SK TU4-EIP-C

Part number: 275 281 169

EtherNet/IP® – 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**

<table>
<thead>
<tr>
<th>1 x Bus interface</th>
<th>SK TU4-EIP-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 x Hexagonal socket screw</td>
<td>M4 x 40 mm</td>
</tr>
</tbody>
</table>

**Accessories required:**

<table>
<thead>
<tr>
<th>1 x Bus connection unit</th>
<th>SK TI4-TU-BUS-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>TI 275280500</td>
<td>(Part No.: 275 280 500)</td>
</tr>
</tbody>
</table>

**Usage area**

External technology unit for connecting a distributed frequency inverter (SK 180E…SK 2xxE) to an EtherNet/IP field bus. The bus interface can be mounted on, or in the immediate vicinity of the frequency inverter. This is connected to the inverter via the system bus, and can directly access up to 4 frequency inverters. 8 digital inputs and 2 digital outputs are available.
Technical Data

**Bus interface**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range</td>
<td>-25 °C...50 °C</td>
</tr>
<tr>
<td>Temperature class</td>
<td>Class 3K4</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP66</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>24 V ± 20 %, ≈ 100 mA Reverse polarity protected</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>3M7</td>
</tr>
<tr>
<td>Firmware version</td>
<td>V1.3 R2</td>
</tr>
<tr>
<td>Hardware version</td>
<td>AA</td>
</tr>
<tr>
<td>Dimensions [mm]*</td>
<td>H x W x D: 95 x 136 x 99</td>
</tr>
</tbody>
</table>

*bus interface fitted to bus connection unit
Depth: 108 mm with cover caps on M12 connection

**Digital input**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital input - working range</td>
<td>Low: 0 V ... 5 V, High: 15 V ... 30 V</td>
</tr>
<tr>
<td>Digital input - specific data</td>
<td>Rᵢ = 8 kΩ, input capacity: 10 nF, response time 1 ms, inputs as per EN 61131-2 type 1</td>
</tr>
<tr>
<td>Digital output - 24 VDC power supply</td>
<td>≤ 400 mA (input)</td>
</tr>
<tr>
<td>Digital output - working range</td>
<td>Low = 0 V, High = 24 V; max. 200 mA</td>
</tr>
</tbody>
</table>

**Bus specification**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet/IP</td>
<td>max. 100 MBaud electrical isolation 500 Vᵦ</td>
</tr>
<tr>
<td>Bus connection</td>
<td>2 x M12 sockets</td>
</tr>
<tr>
<td>Bus termination</td>
<td>performed automatically</td>
</tr>
<tr>
<td>Status display</td>
<td>8 LEDs</td>
</tr>
<tr>
<td>Topology*</td>
<td>Star*, ring, linear bus</td>
</tr>
</tbody>
</table>

* additional switch for “star” topology required

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td>Min. Ethernet CAT-5</td>
</tr>
<tr>
<td>Max. cable length</td>
<td>100 m between two bus interfaces</td>
</tr>
<tr>
<td>Shield</td>
<td>via M12 direct to PE</td>
</tr>
<tr>
<td>PE connection</td>
<td>via PE screw cap in the terminal box</td>
</tr>
</tbody>
</table>

**Power**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update interval for process data between bus interface and frequency inverter</td>
<td>≤ 5 ms</td>
</tr>
<tr>
<td>Parameter read access on the frequency inverter</td>
<td>≈ 15 ms</td>
</tr>
<tr>
<td>Parameter write access with storage in EEPROM</td>
<td>≈ 25 ms</td>
</tr>
<tr>
<td>Cycle times</td>
<td>≥ 1 ms</td>
</tr>
</tbody>
</table>
Bus interface characteristics

<table>
<thead>
<tr>
<th>IO messages (process data connections)</th>
<th>1 “Exclusive Owner”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>max. 2 “Listen Only” connections</td>
</tr>
<tr>
<td></td>
<td>Type “Cyclic”, min. cycle time 1 ms</td>
</tr>
<tr>
<td>Explicit messages</td>
<td>Yes</td>
</tr>
<tr>
<td>UCMM</td>
<td>Supported</td>
</tr>
<tr>
<td>DLR</td>
<td>Supported</td>
</tr>
<tr>
<td>Switch with two ports</td>
<td>integrated</td>
</tr>
<tr>
<td>Addressing via</td>
<td>DIP switches, bus interface parameters, BOOTP and DHCP possible</td>
</tr>
<tr>
<td>Access for NORD diagnostics tool via</td>
<td>Diagnostic socket on the device (if available) or possibly via frequency inverter and the UDP or TCP/IP Ethernet protocols</td>
</tr>
</tbody>
</table>

Installation

The bus interface must be attached to a suitable connection unit (SK TI4-TU…) and connected using the 4 provided M4 x 40 mm hexagon socket collar screws. Installation details can be found in the data sheet for the relevant connection units.

Connections

The two Ethernet lines are connected exclusively via the two M12 sockets on the front. If the bus interface is the final subscriber on the line, one M12 socket can remain unoccupied. The use of EMC cable glands is recommended.

<table>
<thead>
<tr>
<th>PIN</th>
<th>Signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TX+</td>
<td>Transmission Data +</td>
</tr>
<tr>
<td>2</td>
<td>RX+</td>
<td>Receive Data +</td>
</tr>
<tr>
<td>3</td>
<td>TX-</td>
<td>Transmission Data -</td>
</tr>
<tr>
<td>4</td>
<td>RX-</td>
<td>Receive Data -</td>
</tr>
</tbody>
</table>

PIN assignment
M12-4 socket ("D"- coded)
The connection to other signal and control lines takes place via the bus connection unit SK TI4-TU-BUS(-C).

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Double-sprung terminal bar</th>
<th>2 x 18 contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable cross section</td>
<td>AWG 14-26</td>
<td>rigid: 0.14 ... 2.5 mm flexible: 0.14 ... 1.5 mm with wire end sleeves</td>
</tr>
<tr>
<td>PE connection</td>
<td>Via housing</td>
<td></td>
</tr>
<tr>
<td>RJ12</td>
<td>RJ45 - socket</td>
<td>Interface for connecting a parameterisation tool</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potential</th>
<th>Contact</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Digital inputs</td>
<td>1</td>
<td>24 V</td>
<td>Supply potential (+24 V, ≤ 200 mA)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>24 V</td>
<td>Supply potential (+24 V, ≤ 200 mA)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DIN5</td>
<td>Digital input 5</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>DIN7</td>
<td>Digital input 7</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>DIN6</td>
<td>Digital input 6</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>DIN8</td>
<td>Digital input 8</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>0 V</td>
<td>Reference potential (0 V / GND)</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>0 V</td>
<td>Reference potential (0 V / GND)</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>24 V</td>
<td>Supply potential (+24 V, ≤ 200 mA)</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>24 V</td>
<td>Supply potential (+24 V, ≤ 200 mA)</td>
</tr>
<tr>
<td>2 System bus level and digital inputs</td>
<td>11</td>
<td>24 V</td>
<td>Supply voltage (+24 V)</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>24 V</td>
<td>Supply voltage (+24 V)</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>24 V</td>
<td>Supply voltage (+24 V)</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>SYS *</td>
<td>System bus data line *</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>0 V</td>
<td>Reference potential (0 V / GND)</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>SYS -</td>
<td>System bus data line -</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>0 V</td>
<td>Reference potential (0 V / GND)</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>0 V</td>
<td>Reference potential (0 V / GND)</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>DIN1</td>
<td>Digital input 1</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>DIN3</td>
<td>Digital input 3</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>0 V</td>
<td>Reference potential (0 V / GND)</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>0 V</td>
<td>Reference potential (0 V / GND)</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>24 V</td>
<td>Supply voltage (+24 V)</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>24 V</td>
<td>Supply voltage (+24 V)</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>DIN2</td>
<td>Digital input 2</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>DIN4</td>
<td>Digital input 4</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>0 V</td>
<td>Reference potential (0 V / GND)</td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>0 V</td>
<td>Reference potential (0 V / GND)</td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>24 V</td>
<td>Supply voltage (+24 V)</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>24 V</td>
<td>Supply voltage (+24 V)</td>
</tr>
<tr>
<td>3 Digital outputs</td>
<td>31</td>
<td>V1 24V2</td>
<td>Supply potential (+24 V - in) of the digital outputs</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>0V2</td>
<td>Reference potential (0 V / GND) of the digital outputs</td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>DOUT1</td>
<td>Digital output 1 (+24 V, ≤ 200 mA)</td>
</tr>
<tr>
<td></td>
<td>34</td>
<td>DOUT2</td>
<td>Digital output 2 (+24 V, ≤ 200 mA)</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>0V2</td>
<td>Reference potential (0 V / GND) of the digital outputs</td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>0V2</td>
<td>Reference potential (0 V / GND) of the digital outputs</td>
</tr>
<tr>
<td>4 Diagnosis</td>
<td>RJ12 - 1</td>
<td>RS485_A</td>
<td>Data cable RS485</td>
</tr>
<tr>
<td></td>
<td>RJ12 - 2</td>
<td>RS485_B</td>
<td>Data cable RS485</td>
</tr>
<tr>
<td></td>
<td>RJ12 - 3</td>
<td>GND</td>
<td>Reference potential (GND)</td>
</tr>
<tr>
<td></td>
<td>RJ12 - 4</td>
<td>RS232_TxD</td>
<td>Data cable RS232</td>
</tr>
<tr>
<td></td>
<td>RJ12 - 5</td>
<td>RS232_RxD</td>
<td>Data cable RS232</td>
</tr>
<tr>
<td></td>
<td>RJ12 - 6</td>
<td>24 V</td>
<td>Supply voltage (+24 V)</td>
</tr>
</tbody>
</table>
Connection examples

<table>
<thead>
<tr>
<th>Connection of voltage supply and Systembus</th>
</tr>
</thead>
<tbody>
<tr>
<td>VI 24V Brown</td>
</tr>
<tr>
<td>GND/0V Blue</td>
</tr>
<tr>
<td>SYS+ Black</td>
</tr>
<tr>
<td>SYS- Grey</td>
</tr>
<tr>
<td>24 V DC</td>
</tr>
<tr>
<td>GND/0V Systembus</td>
</tr>
<tr>
<td>Systembus+</td>
</tr>
<tr>
<td>Systembus-</td>
</tr>
</tbody>
</table>

Configuration

The basic configuration of the module is primarily carried out via its DIP switches. The DIP switch settings are read after a "Power On" of the bus interface.

<table>
<thead>
<tr>
<th>DIP switch</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 11 10 9 8 7 6 5 4 3 2 1</td>
<td>Address</td>
</tr>
<tr>
<td>X X X 0 0 0 0 0 0 0 0 0</td>
<td>X 0</td>
</tr>
<tr>
<td>X X X 0 0 0 0 0 0 0 1 0</td>
<td>X 1</td>
</tr>
<tr>
<td>X X X 0 - - - - - -</td>
<td>X -</td>
</tr>
<tr>
<td>X X X 1 1 1 1 1 1 1 1</td>
<td>X 255</td>
</tr>
</tbody>
</table>

Access rights for remote maintenance

<table>
<thead>
<tr>
<th>DIP switch</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Only read access to parameters possible.</td>
</tr>
<tr>
<td>1</td>
<td>Read and write access to parameters possible.</td>
</tr>
<tr>
<td>0</td>
<td>No control possible.</td>
</tr>
<tr>
<td>1</td>
<td>Control is possible.</td>
</tr>
<tr>
<td>0</td>
<td>TCP/IP open connection.</td>
</tr>
<tr>
<td>1</td>
<td>Secure TCP/IP connection.</td>
</tr>
</tbody>
</table>

1. System bus (DIP 1)
   The system bus must be terminated at both physical ends.

2. IP address (DIP 2 ... 9)
   The final byte of the IP address can be set via this switch and is controlled in parameter P185. However, parameter P165 must be set to the default setting (setting value "0").

3. Access rights for remote maintenance (DIP 10 ... 12)
   The bus interface and the connected frequency inverter can be accessed using remote maintenance via the Ethernet TCP and UDP protocols. The type of access is defined via the DIP switch with inputs 10 to 12.

Factory settings DIP switches: OFF
LED indicators

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

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Colour</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MS (red/green)</td>
<td>Module State</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Link (yellow)</td>
<td>Link</td>
<td></td>
</tr>
</tbody>
</table>

**EtherNet/IP-specific LEDs**

<table>
<thead>
<tr>
<th>MS (Module State)</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>No operating voltage</td>
</tr>
<tr>
<td>Flashing green</td>
<td>Bus interface not configured</td>
</tr>
<tr>
<td>Green</td>
<td>Bus interface working correctly</td>
</tr>
<tr>
<td>Flashing red</td>
<td>Minor error, faulty configuration</td>
</tr>
<tr>
<td>Red</td>
<td>Unrecoverable error</td>
</tr>
<tr>
<td>Flashing red/green</td>
<td>Power up, self test</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NS (Network State)</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>No operating voltage</td>
</tr>
<tr>
<td>Flashing green</td>
<td>IP address configured but no CIP connection available</td>
</tr>
<tr>
<td>Green</td>
<td>CIP connection(s) available</td>
</tr>
<tr>
<td>Flashing red</td>
<td>Time-out, an &quot;exclusive owner connection&quot; has a time-out error</td>
</tr>
<tr>
<td>Red</td>
<td>Dual IP whose IP address is already being used by the bus interface</td>
</tr>
<tr>
<td>Flashing red/green</td>
<td>Power up, self test</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Link (Green LED)</th>
<th>Activity (Yellow LED)</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>• Bus interface not ready, no control voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No bus connection (check cable connection)</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>• Bus connection (cable connection) to another Ethernet device exists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No bus activity present</td>
</tr>
<tr>
<td>ON</td>
<td>Flashing (Blinking)</td>
<td>• Bus connection (cable connection) to another Ethernet device exists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bus activity present</td>
</tr>
</tbody>
</table>
### NORD-specific LEDs

<table>
<thead>
<tr>
<th>DS (Device State)</th>
<th>EN (Device Error)</th>
<th>Meaning</th>
<th>Flashing Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>Bus interface not ready, no control voltage</td>
<td>OFF</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>Bus interface ready, no error, at least one frequency inverter is communicating via the system bus</td>
<td>ON</td>
</tr>
<tr>
<td>ON</td>
<td>Short flashing</td>
<td>Bus interface ready, but</td>
<td>Flashing Pattern</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• One or more of the connected frequency inverters has fault status</td>
<td>ON</td>
</tr>
<tr>
<td>Long flashing</td>
<td>OFF</td>
<td>Bus interface ready and at least one other subscriber is connected to the system bus, but</td>
<td>Flashing Pattern</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No frequency inverter on the system bus (or connection interrupted)</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• One or more system bus subscriber has an address error</td>
<td>Flashing Pattern</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Software incompatible (bus interface software and FI software incompatible - update required)</td>
<td>ON</td>
</tr>
<tr>
<td>Long flashing</td>
<td>Short flashing</td>
<td>System bus is in status &quot;Bus Warning&quot;</td>
<td>Flashing Pattern</td>
</tr>
<tr>
<td></td>
<td>Flash interval 1x</td>
<td>• Communication on system bus disrupted</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>- 1s pause</td>
<td>• No other subscribers present on system bus</td>
<td>Flashing Pattern</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Module not inserted correctly or no connection to system bus</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Frequency inverter has no supply voltage</td>
<td>ON</td>
</tr>
<tr>
<td>Long flashing</td>
<td>Short flashing</td>
<td>System bus is in status &quot;Bus Off&quot;</td>
<td>Flashing Pattern</td>
</tr>
<tr>
<td></td>
<td>Flash interval 2x</td>
<td>• The system bus 24 V power supply has been interrupted during operation</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>- 1s pause</td>
<td>• The 24V voltage supply of the system bus is missing</td>
<td>ON</td>
</tr>
<tr>
<td>Long flashing</td>
<td>Short flashing</td>
<td>System bus is in status &quot;Bus Off&quot;</td>
<td>Flashing Pattern</td>
</tr>
<tr>
<td></td>
<td>Flash interval 3x</td>
<td>• The system bus 24 V power supply has been interrupted during operation</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>- 1s pause</td>
<td>• The 24V voltage supply of the system bus is missing</td>
<td>ON</td>
</tr>
<tr>
<td>Long flashing</td>
<td>Short flashing</td>
<td>Bus interface error</td>
<td>Flashing Pattern</td>
</tr>
<tr>
<td></td>
<td>Flash interval 4x</td>
<td>• See parameter P170</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>- 1s pause</td>
<td>• See parameter P170</td>
<td>ON</td>
</tr>
<tr>
<td>OFF</td>
<td>Short flashing</td>
<td>System error, internal program sequence interrupted</td>
<td>Flashing Pattern</td>
</tr>
<tr>
<td></td>
<td>Flash interval 1x</td>
<td>• EMC interference (observe the wiring guidelines!)</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>- 7, 1s pause</td>
<td>• Bus interface defective</td>
<td>ON</td>
</tr>
</tbody>
</table>
Error messages

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

<table>
<thead>
<tr>
<th>Error</th>
<th>Meaning</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>100.0</td>
<td>EEPROM error</td>
<td>EMC faults, bus interface defective</td>
</tr>
<tr>
<td>102.0</td>
<td>Timeout</td>
<td>via P151/P513 monitoring</td>
</tr>
<tr>
<td>103.0</td>
<td>System bus BUS OFF</td>
<td>No 24 V supply to the bus, connections not correct</td>
</tr>
<tr>
<td>104.0</td>
<td>Module temperature &gt; 97 °C</td>
<td>SK CU4-… only, permissible internal temperature of bus interface exceeded for approx. 60 sec</td>
</tr>
<tr>
<td>550.1</td>
<td>DIP switch error</td>
<td>The DIP switches (IP address) could not be read correctly</td>
</tr>
<tr>
<td>560.0 ... 560.9</td>
<td>Internal error</td>
<td>Bus interface not ready</td>
</tr>
<tr>
<td>561.0</td>
<td>General network error</td>
<td></td>
</tr>
<tr>
<td>561.1</td>
<td>Ethernet Watchdog timeout</td>
<td></td>
</tr>
<tr>
<td>561.2</td>
<td>Bus cable fault</td>
<td>Bus cable connection interrupted</td>
</tr>
<tr>
<td>561.3</td>
<td>IP address error</td>
<td>IP address of bus interface has been doubly assigned</td>
</tr>
<tr>
<td>563.0</td>
<td>Firmware version incompatible</td>
<td>The firmware version cannot be used for the device</td>
</tr>
<tr>
<td>564.0</td>
<td>MAC address error</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Error (E010)</th>
<th>Meaning</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>Connection error</td>
<td>Contact to SK xU4 lost</td>
</tr>
<tr>
<td>10.1</td>
<td>ASIC error</td>
<td>Communication to Ethernet - ASIC lost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Supply voltage shut-off</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• for SK CU4-… e.g.: Temperature &gt; 97 °C</td>
</tr>
<tr>
<td>10.2</td>
<td>Ethernet/IP Watchdog timeout</td>
<td>Telegram transfer error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check the connections and links, program sequence and Bus Master</td>
</tr>
<tr>
<td>10.3</td>
<td>Timeout by P151/P513</td>
<td>Telegram transfer error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check the connections and links</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check the Watchdog time</td>
</tr>
<tr>
<td>10.4</td>
<td>IP address error</td>
<td>IP address of bus interface has been doubly assigned</td>
</tr>
<tr>
<td>10.5</td>
<td>Internal error</td>
<td>Bus interface not ready</td>
</tr>
<tr>
<td>10.6</td>
<td>Bus cable fault</td>
<td>Bus cable connection interrupted</td>
</tr>
<tr>
<td>10.8</td>
<td>The connection between inverter and bus interface had timeout</td>
<td>SK TU3 bus interface only</td>
</tr>
<tr>
<td>10.9</td>
<td>Bus interface missing (P120)</td>
<td>SK xU4 bus interface only</td>
</tr>
</tbody>
</table>
**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).

<table>
<thead>
<tr>
<th>Parameter [Array]</th>
<th>Meaning</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>P120 [-01]</td>
<td>Option monitoring</td>
<td>“Auto” (default setting)</td>
</tr>
</tbody>
</table>
| 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 |
| P543 [-01]...[-03] | Bus actual value (1...3 (...5)) | Possible settings according to P418 |
| P546 [-01]...[-03] | Bus setpoint value (1...3 (...5)) | Possible settings according to P400 |
| P700 [-01]P701    | Current faults | Information parameter |
| P740/P741        | Process data bus In / Out | Information parameter |
| P745              | Module version | Only SK TU3 |
| P746              | Module status | Only SK TU3 |
| P748              | CANopen/System bus status | Information parameter |

**Bus interface:** The bus interface provides a selection of appropriate parameters for setting or displaying special operating values. Parameters can be adapted using the NORDCON software or an SK PAR-3H / -3E parameter box. All parameters can still be read and written by the bus master via EtherNet/IP.

<table>
<thead>
<tr>
<th>Parameter [Array]</th>
<th>Meaning</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>P150</td>
<td>Set relays</td>
<td>Set DOUT directly or control via BUS</td>
</tr>
<tr>
<td>P151</td>
<td>External bus time-out</td>
<td>Monitoring of SK xU4 bus interface</td>
</tr>
<tr>
<td>P152</td>
<td>Factory setting</td>
<td>Reset bus interface parameters</td>
</tr>
<tr>
<td>P153 [-01]...[-02]</td>
<td>Minimum system bus cycle</td>
<td>Reduction of bus load on the system bus caused by the bus interface</td>
</tr>
<tr>
<td>P154 [-01]...[-02]</td>
<td>Access to option card I/O</td>
<td>Administration of read and write permissions to the IOs of the bus interface</td>
</tr>
<tr>
<td>P160 [-01]...[-04]</td>
<td>IP address</td>
<td>Alternative to setting the array value [-04]: DIP switch, ➔ Value from DIP-switch has priority</td>
</tr>
<tr>
<td>P161 [-01]...[-04]</td>
<td>IP subnet mask</td>
<td></td>
</tr>
<tr>
<td>P164 [-01]...[-04]</td>
<td>IP Gateway</td>
<td></td>
</tr>
<tr>
<td>P165</td>
<td>Addressing mode</td>
<td>Setting “0” = value from DIP-switch or P160 (default setting)</td>
</tr>
<tr>
<td>P166</td>
<td>Process data transmit format</td>
<td>Leave at default setting</td>
</tr>
<tr>
<td>P169</td>
<td>Password</td>
<td></td>
</tr>
<tr>
<td>P170 [-01]...[-02]</td>
<td>Present errors</td>
<td>Display bus interface errors</td>
</tr>
<tr>
<td>P171 [-01]...[-03]</td>
<td>Software version</td>
<td>Firmware version / Revision</td>
</tr>
<tr>
<td>P172</td>
<td>Configuration</td>
<td>Bus interface type</td>
</tr>
<tr>
<td>P173</td>
<td>Module status</td>
<td>Status of system bus or the connected FI</td>
</tr>
<tr>
<td>P174</td>
<td>Status of digital inputs</td>
<td>Image of the switching status of DIN</td>
</tr>
<tr>
<td>P175</td>
<td>Digital output state</td>
<td>Image of the switching status of DOUT</td>
</tr>
<tr>
<td>P176 [-01]...[-02]</td>
<td>Process data bus In</td>
<td>Information parameter</td>
</tr>
<tr>
<td>P177 [-01]...[-02]</td>
<td>Process data bus Out</td>
<td>Information parameter</td>
</tr>
<tr>
<td>P178</td>
<td>Internal temperature</td>
<td>Information parameter</td>
</tr>
<tr>
<td>P180 [-01]...[-02]</td>
<td>Active assembly</td>
<td>Information parameter</td>
</tr>
<tr>
<td>P181 [-01]...[-06]</td>
<td>MAC address</td>
<td>Information parameter</td>
</tr>
<tr>
<td>P185 [-01]...[-04]</td>
<td>Present IP address</td>
<td>Information parameter</td>
</tr>
<tr>
<td>P186 [-01]...[-04]</td>
<td>Current IP subnet mask</td>
<td>Information parameter</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>SK TU3-</th>
<th>SK TU4-</th>
<th>SK CU4- / SK TU4-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access via RJ12 diagnostics socket of the SK 5xxE</td>
<td>Access via RJ12 diagnostics socket of the bus connection unit SK TI4-TU-BUS(-C)</td>
<td>Access via RJ12 frequency inverter diagnostics socket, if connected to the bus interface via the system bus.</td>
</tr>
</tbody>
</table>

Further documentation and software (www.nord.com)

<table>
<thead>
<tr>
<th>Software</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDS - file</td>
<td>Electronic Data Sheet (Object data file)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Document</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BU 0000</td>
<td>Description of NORD CON software</td>
</tr>
<tr>
<td>BU 0040</td>
<td>Parameter box manual</td>
</tr>
<tr>
<td>BU 0180</td>
<td>Frequency inverter manual SK 180E, SK 190E</td>
</tr>
<tr>
<td>BU 0200</td>
<td>Frequency inverter manual SK 2xxE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Software</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORD CON</td>
<td>Parametrisation and diagnostic software</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Document</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BU 2100</td>
<td>Etherne/IP bus communication manual</td>
</tr>
<tr>
<td>TI 275280500</td>
<td>Bus connection unit SK TI4-TU-BUS-C</td>
</tr>
<tr>
<td>TI 275274505</td>
<td>SK TIE4-M12-SYSS System bus connection expansion entrance</td>
</tr>
<tr>
<td>TI 275274506</td>
<td>SK TIE4-M12-SYSM System bus connection expansion exit</td>
</tr>
</tbody>
</table>