GETRIEBEBAU NORD
Member of the NORD DRIVESYSTEMS Group

SK TU3-DEV

Part number: 275 900 085

DeviceNet® – External Bus Interface

The bus interface may only be installed and commissioned by qualified electricians. An electrician is a person who, because of their technical training and experience, has sufficient knowledge with regard to

- Switching on, switching off, isolating, earthing and marking power circuits and devices,
- Proper maintenance and use of protective devices in accordance with defined safety standards.

DANGER — **Danger of electric shock**

The frequency inverter carries hazardous voltage for up to 5 minutes after being switched off.

- Work must not be carried out unless the frequency inverter has been disconnected from the voltage and at least 5 minutes has elapsed since the mains was switched off!

NOTICE — **Validity of document**

This document is only valid in conjunction with the operating instructions of the respective frequency inverter and the bus communication manual for this bus interface (📖 See overview at end of document). These documents contain all of the information that is required for safe commissioning of the bus interface module and the frequency inverter.

Scope of delivery

1 x	Bus interface	SK TU3-DEV

Usage area

Technology unit for connecting a frequency inverter (SK 5xxE) to a **DeviceNet** field bus. The bus interface must be directly plugged into the technology slot of the frequency inverter.

Technical Data

Bus interface

Temperature range	0 °C...40 °C
Temperature class	Class 3K3
Protection class	IP20
Supply voltage	24 V ± 20 %, ≈ 100 mA Reverse polarity protected

Vibration resistance	2M1
Firmware version	V1.1 R8
Hardware version	AA
Dimensions [mm]	H x W x D: 27 x 73 x 101

Bus specification

<table>
<tr><td>DeviceNet</td><td>Max. 500 kBit/s</td></tr>
<tr><td></td><td>electrical isolation 500 V_{eff}</td></tr>
<tr><td>Bus connection</td><td>5-pin open style connector at bus interface</td></tr>
<tr><td>Status display</td><td>4 LEDs</td></tr>
<tr><td>Topology</td><td>Linear bus</td></tr>
<tr><td>Cable</td><td>Shielded, 5-core, in accordance with DeviceNet specification</td></tr>
<tr><td>Cable length</td><td>depending on transmission speed:

<table><tr><th>Bus cable length</th><th>Transfer rate</th></tr><tr><td>Up to 100 m</td><td>500 KBit/s</td></tr><tr><td>100…250 m</td><td>250 KBit/s</td></tr><tr><td>250…500 m</td><td>125 KBit/s</td></tr></table></td></tr>
<tr><td>Shield</td><td>Connection to PE of frequency inverter</td></tr>
<tr><td>PE connection</td><td>Shielding terminal at bus interface, cable cross-section 1.5 mm^2 (flat connecting sleeve included in scope of delivery)</td></tr>
</table>

Power

Update interval for process data between bus interface and frequency inverter	1.25 ms
Parameter read access on the frequency inverter	≈ 12 ms
Parameter write access with storage in EEPROM	≈ 25 ms

Bus interface characteristics

<table>
<tr><td>Parametrisation</td><td>DeviceNet via Explicit Messages</td></tr>
<tr><td>Addressing</td><td><table><tr><th>SK TU3-DEV</th><th>SK xU4-DEV</th></tr><tr><td>via Rotary coding switch</td><td>via DIP switch</td></tr></table></td></tr>
<tr><td>Setting the baud rate</td><td><table><tr><th>SK TU3-DEV</th><th>SK xU4-DEV</th></tr><tr><td>via Rotary coding switch</td><td>via DIP switch</td></tr></table></td></tr>
<tr><td rowspan="4">Supported DeviceNet connection types</td><td>• Explicit Messaging Connection</td></tr>
<tr><td>• Polled I/O Connection</td></tr>
<tr><td>• Bit Strobe I/O Connection</td></tr>
<tr><td>• Change of State/Cyclic I/O Connection</td></tr>
<tr><td>Access for NORD diagnosis tool via</td><td>diagnostics socket on the device (if available) and via frequency inverter</td></tr>
</table>

Installation

Information — Installing the SK TU3-... bus interface

Installation of a technology unit **separate from the frequency inverter** is not possible, since it must be connected directly to the frequency inverter.

The bus interface must be **installed** as follows:

1. Switch off mains voltage, wait for 5 minutes.
2. Push the control terminal cover down slightly or remove.
3. Remove the **dummy cover** by activating the release mechanism at the lower edge and removing it with an upwards rotating movement.
4. Hook the **bus interface** onto the upper edge and press in lightly until it engages.

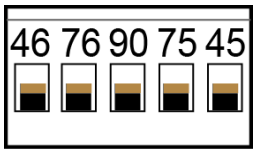
   Take care that the plug connection bar is properly contacted and if necessary fix it with a suitable screw (self-tapping screw 2.9 mm x 9.5 mm, included in the scope of delivery of the frequency inverter).
5. Close the control terminal cover again.

Connections

The bus interface is connected via the 5-pin open style connector attached to the front in accordance with the DeviceNet specification. The 24 V voltage supply of the bus interface is also provided via this connection, meaning that it can also be detected in the field bus system without a frequency inverter voltage supply.

Detail of 5-pin open style connector

Terminal	Signal	Description
46	V-	Bus reference potential
76	CAN_L	DeviceNet bus connection Receive Data -
90	SHIELD	Bus line shield
75	CAN_H	DeviceNet bus connection Transmit Data +
45	V+	24 V supply voltage field bus



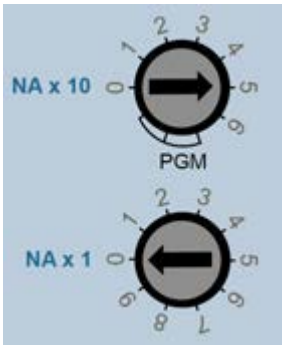
Configuration

The bus address (MAC ID) of the bus interface is set via the rotary coding switches “**NA x 10**” and “**NA x 1**” (1) and the baud rate is set via the rotary coding switch “**DR**” (2). The rotary coding switch settings are read in after a “Power On” of the bus interface.

1. **NA x 10** and **NA x 1**

   The setting of the bus address takes place with decimal coding within the range of 01...63.

   Example: Node ID "**50**"



Information

If a value of > 63 is set as the bus address, the value set in the frequency inverter parameter **P515 CAN address** is automatically read in.

2. **DR**

   If the rotary coding switch is set to a value within the range “**PGM**”, the set value from the frequency inverter parameter **P514 CAN baud rate** is read in as the baud rate.

LED indicators

The operating statuses of the bus interface are visualised using LED indicators.

No.	Name	Colour	Meaning
1	MS	red/green	DeviceNet Module status
	NS	red/green	DeviceNet Network status
2	DS	green	Device State
	DE	red	Device Error

DeviceNet-specific LED

MS (DeviceNet Module status)	**Meaning**
OFF	No voltage supply
Steady illumination in green	Bus interface ready
Flashing green (0.5 s)	• Bus interface in standby mode. No connection to one or more frequency inverters. No parameters exchanged, setpoint specifications via the AC profile not possible. • Baud rate setting for DeviceNet field bus is invalid.
Steady illumination in red	A fault that cannot be acknowledged has occurred. The bus interface may be defective and must be replaced.
Flashing red (0.5 s)	A fault that can be acknowledged has occurred on the bus interface.

NS (DeviceNet Network status)	**Meaning**
OFF	• No voltage supply. • The bus interface has not performed the “DUP_MAC_ID” test.
Steady illumination in green	Normal operation, cyclic data exchange via DeviceNet field bus.
Flashing green (0.5 s)	Bus interface is “Online” and has performed the “Dup_Mac_ID” test but has not established a connection to field bus subscribers.
Steady illumination in red	A serious communication error has occurred (e.g. bus off, duplicated bus address or invalid baud rate setting).
Flashing red (0.5 s)	The I/O connection or the function of parameter P151 has triggered a timeout error. The flash code is displayed for at least 5 seconds.

NORD-specific LEDs

DS (Device State)	**EN** (Device Error)	**Meaning** long flashing = 0.5 s on / 1 s off short flashing = 0.25 s on / 1 s off
OFF	**OFF**	Bus interface not ready, no control voltage
ON	**OFF**	Bus interface ready, no error, at least one frequency inverter is communicating via the system bus
ON	**Short flashing**	Bus interface ready, but • One or more of the connected frequency inverters has fault status
Long flashing	**OFF**	Bus interface ready and at least one other subscriber is connected to the system bus, but • No frequency inverter on the system bus (or connection interrupted) • One or more system bus subscriber has an address error • Software incompatible (bus interface software and FI software incompatible - update required)
Long flashing	**Short flashing** Flash interval **1** x - 1 s pause	System bus is in status "Bus Warning" • Communication on system bus disrupted • No other subscribers present on system bus • Module not inserted correctly or no connection to system bus • Frequency inverter has no supply voltage
Long flashing	**Short flashing** Flash interval **2** x - 1 s pause	System bus is in status "Bus Off" • The system bus 24 V power supply has been interrupted during operation
Long flashing	**Short flashing** Flash interval **3** x - 1 s pause	System bus is in status "Bus Off" • The 24 V voltage supply of the system bus is missing
Long flashing	**Short flashing** Flash interval **4** x - 1 s pause	Bus interface error • See parameter **P170**
OFF	**Short flashing** Flash interval **1** x - 1 s pause	System error, internal program sequence interrupted • EMC interference (observe the wiring guidelines!) • Bus interface defective

Error messages

Error messages from the bus interface - current or archived message relating to the last fault - can be read out via module parameter **P170**. The error messages are lost if the bus interface is switched off.

Error	Meaning	Remarks
100.0	EEPROM error	EMC faults, bus interface defective
101.0	System bus 24 V missing	No 24 V voltage on bus, connections not correct
102.0	Bus timeout P151	By means of timeout supervision parameter **P151/P513**
103.0	System bus BUS OFF	No 24 V supply to the bus, connections not correct
511.0	CANopen BUS OFF	Bus subscriber not connected to bus
511.1	CANopen warning	Bus error
511.2	CANopen overrun	Message buffer of bus interface overwritten with new telegram before processing
511.3	Invalid CANopen address	Incorrect/duplicated bus address
512.0	CANopen timeout	Telegram transfer error

Bus interface-related errors are depicted as follows in the error memory of the frequency inverter (**P700** / **P701**).

Error (E010)	Meaning	Remarks
10.2	External bus interface telegram timeout	Telegram transfer error • Check the connections and links, program sequence and Bus Master.
10.3	Timeout by **P151/P513**	Telegram transfer error. • Check watchdog time (P151). • Check the connections and links and the program sequence in the Bus Master. The release bit is missing in the control word.
10.4	External bus interface initialisation error	Unable to address bus interface. • Check parameter P746 setting. • Check power supply of bus interface. • Check the connections and links.
10.8	External bus interface communication error	Only SK TU3-CAO bus interface: Connection between bus interface and frequency inverter interrupted.
10.9	Missing bus interface	Bus interfaces SK CU4-DEV and SK TU4-DEV only: Connection between bus interface and frequency inverter interrupted (see setting of parameter **P120**).

Parameters

Frequency inverter: The following frequency inverter parameters must be adapted for setting up communication between the frequency inverter and the bus interface (for details please refer to the frequency inverter manual).

Parameter [-Array]	Meaning	Remarks	
P120 [-01]	Option monitoring	**"Auto"** (default setting)	Only SK xU4
P509	Source Control Word	SK TU3-… on SK 5xxE: **"Ethernet TU"** SK xU4-… on SK 180/SK 2xxE: **"System bus"**	
P510 [-01]…[-02]	Setpoint source	**"Auto"** (default setting)	
P513	Time-out	Monitoring of the SK TU3 bus interface	Only SK 5xxE
P543 [-01]…[-03] ([-05]) and **P543**…**P545**	Bus actual value (1...3 (...5))	Possible settings according to **P418**	
P546 [-01]…[-03] ([-05]) and **P546**…**P548**	Bus setpoint value (1...3 (...5))	Possible settings according to **P400**	
P700 [-01]/**P701**	Current/last faults	Information parameter	
P740/**P741**	Process data bus In / Out	Information parameter	
P745	Module version	Information parameter	Only SK TU3
P746	Module status	Information parameter	Only SK TU3
P748	CANopen/System bus status	Information parameter	

Bus interface: No parameters need to be set at the SK TU3-DEV bus interface, since the settings are made via frequency inverter parameters (Details 🕮 Frequency inverter manual).

Parameter access and diagnostics

The NORD CON software and optional control units such as the SK PAR-3H parameter box provide convenient access to the parameters of the bus interface and allow status information to be read out.

SK TU3-	SK TU4-	SK CU4- / SK TU4-
Access via RJ12 diagnostics socket of the SK 5xxE 	Access via RJ12 diagnostics socket of the bus connection unit **SK TI4-TU-BUS(-C)** 	Access via RJ12 frequency inverter diagnostics socket, if connected to the bus interface via the system bus. 

Further documentation and software (www.nord.com)

Software	Description
EDS-file	Device characteristics and parameters

Software	Description
NORD CON	Parametrisation and diagnostic software

Document	Description
BU 0000	Description of NORD CON software
BU 0040	Parameter box manual
BU 0500	Frequency inverter manual SK 500E…SK 535E

Document	Description
BU 0505	SK 54xE frequency inverter manual
BU 2600	DeviceNet bus communication manual