

Manual

NORDAC SK DA-130E

*Decentral field system modules and
frequency inverter*

SK DA-130E-550-340-IBS-AAA ... SK DA-130E-401-340-IBS-AAA

(3~ 380 - 480V, 0.55 - 4.0kW)



BU 0130 GB

Getriebebau NORD

GmbH & Co. KG





NORDAC decentral field system modules SK DA-130E and trio SK 300E frequency inverters



Notes rearding safety and application

(in accordance with: Low Voltage Directive (LVD) 73/23/EWG)

1. General

During operation, drive inverters may have live, uninsulated, maybe even moveable or rotating parts, as well as hot surfaces, depending on their type of protection.

Unauthorised removal of the necessary cover, improper installation or use may endanger persons or property.

You can find further information in the documentation.

All work regarding transport, installation and startup, as well as regarding maintenance should only be carried out by qualified staff (please observe IEC 364 or CENELEC HD 384 resp. or DIN VDE 0100 resp. and IEC 664 or DIN VDE 0110, as well as national directives regarding accident prevention).

Qualified staff in the sense of the general notes on safety are persons, who are familiar with setting up, assembling, starting up and operating this product and who have the relevant qualifications.

2. Intended use

Frequency inverters are components, which are intended to be fitted into electrical appliances or machines.

If fitted into machines, the startup of drive power inverters (i.e. the commencement of the intended use) is prohibited until it has been ascertained that the machines are compliant with the EU directive 89/392/EWG (machine directive); EN 60204 must be observed.

The startup (i.e. the commencement of the intended use) is only permitted if the EMC directive (89/336/EWG) is observed.

The drive power inverters meet the standards of the Low Voltage Directive 73/23/EWG. The harmonised standards of the series prEN 50178/DIN VDE 0160 in connection with EN 60439-1/ VDE 0660 parts 500 and EN 60146/ VDE 0558 are used for the drive power inverters.

The technical data, as well as information on the connection requirements, can be found the specifications plate and the documentation and must be observed at all times.

3. Transport, storage

The notes on transport, storage and correct handling must be observed.

The requirements regarding the climate in accordance with prEN 50178 must be observed.

4. Assembly

Assembly and cooling of the appliances must be carried out in accordance with the relevant documentation.

The drive power inverters should be protected from improper strain. Particularly regarding transport and handling, it is important that no components are bent and/or no separation distances are altered. Touching electronic components and contacts should be avoided.

Drive power inverters contain electrostatic components, which can be damaged easily by improper use. Electrical components must not be damaged or destroyed by mechanical means (possible health risk!).

5. Electrical connection

When working inverters connected to mains, the national directives on accident prevention (e.g. VBG 4) must be observed.

Electrical installations (e.g. cable gauges, protection, protective earthing conductor connections) should be carried out in accordance with the respective regulations. Any additional information can be found in the documentation.

Information regarding the EMC-appropriate installation, such as shielding, earthing, positioning of filters and the laying of cables, can be found in the documentation of the drive power inverters. These notes should also be observed regarding Drive power inverters marked "CE-". The manufacturer of the appliance or the machine is responsible for observing the limit values demanded by laws governing EMC.

6. Operation

Appliances containing drive power inverters may also have to be fitted with additional monitoring and protective facilities in accordance with the relevant valid safety provisions, e.g. directives on technical work equipment, accident prevention, etc. Changes to the drive power inverters with the operating software are permitted.

After disconnecting the drive power inverters from the power supply, live machine components and power connections should not be touched immediately after disconnecting as the capacitors may still be charged. The relevant signs on the drive power inverters should be observed.

All covers should be kept closed during operation.

7. Maintenance and repair

The documentation of the manufacturer should be observed.

This safety information should be kept safe!

Documentation

Name: BU 0130 DE

Mat. no.: 608 13 01

Appliance series: NORDAC SK DA-130E incl. *trio* SK 300E

List of versions

Name of previous issues	Date	Remarks
BU 0130 DE, December 2006 Mat. no.: 608 13 01 / 4906	See BU 0300 DE	First version

Issued by:

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Intended use of the frequency inverters

It is essential that the operating instructions are observed in order to **ensure trouble-free operation** and warranty entitlements are not forfeited. **For this reason, please read the operating instructions** before working with this appliance!

The operating instructions contain important notes on **service and safety**. They should therefore be kept in the **vicinity of the appliance**.

The decentral field system modules with frequency inverter trio SK 300E are appliances for industrial and commercial systems for the operation of three-phase asynchronous motors with squirrel cage rotors. These motors must be suitable for operation on a frequency inverter; other loads must not be connected to the appliance.

The frequency inverter trio SK 300E is an appliance for the stationary assembly on machines. All information regarding the technical data and the permitted conditions on site must be observed at all times.

Startup (commencement of the intended operation) is permitted until it has been ascertained that the machine complies with the EMC directive 89/336/EEG and the conformity of the finished product with the machine directive 89/392/EEG (observe EN 60204).

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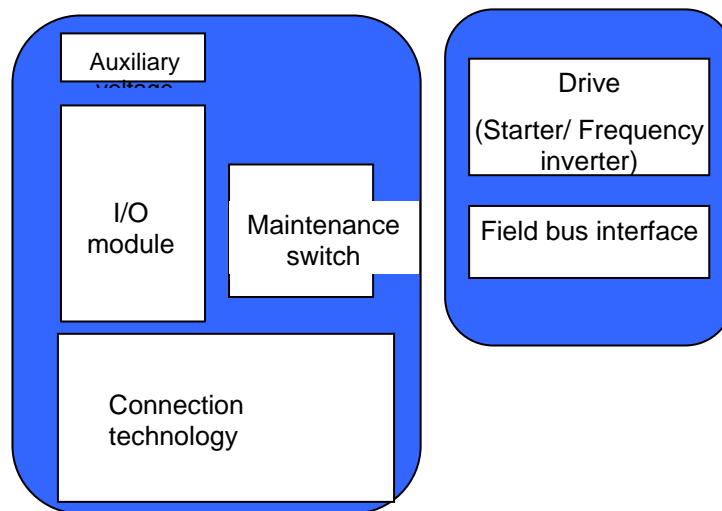
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1 General description

If enhancements, such as additional switching elements, interfaces or comfortable connection technology are required for a drive, field distributor modules are a suitable basis for this. Combined with approved control electronics, these modules constitute a compact drive package. Field distributors are a distribution system for energy (mains or motor-supply), control voltage, field bus connection and sensors / actuators.

The field distributor modules NORDAC DA provide a platform, which can be realised, adjusted to the relevant requirements. These modules are divided into various areas of functionality, which can be built as an option.

Structure of the NORDAC DA modules:



1.1 Delivery

Examine this appliance for damage as a result of transport such as deformation or loose parts **immediately** after arrival/unpacking.

In case of damage, contact the shipper at once and arrange for a thorough examination of the goods.

Important! This also applies if the packaging was unadamaged.

1.2 Scope of delivery

The SK DA-130E is delivered with the relevant system connections and connection points for a 3-phase motor. Only the supply voltage and a control signal are required for startup.

The following NORD components are included in the field distributor module SK DA-130E:

- Frequency inverter SK 300E (SK 300E-xxx-340-B)
- Standard customer interface I/O (SK CU2-STD)
- Technology box with bus activation (e.g. InterBus SK TU2-IBS)

As an option, cables for the connection between the field distributor and the hybrid cable from NORD, which are available in different varieties, can be supplied.

1.3 European EMC directive

If the NORDAC SK DA-130E is installed according to the recommendations of this manual, it will meet all the requirements of the EMC directive, in accordance with the EMC product standard EN60947-4-2 for low voltage control units, semiconductor motorised control units and starters AC voltage.



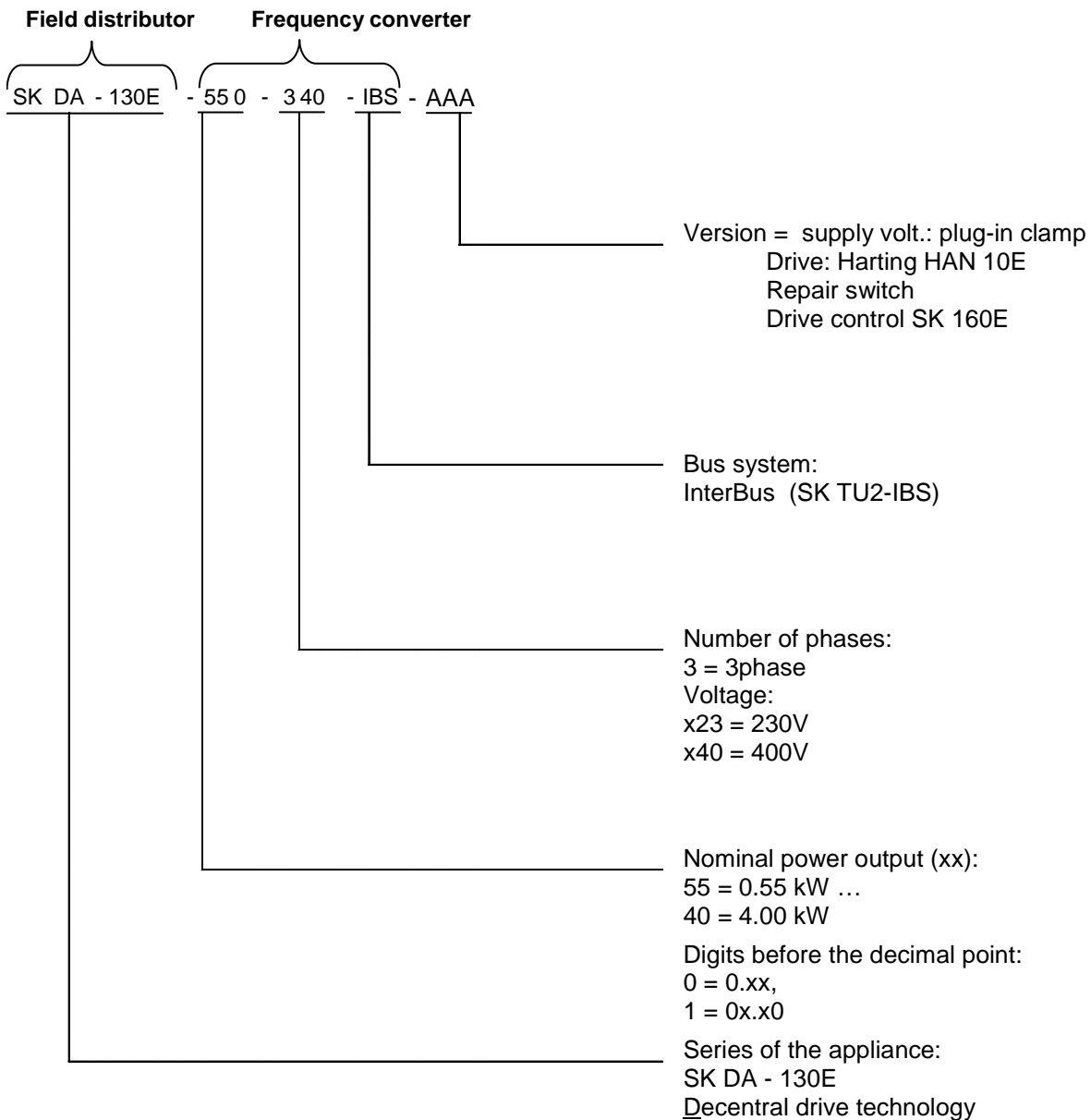
1.4 Nomenclature / Key to models

The frequency inverter **NORDAC trio SK 300E** has the same nomenclature as the one known from other NORDAC frequency inverters. As a result of this, the information contained in this should be used along those lines. The names of the models of the frequency inverter contain the type of the appliance, its capacity, information regarding the voltage, the interference filter, the type of protection, as well as possibly any special equipment. The nomenclature of the connection unit, which constitutes the link between the motor and the frequency inverter, can be found in the name of the gearmotor. Therefore, a drive unit becomes clearly recognisable by its name SK 300E. The nomenclature contains the identification code of the connection unit, the version and the variety of the component, the type of protection, as well as the connection of the motor windings.

NOTE



As a rule, the nomenclature should be stated in orders, as well as in service or support!



2 Functional principle

The field distributor module SK DA-130E is a combination of the full frequency inverter SK 300E and a platform for additional interfaces and switching elements. The frequency inverter SK 300E is the basis for a wide range of applications. Due to the high performance of this frequency inverter, applications of conveyor technology, simple pump control, as well as complex lifting applications or process control can be realised.

This manual shows all the details of the distributor platform SK DA-130E. All additional components, such as the frequency inverter SK 300E and its optional modules, are based on tried and tested components. As these modules are optional, there are also separate operating instructions for these, which should be consulted in any case. The relevant names are listed in German (additional languages on request):

Frequency inverter SK 300E BU 0300 DE

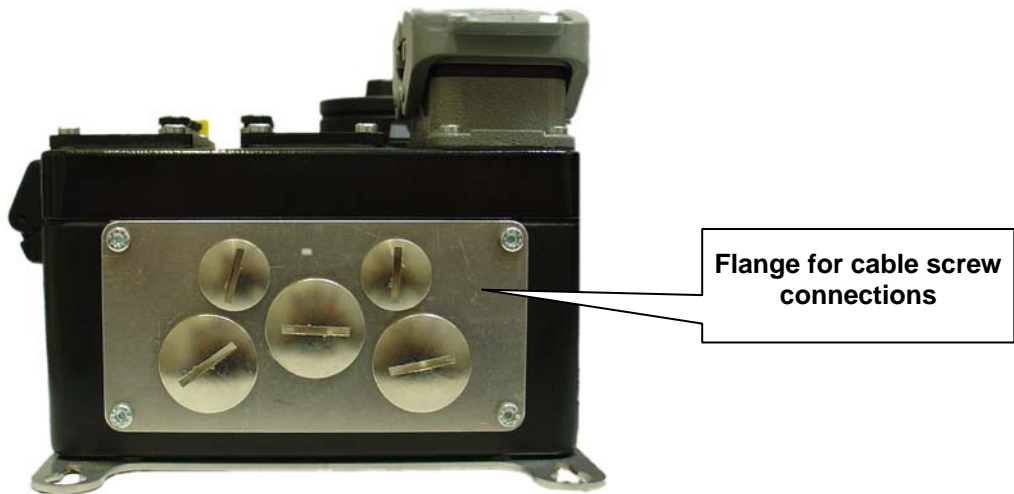
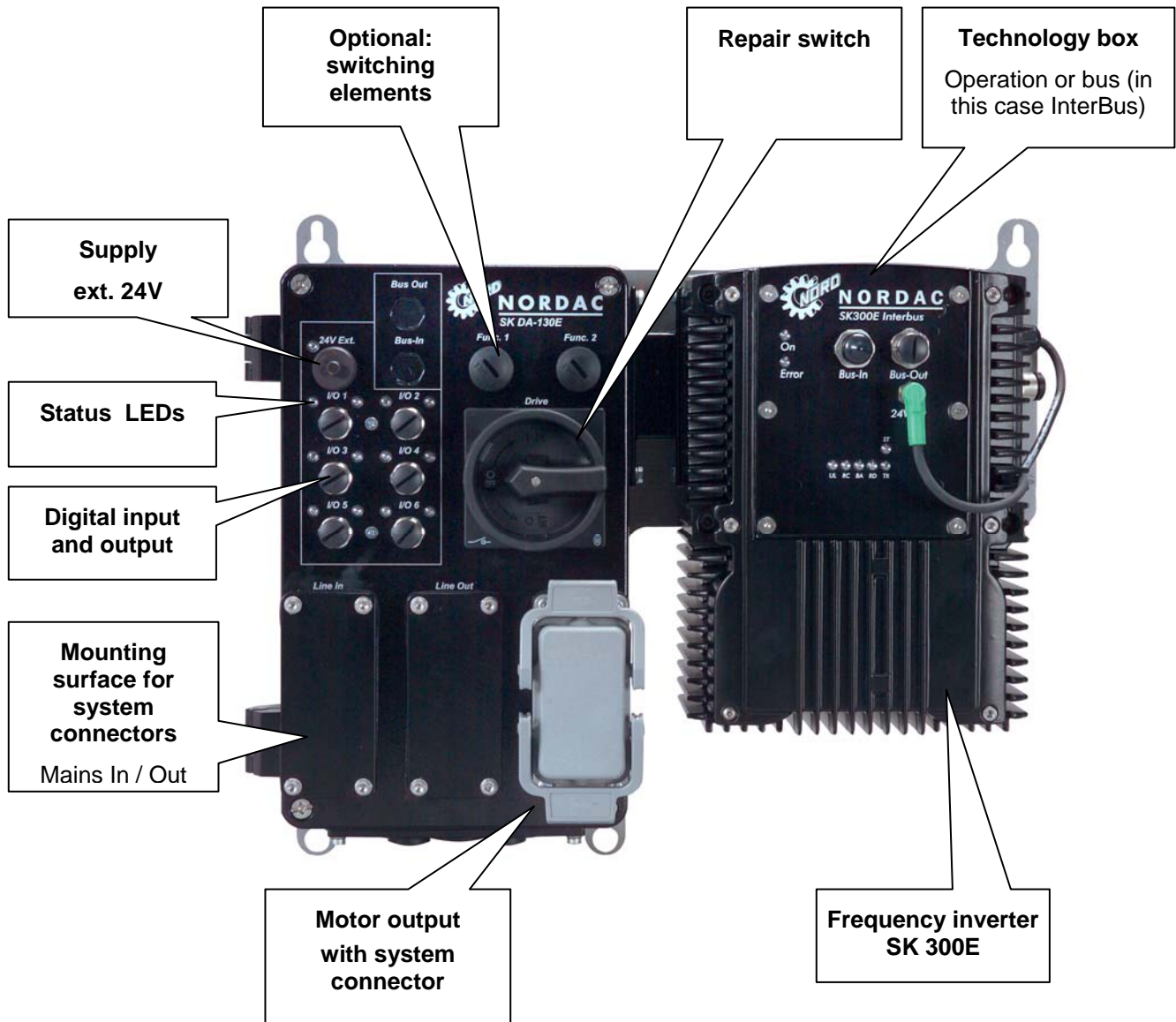
Technology box / Bus system

Profibus	BU 0020 DE
InterBus	BU 0070 DE
CANopen	BU 0060 DE
DeviceNet	BU 0080 DE

The SK DA-130E has high-performance connector terminals, as well as a detachable flange, to which the cable screw connections are mounted. This both applies to the power feed and for the outgoing energy in feed-through technology. The motor output is external with a system connector, in this case Harting HAN 10E. Due to this version, a fast exchange of this appliance is possible.

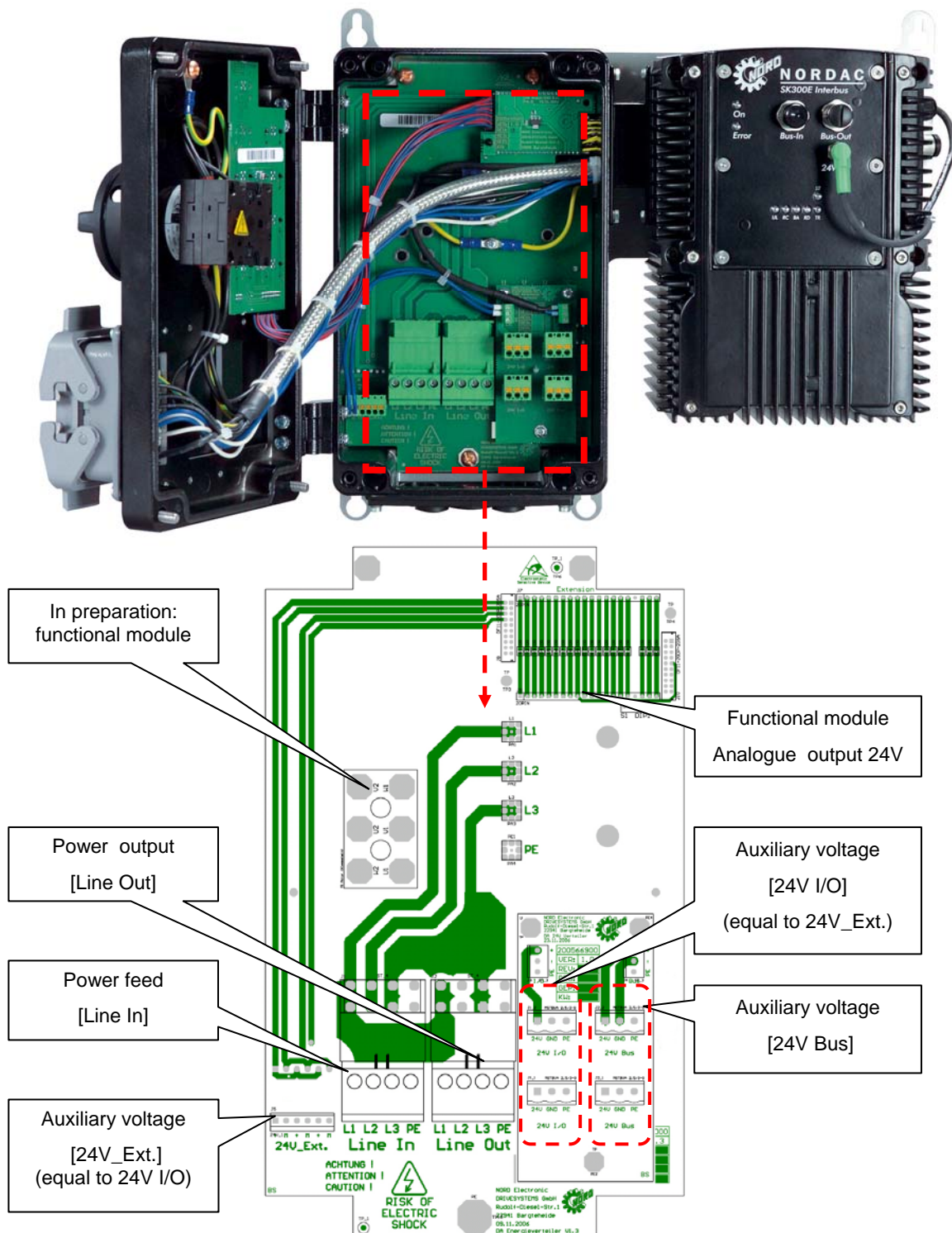
The M12 interface of this appliance is used as an interface for control signals in the form of M12 sockets, as well as the activation of a reversing starter SK 160E. Signals of actuators can be received near the drive and can be used for drive tasks or can be transmitted via the existing bus system for controlling duties. This creates an ideal interface to the automation system by using the unit SK DA-130E. The reversing starter SK 160E can be realised via a 5-phase M12 connection.

3 Appliance configuration



4 Electrical connection

- Power cable: Connection to the mains should be carried out with a cable suitable for the local conditions and with a sufficient wire gauge (max. 4mm²).
- Aux. Voltage: 24V I/O: 2x 3 phase plug with tension-spring terminals of 2.5mm² : voltage supply and output
- Aux. Voltage: 24V bus: 2x 3 phase plug with tension-spring terminals of 2.5mm²: voltage supply and output
- Cable entry: 3 x M25 and 2 x M16 are available. The motor startup is realised with a system connector Harting HAN 10E.



4.1 Terminals

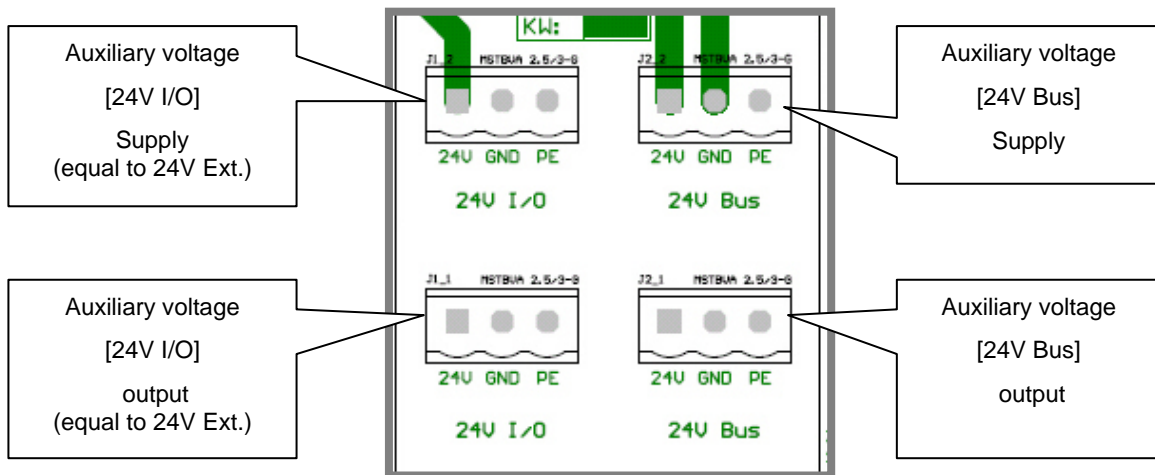
	Terminal	Function	Data
Power stack <i>(Line potential)</i>	Line In L1, L2, L3	Voltage supply	4mm ² , 380...480V, 50...60Hz, 32 A max.
	Line Out L1, L2, L3	Power output	4mm ² , 380...480V, 50...60Hz, 32 A max.
	PE	Protective earthing conductor	4mm ²
24V-level I/O <i>(Equal to 24V Ext.)</i>	Line In 24V, GND, PE	24V I/O-supply	3x 2.5mm ² , 15...30V, max. 6 A
	Line Out 24V, GND, PE	24V I/O- output	3x 2.5mm ² , 15...30V, max. 6 A
24V-level bus	Line In 24V, GND, PE	24V Bus supply	3x 2.5mm ² , 15...30V, max. 6 A
	Line Out 24V, GND, PE	24V Bus output	3x 2.5mm ² , 15...30V, max. 6 A

4.2 Auxiliary voltage connection

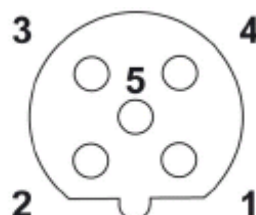
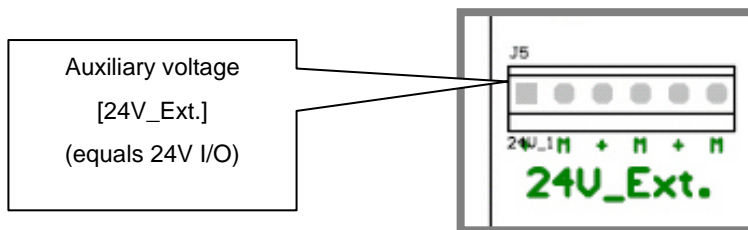
Two 24V sections are available as auxiliary voltage:

- **24V I/O** or. **24V Ext.** (the same potential, supply of connecting sensors and actuators)
- **24V Bus** (supply of integrated bus-modules SK TU2-IBS with M8-connectors)

For both sections, tension-spring terminals are available for feed-through (supply and output).



The terminal "24V Ext." has the same potential as the M12 terminal and the "24V I/O". Internally, this terminal is connected to the input terminal of "24V I/O".



24V Ext. (equals 24V I/O)			
M12 terminal	Pin	Function	
24V-ext. (I/O)	1	24V I/O	
	2	---	
	3	GND	
	4	---	
	5	---	

4.3 M12 terminal sockets

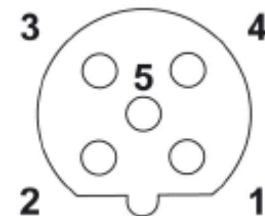
To receive drive actuators and sensors, M12 terminal sockets are available. The signals received are picked up by the frequency inverter (standard I/O) and can be used as drive function or can be transmitted to the optional bus module for controlling tasks.

For the SK 130E, 7 M12 terminal sockets are available. Below is a list of the functionalities and internal links.

M12 terminal socket	Pin	Function
I/O 1	1	24V I/O
	2	Output multi-functional relais 24V
	3	GND
	4	Digital input 2
	5	Analogue/Digital output 24V*
I/O 2	1	24V I/O
	2	---
	3	GND
	4	Digital input 3
	5	---
I/O 3	1	24V I/O
	2	Out
	3	GND
	4	Digital input 4
	5	---
I/O 4	1	24V I/O
	2	Out
	3	GND
	4	Digital input 5
	5	---
I/O 5	1	24V I/O
	2	Analogue/Digital output 24V
	3	GND
	4	Analogue/Digital input 1
	5	---
I/O 6	1	24V I/O
	2	---
	3	GND
	4	Analogueue/Digital input 2
	5	---



M12 terminal socket (female), configuration:



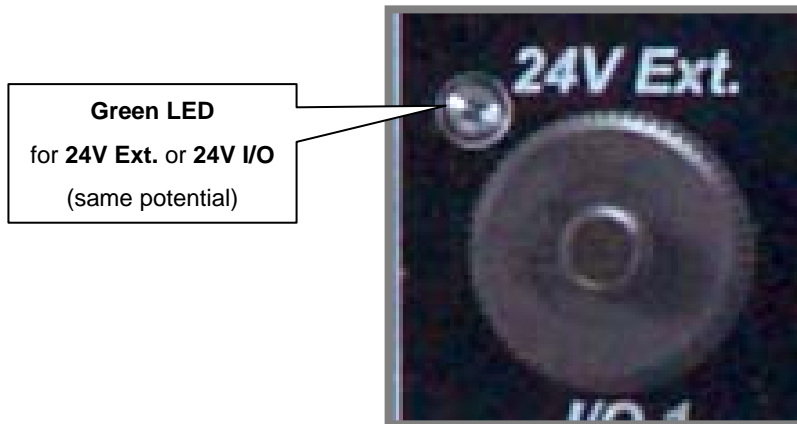
* The analogue/digital output 24V on pin 5 of IO1 is only available if the relevant dip switch has been set to 1. In the factory setting, this switch is set to ON (→ also see p. 15).

4.4 Status LEDs

Above the M12 terminal sockets, status LEDs have been mounted for input and output status. These are connecting sockets of 24V ext. as well as the I/Os (sensors/actuators).

4.4.1 External 24V supply

For external 24V supply of the I/Os, a connection with an M12 terminal socket is available. Here, a green LED has been positioned, which shows the status of **24V Ext. or 24V I/O** (the same potential).



To recognise the relevant I/O status, orange (signal) status LEDs have been fitted. These stand for each input (input left) and output (output, right).

Left LED (orange) → Input

Right LED (orange) → Output



M12 terminal socket	LED left	LED right
I/O 1	Digital input 2	Output multi-functional relay 24V
I/O 2	Digital input 3	---
I/O 3	Digital input 4	---
I/O 4	Digital input 5	---
I/O 5	Analogue/ Digital input 1	Analogue/ Digital output 24V
I/O 6	Analogue/ Digital input 2	---

4.5 Control of the reversing starter SK 160E

The field distributor SK DA-130E is equipped in such a way that a reversing starter SK 160 E can be controled via the terminal sockets I/O1. The SK 160E is an electronic motor starter, which can be switched to both rotational directions. The connection can be realised by 5-phase cable and a M12 terminal socket. The following messages or supply currents are transmitted:

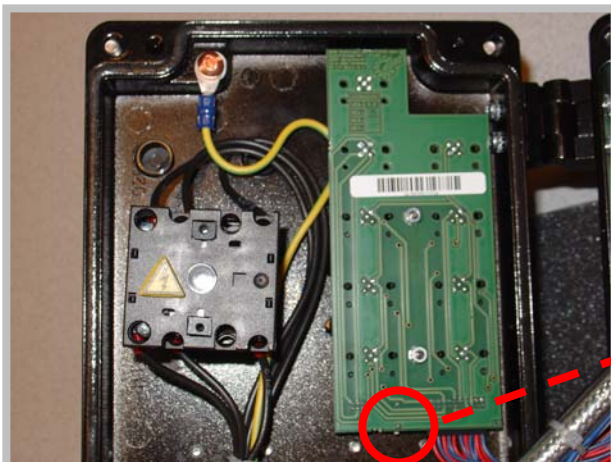


SK 160E				SK 130E		
Pin	Colour	Connector	Function	Pin of I/O 1	Name	Status LED
1	Brown	[43]	24V DC	1	24V I/O	24V Ext. left (green)
2	White	[21]	RUN-RIGHT	2	Output multi-functional relay 24V	I/O 1 right (yellow)
3	Blue	[40]	GND	3	GND	---
4	Black	[17]	OK	4	Digital input 2	I/O 1 left (yellow)
5	Grey	[22]	RUN-LEFT	5	Analogue/Digital output 24V	I/O 5 right (yellow)

To activate the SK 160E, it is necessary for the Pin 2 to be guided from I/O5 (analogue/ digital output 24V) to Pin 5 of I/O1, where the SK 160E is connected. This connection can be made with the help of a dip switch, which is located inside the field distributor, on the board of the I/O unit. In the standard (factory setting), this switch is turned on. It should therefore only be turned off if I/O1 and I/O5 are to be separated.

DIP switch = 1 (On) → Pin 2 of I/O5 (analogue/digital output 24V) connected with mit Pin 5 of I/O1

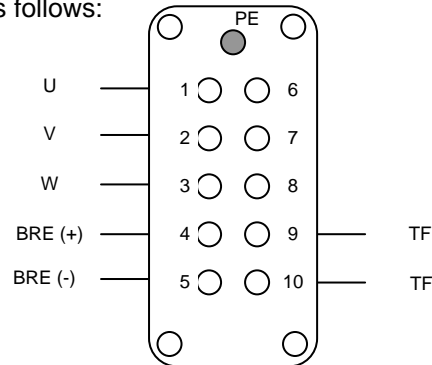
DIP switch = 0 (Off) → Pin 2 of I/O5 (analogue/digital output 24V) separated from Pin 5 of I/O1



4.6 System plug motor output

The motor output is carried out with a system plug. In this case, it is the plug Harting HAN 10E. The configuration of this plug is as follows:

Socket / female



4.7 Internal links

For the field distributor SK DA-130E, the elements attached are connected directly with the components of the frequency inverter. For this, there are the following links, which are explained subsequently with the help of a connection diagramme.

- The supply voltage connected [Line In] is the feed for field distributor and frequency inverters. This is connected from feeding [Line In] via the repair switch to the inverter input. The inverter/motor can therefore be turned off for repair/maintenance.
- The motor output of the frequency inverter is connected directly to the system connector Harting HAN 10E [drive]. The repair switch connects this motor output to the inverter on/off.
- The voltage emitted by the SK 300E for the brake (180V DC) is guided directly to the motor output [drive]. **CAUTION:** Here, you must take care that a brake of a coil voltage of 180 DC has been mounted. Otherwise, the wiring should be changed.
- The connections of the temperature sensor have been guided to the digital input 1 of the SK 300E via motor connection [drive], which, by standard, is responsible for analysis. Through this, the inverter monitors the temperature of the motor, realising the protection of the motor.
- The M12 terminal sockets of the I/Os (I/O 1 to I/O6) are supplied with 24V as soon as a 24V supply is connected to the terminal socket "24V Ext." or the terminal block "24V_I/O".

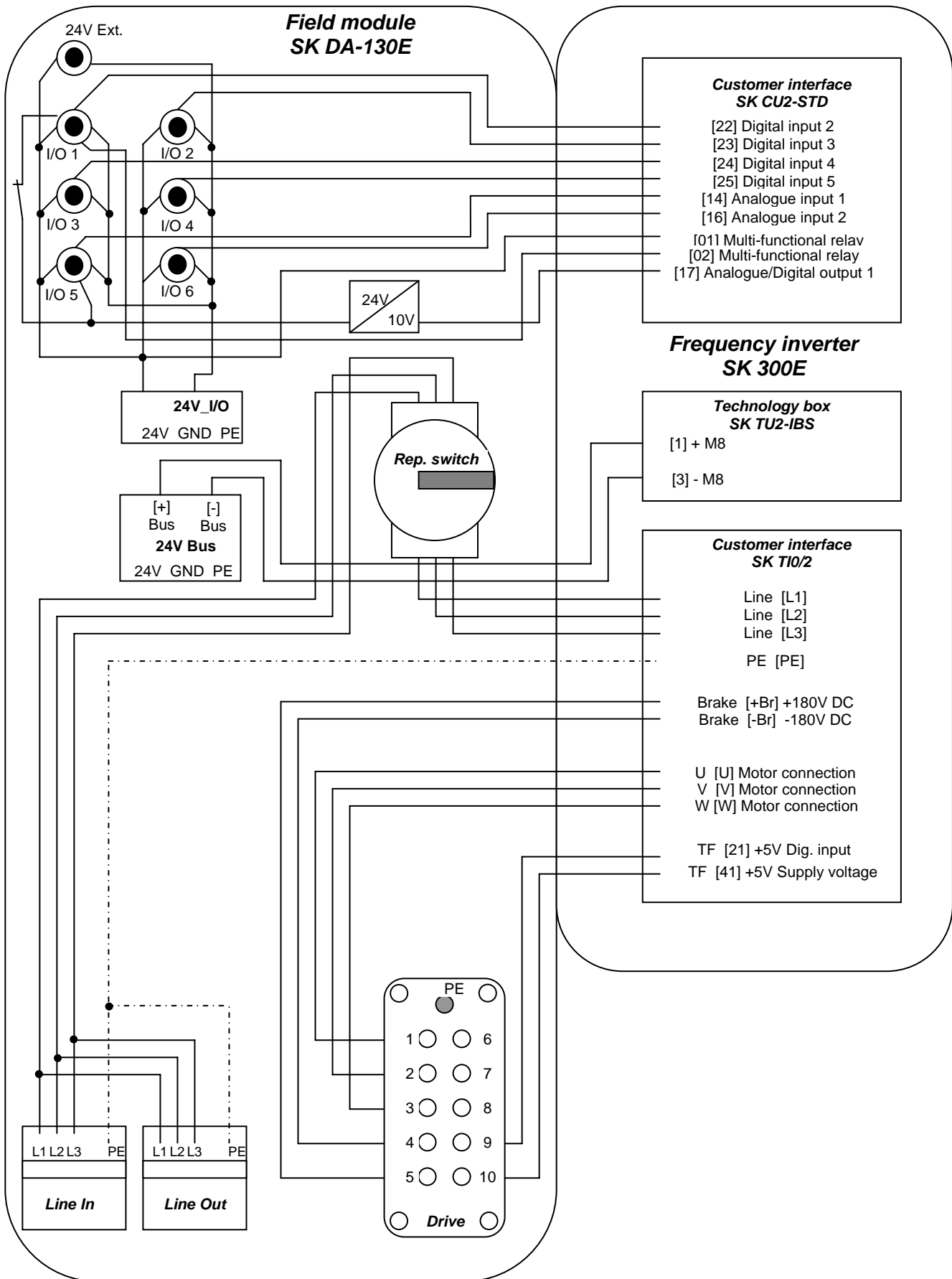
→ **I/O 1** both constitute a digital input and the output of the multi-functional relay (MFR). Via this multi-functional relay, a 24V voltage is applied, so that the 24V can be applied separately via the bus (digital output 24V). The signals are always connected directly with the customer interface of the SK 300E, the "standard I/O". The digital input constitutes the dig-in 2 of the customer interface, the digital output 24V comes from the multi-functional relay. In the standard version, the Pin 2 is connected to the Pin 5 of I/O5 in order to have an additional 24V output for the activation of a SK 160E.

Link to SK 140E/SK 150E: With this terminal, an SK 140E, SK 150E or SK 160E can be fully controlled via a cable. This also includes the supply voltage of the starter (24V), the input to start (RUN-R/RUN-R), as well as the feedback (OK)
(See p.15).

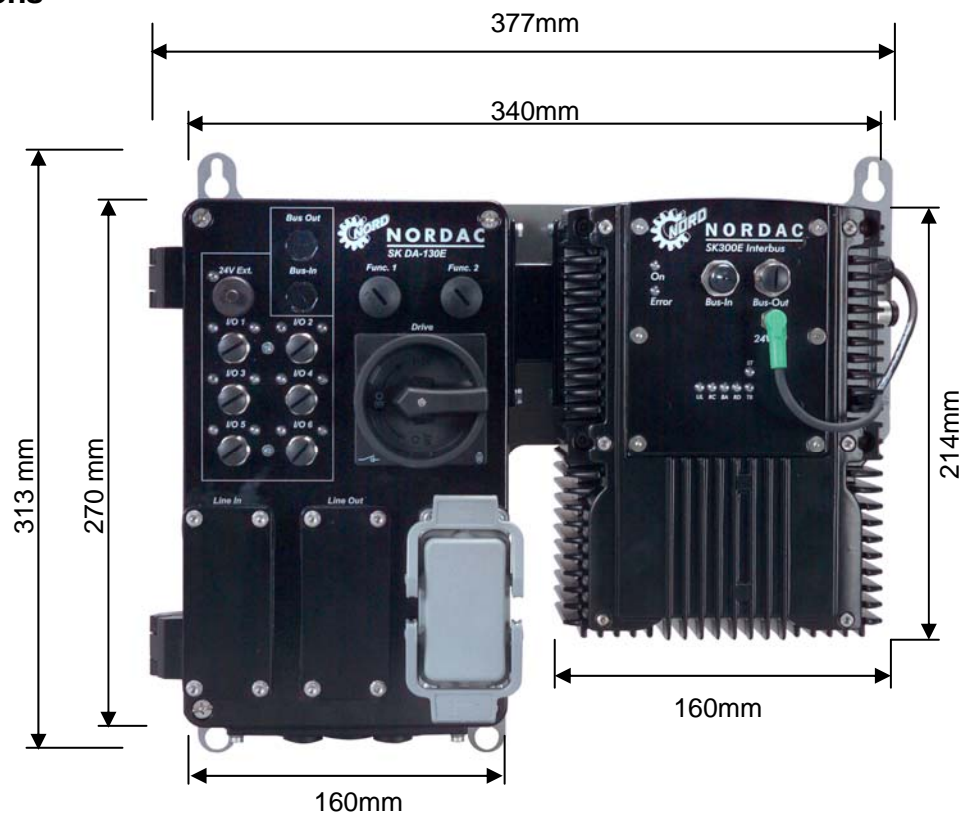
→ **I/O 2 to I/O6** represent digital inputs, which are connected directly with the customer interface of the SK 300E, the standard I/O.

→ All imported and issued control signals can both be used as drive functions and as control functions via the bus system.

4.8 Connection diagramme



5 Dimensions



Depth of appliance: max. 150mm (without any connectors attached)

6 Notes on maintenance and service

When handled correctly, the NORDAC SK DA-130E is maintenance-free.

NOTES



When service is required, it is imperative to be aware that the supply voltage of the frequency inverter is linked to the repair switch. Prior to disassembly of the frequency inverter, the repair switch must be turned off and should be secured against a restart. The directions for safety and installation of the SK 300E, which can be found in the operating manual of the BU 0300 DE, should be followed.

In the event of repairs having to be carried out, please send this appliance to the following address:

Getriebebau NORD GmbH & Co. KG
Rudolf- Diesel- Str. 1
D-22934 Bargteheide, Germany

Should you have any further queries regarding the repair, please contact:

Getriebebau NORD GmbH & Co. KG
Telephone: 04532 / 401 -514 oder -508
Fax: 04532 / 401 -555

If a NORDAC SK DA-130E *is sent for repair*, we cannot accept responsibility for any attached part, such as power supply units, connection cables, etc.

You can get the latest information and documents as free downloads from Getriebebau NORD-Homepage, <http://www.nord.com>.

7 Technical data

Function	Specification
Voltage	3~ 380...480V, -20% /+10%, 47...63 Hz
Output voltage	3 AC 0 – supply voltage
Motor output	0,55...4kW (with 400V), depending on power of the SK 300E
Brakes voltage	Depending on voltage (180V DC at 400V~ / 205V DC at 480V~) generated by the frequency inverter; alternatively via potential-free contact (relay)
Motor temperature monitoring	I ² t-monitoring ; PTC-input
Type of ventilation	Convection
Control input	4x dig. input 15...30V, approx. 2mA (on M12) 2x analogue/digital input (on M12)
Control output	1x analogue/digital output 24V (on M12) 1x Relay 24V / 500mA DC
Motor temperature monitoring	PTC or bimetal switch
Interface	<ul style="list-style-type: none"> • InterBus • Profibus (optional) • CANopen (optional) • AS-Interface (optional) • DeviceNet (optional)
Secure galvanic insulation	Control terminals (digital inputs / outputs)
Scope of the inverter	approx. 95 %
Ambient temperature	-10°C...+50°C, without condensation
Storage and transport temperature	-20°C...+60/70°C, without condensation
Long-term storage	No later than after one year, connect this frequency inverter to the mains for 60 minutes. Maintain this cycle for the period of storage.
Type of protection	IP55 / IP66 (optional), depending on the motor used
Max. altitude of installation above sea level	Up to 1000m: no loss of performance 1000...4000m: 1%/ 100m loss of performance (up to 2000m surge category. 3) 2,000...4,000m: only surge category 2 is adhered to; an external surge protection is required on the power input
Waiting time between two cycles	60 sec for all appliances in the regular operating cycle
CE, EMC	Suitable for industrial use, radio interference class A

8 Agencies and branches

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