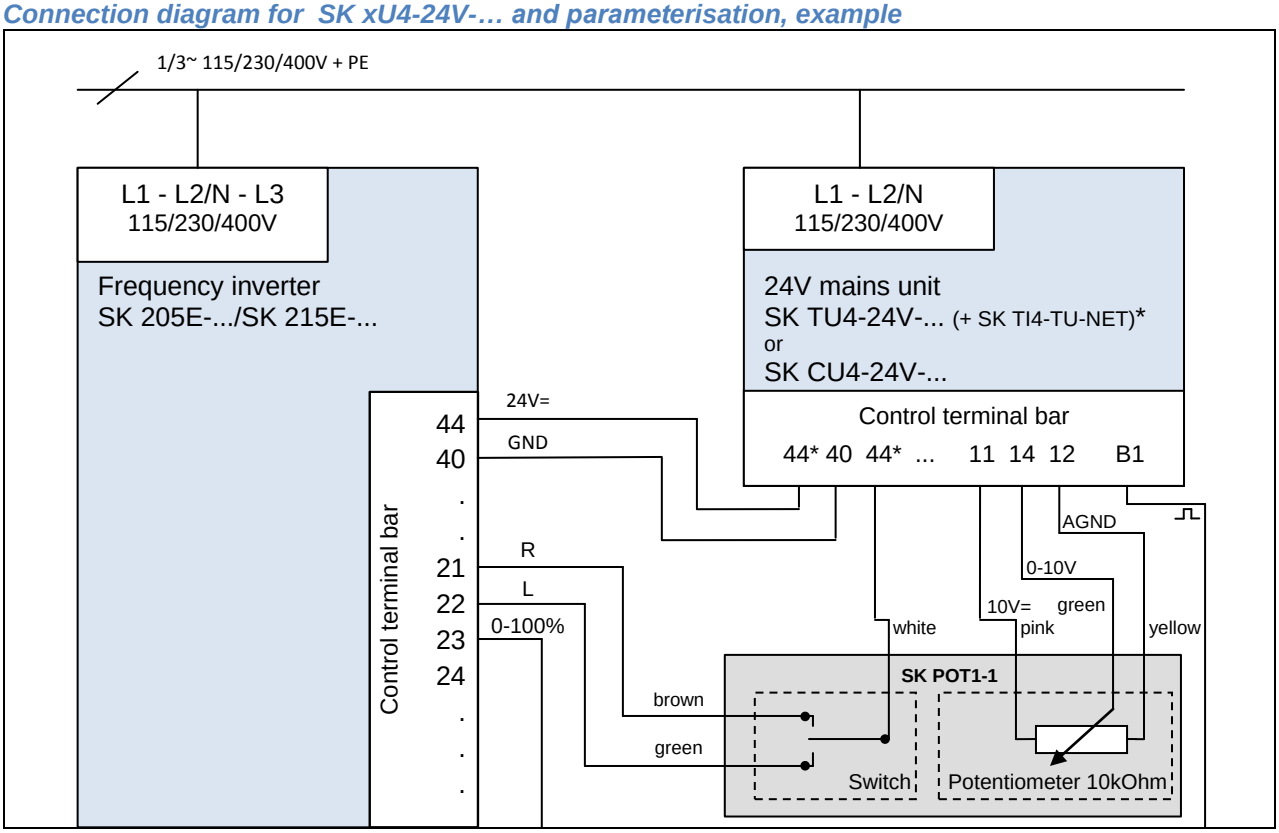
Connections are made according to the following table:

Frequency inverter series	**SK 2x0E**[2]	**SK 2x5E**[3]	**SK 300E**	**SK 5xxE**	**SK 700E or SK 750E**
Interface option / **SK POT1-1 Terminal - Colour**	No Terminal (Function)	SK CU4-IOE / SK TU4-IOE Terminal (Function)	SK CU2-BSC / SK CU2-STD Terminal (Function)	No Terminal (Function)	SK CU1 BSC / SK CU1-STD / SK CU1-MLT Terminal (Function)
1 - white	44 (+24V)	SK CU4-IOE 44 (+24V) or SK TU4-IOE 11 (+24V)	J2:42 (+15V)	X5:42 (+15V / +24V)	Xx.3:42 (+15V)
2 - brown	21 (DIN1)	SK CU4-IOE C1 (DIN5 (corresponds to DIN1 of the box)) or SK TU4-IOE 19 (DIN5 (corresponds to DIN1 of the box))	J2:22 (DIN2)	X5:21 (DIN1)	Xx.3:21 (DIN1)
3 - green	22 (DIN2)	SK CU4-IOE C2 (DIN6 (corresponds to DIN2 of the box)) or SK TU4-IOE 25 (DIN6 (corresponds to DIN2 of the box))	J2:23 (DIN3)	X5:22 (DIN2)	Xx.3:22 (DIN2)
4 - yellow	12 (AGND)	SK CU4-IOE[1] 13 (AIN1-)+12 (0V)) or SK CU4-IOE[1] 5 (AIN1-)+7 (0V))	SK CU2-STD J2.2:12 (AGND) or SK CU2-BSC[1] J2.13 (AIN-)+ J2.12 (AGND))	X4:12 (AGND)	SK CU1-MLT X2.2:12 (AGND) or SK CU1-BSC / -SDT)[1] Xx.13 (AIN1-)+ Xx.12 (AGND))
5 - grey	14 (AIN1+)	SK CU4-IOE 14 (AIN1+) or SK TU4-IOE 3 (AIN1+)	J2:14 (AIN1)	X4:14 (AIN1)	Xx.2:14 (AIN1)
6 - pink	11 (+ 10V)	SK CU4-IOE 11 (+10V) or SK TU4-IOE 1 (+10V)	J2:11 (+10V)	X4:11 (+10V)	Xx.2:11 (+10V)

[1] On the Technology Units of the SK 2xxE and on the basic I/O of the SK 300E and the basic I/O and standard I/O of the SK 700 / SK 750E, the analog inputs are implemented as differential inputs. In order to ensure the correct functioning of the potentiometer, the analog input "AIN-" must be connected with the analog ground.
[2] For devices with an AS interface (SK 220E and SK 230E) Analog Inputs 2 (Terminal 16), and instead of AGND (Terminal 12), Terminal 14 (GND) must be used. In addition, the function of Analog Input 2 (P400[-02]) must be parameterised to the setting {01} = "Setpoint frequency".
[3] Connection of SK POT1-1 to an SK 2x5E can alternatively by made to an IO extension module (SK xU4-IOE) via a suitable mains unit (SK xU4-24V-…). The connection is made according to the following pattern.

In combination with the **SK CU4-24V-…** or **SK TU4-24V-…** modules instead of the SK CU4-IOE or SK TU4-IOE Technology Units, the connection to an SK 2x5E series frequency inverter can, for example, be implemented according to the following pattern.
(Note: Terminal 43 of the SK TU4-24V-… corresponds to Terminal 44 of the SK CU4-24V-…)

Connection diagram for SK xU4-24V-… and parameterisation, example



DIP switch settings: DIP3 = off, DIP4 = on, DIP5 = off
(Therefore no further parameterisation is necessary)

or recommended parameter setting, DIP1-8 = off:

P400 [07] = 1 P420 [02] = 2
P420 [01] = 1 P420 [03] = 26

3.2.2 Parameterisation

For the functions of the control box **SK POT1-1**, some parameters must be changed, according to the frequency inverter and the options.
The most important of these are listed below. For further information, please refer to the manual for the relevant frequency inverter.

Frequency inverter	**SK 2x0E**[1)]	**SK 2x5E:**		**SK 300E**	**SK 5xxE SK 700E SK 750E**
		+ SK xU4-IOE	+ SK xU4-24V-		
Function	Input (Parameter) {Function}				
Enable right	DIN1 (P420[-01]) {01}	DIN5 (P480[-05]) {01}	DIN1 (P420[-01]) {01}	DIN2 (P421) {01}	DIN1 (P420) {01}
Enable left	DIN2 (P420[-02]) {02}	DIN6 (P480[-06]) {02}	DIN2 (P420[-02]) {02}	DIN3 (P422) {02}	DIN2 (P421) {02}
Analog input	AIN1 (P400[-01]) {01}	AIN1 (P400[-03]) {01}	AIN1 (P400[-07]) {01} <u>and</u> DIN3 (P420[-03]) {26}	AIN1 (P400) {01}	AIN1 (P400) {01}
Automatic start (if required)	No input (P428) {1}	No input (P428) {1}	No input (P428) {1}	No input (P428) {1} or {2}	No input (P428) {1}

[1)] For devices with an AS interface (SK 220E and SK 230E) analog input 1 is not present and therefore analog input 2 must be used. Accordingly, parameter P400[-02] must be set to Function {01}.

3.2.3 Technical data

Name	**Value**
Direction selector switch	Left - OFF - Right
Potentiometer	0 … 100% (0 – 10V)
Ambient temperature	0°C … 40°C
Protection class	IP66
Dimensions (L x W x D)	(120 x 80 x 80)mm
Weight approx.	1.0 kg
Wall-mounting	possible with 4 holes at the rear
Connection cable length	approx. 3m

4 Maintenance and servicing information

With proper use, the control and parameter boxes are maintenance-free.

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 / 289 -2515
Fax: 04532 / 289 -2555

No liability can be accepted for attached components if a control or parameter box is sent in for repair!

Information **Reason for return**

If possible, the reason for returning the component/device should be stated. If necessary, at least one contact for queries should be stated.

This is important in order to keep repair times as short and efficient as possible.

On request you can also obtain a suitable return goods voucher from Getriebebau NORD.

Unless otherwise agreed, the device is reset to the factory settings after inspection or repair.

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