

Intelligent Drivesystems, Worldwide Services



(GB)

# SK 180E

Decentralised drive technology  
frequency inverter

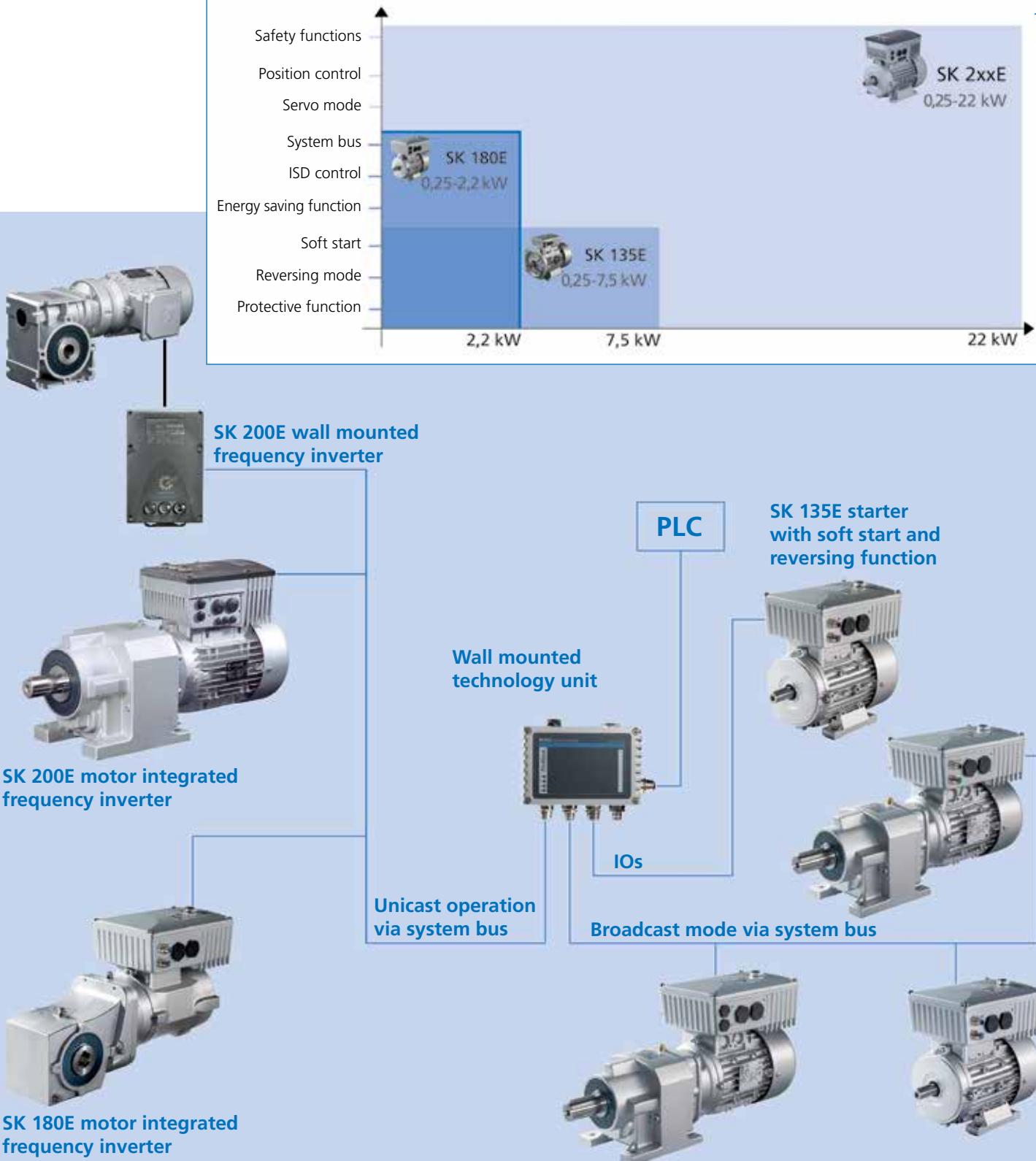
**NORD**  
DRIVESYSTEMS

# Decentralised drive electronics, a great range from NORD

	Description / Function	SK 135E	SK 180E	SK 200E
Type	Power range	up to 7.5 kW	up to 2.2 kW *	up to 22 kW
	Reversing, soft start	✓	-	-
	Frequency inverter	-	✓	✓
Configuration	Connection for PTC temperature sensor		✓	
	Uniform parameter structure / error messages		✓	
	Configuration via software parameterisation		✓	
	Configuration via DIP switches and potentiometers	✓	-	✓
	Number of I/Os DIN / DOUT / AIN	2 / 2 / 0	3 / 2 / 2	4 / 2(1) / 2
Brake functions	Integrated electronic brake rectifier	✓	-	✓
	Integrated brake chopper	-	○ **	✓
	Internal braking resistor	-	○ **	○
	External braking resistor	-	○ **	○
Housing / Version	Housing version	SK 100E	SK 100E	SK 200E
	Wall-mounting possible		✓	
	Protection class (climate class) IP55 (3k3)		✓	
	Protection class (climate class) IP66 (3k4)	○	○	○
	ATEX Zone 22-3D	○	○	○
	EMC rating: Radio interference suppression level (for motor mounting)	C1	C1	C2
	Leakage current (with active mains filter)	< 20 mA	< 16 mA	> 30 mA
Protection	PTC / I <sup>2</sup> t / Motor phase monitoring		✓	
	Oversupply / Undervoltage protection		✓	
	Short-circuit / Earthing monitoring	-	✓	✓
Data / Bus interface	RS 232 PC diagnostic interface		✓	
	Data storage via plug-in EEPROM	-	-	✓
	System bus	-	✓	✓
	Interface for bus coupling	○	○	○
Functionality	STO function	-	-	○
	Connection for incremental encoder (servo mode)	-	-	✓
	Posicon positioning mode	-	-	✓
	Sensorless current vector control (ISD control)	-	✓	✓
	Energy saving function: "Automatic flux optimisation"	-	✓	✓

\* At present available up to 1.1 kW, 2.2 kW available from 2014

\*\* not possible up to 1.1 kW



## Setting standards in decentralised drive technology

- ✓ Decentralised drive technology for all drive applications from a single source
- ✓ Seamless interaction of all components
- ✓ Communication via a common system bus (SK 180E and above) or field bus

- ✓ Identical and compatible optional modules
- ✓ Same operating interface and diagnostic tools
- ✓ "Look and Feel"
  - Uniform parameters
  - Common operating concept
  - Common design concept

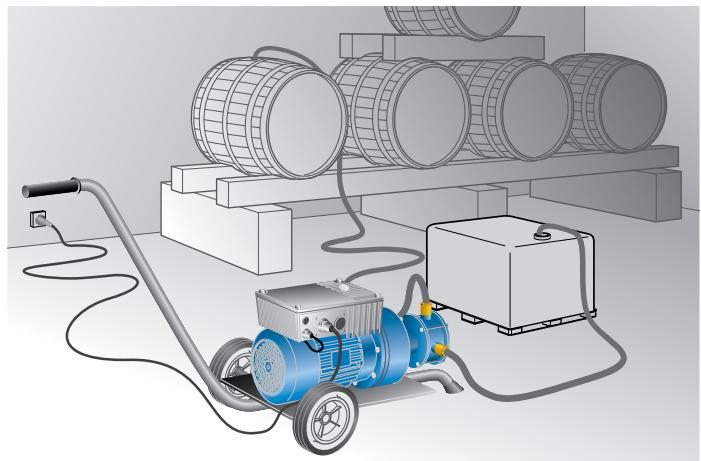
# SK 180E system overview



## SK 180E - Compact frequency inverter for decentralised applications

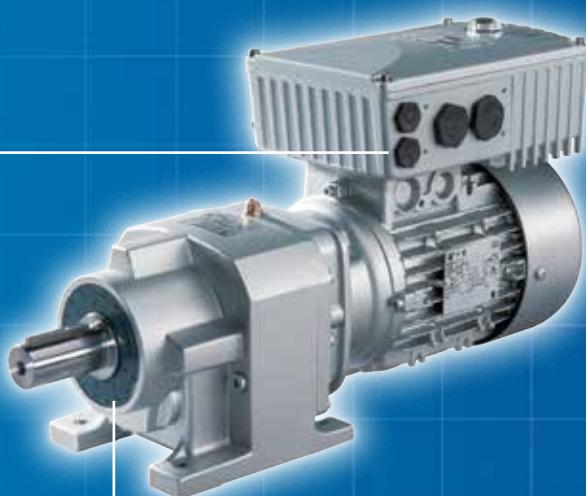
The advantages of using a frequency inverter to control an electric motor are obvious. In addition to basic functions such as speed control and communication with control units, modern frequency inverters also offer features to perform which can perform automatic positioning and safety functions.

However, many applications do not fully utilise the immense scope of functions of modern frequency inverters. To fill the gap which has resulted between simple motor starters and the advanced features of the SK 200E range, NORD has developed a new frequency inverter. This concentrates on the essential functions for pumps and conveyor technology (PI / speed control, energy saving, communication with peripherals) and results in significant savings, in both purchase and performance.





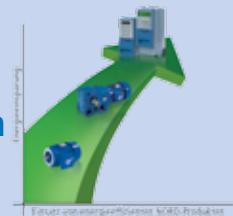
- All normal drive functions
- Leakage current < 16 mA
- Consistent parameter structure
- "Stand-alone" operation (integrated 24V power supply)
- 3 digital inputs and 2 digital outputs
- 2 analog inputs (can optionally be used for current or voltage setpoints, or can also be configured as additional digital inputs e.g. for sensors)
- 4 parameter sets which can be switched online
- Process controller, PI controller
- Energy saving function "Automatic flux optimisation"



#### Optional

- AS interface on board
- Field bus
- I/O Modules
- System plug connectors (e.g. Harting HAN 10E)
- Variants for ATEX Zone 22 - 3D
- Various control options (switches, potentiometers or ParameterBoxes)

## Energy-saving function



- Automatic flux optimisation for pump/fan applications
- Large energy savings
- Simple setting via parameters

## Mains

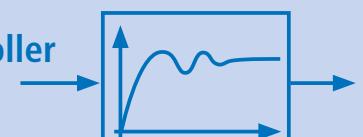


## EMC - Filter Class C1 (B)

- All 230V/400V devices have an integrated mains filter.
- Also ideal for applications in a domestic environment, due to compliance with Class C1 (for motor-mounting), or Class C2, (for wall mounting with motor cable up to 5m long)
- Suitable for personal protection due to low leakage current (< 16 mA) for operation with universal current FI circuit breakers

## Process controller

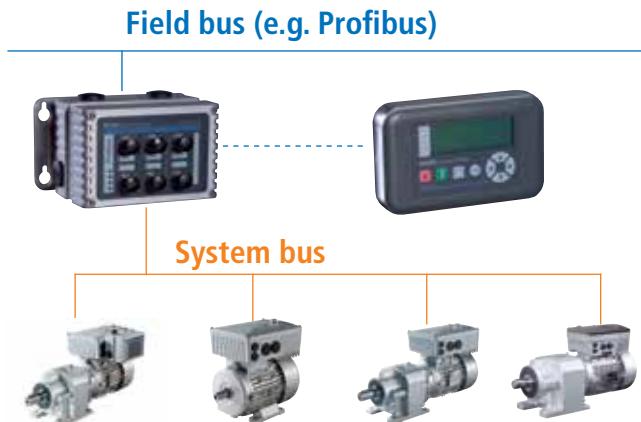
## PI controller



- All SK 180E devices feature 2 integrated analogue inputs.
- P and I component can be set separately
- High precision regulation

# Communication and diagnosis via the system bus

## Tunneling of parameter data via the system bus



NORD bus technology modules make a significant contribution to the construction of economical and user-friendly drive combinations. These can act as gateways between the field bus level and the NORD system bus, so that up to 4 frequency inverters can be controlled by a single bus module. Tunneling of parameter data enables access to all of the data records of the frequency inverters. If not all of the frequency inverters need to be accessed separately, considerably more devices can be controlled in broadcast mode.

## NORD CON software

NORD CON is the free operating software for controlling, parameterisation and diagnostics of all NORD frequency inverters.

### Remote control

A virtual control unit, analogous to a SimpleBox (optional control and parameterisation unit), enables the display of operating values, parameterisation and the control of a connected frequency inverter.

### Parameterisation

A convenient overview enables the user to adjust each available parameter. With an appropriate printing option, parameter lists are generated in printed form, either completely or only with the amended values. The finished data sets can be saved on a PC/laptop and archived for future use.

### Diagnosis

The NORD CON oscilloscope function is an extremely useful instrument for the optimum adjustment of drive systems. By means of line graphs, all drive characteristics (current, torque, etc.) can be recorded and analysed. On the basis of the results, fine tuning of the ideal parameter settings of the relevant drive unit is possible.



# Variable configuration



## Control units

Convenient handheld boxes allow for local operation of the device. The ParameterBox allows you to store 5 data sets.



## Customer units

Application-specific interfaces in the inverter enable communication via field bus systems (e.g. Profibus DP) or can be used to extend the digital and analog inputs and outputs.



## Technology Units

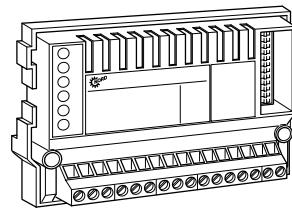
Robust units supplement the devices with field bus interfaces (e.g. Profibus DP), which are available with or without M12 sockets for connecting sensors or actuators in the field. Technology units can be fitted on the device or remotely (wall mount).



## PotiAdapter

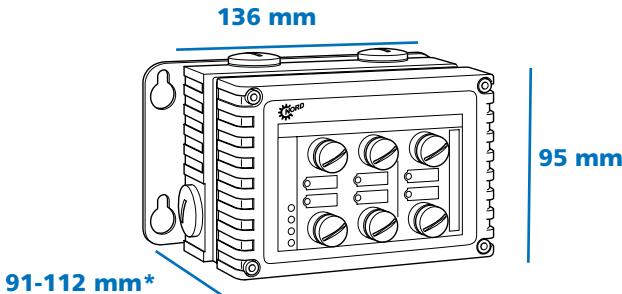
For direct control of the device, a convenient switch (L-O-R) and potentiometer unit can be installed with the PotiAdapter. This is a very practical solution for pumps.





# Customer units

Name	Description	Protocol Data	Inputs /Outputs	Order number
SK CU4-PBR	Internal bus interface PROFIBUS DP	DPV 0 and DPV 1 Max. 12 MBit/s	2x digital inputs	275 271 100
SK CU4-CAO	Internal bus interface CANopen	DS 301 and DS 402 Max. 1 MBit/s	2x digital inputs	275 271 001
SK CU4-DEV	Internal bus interface DeviceNet	AC-Drive Max. 500 kBit/s	2x digital inputs	275 710 002
SK CU4-ECT	Internal bus interface EtherCAT	CoE Max. 100 MBit/s	2x digital inputs	275 271 017
SK CU4-MBR	Internal interface for the control of an electromechanical brake		1x digital input (to control the brake) 1x digital output (feedback)	275 271 010
SK CU4-IOE	Internal IO extension for additional sensor and actuator signals		2x digital inputs 2x analog inputs 1x analog output	275 271 006
SK CU4-REL	Internal extension for converting digital signals to relay switchover contacts and bipolar setpoints to unipolar setpoints		2x analog inputs (-10V ...+10V) 2x relay outputs (changeover)	275 271 011

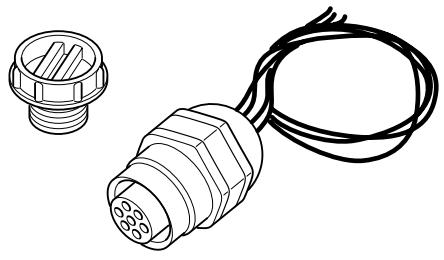


# Technology Units

Name	Description	Protocol Data	Inputs /Outputs	Order number
SK TU4-PBR SK TU4-PBR-C	Bus interface PROFIBUS DP	DPV 0 and DPV 1 Max. 12 MBit/s	4x digital inputs, 2x digital outputs	275 281 100 (IP55) 275 281 150 (IP66)
SK TU4-PBR-M12 SK TU4-PBR-M12-C	PROFIBUS DP interface with M12 connector for sensors and actuators	DPV 0 and DPV 1 Max. 12 MBit/s	4x digital inputs, 2x digital outputs	275 281 200 (IP55) 275 281 250 (IP66)
SK TU4-CAO SK TU4-CAO-C	Bus interface CANopen	DS 301 and DS 402 Max. 1 MBit/s	4x digital inputs, 2x digital outputs	275 281 101 (IP55) 275 281 151 (IP66)
SK TU4-CAO-M12 SK TU4-CAO-M12-C	CANopen interface with M12 plug connector for sensors and actuators	DS 301 and DS 402 Max. 1 MBit/s	4x digital inputs, 2x digital outputs	275 281 201 (IP55) 275 281 251 (IP66)
SK TU4-DEV SK TU4-DEV-C	Bus interface DeviceNet	AC-Drive Max. 500 kBit/s	4x digital inputs, 2x digital outputs	275 281 102 (IP55) 275 281 152 (IP66)
SK TU4-DEV-M12 SK TU4-DEV-M12-C	DeviceNet bus interface with M12 plug connector for sensors and actuators	AC-Drive Max. 500 kBit/s	4x digital inputs, 2x digital outputs	275 281 202 (IP55) 275 281 252 (IP66)
SK TU4-ECT SK TU4-ECT-C	EtherCat bus interface with M12 plug connectors for bus input/output	CoE Max. 100 MBit/s	8x digital inputs, 2x digital outputs	275 281 117 (IP55) 275 281 167 (IP66)
SK TU4-PNT SK TU4-PNT-C	PROFINET bus interface with RJ45 connector according to AIDA specification	PROFINET IO Conformance Class B Max. 100 MBit/s	8x digital inputs, 2x digital outputs	275 281 115 (IP55) 275 281 165 (IP66)
SK TU4-IOE SK TU4-IOE-C	Technology unit for additional sensor and actuator signals		4x digital inputs 2x digital outputs 4x analog inputs 2x analog outputs	275 281 106 (IP55) 275 281 156 (IP66)
SK TU4-IOE-M12 SK TU4-IOE-M12-C	Technology unit for additional sensor and actuator signals with external M12 plug connectors.		4x digital inputs 2x digital outputs 4x analog inputs 2x analog outputs	275 281 206 (IP55) 275 281 256 (IP66)
SK TI4-TU-BUS SK TI4-TU-BUS-C	<b>Connection units required for all BUS technology units</b>			275 280 000 (IP55) 275 280 500 (IP66)
SK-TIE4-WMK-TU	Wall-mounting kit for technology units			275 274 002 (IP66)

**\*91 mm**

without wall-mounting plate and  
without M12 screw connector



# System connectors

	Name	Description	Order number
Power	SK TIE4-HAN-Q5	Power in/out (HANQ5)	275 274 110
Other versions available on request			
Bus system	SK TIE4-M12-AS1	AS interface (M12)	275 274 502
	SK TIE4-M12-ASI-AUX	AS interface (AUX, M12)	275 274 513
	SK TIE4-M12-CAO	CANopen (M12)	275 274 501
	SK TIE4-M12-PBR	Profibus (M12)	275 274 500
	SK TIE4-M12-SYSM	System bus (M12) master	275 274 505
	SK TIE4-M12-SYSS	System bus (M12) slave	275 274 506
Control signals	SK TIE4-M12-ANA	Analog value (M12)	275 274 508
	SK TIE4-M12-INI	Initiator (M12)	275 274 503
	SK TIE4-M12-POW	24 V supply (M12)	275 274 407
	SK TIE4-M12-M16	Extension from M12 to M16	275 274 510



### Flexibility through plug connectors

The screw connections on the respective adapter unit can be fitted with system connectors for power, motor output, control and bus signals.

### Optional slots for the SK TI4-TU

4x M16 screw connection

2x M20 screw connection



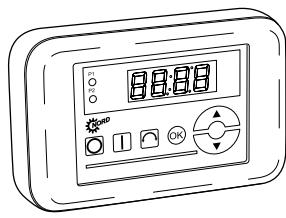
### Optional slots for the SK 180E

The following optional slots are available on the left and right of the housing:

2x M25 screw connection (A/B)

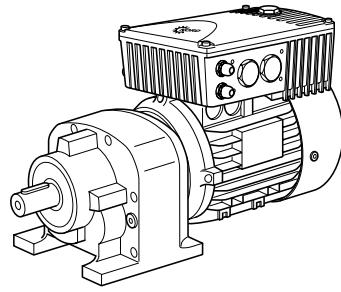
2x M16 screw connection





## Control units

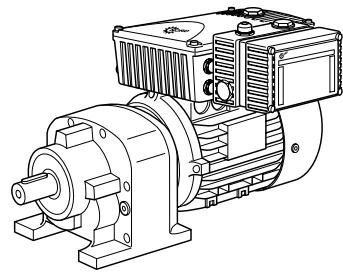
Name	Description	Equipment	Order number
SK CU4-POT	Module for mounting on the frequency inverter, with L-0-R switch and potentiometer	Switch L-0-R	275 271 207 (IP66)
SK POT1-1	External PotentiometerBox with L-0-R switch and potentiometer	Switch L-0-R	278 910 120 (IP66)
SK CSX-3H SK CSX - 3E	SimpleBox: Operating panel for easy and fast operation	4-digit, 7-segment display	275 281 013 Handheld (IP54) 275 281 413 Control cabinet (IP54)
SK PAR-3H SK PAR - 3E	ParameterBox: Convenient control panel for text-controlled commissioning, parameterisation and control of the device. 5 data sets can be stored. Direct connection to the PC via USB possible (Handheld only)	Multi-language plain text display	275 281 014 Handheld (IP54) 275 281 414 Control cabinet (IP54)
SK SSX - 3A	For direct local operation (e.g. speed display on the machine), this setpoint box can be installed permanently. As an option, a simple adjustment of the setpoint or a switchover to a SimpleBox mode also allowing parameter set-up is possible.	4-digit, 7-segment display	275281513 (IP54)
SK TU4-MSW SK TU4-MSW-C	Maintenance switch, lockable	Power switch	275 281 123 (IP55) 275 281 173 (IP66)
SK TI4-TU-MSW SK TI4-TU-MSW-C	<b>Connection unit required for the maintenance switch technology unit</b>		275 280 200 (IP55) 275 280 700 (IP66)
SK-TIE4-WMK-TU	Wall-mounting kit for technology units		275 274 002 (IP66)



# Technical data

Function	Specification		
Power / Voltage	1~ 115 V 0.25 – 0.75 kW (no mains filter) 1/3~ 230 V 0.25 – 1.1 kW 3~ 400 V 0.25 – 2.2 kW		
Standard	<ul style="list-style-type: none"> <li>• Integrated mains filter</li> <li>Class C1 (residential environment) for motor mounting of the frequency inverter,</li> <li>Class C2 (industrial areas) for wall-mounting with motor cable length up to 5m</li> <li>• Low leakage current (&lt; 16 mA)</li> <li>• Adaptation for operation on IT network by means of jumpers (change of leakage current possible)</li> <li>• Consistent and user-friendly parameter structure</li> <li>• Automatic motor parameter identification</li> </ul>		
Output frequency	0.0 ... 400.0 Hz		
Typical overload capacity	200% for 3.5 s 150% for 60 s		
Protective measures against	Overtemperature, short circuit, earth fault, over/under-voltage, overload		
Regulation and control	Sensorless current vector control (ISD), linear V/f characteristic curve, automatic flux optimisation (energy-saving function)		
Motor temperature monitoring	Temperature sensor (PTC), temperature monitor (bimetal), temperature sensor (KTY84) $I^2t$ motor		
Standard interfaces	RS 485 (USS), RS 232 (commissioning and diagnosis), system bus		
Ambient temperature	-25 ... +40°C (S1- 100 % ED), -25°C ... +50°C (S3 - 75 % ED 15 min)*		
Version	Motor mounted, wall mounted		
Protection class	IP66 measures: IP55 optional IP66 <ul style="list-style-type: none"> <li>• Powder coated housing</li> <li>• Low pressure test</li> <li>• Coated PCBs</li> <li>• Membrane valve</li> </ul>		

\* Note the technical data for wall mounting!



## Technical data

	Inverter ID SK 180E...	Mains voltage	Output voltage	Nominal motor power		Typical input current	
				[kW]	[hp]	1~rms[A]	3~rms[A]
1~/3~ 1 ~ 115 V	-250-112-O (-C)	1 ~ 110...120 V -/+10% 47...63 Hz	3 ~ AC 0 V to twice the mains voltage	0.25	1/3	7.6	
	-370-112-O (-C)			0.37	1/2	11.0	
	-550-112-O (-C)			0.55	3/4	14.3	
	-750-112-O (-C)			0.75	1	18.0	
1~/3~ 200 ... 240 V	-250-323-B (-C)	3 ~ 200 ... 240 V, -/+ 10% 47 ... 63 Hz	3 ~ AC 0 V up to mains voltage	0.25	1/3	4.5	3.2
	-370-323-B (-C)			0.37	1/2	5.7	3.8
	-550-323-B (-C)			0.55	3/4	7.2	4.8
	-750-323-B (-C)			0.75	1	10.6	7.0
	-111-323-B (-C)			1.1	1 1/2	14	9.2
3 ~ 400 V	-250-340-B (-C)	3 ~ 380 ... 480V, -20% / +10%, 47 ... 63 Hz	3 ~ AC 0 V up to mains voltage	0.25	1/3		2.0
	-370-340-B (-C)			0.37	1/2		2.3
	-550-340-B (-C)			0.55	3/4		2.6
	-750-340-B (-C)			0.75	1		3.2
	-111-340-B (-C)			1.1	1 1/2		4.1
	-151-340-B (-C)			1.5	2		6.0
	-221-340-B (-C)			2.2	3		7.0



Nominal output voltage rms[A]	Dimensions LxWxH[mm]
1.7	221 x 154 x approx.110
2.1	221 x 154 x approx.110
3.0	221 x 154 x approx.110
4.0	221 x 154 x approx.110
1.7	221 x 154 x approx.110
2.2	221 x 154 x approx.110
3.0	221 x 154 x approx.110
4.0	255 x 165 x approx.110
5.5	255 x 165 x approx.110
1.2	221 x 154 x approx.110
1.5	221 x 154 x approx.110
1.7	221 x 154 x approx.110
2.3	221 x 154 x approx.110
3.1	221 x 154 x approx.110
4.0	255 x 165 x approx.110
5.5	255 x 165 x approx.110





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