Intelligent Drivesystems, Worldwide Services

GB

DeviceNet

BU 0080

DeviceNet Bus modules

Supplementary manual for NORDAC frequency inverters

NORD DRIVESYSTEMS

N O R D A C Frequency Inverters

Safety and operating instructions for drive power converters

(as per: Low Voltage Directive 2006/95/EEC)

1.General

During operation, drive power converters may, depending on their protection class, have live, bare, moving or rotating parts or hot surfaces.

Unauthorised removal of covers, improper use, incorrect installation or operation causes a risk of serious personal injury or material damage.

Further information can be found in this documentation.

All transportation, installation commissioning and maintenance work must be carried out by **qualified personnel** (compliant with IEC 364 or. CENELEC HD 384 or DIN VDE 0100 and IEC 664 or DIN VDE 0110 and national accident prevention regulations).

For the purposes of these basic safety instructions, qualified personnel are persons who are familiar with the assembly, installation, commissioning and operation of this product and who have the relevant qualifications for their work.

2. Proper use in Europe

Drive power converters are components intended for installation in electrical systems or machines.

When installed in machines, the drive power converter must not be commissioned (i.e. commencement of the proper use) until it has been ensured that the machine meets the provisions of the EC Directive 2006/42/EEC (Machinery Directive); EN 60204 must also be complied with.

Commissioning (i.e. implementation of the proper use) is only permitted if the EMC directive (2004/108/EEC) is complied with.

Drive power converters with a CE label meet the requirements of the Low Voltage Directive 2006/95/EEC. The stated harmonized standards for drive current inverters are used in the declaration of conformity.

Technical data and information for connection conditions can be found on the rating plate and in the documentation, and must be complied with.

The drive power converters may only be used for safety functions which are described and explicitly approved.

3. Transport, storage

Information regarding transport, storage and correct handling must be complied with.

4. Installation

The installation and cooling of the equipment must be implemented according to the regulations in the corresponding documentation.

The drive power converter must be protected against impermissible loads. Especially during transport and handling, components must not be deformed and/or insulation distances must not be changed. Touching of electronic components and contacts must be avoided.

Drive power converters have electrostatically sensitive components, which can be easily damaged by incorrect handling. Electrical components must not be mechanically damaged or destroyed (this may cause a health hazard!).

5. Electrical connection

When working on live drive power converters, the applicable national accident prevention regulations must be complied with (e.g. BGV A3, formerly VBG 4).

The electrical installation must be implemented as per the applicable regulations (e.g. cable cross-section, fuses, earth lead connections) . Further instructions can be found in the documentation.

Information regarding EMC-compliant installation – such as shielding, earthing, location of filters and installation of cables – can be found in the drive power converter documentation. These instructions must be complied with even with CE marked drive power converters. Compliance with the limit values specified in the EMC regulations is the responsibility of the manufacturer of the system or machine.

6. Operation

Systems in which drive power converters are installed must be equipped, where necessary, with additional monitoring and protective equipment as per the applicable safety requirements, e.g. legislation concerning technical equipment, accident prevention regulations, etc.

The parameterisation and configuration of the drive power converter must be selected so that no hazards can occur.

All covers must be kept closed during operation.

7. Maintenance and repairs

After the drive power converter is disconnected from the power supply, live equipment components and power connections should not be touched immediately, because of possible charged capacitors. Observe the applicable information signs located on the drive power converter.

Further information can be found in this documentation.

These safety instructions must be kept in a safe place!

Documentation

Designation: BU 0080 DE
Part No.: 607 08 01
Device series: **DeviceNet** for SK 300E, SK 500E (entire series), SK 700E, SK 750E

Version list

Designation of previous issues	Software Version	Comments
BU 0080 GB, December 2005 Part No. 607 0801 / 5205	V 1.1 R6	Original version
BU 0080 GB, August 2010 Part No. 607 0801 / 3110	V 1.1 R7	Deletion of option "DevicenNet mc" for FI-series "vector mc" Inclusion of option "SK TU3-DEV" for FI-series SK 500E

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Intended use of the frequency inverter

Compliance with the operating instructions is **necessary for fault-free operation** and the acceptance of any warranty claims. **These operating instructions must be read** before working with the device!

These operating instructions contain **important information about servicing.** They must therefore be kept **close to the device**.

The DeviceNet module can only be used for the specifically defined frequency inverter series, use across series is only possible with the SK TU2-… module with SK 300E and Sk 750E. The use of these modules with other devices is not permitted and can lead to their destruction.

The DeviceNet modules and the corresponding frequency inverters are devices for stationary installation in control cabinets or decentralised structures. All details regarding technical data and permissible conditions at the installation site must be complied with.

Commissioning (implementation of the correct use) is not permitted until it has been ensured that the machine complies with the EMC directive 204/108/EEC and that the conformity of the end product meets the machine directive 2006/42/EEC (note EN 60204).

NOTE

This supplementary operating manual is only valid in conjunction with the operating manual supplied for the respective frequency inverter.

1 Introduction

1.1 General information

This DeviceNet documentation is valid for the NORDAC SK 300E, SK 500E, SK 700E series and for SK 750E.

NORDAC frequency inverters can be equipped with various modules for parameterisation or control. A slot is provided for this in the basic device. As delivered, there is a blank cover at this location, which must be replaced by the DeviceNet technology unit.

1.2 The bus system

As well as the communication profile, DeviceNet defines so-called device profiles for the most important types of device used in industrial automation technology, e.g. digital and analog I/Os, drives, etc.

DeviceNet is an open field bus system, via which various control units such as SPS or PCs can be linked to sensors and actuators.

Devices from various manufacturers and with different degrees of complexity can be linked with DeviceNet and can be controlled, diagnosed, configures and parameterised via the bus.

DeviceNet provides the connection between the communication participants via the proven "Common Industrial Protocol" (CIP). The physical basis for this is the CANbus.

1.3 DeviceNet with NORDAC frequency inverters

Features:

- Electrically isolated bus interface
- Standard transfer rates up to 500 KBit/s
- Easy connection to the inverter via a 5-pin open-style plug connector.
- Status display with 4 LEDs
- 24V supply for bus drivers
- Programming of all frequency inverter parameters using DeviceNet
- Support of the communication profile DeviceNet Specification Release 2.0
  and the drive profile AC Drive
- Group 2 Only Slave (Support of the predefined master/ slave connection set)

1.4 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.

1.5 Scope of supply

SK TU1-DEV	for frequency inverter SK 700E	IP20 or
SK TU2-DEV(-C)	for frequency inverter SK 300E or SK 750E	IP55 **(optionally IP66)** or
SK TU3-DEV*	for frequency inverter SK 500E *incl. screw for optional fixing to the FI	IP20

1.6 Certifications

1.6.1 European EMC Directive

If NORDAC frequency inverters or their options are installed according to the recommendations in this instruction manual, it meets all EMC directive requirements, as per the EMC product standard for motor-operated systems EN 61800-3.

1.6.2 RoHS compliance

The DeviceNet bus options described here are designed to be RoHS compliant according to Directive 2002/95/EEC

1.7 Identification System

SK TU3-DEV(-C)

IP protection class:	Standard = IP55, C = „coated“ (IP66)
Bus system:	AS1 = AS-Interface, CAN = CAN, CAO = CANopen, **DEV** = **DeviceNet**, ECT = EtherCAT®, etc.
Device series:	SK TU1 / SK TU2 / **SK TU3**

2 Modules

2.1 NORDAC SK 500E

By the use of various modules for display, control and parameterisation, the NORDAC SK 5xxE can be easily adapted to various requirements.

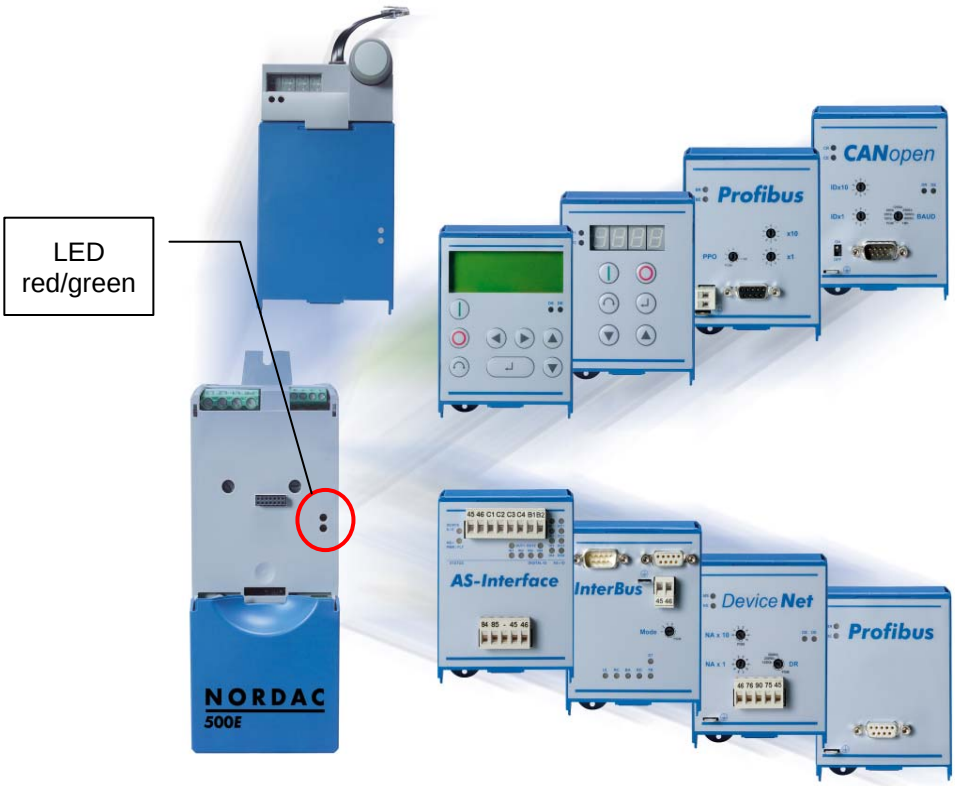
Alphanumerical display and operating modules can be used for simple commissioning. For more complex tasks, various connections to a PC or an automation system can be selected.

The technology unit (Technology Unit, SK TU3-…) is connected externally to the front of the frequency inverter and is therefore easy to access and replace at any time.

In the delivery condition, without the technology unit, 2 LEDs (green/red) are visible externally. These signal the actual device status.

The green LED indicates that the mains voltage is present and operational, while a flashing code that increases in speed shows the degree of overload at the frequency inverter output.

The red LED signals actual error by flashing with a frequency which corresponds to the number code of the error (Manual BU 0500 Section 6).



WARNING

Modules should 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 not possible. It must be connected directly to the frequency inverter.

NOTE

2.1.1 DeviceNet module SK TU3-DEV

This DeviceNet module can be used for all types of SK 500E devices. It occupies the technology slot which can then no longer be used for control and display modules. Alternatively, the SimpleBox SK CSX-0 can be plugged on to the DeviceNet module and connected via the RS232/485 interface with the frequency inverter.

The DeviceNet module must be provided with an external 24V power supply. This DeviceNet participant can therefore be identified by the master system even without a voltage supply to the frequency inverter. The data required for this purpose are set using a rotary coding switch. This Bus data is read in when the 24V is applied from the frequency inverter.

Supply voltage:

The supply voltage is 24V DC ±25% (pin 1 = V-, pin 5 = V+ (from left to right)). The connection is made via the 5-pin open-style plug connector. (See illustration below)

Setting the node address: (See Section.5.4)

The node address (0...63) can be set with the rotary switches NA x 1 and NA x 10:

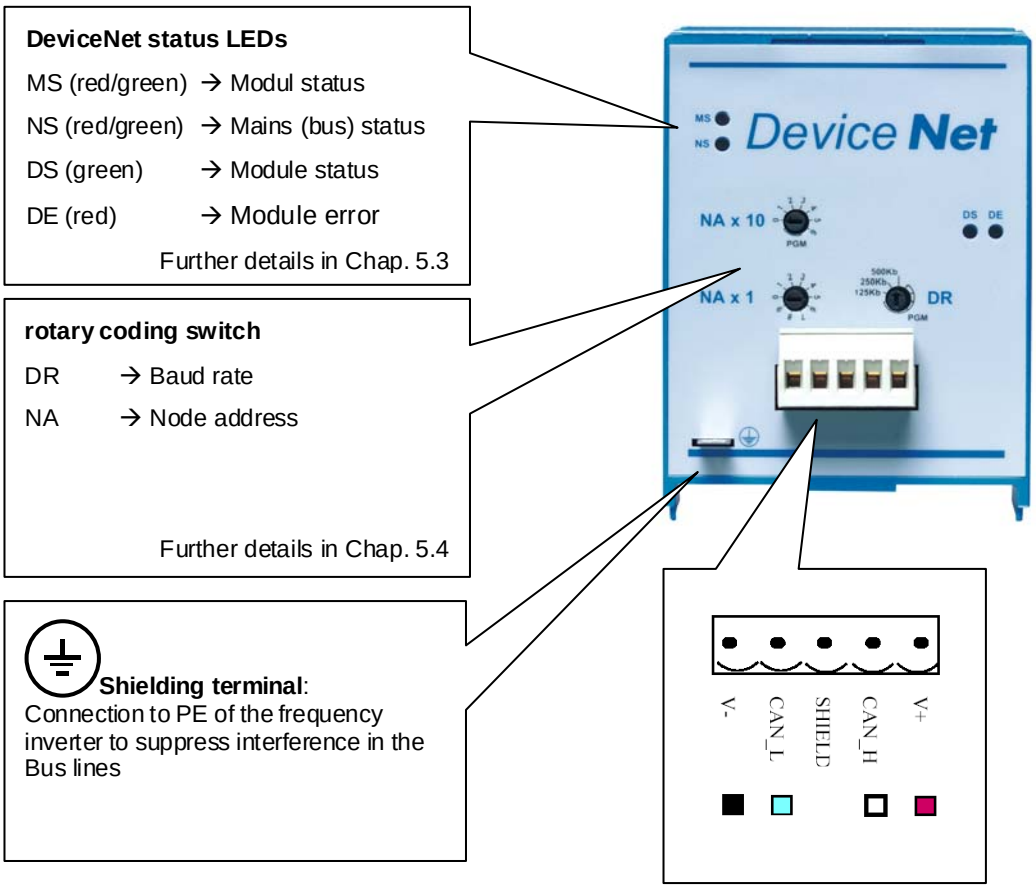
Example: Node address = 50 dec = NAx 1 = 0, NAx 10 = 5

If the node address is set to a value greater than 63, the value from the parameter (P515[-01]) of the frequency inverter is used as the node address.

Setting the baud rate: (See Section 5.4)

The baud rate can be set using the rotary switch DR (125kBit/s...500kBit/s). If a value in the PGM range is set, the value from parameter (P514) of the frequency inverter is used as the baud rate.

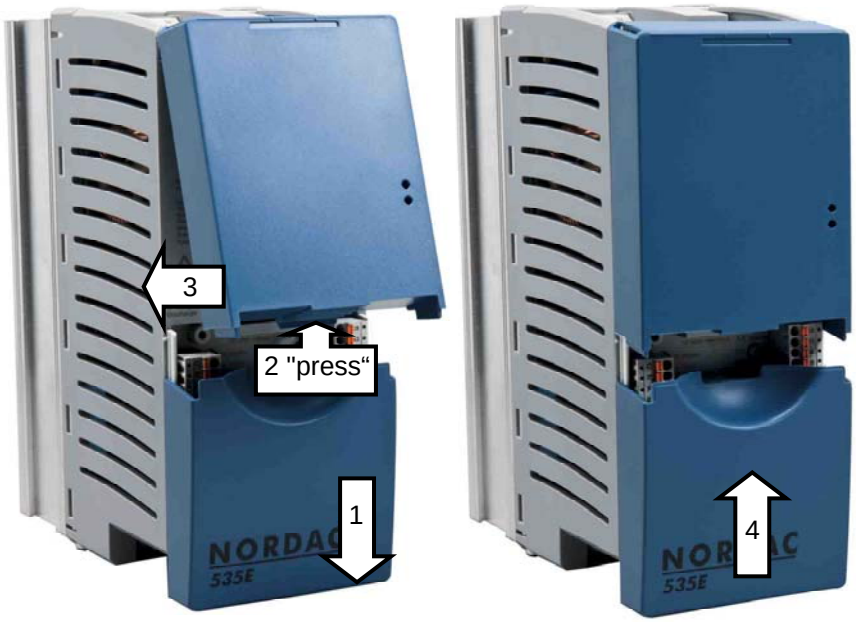
Note: The settings made using the rotary coding switch are not transferred to the frequency inverter or saved.



2.1.2 Installation of the SK TU3 technology unit

The technology units must be installed 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 pressing the release on the lower edge and pulling off with an upward turning movement. If necessary, the fixing screw next to the release must be removed.
4. Hook the technology unit onto the upper edge slots and press in lightly until engaged. Ensure full contact with the connector strip and fasten with the screws if necessary (separate packet).
5. Close the control terminal cover again.



Similar to illustration

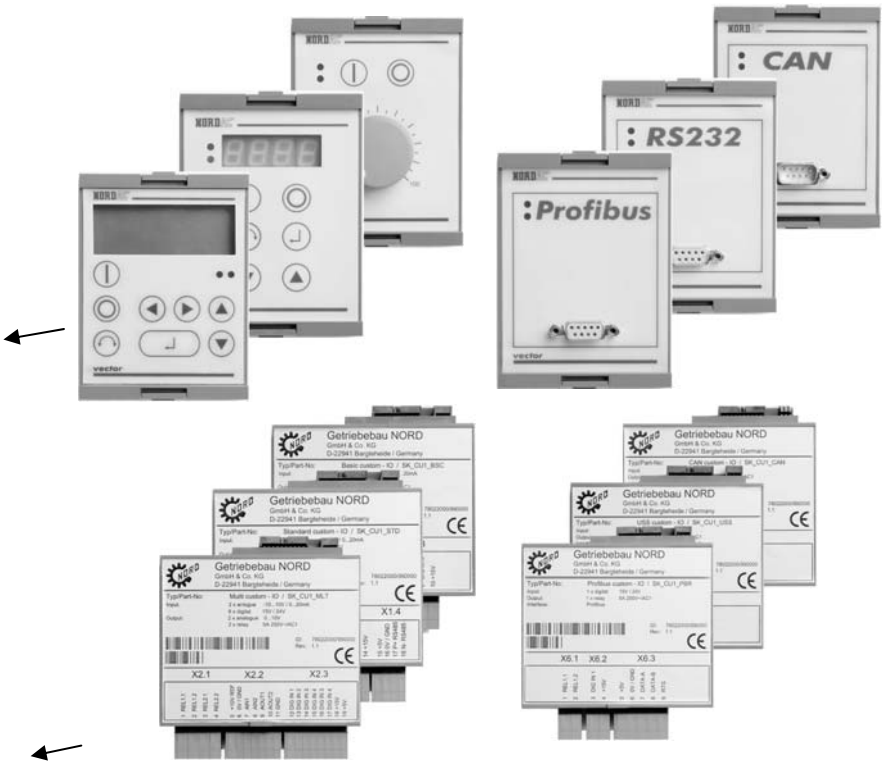
Further detailed information can be found in the device manual BU 0500.

- www.nord.com –

2.2 NORDAC SK 700E

With the combination of modules for display, **technology units** and modules with digital and analog inputs and interfaces, **customer interfaces** or **special extensions,** the NORDAC SK 700E can easily be extended tot cater for the requirements of a wide range of different applications.

Technology units (**TU**) are modules which can be inserted from above for display, parameterisation and control of the inverter.



Customer interfaces (**C**ustomer **U**nits) are modules which are inserted into the upper slot inside the inverter. They are used for control and communication using digital/analog signals or bus interfaces.

Special extensions (E**X**tension **U**nits) are inserted into the lower slot of the inverter. Such an extension unit is required if the speed is to be controlled or positioned by an incremental (absolute) encoder.

WARNING

Modules must not be inserted or removed unless the device is **free of voltage**. The slots may only be used for the intended modules. The slots are coded to prevent them being mixed up.

Installation of a technology unit separate from the frequency inverter is not possible. It must be connected directly to the frequency inverter.

NOTE

2.2.1 DeviceNet module SK TU1-DEV

This DeviceNet module can be used for all types of SK 700E devices. It occupies the technology slot which can then no longer be used for control and display modules. Alternatively, a hand-held parameter box SK PAR-xH (with adapter cable) can be connected to the frequency inverter via an optional RS232/RS485 interface.

The DeviceNet module must be provided with an external 24V power supply. This DeviceNet participant can therefore be identified by the master system even without a voltage supply to the frequency inverter. The data required for this purpose are set using a rotary coding switch. This Bus data is read in when the 24V is applied from the frequency inverter.

Supply voltage:

The supply voltage is 24V DC ±25% (pin 1 = V-, pin 5 = V+ (from left to right)). The connection is made via the 5-pin open-style plug connector. (See illustration below)

Setting the node address: (See Section.5.4)

The node address (0...63) can be set with the rotary switches NA x 1 and NA x 10:

Example: Node address = 50 dec = NAx 1 = 0, NAx 10 = 5

If the node address is set to a value greater than 63, the value from the parameter (P515) of the frequency inverter is used as the node address.

Setting the baud rate: (See Section.5.4)

The baud rate can be set using the rotary switch DR (125kBit/s...500kBit/s). If a value in the PGM range is set, the value from parameter (P514) of the frequency inverter is used as the baud rate.

DeviceNet status LEDs: (See Section.5.3)

MS (red/green): Module status

MS (red/green) Mains (bus) status

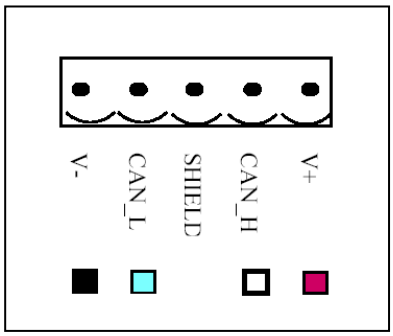
Module status LEDs (See Section 5.3):

DS (green): Module status

DE (red): Module error

Shielding terminal:
Connection to PE of the frequency inverter to suppress interference in the Bus lines

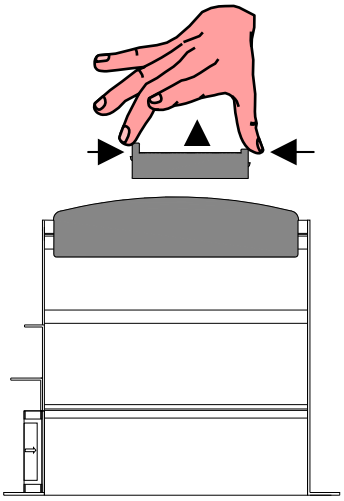
Connector assignment:



2.2.2 Installation of the SK TU1 technology unit

Installation: the technology units must be installed as follows:

1. Switch off the mains voltage, observe the waiting period.
2. Remove the dummy cover by actuating the unlocking device on the top and bottom edge.
3. Allow the technology unit to engage audibly by pressing lightly on the installation surface.



WARNING

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 not possible. It must be connected directly to the frequency inverter.

NOTE

2.3 NORDAC *trio* SK 300E

With the combination of **technology units** and **customer units** (interfaces with digital and analog inputs) the NORDAC *trio* SK 300E can easily be extended to cater for the requirements of a wide range of different applications.

2.3.1 DeviceNet module SK TU2-DEV

This DeviceNet module can be used for all types of SK 300E and SK 750E devices. With the SK 300E it occupies the technology slot which can then no longer be used for control and display modules. Alternatively, a hand-held parameter box, SK PAR-2H can be connected (SK PAR-3H with adapter) to the frequency inverter via a standard RS485 interface (M12).

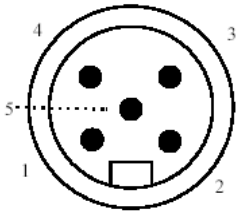
The DeviceNet module must be provided with an external 24V power supply. This DeviceNet participant can therefore be identified by the master system even without a voltage supply to the frequency inverter. The data required for this purpose are set using a rotary coding switch. This Bus data is read in when the 24V is applied from the frequency inverter.

Supply voltage:

The supply voltage is 24V DC ±25% (pin 1 = V-, pin 5 = V+ (from left to right)). The connection is made via the 5-pin open-style plug connector. (See illustration below)

Connector assignment:

1 Shield
2 V+
3 V -
4 CAN_H
5 CAN_L



DeviceNet status LEDs: (See Section 5.3)

MS (red/green):	Module status
MS (red/green)	Mains status

Module status LEDs (See Section 5.3):

DS (green):	Module status
DE (red):	Module error

Setting the node address:(See Section 5.4)

The node address (0...63) can be set with the rotary switches NA x 1 and NA x 10:

Example: Node address = 50 dec = NAx 1 = 0, NAx 10 = 5

If the node address is set to a value greater than 63, the value from the parameter (P515) of the frequency inverter is used as the node address.

Setting the baud rate:(See Section 5.4)

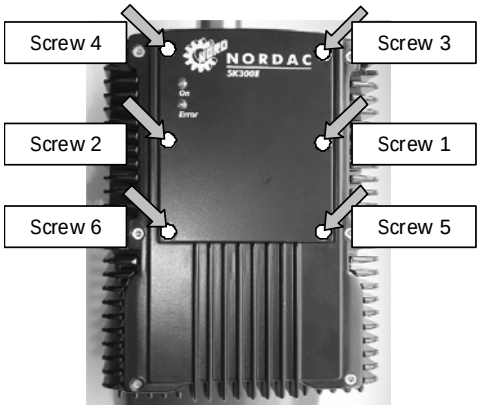
The baud rate can be set using the rotary switch DR (125kBit/s...500kBit/s). If a value in the PGM range is set, the value from parameter (P514) of the frequency inverter is used as the baud rate.

2.3.2 Installing the technology unit

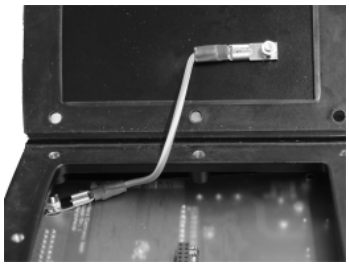
Installation: the technology units must be installed as follows:

1. Switch off the mains voltage, observe the waiting period.
2. Undo the 6 fastening screws on the **blind plate** and remove the blind plate (see left illustration).
3. Attach the PE connection on the inside of the technology unit being mounted (see right illustration). Fit the seal together with the **technology unit** on the surface of the frequency inverter. Ensure that the connector strip has full contact.
4. Lightly tighten all 6 fastening screws.
5. Now tighten the 6 fastening screws in the specified sequence from 1 to 6 (see Fig. 1 on next page) and with the torque given in the table.

Frequency inverter size	Screw size	Tightening torque
Size 1	M4 x 8	1.5Nm ± 20%
Size 2		



Technology unit fastening screws



PE connection on the technology unit

WARNING

NOTE

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 not possible. It must be connected directly to the frequency inverter.

Operation is not permitted if there is no secure PE connection to the frequency inverter and to the technology unit!

3 The DeviceNet protocol

Participants	Up to 64 participants can communicate with each other in a DeviceNet network. Each participant has its own node address.
Communication, connection objects	Communication between the individual devices is carried out via connection objects. Before the exchange of data can start, these connections (*Connection Objects*) must be set up.
Predefined Master/ Slave Connection Set	The Predefined Master/ Slave Connection Set provides an interface with which a set of up to 4 connections can be allocated: Explicit Messaging Connection Polled I/O Connection Bit.Strobe I/O Connection Change Of State / Cyclic I/O Connection Access to the slave is only possible from a Master.
Object model	DeviceNet describes all data and functions on the basis of an object model. An *object* represents the individual components within a device. It is determined by its data or characteristics (*attributes*) and provides functions or services (*Services*) for external access. An object class defines all characteristics (attributes/services) for objects of the same type. With the creation of an object instance, a real copy of the object with its own data is created.
Explicit Message	Via *Explicit Messages* , low priority configuration or diagnostic data are exchanged (parameterisation). This connection is always a point-to-point connection according to the Client/Server principle.
I/O Messages	*I/O Messages* are used to transfer process data. An I/O Message always has a producer (transmitter). However, several consumers (recipients) may exist. The process data can contain either 8 Bytes (unfragmented) or can be distributed (fragmented) over several telegrams.
Polling	A *Polled* connection corresponds to a Master-Slave connection: The Master send cyclical data to the Slave. This then responds with its status data.
Bit-Strobe	In a*Bit-Strobe* connection, the Master sends an 8 Byte telegram to all connected devices. Each participant is allocated exactly one bit. As all participants receive the telegram simultaneously, a synchronous reaction can therefore be carried out. The reaction of the individual participants is specific to the application and must be known to the Master. Bit-Strobe telegrams are not confirmed.

4 Bus configuration

A DeviceNet network consists of a maximum of 64 participants (nodes) and is based on a linear topology. The number of participants is dependent on the driver modules (standard approx. 100 nodes). Repeaters must be used for a high number of nodes.

Shielded, 5-wire cables according to the DeviceNet specification must be used.

4.1 Laying the bus cables

In an industrial environment the correct installation of the bus system is particularly important in order to reduce potential interference. The following points are designed to help prevent interference and problems right from the start. The installation guidelines are not complete and applicable safety and accident prevention guidelines must be complied with.

4.2 Cable length

The guaranteed transfer speeds or transfer distances can only be achieved without errors if the specific cable parameters are complied with.

2-wire shielded copper cable should be used.

Bus length	Maximum baud rate
up to 500m	125 KBit/s
up to 250m	250 KBit/s
up to 100m	500 KBit/s

The maximum length of spur cables depends on the cable material and the selected baud rate. These can be seen in the DeviceNet specification.

4.3 Cable layout and shielding (EMC measures)

Without EMC measures, high frequency interference, which is mainly caused by switching processes or lightning often has the effect of interfering with electronic components in the bus participants and error-free operation is no longer ensured.

Appropriate shielding of the bus cable reduces electrical interference which can arise in an industrial environment.

Bus lines should be laid with a minimum spacing of 20 cm to other lines which carry a voltage higher than 60 V. This applies to lines laid inside and outside of control cabinets.

Note: If earthing potential values are different, transient current may flow through shielding which is connected on both sides. This may be a danger to electronic components. Differences in potential must be reduced using sufficient potential equalisation.

With the NORDAC SK 500E and SK 700E series, the PE terminal of the module must be connected to the PE of the frequency inverter (e.g. shielding angle)

5 Frequency inverters - settings and control elements

5.1 Frequency inverter bus parameters

To operate the inverter with the DeviceNet protocol, the bus must be connected to the Master and some settings must be made on the frequency inverter.

With the DeviceNet protocol, the inverter parameters are mapped onto DeviceNet objects in the range 100 to 109:		
- Class = 100 + parameter number / 100 - attribute = parameter number % 100 - instance = sub-index +1	or	- Parameter number = (class – 100) * 100 + attribute - sub-index = instance -1

The frequency inverter can always be parameterised. Control of the inverter via DeviceNet can be activated by setting parameter **P509** to value 18, 19 or 20 (**SK 500E: value 7**). (see below)

5.1.1 Control terminal parameters

Parameter	Setting value / Description / Note	Comments
P480 .. - 01 ... .. - 12	**Function Bus I/O In Bits**	
0 ... 72 [0]	The Bus I/O In Bits are perceived as digital inputs. They can be set to the same functions as the digital inputs (See P420…of the respective FI manual). **[01]=** Bus I/O In Bit 0 **[02]=** Bus I/O In Bit 1 **[03]=** Bus I/O In Bit 2 **[04]=** Bus I/O In Bit 3 **[05]=** Bus I/O In Bit 4 **[06]=** Bus I/O In Bit 5 **[07]=** Bus I/O In Bit 6 **[08]=** Bus I/O In Bit 7 **[09]=** Flag 1 (only SK 500E) **[10]=** Flag 2 (only SK 500E) **[11]=** Bit 8 BUS control word (only for SK 500E) **[12]=** Bit 9 BUS control word (only for SK 500E)	
P481 .. - 01 ... .. - 10	**Function Bus I/O Out Bits**	
0 ... 39 [0]	The bus I/O Out bits are perceived as multi-function relay outputs. They can be set to the same functions as the digital inputs (See P434…of the respective FI manual). **[01]=** Bus I/O Out Bit 0 **[02]=** Bus I/O Out Bit 1 **[03]=** Bus I/O Out Bit 2 **[04]=** Bus I/O Out Bit 3 **[05]=** Bus I/O Out Bit 4 **[06]=** Bus I/O Out Bit 5 **[07]=** Bus I/O Out Bit 6 / Flag 1 **[08]=** Bus I/O Out Bit 7 / Flag 2 **[09]=** Bit 10 BUS status word (only for SK 500E) **[10]=** Bit 13 BUS status word (only for SK 500E)	

Parameter	Setting value / Description / Note	Comments
P482 .. - 01 ... .. - 10	**Standardisation of bus I/O Out bits**	
-400 … 400 % [100]	Adjustment of the limit values of the relay functions/Bus Out Bits. For a negative value, the output function will be output negative. When the limit value is reached and the setting values are positive, the relay contact closes, with negative setting values the relay contact opens.	
P483 .. - 01 ... .. - 10	**Hysteresis of bus I/O Out bits**	
1 … 100 % [10]	Difference between switch-on and switch-off point to prevent oscillation of the output signal.	

5.1.2 Additional parameters

Parameter	Setting value / Description / Note	Comments
P507	**PPO type**	
1 ... 4 [1]	Only with the Profibus, InterBus or DeviceNet option **1** = PPO- type 1: DeviceNet with data length of 2 words / AC profile 1 **2** = PPO- type 2: DeviceNet with data length of 4 words / AC profile 2 **3, 4 =** PPO- type 3, 4: Reserved	
P509	**Interface**	**SK 300E, SK 700E, SK 750E**
0 ... 21 [0]	Selection of the interface from which the inverter is controlled. **0 = Control terminal or keyboard control** with the **Control Box** (option) ,the **ParameterBox** (option) or **the Potentiometer option** **1 = Control terminals only,** the inverter can only be controlled via the digital inputs and the analog input (s). **18 = DeviceNet setpoint**, the frequency setpoint is transferred via DeviceNet. Control via the digital inputs is still active. **19 = DeviceNet control word**, the control signals (enable, direction of rotation, ...) are transferred via DeviceNet, the setpoint via the analog input or the fixed frequency. **20 = DeviceNet,** all control data is transferred via DeviceNet. The analog input and the digital inputs have no function (except safety functions, see below)	
P509	**Control word source**	**SK 500E**
0 ... 10 [0]	Selection of the interface via which the FI is controlled. **0 = Control terminal or keyboard control** with the Control Box (if P510=0), the ParameterBox (not extension parameter box) or via BUS I/O Bits. **1 = Only control terminals** , the FI can only be controlled via the digital and analog inputs or via the bus I/O Bits. **2 = USS** , the control signals (enable, rotation direction, etc.) are transferred via the RS485 interface, the setpoint via the analog input or the fixed frequencies. **3 = CAN** control word **4 = Profibus** control word **5 = InterBus** control word **6 = CANopen** control word **7 = DeviceNet** control word **8 = EtherCAT** control word **9 = CAN Broadcast** **10 = CANopen Broadcast**	

Parameter	Setting value / Description / Note	Comments
P510	**Auxiliary setpoint interface**	**SK 300E, SK 700E, SK 750E**
0 ... 8 [0]	Selection of the interface from which the inverter is controlled. **0 = Auto:** The auxiliary setpoint value is automatically taken from the interface of the main setpoint value P509 >interface< **1 = USS** **2 = CANbus** **3 = Profibus** **4 = InterBus** **5 = CANopen** **6 = DeviceNet** **7 =** Reserved **8 = CAN Broadcast**	
P510 **... - 01** **... - 02**	**Setpoint source**	**SK 500E**
0 ... 10 [0]	Selection of the setpoint source to be parameterised. **[01] =** Main **setpoint source** **[02] =** Auxiliary **setpoint source**	
	Selection of the interface via which the FI receives the setpoint. **0 = Auto:** the source of the auxiliary setpoint is automatically derived from the setting in the parameter P509 >Interface< **1 = Control terminals**, digital and analog inputs control the frequency, including fixed frequencies **2 = USS** **3 = CAN** **4 = Profibus** **5 = InterBus** **6 = CANopen** **7 = DeviceNet** **8 = EtherCAT** **9 = CAN Broadcast** **10 = CANopen Broadcast**	
P513	**Telegram downtime**	
-0.1 / 0.0 / 0.1 ... 100.0 s [0.0]	Monitoring function of the active bus interface. Following receipt of a valid telegram, the next one must arrive within the set period. Otherwise the FI reports an error and switches off with the error message E010 >Bus Time Out<. **0.0 = Off**: Monitoring is switched off. **-0.1 = No error**: Even if communication between BusBox and FI is interrupted (e.g. 24V error, Box removed, etc.), the FI will continue to operate unchanged. **Note:** If necessary, this value is monitored internally by the Bus Master (depending on the control unit used) with lower trigger monitoring times and the communication to the Slave is interrupted.	
P514	**CANbus baud rate**	
0 ... 7 [4]	Setting the transfer rate (transfer speed). **This setting is only valid if the rotary switch on the module is set in the PGM range, otherwise the setting is made using the rotary coding switch.** **0 =** 10kBit/s **1 =** 20kBit/s **2 =** 50kBit/s **3 =** 100kBit/s **4 =** 125kBit/s **5 =** 250kBit/s **6 =** 500kBit/s **7 =** 1MBit/s (for test purposes only)	
P515	**CANbus address**	**SK 300E, SK 700E, SK 750E**
0 ... 255 [0 / 50]	Setting for the CANbus basic address. (See above) **This setting is only valid if the rotary switch on the module is set in the PGM range, otherwise the setting is made using the rotary coding switch.**	

Parameter	Setting value / Description / Note	Comments
P515 **... - 01** **...** **... - 03**	**CANbus address**	**SK 500E**
0 … 255 [50]	Setting for the CANbus address. From SW 1.6 and above, can be set in three levels: **[01] =** Receipt address for CAN and CANopen (as before) **[02] =** Broadcast – receipt address for CANopen (Slave) **[03] =** Broadcast –Transmission address for CANopen (Master)	

P543 (P)	Actual bus value 1	
0 ... 12 (22) [1]	The return value 1 (IW1) can be set for bus control in this parameter. **SK 300E, SK 700E SK 750E** **0 =** Off **1 =** Actual frequency **2 =** Actual speed **3 =** Current **4 =** Torque current **5 =** Status of digital inputs and relay **6 =** Actual position (only *posicon, SK700/750E*) **7 =** Setpoint position (only *posicon, SK700/750E*) **8 =** Setpoint frequency **9 =** Error number **10 =** Actual position increment [1] (only *posicon, SK700/750E*) **11 =** Setpoint position increment [1] (only *posicon, SK700/750E*) **12 =** BUS I/O Out Bits 0-7 **SK 500E** **0 =** Off **1 =** Actual frequency **2 =** Actual speed **3 =** Current **4 =** Torque current (100% = P112) **5 =** State of digital inputs and outputs[2] **6 =** Actual position Low word **7 =** Setpoint position Low word **8 =** Setpoint frequency **9 =** Error number **10 =** Actual position increment Low word **11 =** Setpoint position increment Low word **12 =** Bus I/O Out Bits 0...7 **13 =** Actual position High word **14 =** Setpoint position High word **15 =** Actual position increment High word **16 =** Setpoint position increment High word **17 =** Value analog input 1 (P400) **18 =** Value analog input 2 (P405) **19 =** Setpoint frequency master value (P503) **20 =** Setpoint frequency after master value ramp **21 =** Actual frequency without master value slip **22 =** Speed from encoder (only possible with SK 52x/53xE and encoder feedback)	

P544 (P)	Actual bus value 2	
0 ... 12 (22) [0]	In this parameter, the return value 2 (IW2) can be set for bus control. For setting values, see parameter (P543)	

P545 (P)	Actual bus value 3	
0 ... 12 (22) [0]	In this parameter, the return value 3 (IW3) can be set for bus control. This is only available if P546 ≠ is 3 (only applies for SK 700E / SK 750E). For setting values, see parameter (P543)	

[1] An indicated revolution of the motor results from 8192 encoder increments.

[2] The assignment of the digital inputs in P543/ 544/ 545 = 5

Bit 0 = DigIn 1	Bit 1 = DigIn 2	Bit 2 = DigIn 3	Bit 3 = DigIn 4
Bit 4 = DigIn 5	Bit 5 = DigIn 6	Bit 6 = DigIn 7	Bit 7 = Reserved
Bit 8 = Reserved	Bit 9 = Reserved	Bit 10 = Reserved	Bit 11 = Reserved
Bit 12 = Out 1	Bit 13 = Out 2	Bit 14 = Out 3	Bit 15 = Out 4

Parameter	Setting value / Description / Note	Comments
P546 (P)	**Bus setpoint 1**	
0 ... 7 (47) [1]	In this parameter, a function is assigned to the delivered setpoint 1 (SW1) for bus control. **NOTE:** Further details can be found in the respective FI manual or in the description of P400. **SK 300E, SK 700E SK 750E** **0 =** Off **1 =** Setpoint frequency (16 bit) **2 =** 16 Bit setpoint position (only *posicon, SK700/750E*) **3 =** 32 Bit setpoint position (only *posicon, SK700/750E* and if PPO- type 2 or 4 are selected) **4 =** Control terminals *posicon (*only *posicon, SK700/750E*, 16Bit) **5 =** Setpoint position (16 Bit) increment [1] (only*posicon, SK700/750E*) **6 =** Setpoint position (32 Bit) increment [1] (only*posicon, SK700/750E*) **7 =** Bus IO In Bits 0-7 **SK 500E** **0 =** Off **1 =** Setpoint frequency (16 bit) **2 =** Torque current limit (P112) **3 =** Actual frequency PID **4 =** Frequency addition **5 =** Frequency subtraction **6 =** Current limit (P536) **7 =** Maximum frequency (P105) **8 =** Actual PID frequency limited **9 =** Actual PID frequency monitored **10 =** Torque servo mode (P300) **11 =** Lead torque (P214) **12 =** Reserved **13 =** Multiplication **14 =** PI process controller actual value **15 =** PI process controller setpoint **16 =** PI process controller lead **17 =** Digital In bits 0...7 **18 =** Reserved **19 =** Set relay (P434/441/450/455=38) **20 =** Set analog output (P418=31) **21 =** Setpoint position Low word (SK 530E and above) **22 =** Setpoint position High word (SK 530E and above) **23 =** Setpoint position increment Low word (SK 530E and above) **24 =** Setpoint position increment High word (SK 530E and above) **25 =** ... 45 Reserved **46 =** Setpoint torque process controller **47 =** Gearing transfer factor	
P547 (P)	**Bus setpoint 2**	
0 ... 46 (47) [0]	In this parameter, a function is assigned to the delivered setpoint 2 (SW2) for bus control. **0 =** Off **1 =** Setpoint frequency **2 =** Torque current limit (P112) **3 =** Actual frequency PID **4 =** Frequency addition **5 =** Frequency subtraction **6 =** Current limit (not SK 300E) **7 =** Maximum frequency (not SK 300E) **8 =** Actual PID frequency limited **9 =** Actual PID frequency monitored **10 =** Torque (not SK 300E) **11 =** Torque lead (not SK 300E) **12 =** Control terminals *posicon* (not SK 300E) **13 =** Multiplication (not SK 300E) **14 =** PI process controller actual value **15 =** PI process controller setpoint **16 =** PI process controller lead **17 =** Digital In bits 0...7 **18 =** Curve travel calculator (not SK 300E) **19 =** Set relay **20 =** Set analog output **21 =** Setpoint position Low word (SK 530E and above) **22 =** Setpoint position High word (SK 530E and above) **23 =** Setpoint position increment Low word (SK 530E and above) **24 =** Setpoint position increment High word (SK 530E and above) **25 =** ... 45 Reserved **46 =** Setpoint, torque process controller (not SK 300E) **47 =** Gearing transfer factor (only SK 500E)	
P548 (P)	**Bus setpoint 3**	
0 ... 46 (47) [0]	In this parameter, a function is assigned to the delivered setpoint 3 (SW3) for bus control. This is only available if P546 ≠ is 3 (only applies for SK 700E / SK 750E). For setting values, see parameter (P547)	
P551	**Drive profile**	**always visible**
0 ... 1 (On / Off) [0 = Off]	Depending on the option, this parameter is used to activate the **CANopen profile DS401** or the **InterBus Drivecom profile** .	

5.1.3 Information parameters

NOTE

As of firmware version V1.9 R0 for the SK 500E series, not only current error messages but also warnings and information messages can be displayed via the parameter. In this context, the parameter **(P700)** has been converted into an array parameter. I.e. error messages are displayed in (P700 [-01]), warnings in (P700[-02]), and information in (P700 [-03]).

For all other series (SK 300E, SK 700E, SK 750E), parameter (P700) still only indicates error messages.

Parameter	Setting value / Description / Note	Comments
P740 **... - 01** **...** **... - 06**	**Process data bus In**	**SK 300E, SK 700E, SK 750E**
0000 ... FFFF (hex)	Displays the actual control word and the setpoints.	**... - 01** = Control word **... - 02** = Setpoint 1 (P546) **... - 03** = Setpoint 1 High byte **... - 04** = Setpoint 2 (P547) **... - 05** = Setpoint 3 (P548) **... - 06** = Bus I/O In Bits (P480)
P740 **... - 01** **...** **... - 13**	**Process data bus In**	**SK 500E**
0000 ... FFFF (hex)	This parameter informs about the actual control word and the setpoints that are transferred via the bus systems.	**... - 01 =** Control word... — Control word, source from P509. **... - 02 =** Setpoint 1 **- 03 =** Setpoint 2 **... - 04 =** Setpoint 3 — Setpoint data from main setpoint P510 - 01. **... - 05 =** Bus I/O Out Bits (P480) — The displayed value depicts all Bus In bit sources linked with *OR*. **... - 06 =** Parameter data Out 1 **... - 07 =** Parameter data In 2 **... - 08 =** Parameter data In 3 **... - 09 =** Parameter data In 4 **... - 10 =** Parameter data In 5 — Data during parameter transfer. **... - 11 =** Setpoint 1 **... - 12 =** Setpoint 2 **... - 13 =** Setpoint 3 — Setpoint data from auxiliary setpoint P510 - 02.
P741 **... - 01** **...** **... - 06**	**Process data bus Out**	**SK 300E, SK 700E, SK 750E**
0000 ... FFFF (hex)	Displays the actual status word and actual values.	**... - 01** = Status word **... - 02** = Actual value 1 (P543) **... - 03** = Actual value 1 High byte **... - 04** = Actual value 2 (P544) **... - 05** = Actual value 3 (P545) **... - 06** = Bus I/O In Bits (P481)

Parameter	Setting value / Description / Note		Comments
P741 **... - 01** **...** **... - 13**	**Process data bus Out**		**SK 500E**
0000 ... FFFF (hex)	This parameter provides information about the actual status word and the actual values that are transferred via the bus systems.	**... - 01 =** Status word	Status word, source from P509.
		... - 02 = Actual value 1 (P543) **... - 03 =** Actual value 2 (P544) **... - 04 =** Actual value 3 (P545)	
		... - 05 = Bus I/O Out Bits (P481)	The displayed value depicts all Bus In bit sources linked with *OR*.
		... - 06 = Parameter data Out 1 **... - 07 =** Parameter data Out 2 **... - 08 =** Parameter data Out 3 **... - 09 =** Parameter data Out 4 **... - 10 =** Parameter data Out 5	Data during parameter transfer.
		... - 11 = Master function actual value 1 **... - 12 =** Master function actual value 2 **... - 13 =** Master function actual value 3	Actual value of master function 502/P503.
P742	**Database version**		
0 ... 9999	Displays the internal database version of the FI.		

P744	**Configuration**	**SK 300E, SK 700E, SK 750E**
0 ... 9999	This parameter displays the option modules detected by the FI. The display with the ParameterBox is in plain text. The possible combinations are displayed in code in the ControlBox. Both right digits indicate the customer unit used and the two left digits indicate the special extension unit. The options vary depending on the FI type.	

Customer Unit **SK CU1-...**		Special extension unit **SK XU1-...**	
No IO	**XX00**	Encoder	**01XX**
Basic IO	**XX01**	PosiCon	**02XX**
Standard IO	**XX02**		
Multi IO	**XX03**		
USS IO	**XX04**		
CAN IO	**XX05**		
Profibus IO	**XX06**		

P744	**Configuration**	**SK 500E**
0000 ... FFFF (hex)	This parameter displays the design status integrated in the FI. Display is in hexadecimal code (SimpleBox, ControlBox, Bus system). The display is in plain text when the ParameterBox is used. **SK 500E = 0000** **SK 520E = 0101** **SK 530E/535E = 0201** **SK 510E/511E/515E = 0000**	

P745	**Module version**	**SK 300E, SK 500E**
0.0 ... 3276.7	Design status (software version) of the technology unit (SK TU2/3-xxx), but only when a separate processor is present, therefore not for SK TU2/3-CTR. Have this data available if you have a technical query.	

Parameter	Setting value / Description / Note	Comments
P745 ... - 01 ... ... - 03	**Module version**	**SK 700E, SK 750E**
0.0 ... 3276.7	Software version of the installed module [01] Technology unit (E.g.: DeviceNet Technology Unit) [02] Customer Unit [03] Special Extension Unit	
P746	**Module status**	**SK 300E, SK 500E**
0000 ... FFFF (hex)	Indicates the actual status (readiness, error, communication) of the technology unit (SK TU2/3-xxx), but only when own processor is present, therefore not for the SK TU2/3-CTR. Code details can be found in the respective BUS module manual. Different contents are shown depending on the modules. (DeviceNet: See Section 5.2)	
P746 ... - 01 ... ... - 03	**Module status**	**SK 700E, SK 750E**
0000 ... FFFF (hex)	Status of integrated modules [01] Technology unit (E.g.: DeviceNet Technology Unit) [02] Customer Unit [03] Special Extension Unit	

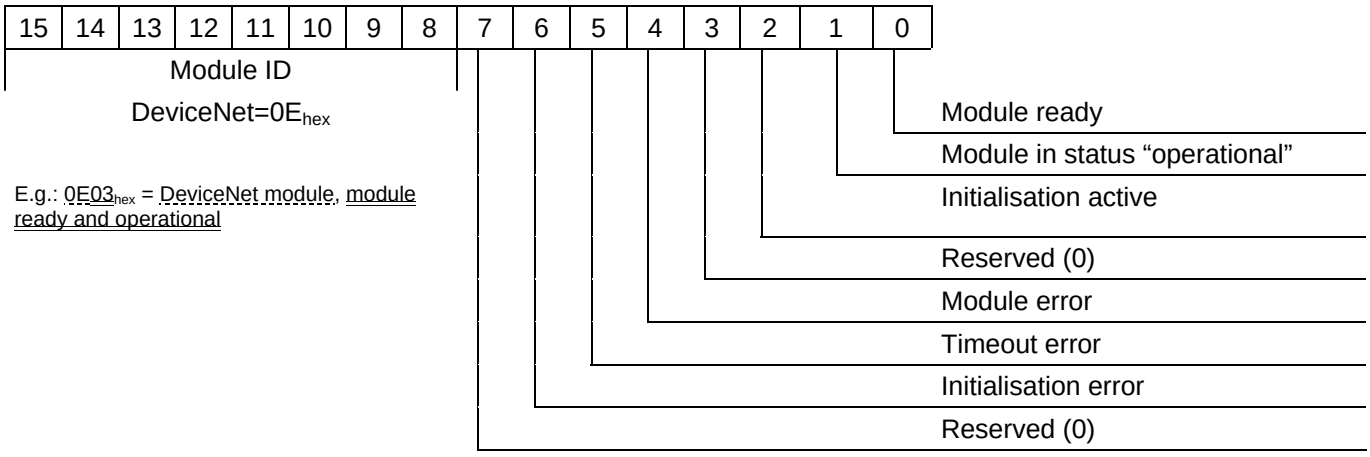
NOTE

When activated, the functions **block current**, **quick stop**, **remote control** and **cancel error** are available at the (local) control terminals. To operate the drive, a high signal must be present on the digital inputs being used before the drive can be enabled.

5.2 Module status

In parameter **P746**, the status of the DeviceNet module can be read.

Parameter P746 is a subindex parameter: Subindex 0 contains the status of the DeviceNet technology unit. The parameter contains binary coded information which is displayed in hexadecimals:



5.3 LED display

The status of the DeviceNet technology unit is shown by a total of 4 LEDs:

- MS/NS: DeviceNet status
- DS/DE: Module status

MS (red/green): DeviceNet module status

Display	Significance
Off	No power supply to the module
Green on	Module is ready
Green flashing	Module is on standby
Red flashing	Acknowledgeable error
Red on	Non-acknowledgeable error, module may have to be replaced

NS (red/green): DeviceNet network status

Display	Significance
Off	Module is not online: - No power supply to the module - The module could not perform the Dup_MAC_ID test
Green flashing	Module is online and has performed the Dup_MAC_ID test, but has not carried out the setup of communication with other participants
Green on	The module is online and has a connection with a Master
Red flashing	One or more I/O connections are in a timeout status
Red on	The module has detected an error, so that no communication is possible, e.g. Bus Off, Dup_MAC-ID test error)

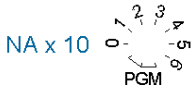
DS (green): Module status

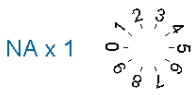
Display	Significance
Off	No voltage supply
Flashing	Initialisation (init. phase)
On	Module OK

DE (red): Module status

Display	Significance
Off	No error
Rapid flashing (0.2s)	Initialisation phase
Slow flashing (0.5s)	Timeout error
Isolated flashing	Inverter error (see frequency inverter instructions)
On	System error, e.g. plug contact not correct

5.4 Rotary coding switch

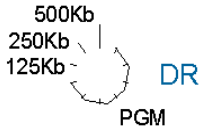




The node address can be set with the rotary switches NA x 1 and NA x 10:

Example: Node address = 50 dec = NAx 1 = 0, NAx 10 = 5

If the node address is set to a value greater than 63, the value from the parameter (P515) of the frequency inverter is used as the node address.



The baud rate can be set using the rotary switch DR (125kBit/s...500kBit/s). If a value in the PGM range is set, the value from parameter (P514) of the frequency inverter is used as the baud rate.

6 Data transmission

6.1 I/O Messages - operating modes

Via I/O messages the control data is transmitted from the Master to the frequency inverter, or status data is transmitted from the frequency inverter to the Master.

Transmission can be cyclically (Polling 7 Cyclic) or event controlled (Change Of State/Bit-Strobe). With the SK 700E series, 4 or 8 Bytes of data are transmitted.

6.2 Assembly

(P551) sets whether the AC profile is active. Via (P507) the active AC Drive assembly instance is selected or the data length is specified (See table).

The following assembly instances are available for I/O messages:

Assembly	Profile	Length		P551	P507
20	AC-DRIVE	4 Byte	Control word + setpoint speed	1	1
21	AC-DRIVE	4 Byte	Control word + setpoint speed	1	2
70	AC-DRIVE	4 Byte	Status word + actual speed	1	1
71	AC-DRIVE	4 Byte	Status word + actual speed	1	2
100	NORDAC	4 Byte	Control word + setpoint 1	0	1
101	NORDAC	8 Byte	Control word + setpoint 1 + setpoint 2 + setpoint 3	0	2
110	NORDAC	4 Byte	Status word + actual value 1	0	1
111	NORDAC	8 Byte	Status word + actual value 1 + actual value 2 + actual value 3	0	2

6.3 AC Profile

If the AC Profile is activated (P551=On), the assembly instances 10, 21, 70 and 71 are valid. The process data has the following meaning:

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
20	0						Fault Reset		Run Forward
	1								
	2	Setpoint speed [min^{-1}](Low Byte)							
	3	Setpoint speed [min^{-1}](High Byte)							
21	0		NetRef	NetCtrl			Fault Reset		Run Forward
	1								
	2	Setpoint speed [min^{-1}](Low Byte)							
	3	Setpoint speed [min^{-1}](High Byte)							
70	0						Run 1		Fault
	1								
	2	Actual speed [min^{-1}](Low Byte)							
	3	Actual speed [min^{-1}](High Byte)							
71	0	At Reference	Ref from Net	Ctrl from Net	Ready	Run 2	Run 1	Warning	Fault
	1	Drive State							
	2	Actual speed [min^{-1}](Low Byte)							
	3	Actual speed [min^{-1}](High Byte)							

6.4 Process data (PZD)

In the process data area (PZD) , control words and setpoints are transferred from the Master to the Slave (frequency inverter) and in return, status words and actual values are sent from the Slave to the Master. The structure of the PZD area is always the same in terms of the sequence of its elements (words), however, dependent upon direction of data Master ⇒ Slave / Slave ⇒ Master, it is described differently.

The process data area of the reference data has the following structure:

- STW: **Control Word; length 16 bit, order telegram**
  contains control bits (e.g. enable, rapid stop, error acknowledgement)
- ZSW: **Status Word; length 16 bit, response telegram**
  contains status bits (e.g. FI running, fault)
- SW1..3: **Setpoints; maximum 3 possible, 16 or 32 bit, order telegram**
  e.g. frequency setpoint, position setpoint, torque setpoint
- IW1..3: **Actual Values; maximum 3 possible, 16 or 32 bit, response telegram**
  e.g. actual frequency value, actual position value, actual torque value

6.4.1 Process data for SK 300E/700E/750E

	1st word	2nd word	3rd word	4th word
PZD area with 1x16 bit setpoint	STW ZSW	SW1 IW1		
PZD area with up to 3 16 bit setpoints	STW ZSW	SW1 IW1	**SW3** **IW3**	**SW2** **IW2**
PZD area with 1x 32-Bit setpoint and 1x 16-Bit	STW ZSW	SW1 IW1		SW2 IW2

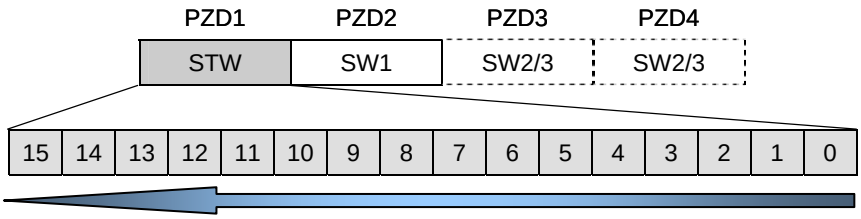
6.4.2 Process data for SK 500E (entire series)

	1st word	2nd word	3rd word	4th word
PZD area with 1x16 bit setpoint	STW ZSW	SW1 IW1		
PZD area with up to 3 16 bit setpoints	STW ZSW	SW1 IW1	**SW2** **IW2**	**SW3** **IW3**

Note: 32-Bit setpoints consist of High and Low words (16-Bit each).

6.4.3 Control word (STW)

The control word (STW) is the first word transferred to the frequency inverter in the process data area in an order telegram. For example, a control word "Ready for switch-on" corresponds to $047E_{(hex)}$.

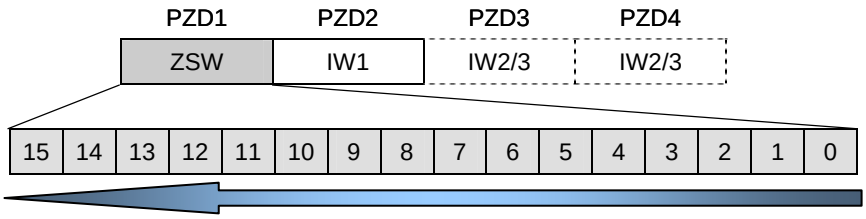


Bit	Value	Significance	Comments
0	0	OFF 1	Reverse with the brake ramp, with disconnection from supply at f=0Hz
	1	ON	Ready for operation
1	0	OFF 2	Cut off voltage; the inverter output voltage is switched off; the FI enters a state where switching on is disabled.
	1	Operating condition	OFF 2 is cancelled
2	0	OFF 3	Quick stop with programmed quick stop time; with disconnection from supply at f=0Hz; the FI switches to starting disabled condition.
	1	Operating condition	OFF 3 is cancelled
3	0	Disable operation	Cut off voltage; the inverter output voltage is switched off; the FI enters a state where switching on is enabled.
	1	Enable operation	The output voltage is enabled; ramp to the existing setpoint
4	0	Lock ramp generator	Ramp generator is set to zero; no disconnection from supply at f=0Hz; FI remains in the operation enabled state.
	1	Operating condition	Enable ramp generator
5	0	Stop ramp generator	The setpoint currently provided by the ramp generator is "frozen" (frequency is maintained).
	1	Enable ramp generator	Enable setpoint on ramp generator
6	0	Disable setpoint	Selected setpoint value is set to zero on the ramp generator.
	1	Enable setpoint	Selected ramp generator setpoint is activated.
7	0	No acknowledgement	With the switch from 0 to 1, errors which are no longer active are acknowledged.
	1	Acknowledge	Note: When a digital input has been programmed for the "ack.fault" function, this bit must not permanently be set to 1 via the bus (otherwise, edge evaluation would be prevented).
8	0		
	1	Bit 8 active	Bus bit 8 from the control word is set. (Only for SK 200E and SK 500E) For further details of the function please refer to parameter (P480).
9	0		
	1	Bit 9 active	Bus bit 9 from the control word is set. (Only for SK 200E and SK 500E) For further details of the function please refer to parameter (P480).
10	0	PZD invalid	The transmitted process data is invalid.
	1	PZD valid	Valid process data is transferred from the master. **Note:**If setpoints only are transferred via the bus, this bit must be set so that the transferred setpoint is valid.
11	0		
	1	Rotational direction: right	Rotational direction right (priority) – ON*
12	0		
	1	Rotational direction: left	Rotational direction left – ON*
13	0/1		Reserved
14	0/1	Bit 0 to switch parameter set	00 = Parameter set 1 01 = Parameter set 2
15	0/1	Bit 1 to switch parameter set	10 = Parameter set 3 11 = Parameter set 4

* If Bit 12=0, then "Direction of rotation right ON" applies

6.4.4 Status word (ZSW)

In the inverter response telegram, in the area of the process data the status word (ZSW) is transferred as the first word. For example, the status word "Ready for switch-on" corresponds to $0B31_{(hex)}$.



Bit	Value	Significance	Comments
0	0	Not ready to start	
	1	Ready to start	Initialisation completed, charging relay ON, output voltage disabled
1	0	Not ready for operation	Causes: No command has been activated, fault is signaled, OFF2 or OFF3 activated, starting disabled state activated
	1	Ready for operation	ON command activated, no faults present. The inverter can be started with the command ENABLE OPERATION
2	0	Operation disabled	
	1	Operation enabled	The output voltage is enabled; ramp to the existing setpoint
3	0	No fault	
	1	Fault	Drive fault resulting in stoppage; this state is changed to starting disabled after the fault has been successfully acknowledged
4	0	OFF 2	OFF2 command applied
	1	No OFF 2	
5	0	OFF 3	OFF3 command applied
	1	No OFF 3	
6	0	Starting not disabled	
	1	Starting disabled	Switches first to OFF1, then to ready-to-start status
7	0	No warning	
	1	Warning	Drive operation continues, no acknowledgement necessary
8	0	Actual value not O.K.	Actual value does not match the setpoint (with *posicon:* failure to reach setpoint position)
	1	Actual value O.K.	Actual value matches required setpoint (setpoint has been reached) (with *posicon:* setpoint has been reached)
9	0	Local guidance	Guidance on local device has been activated
	1	Guidance requested	The master has been requested to assume guidance.
10	0		
	1	Bit 10 active	Bus bit 10 from the status word is set. For further details of function, please refer to parameter P481.
11	0		
	1	Rotational direction: right	Inverter output voltage is turning right
12	0		
	1	Rotational direction: left	Inverter output voltage is turning left
13	0		
	1	Bit 13 active	Bus bit 13 from the status word is set. For further details of function, please refer to parameter P481.
14	0/1	Currently active parameter set 0	00 = Parameter set 1 01 = Parameter set 2	10 = Parameter set 3 11 = Parameter set 4
15	0/1	Currently active parameter set 1		

Deviations in the status word (ZSW) for SK 300E and SK 700/750E series devices

With the above device types, the meanings of the two bits 10 and 13 in the status word deviate from the status word of the SK 500 E.

Meaning of the two individual bits:

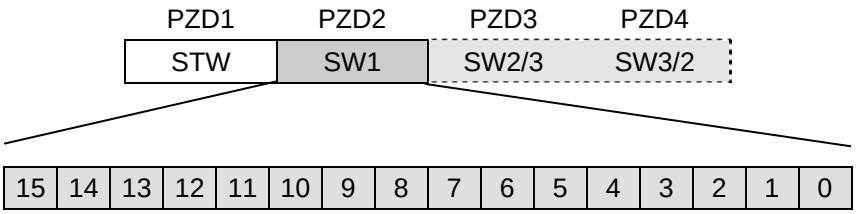
Bit	Value	Significance	Comments
10	0	MFR 1 reference value undershot	Programmed function of the MFR 1 met or actual value < programmed reference value
	1	MFR 1 reference value reached	Programmed function of the MFR 1 is fulfilled, or Actual value > programmed reference value
13	0	MFR 4 reference value undershot	Only for SK 700E/750E with posicon upgrade: Status MFR 4 = 0
	1	MFR 4 reference value reached	Only for SK 700E/750E with posicon upgrade: Status MFR 4 = 1

6.4.5 The setpoint 1 (SW1)

The function of the 1st setpoint is set in parameter P546. The following options are available:

6.4.5.1 Setpoint frequency

The setpoint frequency in setpoint 1 is transferred as a 16 Bit value as standard. Setpoint 1 is transferred to the inverter as the second word in the process data area in the order telegram.



The setpoint is transferred as a whole number with a value range of -32768 to 32767 (8000 hex to 7FFF hex). The value 16384 (4000 hex) is equal to 100%. The value C000 HEX corresponds to -100%. A setpoint of 100% corresponds to the parameter **maximum frequency** (parameter P105) set in the same parameter set.

6.4.5.2 Setpoint position (16 or 32 Bit)

With the special extension **Posicon (SK XU1-POS) of the SK 700E** the absolute setpoint position can be transferred as a 16 or 32 Bit value in Setpoint 1, whereby the resolution is 1=0.001 rotation. In addition, the control terminals (*setting of Posicon control bits*) can be transferred in binary.

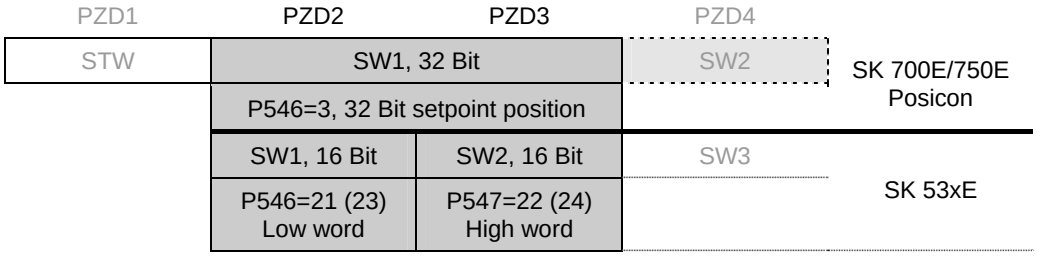
The **SK 53xE version** of the SK 500E series is also able to transfer positions, however here, the 32 Bit position is divided into two 16 Bit components (Low word and High word). The assignment of the two 16 Bit components is then carried out via appropriate parameterisation on 2 arbitrary setpoints (e.g.: SW1 and SW2).

16-Bit setpoint position setting:

As a **16 Bit** value, a range of +32767 (= 32,767 revolutions) to -32768 (= -32,768 revolutions) is possible. The 16 Bit setpoint position is transferred as the second word in the process data area (as with the setpoint frequency)

32-Bit setpoint position setting:

As a **32 Bit** value, the full position range of +/- 50000,000 revolutions is available. With the SK 700E/750E, the 32 Bit setpoint position is transferred in the area of the process data as the **second and third** word (with the SK 500E in any two of the three words PZD2, PZD3, PZD4). With SK 52xE:



Control Bit settings *Posicon (SK 700E/750E/53xE)*:

A 16 Bit value is transferred in which the control terminals of the PosiCon special extension unit are mapped. The setpoint position is based on the position array or position increment as per (P610).

The transferred Bits have the following meaning (see Manual BU 710 / BU 0510):

SK 700E + SK TU1-POS	
Bit	**Function**
Bits 0-5	Position array/position increment
Bit 6	Reference point run
Bit 7	Reference point
Bit 8	Teach-in
Bit 9	Quit teach-in
Bit 10	Reset position

SK 500E	
Bit	**Function**
Bits 0-3	Position array/position increment
Bits 4-7	Vacant
Bits 8-15	no significance

6.4.6 Second and third setpoint (SW2/3)

With the SK 500E, the assignment of setpoints 2 and 3 to the process data words PZD3 and PZD4 is carried out in the opposite manner to the SK 300E/700E/750E series.

6.4.6.1 Second and third setpoint SK 300E/SK 700E/SK 750E(SW2/3)

If the PPO type 2 or 4 is used, in addition to setpoint 1, a 2nd setpoint can be transferred in word PZD4 and a 3rd setpoint in PZD3.

PZD1	PZD2	PZD3	PZD4
STW	SW1	SW3	SW2

A third setpoint value can only be transferred if a 32 Bit setpoint value is not transferred in the first setpoint.

PZD1	PZD2	PZD3	PZD4
STW	SW1		SW2

The second and third setpoints are always 16 Bit. The function of the second and third setpoints can be set in the inverter with parameter P547 ''*Setpoint function 2*' and P548 ''*Setpoint function 3*' respectively.

Both setpoints are transferred as whole numbers in the range (-32768 to 32767). The value 16384 (4000 HEX) corresponds to 100%. The value C000 HEX is equal to –100%, so setpoints in the range –200% to +200% can be transferred. A setpoint of 100% corresponds to the respective nominal value:

Setting	**100% is equal to**
Off	
Setpoint frequency, actual frequency PID, actual frequency PID limited, actual frequency PID monitored, frequency addition, frequency subtraction, maximum frequency	Maximum frequency (P105)
Torque current limit	Torque current limit (P112)
Current limit	Inverter nominal current
Servo mode torque	Nominal torque (P112)
Lead torque	Lead torque (P214)

In addition, PosiCon control bits can be transferred here (see setpoint 1)

6.4.6.2 Second and third setpoint SK 500E (SW2/3)

In addition to setpoint 1, a second setpoint can be transferred in word PZD3 and a third setpoint in PZD4.

PZD1	PZD2	PZD3	PZD4
STW	SW1	SW2	SW3

The second and third setpoints are always 16 Bit. The function of the second and third setpoints can be set in the inverter with parameter P547 ‘Setpoint 2 function’ and P548 ‘Setpoint 3 function’ respectively.

Both setpoints are transferred as whole numbers in the range -32768 to 32767. The value 16384 (4000 HEX) corresponds to 100%. The value C000 HEX is equal to –100%, so setpoints in the range –200% to +200% can be transferred. A setpoint of 100% corresponds to the respective nominal value:

Setting	**100% is equal to**
Off	
Setpoint frequency, actual frequency PID, actual frequency PID limited, actual frequency PID monitored, frequency addition, frequency subtraction, maximum frequency	Maximum frequency (P105)
Torque current limit	Torque current limit (P112)
Current limit	Inverter nominal current
Servo mode torque	Nominal torque (P112)
Lead torque	Lead torque (P214)

6.4.7 The actual value 1 (IW1)

The actual value 1, i.e. the actual output frequency of the inverter, is transferred as a 16 Bit value as standard in the actual value 1. The actual value 1 is transferred to the master in the inverter response telegram as the second word in the process data area.

The actual value 1 is transferred as a whole number in the range (-32768 to 32767). In addition to the actual frequency, other actual inverter values can be transferred. The setting is made in P543 *'Actual value 1 function*'.

The settings ‘Actual frequency’, ‘Actual speed’, ‘Current’ and ‘Torque current’ are transferred as percentages of the respective nominal values. The value 16384 (4000 HEX) corresponds to 100%. The value C000 HEX corresponds to -100%. Actual values in the range –200% to +200% can be transferred.

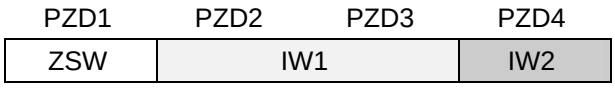
With the setting ‘Digital I/O status’, the states of the control terminals and the relay (MFR) /digital outputs can be transferred:

SK 700E/750E	
Bit	**Status**
Bits 0-5	Digital input 1-6
Bit 6-11 for *posicon* special extension unit	Digital input 7-12
Bit 6 for encoder special extension unit	Digital input 7
Bits 12-15	Multifunctional relay 1-4

SK 500E	
Bit	**Status**
Bits 0-4	Digital input 1-5
Bit 5-6 (above SK 520E)	Digital input 6-7
Bits 12-15	Relay and digital outputs 1 - 4

With the setting 'Actual position' and 'Setpoint position' the actual absolute position is transferred. The resolution is 1 = 0.001 revolutions.

If **with SK 700E/750E** the value 'Setpoint position 32 Bit' is set in parameter P546 (*Setpoint function 1*), then the actual value (setpoint or actual position) is also transferred as a 32 Bit value in PZD2 and PZD3:



6.4.8 Actual value 2 and actual value 3 (IW2/3)

It is possible to forward two more actual values to the controller if PPO type 2 or 4 is used for transfer.

The assignment of the actual values 2 and 3 to the process data words PZD3 and PZD4 is carried out in the same way as the assignment of setpoints 2 and 3. These also differ in sequence between the SK 500E and other inverter series.

6.4.8.1 Second and third actual value SK 300E/SK 700E/SK 750E(SW2/3)

The actual value 2 (IW2) is transmitted in PZD4. The value to be transferred can be selected in P544 (actual bus value 2). Actual value 3 (IW3) can be transmitted in PDZ3 if actual value 1 is **not** a 32 Bit value. The value to be transferred can be selected in P545 (actual bus value 3).

6.4.8.2 Second and third setpoint SK 500E (SW2/3)

The actual value 2 (IW2) is transmitted in PZD3. The value to be transferred can be selected in P544 (actual bus value 2). The actual value 3 (IW3) is transmitted in PZD4. The value to be transferred can be selected in P545 (actual bus value 3).

6.4.9 The status machine

The frequency inverter passes through a status machine. The changes between various states are triggered by the respective control commands in the process data control word. The actual status is returned in the process data status word.

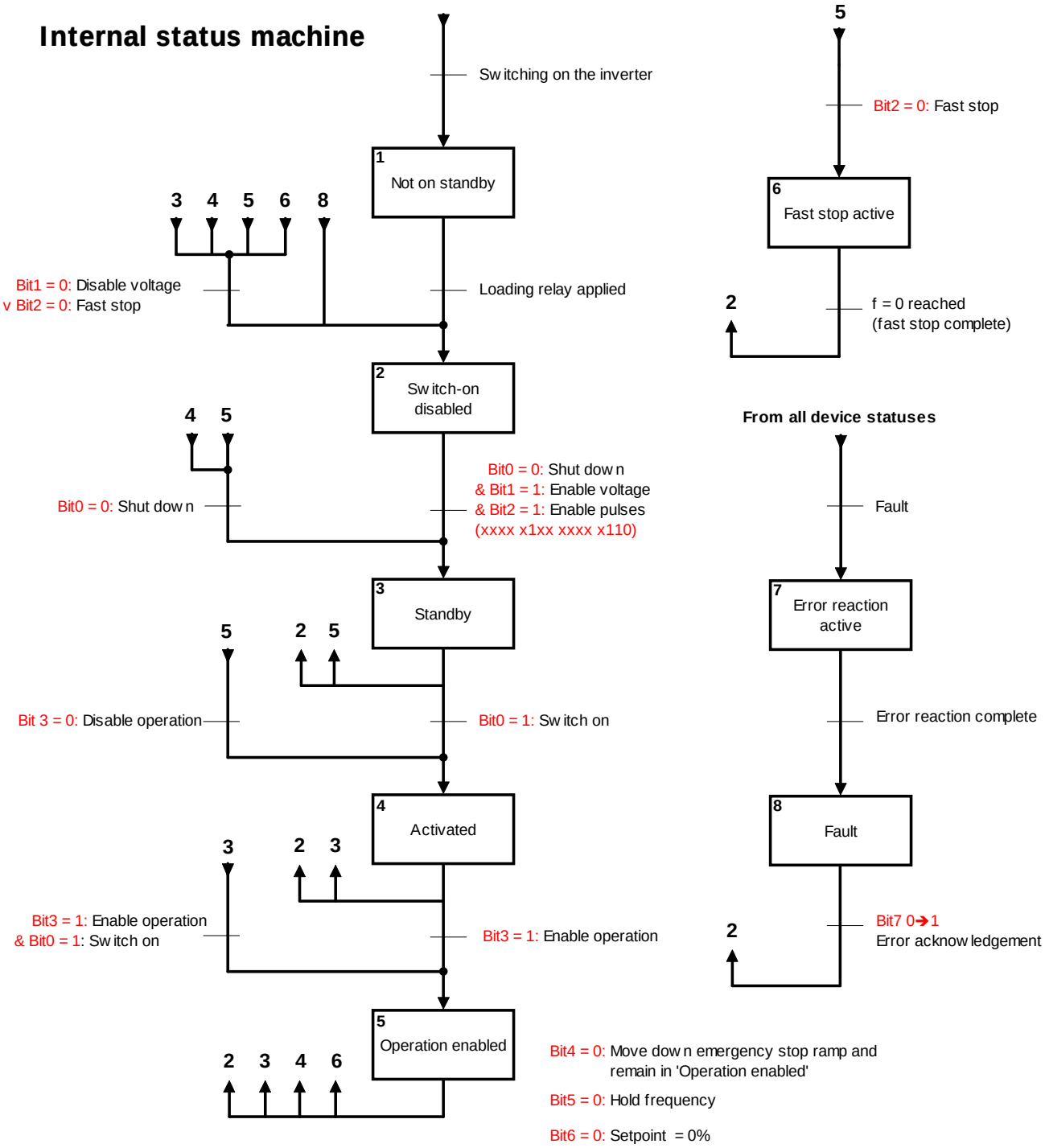
After switching on, the inverter is in **switch-on disabled** status. This status can only be ended by transmitting the “Shut down (Off 1)” command.

The answer to a Master telegram normally does not yet contain a reaction to the control command. The controller has to check the answers from the slaves as to whether the control command has been carried out.

The following Bits indicate the status of the frequency inverter:

Status	**Bit 6** Switch-on disable	**Bit 5** Emergency stop	**Bit 4** Disable voltage	**Bit 3** Fault	**Bit 2** Operation enabled	**Bit 1** Standby	**Bit 0** Ready for switch-on
Not ready to start	0	X	X	0	0	0	0
Starting disabled	1	X	X	0	0	0	0
Ready to start	0	1	1	0	0	0	1
Activated	0	1	1	0	0	1	1
Operation enabled	0	1	1	0	1	1	1
Fault	0	X	X	1	0	0	0
Error active	0	X	X	1	1	1	1
Emergency stop active	0	0	1	0	1	1	1

Internal status machine



Bit4 = 0: Move down emergency stop ramp and remain in 'Operation enabled'

Bit5 = 0: Hold frequency

Bit6 = 0: Setpoint = 0%

Control bits

0. Ready for operation / shut down
1. Disable / enable voltage
2. Enable pulses / emergency stop
3. Disable / enable operation
4. Operation condition / block RUE
5. Enable / stop RUE
6. Enable / disable setpoint
7. Error acknowledgement (0➔1)
10. Control data valid / invalid
11. *Rotation right*
12. *Rotation left*
14. *Parameter set Bit 0*
15. *Parameter set Bit 1*

Priority of control commands:

1. Disable voltage
2. Fast stop
3. Shut down
4. Enable operation
5. Switch on
6. Disable operation
7. Reset error

Designation of statuses:

1: Bit 0 = 0
2: Bit 6 = 1
3: Bit 0 = 1
4: Bit 1 = 1
5: Bit 2 = 1
6: Bit 5 = 0
7: Bit 2 & Bit 3 = 1
8: Bit 3 = 1

6.5 Object classes

6.5.1 Class 01 - Identity Object

The Identity Object is used to identify devices within the DeviceNet network.

Inst	Attr.	Description	Type	Access
1	1	Vendor ID	UINT	Get
	2	Device type	UINT	Get
	3	Product code	UINT	Get
	4	Revision (Major/Minor revision)	STRUCT	Get
	5	Status	UINT	Get
	6	Serial number	UDINT	Get
	7	Product Name	SHORTSTR	Get

6.5.2 Class 03 - DeviceNet Object

Bus-specific settings can be read out via the DeviceNet Object

Inst	Attr.	Description	Type	Access
1	1	Node Address	USINT	Get
	2	Baud rate	USINT	Get
	3	BOI	BOI	Get
	4	Bus-Off Counter	USINT	Get
	5	Allocation Information	STRUCT	Get
	6	MAC ID Switch Changed	BOOL	Get
	7	Baud Rate Switch Changed	BOOL	Get
	8	MAC ID Switch Value	USINT	Get
	9	Baud Rate Switch Value	USINT	Get

6.5.3 Class 04 – Assembly Object

The process data is mapped in the Assembly Objects

Inst	Attr.	Description	Type	Access
20	3	Assembly Data AC-Profile	UINT	Set
21	3	Assembly Data AC-Profile	UINT	Set
70	3	Assembly Data AC-Profile	UINT	Get
71	3	Assembly Data AC-Profile	UINT	Get
100	3	Assembly Data NORDAC-Profile	UINT	Set
101	3	Assembly Data NORDAC-Profile	UDINT	Set
110	3	Assembly Data NORDAC-Profile	UINT	Get
111	3	Assembly Data NORDAC-Profile	UDINT	Get

6.5.4 Class 05 – DeviceNet Connection Object

The settings for each active connection can be read out in this object:

Instance 1: Expl.Message

Instance 2: Polling

Instance 3: Bit-Strobe

Instance 4: COS/Cyclic

Inst	Attr.	Description	Type	Access
1-4	1	State	USINT	Get
	2	Instance Type	USINT	Get
	3	transportClass_trigger	BYTE	Get
	4	produced_connection_id	UINT	Get
	5	consumed_connection_id	UINT	Get
	6	initial_comm_characteristic	BYTE	Get
	7	produced_connection_size	UINT	Get
	8	consumed_connection_size	UINT	Get
	9	expected_packet_rate	UINT	Get/Set
	12	watchdog_timeout_action	USINT	Get
	13	produced_con_path_length	UINT	Get
	14	produced_connection_path	EPATH	Get
	15	consumed_con_path_length	UINT	Get
	16	consumed_connection_path	EPATH	Get
	17	produced_inhibit_time	UINT	Get

6.5.5 Class 40 (28_{hex}) – Motor Data Object

Motor-specific data can be set or read via the Motor Data Object. This object is only valid if the AC Profile is switched on (see above)!

Inst	Attr.	Description	Type	Access
1	3	Motor type	USINT	Get
	6	Stator current [0.1A]	UINT	Get
	7	Rated voltage [V]	UINT	Get/Set
	8	Rated motor power [W]	UDINT	Get/Set
	9	Nominal frequency	UINT	Get/Set
	12	Number of poles	UINT	Get

6.5.6 Class 41 (29_{hex}) – Motor Data Object

Here the control of the device can be set and the status read out. This object is only valid if the AC Profile is switched on (see above)!

Inst	Attr.	Description	Type	Access
1	3	RunFwd (Setpoint rotation direction right)	BOOL	Get/Set
	4	RunRev (Setpoint rotation direction left)	BOOL	Get/Set
	5	NetCtrl (Control via DeviceNet)	BOOL	Get/Set
	6	Drive State (FI status in AC-Profile)	USINT	Get
	7	Running Fwd (Actual direction of rotation right)	BOOL	Get
	8	Running Rev (Actual direction of rotation left)	BOOL	Get
	9	Ready (Ready for switch-on)	BOOL	Get
	10	Faulted (Error)	BOOL	Get
	11	Warning	BOOL	Get
	12	Fault reset	BOOL	Get/Set
	13	Fault Code (Actual fault)	UINT	Get

6.5.7 Class 42 (29_{hex}) – Motor Data Object

Here the setpoint source of the device can be set and the actual value read out. This object is only valid if the AC Profile is switched on (see above)!

Inst	Attr.	Description	Type	Access
1	4	NetRef (Setpoint source)	BOOL	Get/Set
	6	DriveMode	USINT	Get
	7	Actual speed [rpm]	INT	Get
	8	Actual setpoint speed [rpm]	INT	Get/Set
	9	Actual current [0.1A]	INT	Get
	15	Actual power [W]	INT	Get
	16	Input voltage [V]	INT	Get
	17	Output voltage [V]	INT	Get
	18	Start-up time [ms]	UINT	Get/Set
	19	Braking time [ms]	UINT	Get/Set
	20	Minimum speed [rpm]	UINT	Get/Set
	21	Maximum speed [rpm]	UINT	Get/Set
	29	RefFromNet (Setpoint via DeviceNet)	BOOL	Get

6.5.8 Class 42 ($2A_{hex}$) – Acknowledge Handler Object

The *Acknowledge Handler* is used to manage the reception of *Message Acknowledgements*

Inst	Attr.	Description	Type	Access
1	1	Acknowledge Timer	UINT	Set
	2	Retry Limit	USINT	Get/Set
	3	COS Producing Connect Instance	UINT	Get

6.5.9 Class 100-107 (64_{hex}-$6B_{hex}$) – NORDAC Objects

All parameters of the frequency inverter can be accessed with the aid of the NORDAC Objects. The parameter number (PNr) can be obtained from the operating instructions for the frequency inverter:

Conversion of PNr → to class:	Area	Conversion of Class → to PNr:
Class = 100 + PNr / 100	(100-109)	PNr = (Class – 100) * 100 + Attribute
Attribute = PNr % 100	(0-99)	Sub-Index = Instance -1
Instance = Sub-Index +1	(1-255)	

E.g.: P745, Sub-Index 2 = Class 107, Attribute 45, Instance 3

Class		Inst	Attr.	Description	Type	Access
100	NORDAC Operation	1-255	0-99	Operating displays		
101	NORDAC Basic	1-255	0-99	Basic parameters		
102	NORDAC Motor	1-255	0-99	Motor data		
103	NORDAC Control	1-255	0-99	Control parameters		
104	NORDAC Terminal	1-255	0-99	Control terminal settings		
105	NORDAC Additional	1-255	0-99	Additional functions		
106	NORDAC Positioning	1-255	0-99	Positioning parameters		
107	NORDAC Information	1-255	0-99	Information parameters		

6.5.10 Class 120 (78_{hex}) – NORDAC Index Object

All parameters can be accessed via this object by setting the parameter number and the sub-index. Then the parameter can be read or written via Attribute 3.

Inst	Attr.	Description	Type	Access
1	1	Parameter number	UINT	Get/Set
	2	Parameter sub-index	USINT	Get/Set
	3	Read / Write parameter	DINT	Get/Set

7 Errors

7.1 Troubleshooting

The majority of frequency inverter functions and operating data are continuously monitored and simultaneously compared with limiting values. If a deviation is detected, the inverter reacts with a warning or an error message.

Basic information on this topic is contained in the manual for the basic equipment.

Errors cause the frequency inverters to switch off, in order to prevent a device fault.

The following options are available to reset a fault (acknowledge):

1. switching the mains off and on again,
2. By an appropriately programmed digital input (P420 ... P425 = Function 12),
3. By switching of the “enable” on the frequency inverter (if no digital input is programmed for acknowledgement),
4. by bus acknowledgement or
5. by P506, the automatic error acknowledgement.

Device LEDs:	As delivered, with SK 300E series devices (except ATEX versions) and SK 500E (without technology unit), 2 LEDs (green/red) are externally visible. These signal the actual device status. The **green LED** indicates that the mains voltage is present and operational, while a flashing code that increases in speed shows the degree of overload at the frequency inverter output. The**red LED** signals actual error by flashing with a frequency which corresponds to the number code of the fault.

The following table shows all the faults which are attributable to bus operation. In the operating display of the optional "ControlBox" only error E010 is displayed. A finer categorisation of errors can be obtained from the information parameters P700 "Actual Faults" or P701 "Last Fault 1...5".

NOTE

As of firmware version V1.9 R0 for the SK 500E series, not only current error messages but also warnings and information messages can be displayed via the parameter. In this context, the parameter **(P700)** has been converted into an array parameter. I.e. error messages are displayed in (P700 [-01]), warnings in (P700[-02]), and information in (P700 [-03]).

For all other series (SK 300E, SK 700E, SK 750E), parameter (P700) still only indicates error messages.

7.1.1 Error display

ControlBox / SimpleBox: The 4-digit, 7-segment display of these boxes indicates a fault with its number and the prefix "E". If the cause of the error is no longer present, the error display flashes and the error can be acknowledged with the OK key.

ParameterBox: The error messages are shown in plain text.

7.1.2 Error memory

The current error is saved in parameter P700 and the last five error messages are saved in parameter P701 [-01]…[-05]. Further information on inverter status at the time the error occurred are stored in parameters P702 to P706 / P799. More detailed information can be found in the main manual for the frequency inverter.

7.2 Error messages

Table of possible bus-specific error messages

Display in the ControlBox		Fault	Cause
Group	**Details in P700 / P701**	**Text in the ParameterBox**	• **Remedy**
E010	**10.0**	**Telegram downtime**	Data transfer is faulty. Check P513. • Check external Bus connection. • Check bus protocol program process. • Check Bus Master.
	10.2	**External bus module telegram timeout**	Telegram transfer is faulty. • Check external connection. • Check bus protocol program process. • Check Bus Master.
	10.4	**External bus module initialisation failure**	• Check P746. • Bus module not correctly plugged in. • Check Bus module current supply.
	10.1	**External Bus module system failure**	Further details can be found in Section 5.2 .
	10.3		
	10.5		
	10.6		
	10.7		
	10.8	**External module communication failure**	Connection fault / error in the external component

8 Additional information

8.1 Electronic data sheet (eds file)

All available objects are contained in the (SK***E.eds) “Electronic data sheet” (eds file).

http://www.nord.com/bus

Series	eds file	Folder
NORDAC vector mc	SKMCDN.eds	Vector MC
NORDAC SK 300E	SK300EDN_BSC.eds	SK TU2-DEV
	SK300EDN_NOC.eds	
	SK300EDN_STD.eds	
NORDAC SK 500E	SK500EDN.eds	SK TU3-DEV
	SK520EDN.eds	
	SK520EDN_POS.eds	
NORDAC SK 700E / SK 750E	SK700EDN_BSC.eds	SK TU1-DEV
	SK700EDN_BSC_ENC.eds	
	SK700EDN_BSC_POS.eds	
	SK700EDN_CAN.eds	
	SK700EDN_CAN_ENC.eds	
	SK700EDN_CAN_POS.eds	
	SK700EDN_KAR.eds	
	SK700EDN_KAR_ENC.eds	
	SK700EDN_KAR_POS.eds	
	SK700EDN_MLT.eds	
	SK700EDN_MLT_ENC.eds	
	SK700EDN_MLT_POS.eds	
	SK700EDN_NOC.eds	
	SK700EDN_NOC_ENC.eds	
	SK700EDN_NOC_POS.eds	
	SK700EDN_PBR.eds	
	SK700EDN_PBR_ENC.eds	
	SK700EDN_PBR_POS.eds	
	SK700EDN_SPS.eds	
	SK700EDN_SPS_ENC.eds	
	SK700EDN_SPS_POS.eds	
	SK700EDN_STD.eds	
	SK700EDN_STD_ENC.eds	
	SK700EDN_STD_POS.eds	
	SK700EDN_USS.eds	
	SK700EDN_USS_ENC.eds	
	SK700EDN_USS_POS.eds	

8.2 Maintenance and servicing information

In normal use, NORDAC frequency inverters and their accessories are maintenance-free.

If air intake filters have been built into the control cabinet, then these should also be regularly cleaned or replaced.

If you contact our technical support, please have the precise device type (rating plate/display), accessories and/or options, the software version used (P707) and the series number (rating plate) at hand.

Repairs

The device must be sent to the following address if it needs repairing:

NORD Electronic DRIVESYSTEMS GmbH
Tjüchkampstr. 37
26605 Aurich, Germany

For queries about repairs, please contact:

Getriebebau NORD GmbH & Co. KG
Tel.: 04532 / 401-515
Fax: 04532 / 401-555

If a frequency inverter or accessories are sent in for repair, no liability can be accepted for any added components, e.g. such as line cables, potentiometer, external displays, etc.!

Please remove all non-original parts from the frequency inverter.

NOTE

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 obtain a suitable goods return voucher from Getriebebau NORD GmbH.

Internet information

You can find the comprehensive manuals in German and in English on our Internet site.

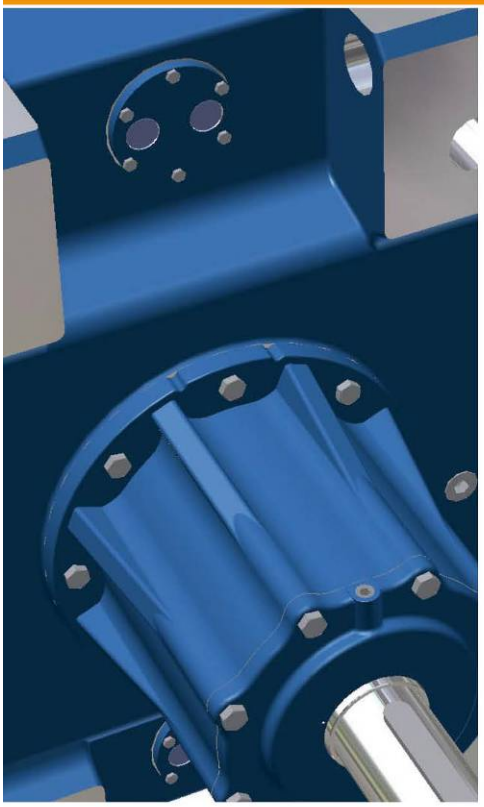
www.nord.com

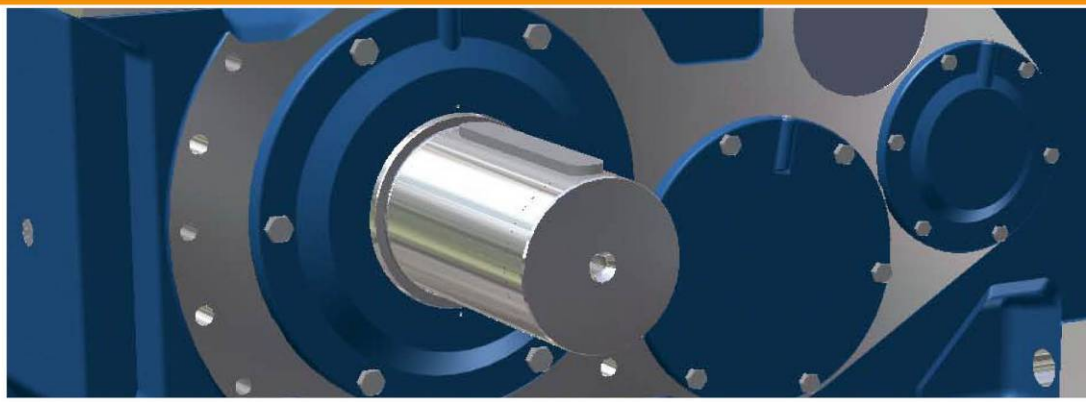
8.3 Abbreviations in this manual

CU .....Customer Unit (customer interface (internal)
DI, DIN .Digital input
EDS.....Electronic Data Sheet
EMC .....Electromagnetic compatibility
FI .....Frequency inverter
HW .....Hardware
IND.....Index
IW.....Actual value
STW.....Control word
SW .....Software version, setpoint
TU .....Technology Unit (external)
ZSW.....Status word

9 Keyword index

Intelligent Drivesystems, Worldwide Services





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