

GETRIEBEBAU NORD

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Getriebebau NORD GmbH & Co. KG

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SK SSX-3A

Part number: 275 281 513

Control box / manual control unit

Scope of delivery

1 x	Control box	SK SSX-3A
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Field of use

The SimpleSetpointBox SK SSX-3A is primarily intended for permanent connection on the device's terminal strip. The control device can be used as a handheld or attachment variant (wall mounting). A maximum cable length of 20 m must be observed. Three operation modes are available that are activated automatically depending on the connection variant and the device series. In connection with the NORDAC *FLEX* series, the full functional range can be used. The SimpleSetpointBox can also be used with any other NORD frequency inverter, but only the 485C mode (control mode via RS485) is available here.

Technical data

Control voltage	24 V _{DC} ± 20%
Current consumption	approx. 35 mA
Display	4-digit, 7-segment display
Interfaces	RS232 or RS485
Wall mounting	possible via 2 holes inserted on the back
Connection cable length	max. 20 m (not included in the scope of delivery)

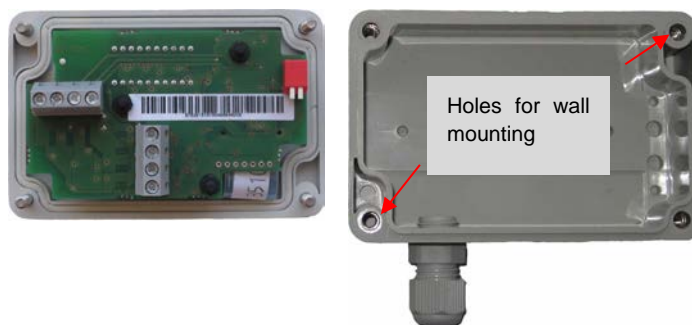
Operating modes	485C/IO-C/IO-S
Protection class	IP54
Dimensions (L x W x D)	(98 x 64 x 37) mm
Weight	0.3 kg
Ambient temperature	0 °C ... 40 °C

Technical Information / Datasheet	SK SSX-3A			
Control box	TI 275281513	1.0	0723	en

Installation

Open the box by loosening the front screw connections. Inside the box – on the back of the cover – you can find the connection terminals for the electrical connections and a 2-part DIP switch element.

The other housing part contains an M12 cable gland and two through holes for optional wall mounting.




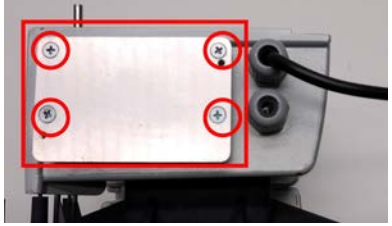


Attachment to a NORDAC FLEX

For the direct attachment of the SK SSX-3A to a NORDAC FLEX (SK 2xxE) frequency inverter, an adapter kit is available.

Designation:	SK TIE4-SSX-3A adapter kit
Part number:	275 274 910
Delivery scope:	<ul style="list-style-type: none"> 1 mounting plate 1 cable gland M16 x 1.5 4 spacer bolts SW7-M4 4 countersunk-head screws M4 x 8 2 cap screws M4 x 8 1 SK 2xxE connection cable SSX-3A



The attachment to the NORDAC FLEX is done in the following steps:

Step	Description	Illustration
1	Screw the four hexagonal spacer bolts into the four threads of the frequency inverter's connection unit that are used to attach an SK TU4-xxx.	
2	Attach the mounting plate to the spacer bolts using the countersunk-head screws. NOTE: The counterbore must be on the upper side so that the countersunk-head screws are flush with it after the installation.	
3	Attach the basic housing of the SK SSX-3A to the mounting plate using two cap screws, and lead the connection cable from the SK SSX-3A to the frequency inverter's connection unit. Recommendation: Insert the cable via the lower M16 port using the enclosed cable gland.	
4	Prepare the connections (see Sections "Connection" and "Operating modes"). Place the SK SSX-3A onto the basic housing and seal it using the four screws.	

Connection

The SimpleSetpointBox offers different operating modes. Depending on the required operating mode, the data or supply cables can be connected in different ways. The connection is made via a 3- or 4-core cable on the terminal strip. The connection terminals are described in Section "Operating modes".

Connection data

Designation	Value
Cross section of rigid cable	0.14 ... 2.5 mm
Cross section of flexible cable	0.14 ... 1.5 mm
AWG – standardisation	AWG 26-14
Tightening torque of screw terminals	0.5 ... 0.6 Nm

Use the (enclosed) cable gland to lead the connection cable out of the device. Insert and tighten the cable gland in the back part of the housing.

It is recommended to limit the connection cable's length to 20 m. To avoid interference, install the cable separately from other cables.

Control box – SK SSX-3A

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

Connection type	Purpose	Frequency inverter
Open ends	Fixed wiring on terminal strip	SK 2xxE, SK 5xxE ¹⁾
M12 plug connector	Permanent, detachable connection to the SK 2xxE on SK TIE-M12-INI flange coupling	SK 2xxE
RJ12 plug connection	Temporary plug connection	SK 2xxE, SK 5xxE ¹⁾ , SK 5xxP, SK 250E-FDS, SK 180E, SK 300P

1) Only for types with RS485 interface on terminal strip

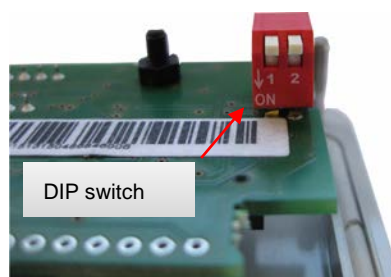
Operating modes

The SimpleSetpointBox offers the following 3 operating modes:

- 485C (control mode via RS485)
- IO-C (control mode via IO communication)
- IO-S (control mode via IO communication)

The box selects the operating modes independently. For devices with firmware version V 1.2 and higher, this can be preset via DIP switches.

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



If the DIP switch was configured as “Auto Scan” and no participant is detected during the scanning process, the box automatically switches to the IO-S operating mode.

If the operating mode was preset to 485C or IO-C via the DIP switch, and no connection could be established to the frequency inverter, the SimpleSetpointBox switches to failure mode (error **E009**).

Information

Firmware version number

Press and hold the OK key when switching on the box (power up) to display the version number of the SK SSX-3A's firmware.

Operating mode 485C (control mode via RS485)

In operating mode 485C, the communication takes place via the RS485 interfaces of the SimpleSetpointBox and the connected frequency inverter. All features provided by the SimpleBox SK CSX-3H/-3E ([BU0040](#)) are available.


Field of use

In this operating mode, the box can communicate with all frequency inverters from Getriebebau NORD. As a prerequisite, the relevant frequency inverters must provide a respective interface (RS485) (on terminal strip or RJ12 socket).

Functions

In this operating mode, the functions

- Parameterisation
- Control
- Display of operating modes

are fully available and correspond to those of the SimpleBox SK CSX-3H/-3E ( [BU0040](#)).

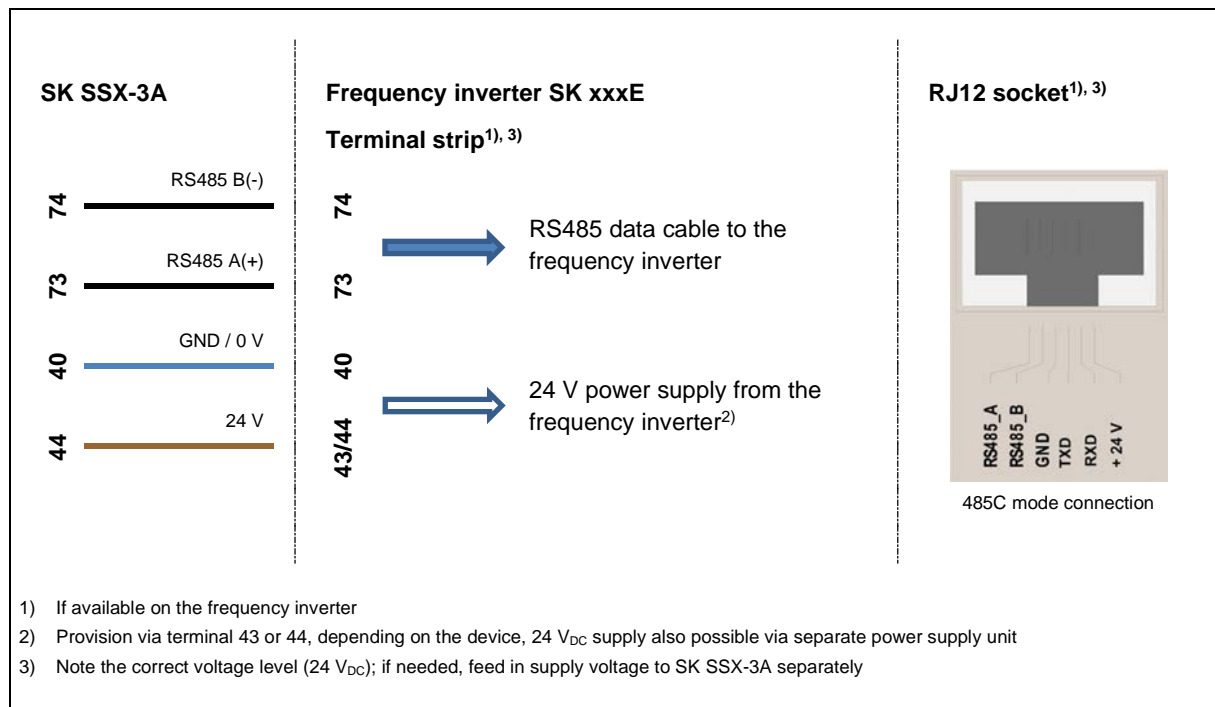
Socket assignment

A 4-pole cable is connected to the vertical terminal strip.

A terminating resistor of 270 Ω required for the RS485 communication is integrated.



44	24 V _{DC}
40	GND
73	RS485 A(+)
74	RS485 B(-)



Frequency inverter settings

Designation	Parameter number	Value	Notes
Source control word	P509	0	Is the default value
Source Setpoint(s)	P510	0	Is the default value
USS baud rate	P511	3 (38400 baud) ¹⁾	Is the default value
USS address	P512	0	Is the default value

1) You can also set lower baud rates but the SK SSX-3A (temporarily) configures the frequency inverter to setting {3} = 38400 baud, if it has been parameterised to values < 19200 baud. After "Mains off" on the frequency inverter, the original setting is activated again.

Boot Up display

After the switch-on, the following is briefly displayed:



Operation

The operation of the SimpleSetpointBox SK SSX-3A in this mode is identical to the SimpleBox SK CSX-3H/-3E ([BU0040](#)).

The frequency inverter will only recognise control commands (enable/stop/direction) and the setpoint from the box if it was not enabled by other sources (e.g. digital input of the FI) (priority circuit). This means that the source that started the drive must also set it to stop.

The setpoint from the SimpleSetpointBox will only be processed as main setpoint. As usual, setpoints from other sources can be additionally considered in the form of auxiliary setpoints (e.g. Frequency addition).

NOTICE

Drive does not stop automatically

If the SK SSX-3A is disconnected from an enabled frequency inverter, the drive continues to run unchanged. To stop the drive, the SK SSX-3A must be reconnected to the frequency inverter.

- To monitor the communication, set the parameter **P513** “Telegram time-out”.
-

Communication connection interrupted

Interrupting the communication (disconnecting the plugs of individual cables) has different impacts on the frequency inverter and the SimpleSetpointBox.

Disconnecting one or both data cables (RS485)

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

Parameter **P513** “Telegram time-out” offers an optional monitoring of the communication on frequency inverter side. If the interrupted communication cannot be restored within the set time, the drive will be stopped without an error message.

If the data connection was re-established, the SK SSX-3A starts a scanning process and switches back to online mode immediately after its completion. The error message disappears.

Loss of supply voltage

The box and the frequency inverter behave identically compared to the behaviour in the “Disconnecting the data cables” case described above, with the exception that the SimpleSetpointBox switches off without an error message.

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

In operating mode IO-C, the communication takes place via digital input “1” and digital output “1” of the frequency inverter. All features provided by the SimpleBox SK CSX-3H/-3E ([BU0040](#)) are available.

Field of use

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

Functions

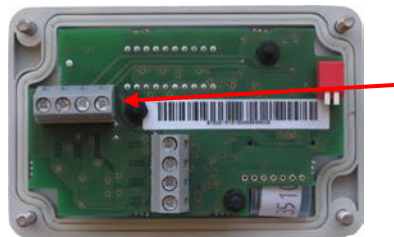
In this operating mode, the functions

- Parameterisation
- Control
- Display of operating modes

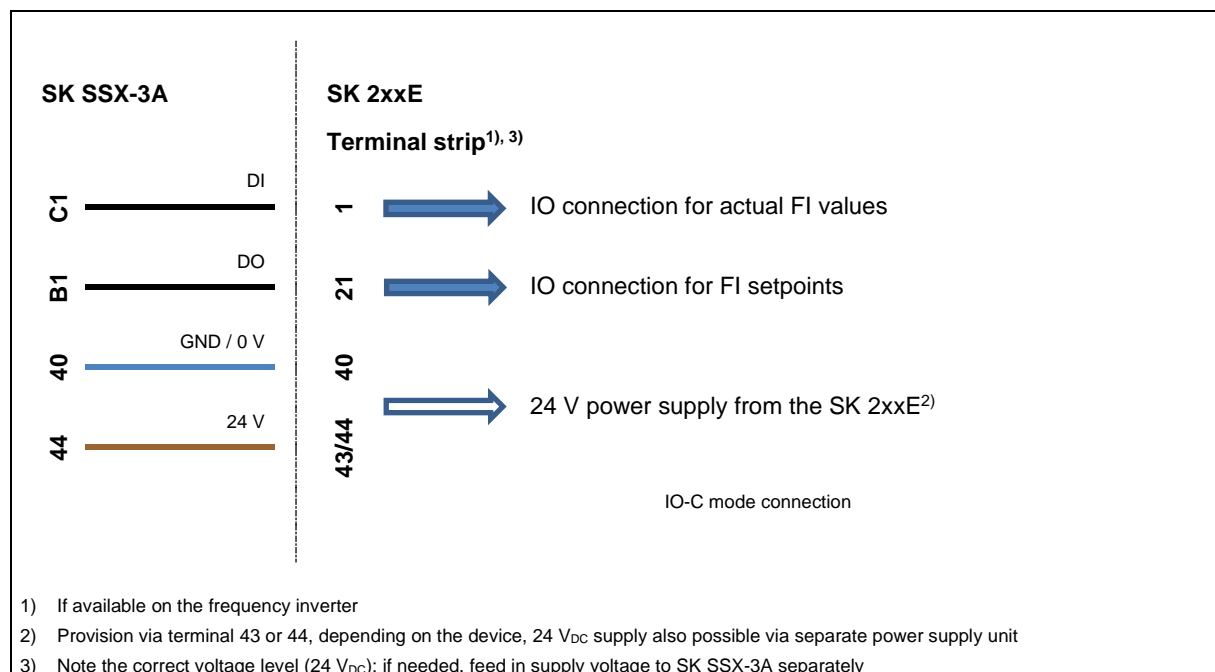
are available and correspond to those of the SimpleBox SK CSX-3H/-3E ([BU0040](#)). For technical reasons, the response times for display and key acceptance may be slightly increased.

Socket assignment

A 4-pole cable is connected to the horizontal terminal strip.



44	24 V _{DC}
40	GND
B1	DO
C1	DI



Frequency inverter settings

Designation	Parameter number	Value	Notes
Digital output 1 function	P434 [-01]	{00} or {07} ¹⁾	Setting {07} is the default value. If this setting was selected, the error message cannot be read out directly in case of a fault.

1) Other settings are not permitted and may lead to loss of communication between the SimpleSetpointBox and the frequency inverter in IO-C mode.

Information

Disabling 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 disabled. The condition is that the digital output 1 is parameterised to “No function” {00} or the default setting “Fault” {07}.

For the DIP switches S1: 3...5 of the frequency inverter (“BUS”/“IO”) the factory settings (“OFF”/“0”) must be kept to avoid any communication faults on the frequency inverter.

Information

Parameter P434 [-01] – Disable IO-C mode

If parameter P434 [-01] is set to values \neq {00} or \neq {07}, the IO-C mode of the SK SSX-3A will be disabled after a restart of the frequency inverter.

Boot Up display

After the switch-on, the following is briefly displayed:



Operation

The operation of the SimpleSetpointBox SK SSX-3A in this mode is identical to the SimpleBox SK CSX-3H/-3E ([BU0040](#)).

The frequency inverter will only recognise control commands (enable/stop/direction) and the setpoint from the box if it was not enabled by other sources (e.g. digital input of the FI) (priority circuit). This means that the source that started the drive must also set it to stop.

The setpoint from the SimpleSetpointBox will only be processed as main setpoint. As usual, setpoints from other sources can be additionally considered in the form of auxiliary setpoints (e.g. Frequency addition).

NOTICE

Drive does not stop automatically

If the SK SSX-3A is disconnected from an enabled frequency inverter, the drive continues to run unchanged. To stop the drive, the SK SSX-3A must be reconnected to the frequency inverter.

- To monitor the communication, set the parameter **P513** “Telegram time-out”.

Information

Timeout – Monitoring (P513)

When using the timeout function (P513), settings > {6s} are to be avoided. Otherwise, monitoring is disabled in case of exclusive interruption of the actual value channel (terminal C1 to terminal 1).

Communication connection interrupted

Interrupting the communication (disconnecting the plugs of individual cables) has different impacts on the frequency inverter and the SimpleSetpointBox.

Interruption of the actual value channel (connection of terminal C1) (SK SSX-3A) to terminal 1 (SK 2xxE)

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

Parameter **P513** “Telegram time-out” offers an optional monitoring of the communication on frequency inverter side. If the interrupted communication cannot be restored within the set time (max. 6 s), the drive will be stopped with error message **E010**.

If the data connection is re-established, the SK SSX-3A starts a scanning process and switches back to online mode immediately after its completion. The error messages disappear.

Interruption of the setpoint channel (connection of terminal B1) (SK SSX-3A) to terminal 21 (SK 2xxE)

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

Parameter **P513** “Telegram time-out” offers an optional monitoring of the communication on frequency inverter side. If the interrupted communication cannot be restored within the set time, the drive will be stopped with error message **E010**.

If the data connection was re-established, the SK SSX-3A starts a scanning process and switches back to online mode immediately after its completion. The error messages disappear.

Loss of supply voltage

The box and the frequency inverter behave identically compared to the behaviour in the “Interruption of the setpoint channel” case described above, with the exception that the SimpleSetpointBox switches off without an error message.

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

In operating mode IO-S, the communication takes place via digital input “1” of the frequency inverter. The frequency inverter does not report back any operating or parameter values to the box.

Field of use

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

Functions

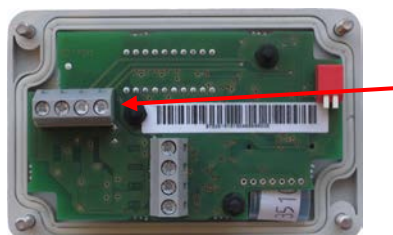
In this operating mode, the functions

- Control
- Setpoint display

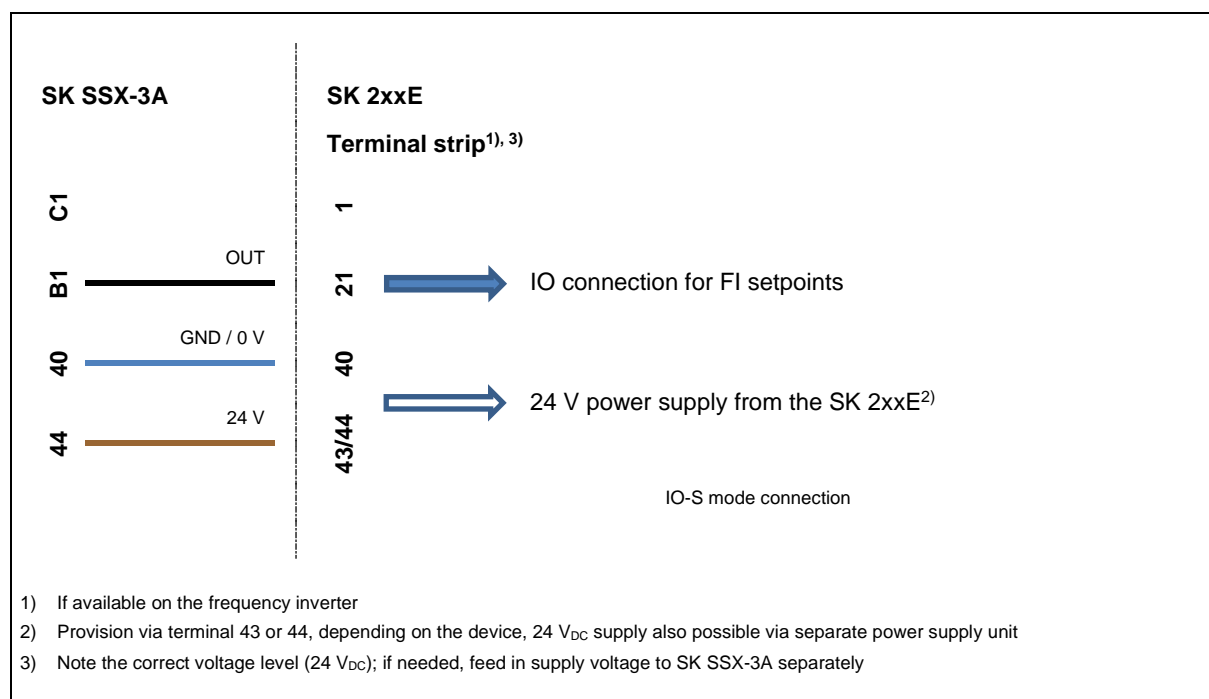
are available. The setpoint display is scalable; the setpoint is continuously transmitted to the frequency inverter.

Socket assignment

A 3-pole cable is connected to the horizontal terminal strip.



44	24 V _{DC}
40	GND
B1	Signal OUT
C1	Signal IN



Frequency inverter settings

Designation	Parameter number	Value	Notes
Setpoint I/P function	P400 [-05]	{01} ¹⁾	Is the default value
Digital input 1 function	P420 [-01]	{29} ²⁾	Function {29} "Enable SK SSX-box" must be set in advance using a parameterisation tool or in mode IO-C.

- 1) The function can be re-parameterised as required (e.g. as auxiliary setpoint ["Frequency addition"]). For this, the SK SSX-3A must be temporarily set to IO-S mode, or a different parameterisation tool (e.g. NORDCON, ParameterBox, etc.) must be used.
- 2) Only with this setting, the frequency inverter will process the control commands from the SimpleSetpointBox (enable/stop).

Information

Disabling the IO functions

In “IO-S” mode, the parameterised functions of “Digital input 1” (parameter **P420 [-01]**) are disabled. For the DIP switches S1: 3...5 of the frequency inverter (“BUS”/“IO”) the factory settings (“OFF”/“0”) must be kept to avoid any communication faults on the frequency inverter.

Boot Up display

After the switch-on, the following is briefly displayed:



Operation

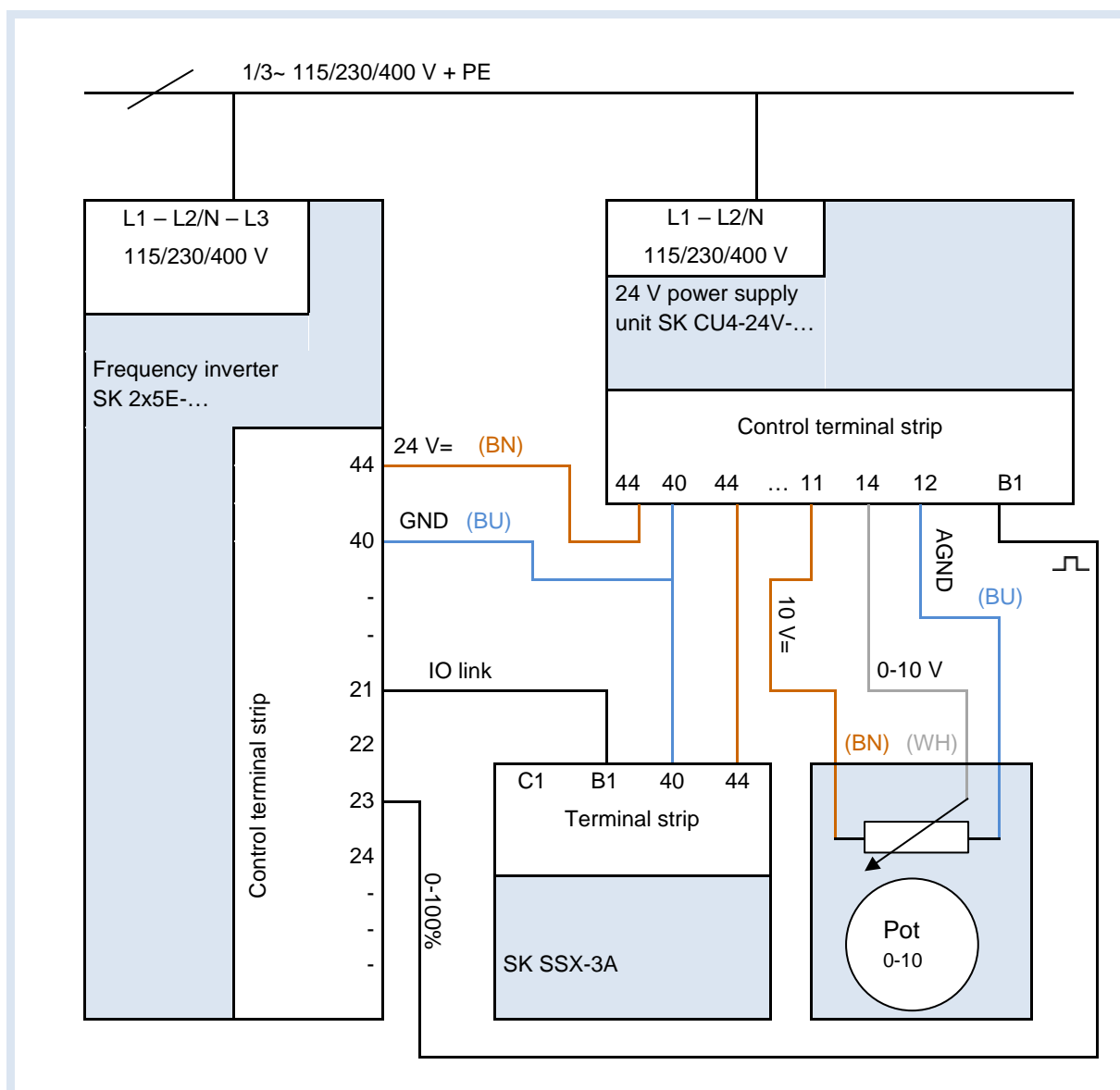
The operation of the SimpleSetpointBox SK SSX-3A in this mode is similar to the SimpleBox SK CSX-3H/-3E ([BU0040](#)), except for the following differences:

- The frequency inverter parameters are not accessible.
- The display does not indicate the frequency inverter’s actual operating value but the setpoint currently transmitted by the SK SSX-3A.
- The setpoint is displayed as a percentage value (-100.0% ... 0.0 ... 100.0%) and is scalable (**P050**).
- Pressing the OK key during operation does not save the displayed value as frequency inverter’s “Jog frequency” (**P113**) but as “Start value” within the box (**P051**).

The frequency inverter processes control commands (enable/stop/direction) from the box additively. An enable command by the box corresponds to an “Enable right”.

For example, if the frequency inverter is enabled by the box and receives another enable command in parallel (“Enable left”) via a digital input, both enable commands annul each other. At its deceleration ramp, the drive is running on speed “0” and switches to the “Ready for switch-on” state.

The setpoints are processed according to the setting in parameter **P400 [-05]**. In the parameter’s factory setting, the SK SSX-3A’s setpoint adopts the characteristics of a main setpoint. If setpoints from other sources shall also be considered, they must be defined as auxiliary setpoints.



Apart from the SimpleSetpointBox, a potentiometer is additionally connected to frequency inverters of type SK 2x5E. At the SK CU4-24V... power supply unit, its analogue signal is converted into pulses and routed to digital input 3 of the frequency inverter. After adjusting the function for digital input 3 (**P420 [-03]**) to function **{26}** “Analog fct.”, the parameter **P400 [-07]** must be parameterised to **{02}** “Frequency addition”. With this configuration, the analogue signal from the potentiometer is processed additively to the setpoint of the SK SSX-3A.

Information

Display

The display of the SK SSX-3A does not indicate the actual speed of the drive. It only displays the currently set setpoint of the SimpleSetpointBox.

Parameterising the SK SSX-3A in IO-S mode

The SimpleSetpointBox has its own parameters.

The parameters are only accessible if the SK SSX-3A is in IO-S mode (see section "Operating mode IO-S (setpoint mode via DI1 of the frequency inverter)") and currently does not send an enable signal.

As with the SimpleBox ([BU0040](#)), the parameters are selected via the value keys ▼ and ▲. By pressing the OK key, the current setting is displayed and can be adjusted via the value keys. New values are applied by pressing the OK key again, and permanently saved in the SK SSX-3A. By pressing the keys to stop or change the rotation direction, the display jumps to the initial display or one level back. Changes that have not been saved with OK will not be applied. During parameterisation, both LEDs of the SK SSX-3A (P1 and P2) light up permanently.

P050	Scaling factor
Setting range	0.01 ... 99.99
Factory setting	{ 1.00 }
Description	With this parameter, the scaling of the SK SSX-3A display can be adjusted in the IO-S mode. It is therefore possible to display system-specific operating values e.g. the throughput quantity. Setting { 1.00 } corresponds to a display amount of -100% ... 100%.
Note	The display only considers values sent by the SK SXX-3A.

P051	Start value
Setting range	$(-100 \dots 100) \times (P050)$
Factory setting	{ 0.0 }
Description	Storage location of the start value. When enabled, the value set here is evaluated as the start value for the frequency inverter. The start value is not saved in the frequency inverter. The start value can also be written to the parameter via the currently set setpoint of the box by pressing the OK key. The value range of the start value depends on the scaling (P050).
Note	Starting from a value < -999 (possible in case of scaling factors ≥ 10.00), the sign is no longer displayed.

Communication connection interrupted

Interrupting the communication (disconnecting the plugs of individual cables) has different impacts on the frequency inverter and the SimpleSetpointBox.

Interruption of the setpoint channel (connection of terminal B1 [SK SSX-3A] to terminal 21 [SK 2xxE])

The SimpleSetpointBox does not report an error and remains in operation. Setpoints and enabling can be modified on it. The drive, however, is stopped if it is not driven by another source with an enable signal and setpoint.

Parameter **P513** "Telegram time-out" offers an optional monitoring of the communication on the frequency inverter side. If the interrupted communication cannot be restored within the set time, the drive will be stopped with error message **E010**.










If the data connection was re-established, the error must be acknowledged (press START and STOP keys in succession) to restart the drive.

Loss of supply voltage

The box and the frequency inverter behave identically compared to the behaviour in the “Interruption of the setpoint channel” case described above, with the exception that the SimpleSetpointBox switches off.

Other applicable documents and further information

Documents and software can be downloaded from our website www.nord.com.

Documentation	Contents
 BU 0000	Manual for use of NORDCON software
 BU0040	Parameterisation units for drive electronics. Manual with installation instructions
 BU 0135	Manual for frequency inverter NORDAC <i>START</i> (SK 135E)
 BU 0180	Manual for frequency inverter NORDAC <i>BASE</i> (SK 180E)
 BU 0200	Manual for frequency inverter NORDAC <i>FLEX</i> (SK 200E)
 BU 0250	Manual for frequency inverter NORDAC <i>LINK</i> (SK 250E-FDS)
 BU 0500	Manual for frequency inverter NORDAC <i>PRO</i> (SK 500E)
 BU 0600	Manual for frequency inverter NORDAC <i>PRO</i> (SK 500P)
 BU 0800	Manual for frequency inverter NORDAC <i>ON</i> (SK 300P)

Software

Software	Description
NORDCON	Parameterisation and diagnostic software