

SK TU3-PBR-24V

Part number: 275 900 160

PROFIBUS® DP – 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-PBR-24V
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Usage area

Technology unit for connecting a frequency inverter (SK 5xxE) to a **PROFIBUS DP** 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	V3.6 R0
Hardware version	AA
Dimensions [mm]	H x W x D: 27 x 73 x 101

Technical Information / Datasheet		SK TU3-PBR-24V			
PROFIBUS DP Bus module		TI 275900160	V 1.0	4116	EN

Bus specification

PROFIBUS DP	Max. 12 MBit/s electrical isolation 500 V _{eff}								
Bus connection	SUB-D9-PROFIBUS connector								
Status display	2 LEDs								
Topology	Linear bus								
Power setting	PROFIBUS DP-V0								
Cable	Cable type A according to EN 50170 (drilled, shielded two conductor cable)								
Cable length	depending on transmission speed: <table border="1" data-bbox="454 627 917 750"> <thead> <tr> <th>Bus cable length</th> <th>Transfer rate</th> </tr> </thead> <tbody> <tr> <td>400 m</td> <td>500 KBit/s</td> </tr> <tr> <td>200 m</td> <td>1500 KBit/s</td> </tr> <tr> <td>100 m</td> <td>3...12 MBit/s</td> </tr> </tbody> </table>	Bus cable length	Transfer rate	400 m	500 KBit/s	200 m	1500 KBit/s	100 m	3...12 MBit/s
Bus cable length	Transfer rate								
400 m	500 KBit/s								
200 m	1500 KBit/s								
100 m	3...12 MBit/s								
Shield	via SUB-D9-PROFIBUS connector*								
PE connection	Shielding terminal at bus interface, cable cross-section 1.5 mm ² (flat connecting sleeve included in scope of delivery)								

* Connect shield in SUB-D9-PROFIBUS connector to metal housing of SUB-D9-PROFIBUS connector and the functional earth over a large area.

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

Communication Performance levels DP-V0	Cyclic useful data connection between DP master and DP slaves (point-to-point useful data communication or Multicast)						
Communication Performance levels DP-V1	Acyclic data communication between DP master DPM1 and DP slaves						
Transfer Method	RS485						
Addressing	<table border="1" data-bbox="790 1489 1364 1601"> <thead> <tr> <th>SK TU3-PBR</th> <th>SK TU3-PBR-24V</th> <th>SK xU4-PBR</th> </tr> </thead> <tbody> <tr> <td>Parameter P508 at frequency inverter</td> <td>Rotary coding switch or parameter P508 at frequency inverter</td> <td>DIP switch or parameter P160</td> </tr> </tbody> </table>	SK TU3-PBR	SK TU3-PBR-24V	SK xU4-PBR	Parameter P508 at frequency inverter	Rotary coding switch or parameter P508 at frequency inverter	DIP switch or parameter P160
SK TU3-PBR	SK TU3-PBR-24V	SK xU4-PBR					
Parameter P508 at frequency inverter	Rotary coding switch or parameter P508 at frequency inverter	DIP switch or parameter P160					
Synchronisation	Sync mode (synchronisation of outputs) and Freeze mode (synchronisation of inputs)						
Bus access	<ul style="list-style-type: none"> • Token Passing procedure • Master/Slave procedure • Mono-Master or Multi-Master System 						
Access for NORD diagnosis tool via	diagnostics socket on the device (if available) and via frequency inverter						

Installation

i 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).

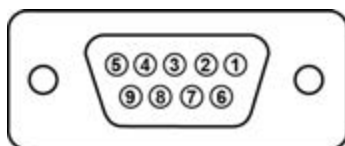
5. Close the control terminal cover again.

Connections

The bus interface is connected via the SUB-D9 PROFIBUS socket (1) attached to the front. The power supply is provided via the screw terminals (2).

(1) Detail of SUB-D9-PROFIBUS socket

Pin	Signal	Description
1	Shield	Shielding, protective earth (functional earthing)
2	NC	Not occupied
3	RxD/TxD-P	Receive / transmit line, positive
4	CNTR-P	Control signal for repeater, positive
5	DGND	Movement potential for data transmission and +5 V
6	VP	+5 V (power supply for bus resistors)
7	NC	Not occupied
8	RxD/TxD-N	Receive / transmit line, negative
9	CNTR-N	Control signal for repeater, negative



(2) Detail of power supply

Terminal	Name	Description
45	24 V	24 V supply
46	GND	Earthing



Configuration

The PROFIBUS address of the bus interface is set via the rotary coding switches “x10” and “x1” (1) and the operating mode of the bus interface is set via the rotary coding switch “PPO” (2). The rotary coding switch settings are read in after a “Power On” of the bus interface.



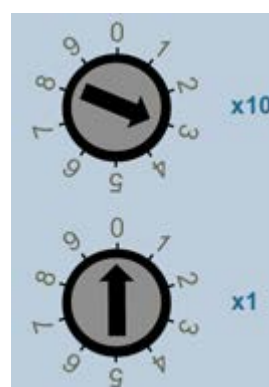
i Information

The settings made using the rotary coding switch are not read into connected frequency inverters.

1. x10 and x1

The setting of the bus address takes place with decimal coding within the range of 03...125.

Example: PROFIBUS address "30".



i Information

PROFIBUS addresses higher than “99” are set in combination with the position of the rotary coding switch “PPO”.

2. PPO

For PROFIBUS addresses "03"..."99": Assign PPO type 1...4 by rotating the rotary coding switch to position “1”...“4” .

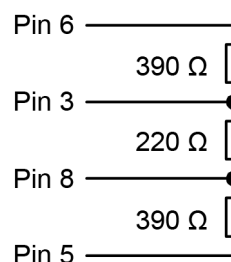
For PROFIBUS addresses "100"..."125": Assign PPO type 1...4 by rotating the rotary coding switch to position “1”...“4” within the range of **+100**.

If the rotary coding switch is set in the “PGM” area, the values set via parameters **P507 PPO Type** and **P508 Profibus Address** are read in from the connected frequency inverter.



3. If the bus interface is the final subscriber on the field bus, a terminating resistor must be provided. This can be found in the SUB-D9-PROFIBUS standard plug.

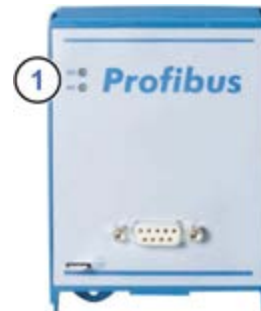
Pin	Signal	Description
6	VP	+5 V (power supply for bus resistors)
3	RxD/TxD-P	Receive / transmit line, positive
8	RxD/TxD-N	Receive / transmit line, negative
5	DGND	Movement potential for data transmission and +5 V



LED indicators

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

No.	Name	Colour	Meaning
1	BR	green	PROFIBUS DP Status
	BE	red	PROFIBUS DP Error



PROFIBUS DP-specific LED

BR (Bus Ready, PROFIBUS DP Status)	BE (Bus Error, PROFIBUS DP Error)	Meaning
OFF	OFF	Bus interface not ready or no power supply.
Steady illumination in green	OFF	Normal operation, cyclic data exchange via PROFIBUS DP.
Steady illumination in green	Steady illumination in red	Defective operation (e.g. PPO type changed during operation).
Flashing green (1 s)	OFF	No process data received after switching on (e.g. no connection to PROFIBUS DP master).
Flashing green (1 s)	Brief illumination	Bus interface initialisation (after switching on the bus interface or changing a PROFIBUS-specific parameter at the connected frequency inverter).
Flashing green (1 s)	Steady illumination in red	Timeout due to process data reception: The watchdog timer parameterized by the PROFIBUS DP master has elapsed without reception of new process data for a maximum of 3 seconds (e.g. baud rate not detected or cable break).
Flashing green (1 s)	Flashing red (1 s)	Timeout due to process data reception: The time set in parameter P513 "Telegram failure time" has elapsed without new process data being received.
Flashing green (1 s)	Flashing red (0.5 s)	Communication between frequency inverter and PROFIBUS DP interface interrupted.

Error messages

Error messages from the bus interface – current or archived messages relating to the last fault - can be read out via module parameter **P170** (SK xU4-PBR only). 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
500.0	PROFIBUS ASIC error	No communication with ASIC
501.0	PROFIBUS address incorrect	Address outside permissible range (3...125)
502.0	PROFIBUS 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
10.0	Connection error	Contact to bus interface lost
10.2	PROFIBUS telegram failure	Telegram transfer error <ul style="list-style-type: none"> • Check the connections and links, program sequence and Bus Master.
10.3	Timeout by P151/P513	Telegram transfer error. <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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-PBR bus interface: Connection between bus interface and frequency inverter interrupted.
10.9	Missing bus interface	Only bus interfaces SK CU4-PBR and SK TU4-PBR: 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
P507	PPO Type	PROFIBUS DP-specific parameters Only SK 5xxE
P508	Profibus address	PROFIBUS DP-specific parameters Only SK 5xxE
P509	Source Control Word	SK TU3-... on SK 5xxE: " Profibus " 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] and P543 ... P545	Bus actual value (1...3)	Possible settings according to P418
P546 [-01]...[-03] and P546 ... P548	Bus setpoint value (1...3)	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-PBR bus interface, since the settings are made via frequency inverter parameters (For 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
GSD-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 2700	PROFINET DP bus communication manual