8200 motec   0.25 ... 7.5 kW

starttec   0.25 ... 4.0 kW

Lenze Global Drive – Distributed drive solutions

Lenze

No matter which drive solution you imagine, we make your dreams come true.

True to our slogan (one stop shopping) we offer you a complete program of electronic and mechanical drive systems which is distinguished by reliability and efficiency.

The scope of our program includes frequency inverters, speed controllers, servo controllers, variable-speed drives, gearboxes and motors, as well as clutches and brakes.
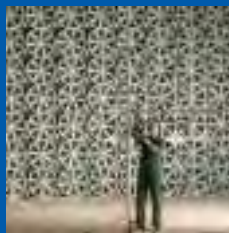
Many well-known companies use Lenze products in various applications.

8200 motec/starttec | Distributed drive solutions

Basic device and accessories

A selection guide to help you quickly find the right solution for your drive task can be found in "Product information – **Quick selection guide**" on page 1-11

Mains

Line protection fuses
or
Automatic circuit-breakers
>> Page 4-4 et seqq.

Mains chokes
>> Page 4-7 et seqq.

Mains loops
>> Page 4-19 et seqq.

Switch/potentiometer unit
>> Page 4-23 et seqq.

Automation components

Communication modules
keypad or RS232
>> Page 3-6 et seqq.

frequency inverters
8200 motec
standard model
0.25 … 7.5 kW
>> Page 2-2 et seqq.

motor starters
starttec
standard model
0.25 … 4.0 kW
>> Page 2-20 et seqq.

IP65 enclosure

Brake rectifiers
>> Page 4-12 et seqq.

Function modules,
e.g. Standard I/O
>> Page 3-12 et seqq.

Brake resistors, high
enclosure protection
>> Page 4-8 et seqq.

Drive PLC

>> Page 3-30
et seqq.

Extension
boards for
Drive PLC
>> Page
3-37
et seqq.

GDC para-
meterisation
software
>> Page 3-10
et seqq.

Motor

I/O system
>> Page
3-39
et seqq.

Operator/display
units
>> Page
3-38 et seqq.

Fit for any drive task, even in distributed applications. Whether you need to solve simple drive tasks or place high demands on your drive's functionality, the 8200 motec range of robust frequency inverters and the starttec motor starter with tailor-made accessories will always provide you with drive components tailored exactly to meet the requirements of your applications. The option to purchase these components ready for connection and pre-assembled on a Lenze geared motor or a Lenze three-phase AC motor reduces the time and money you will have to spend on project planning and assembly.

We can provide a complete and universally applicable system able to meet all your operational, diagnostics and communication needs in a user-friendly way. Developed specifically for use in day-to-day operations, our range of products for distributed drive solutions is part of our field-proven system comprising expert advice, training, support, service and much more — features that really pay off.

Lenze is the competent partner for your application. Lenze is not only a supplier for single components but also offers solutions for complete drive systems including planning, execution and commissioning.

Furthermore, a worldwide service and distribution network allows a qualified customer advisory service on the job and a fast and extensive after sales service.

Our quality assurance system for design, production, sales and service is certified according to DIN ISO 9001 : 2000.
Our customers set the standards for measuring the quality of our products.
Our task is to meet your requirements, since customer orientation is a Lenze principle demanding the best quality.

See for yourself.

A worldwide service –
Our team of experts provides reliable and
professional assisteance.
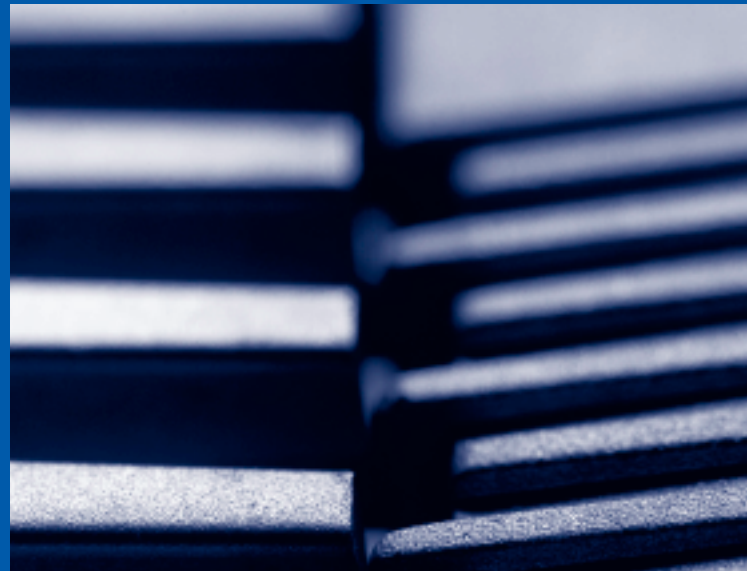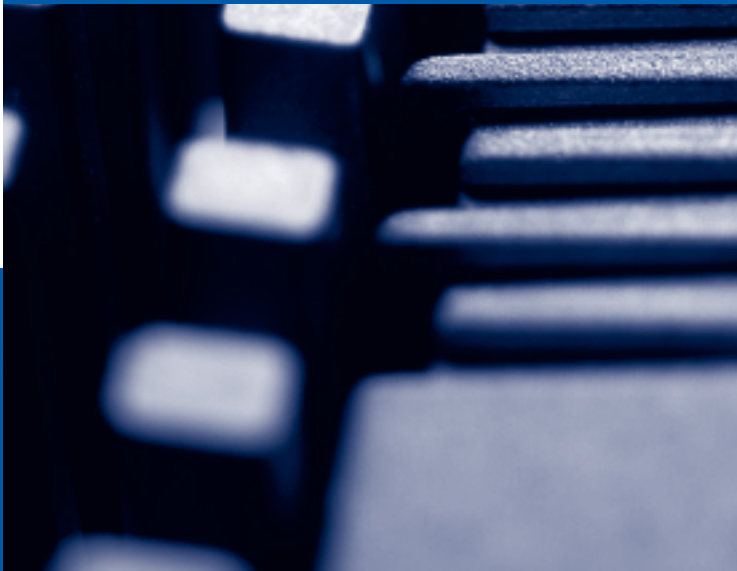
Contents | 8200 motec
starttec

Product information | 8200 motec starttec

1

1

Abbreviations used in this catalog

U_{mains}	[V]	Mains voltage
U_{DC}	[V]	DC supply voltage
U_M	[V]	Output voltage
I_{mains}	[A]	Mains current
I_r	[A]	Rated output current
I_{max}	[A]	Maximum output current
I_{PE}	[mA]	Discharge current
P_r	[kW]	Rated motor power
P_V	[W]	Inverter power loss
P_{DC}	[kW]	Power in addition to that which can be drawn from the DC bus in power-adaptive operation
S_r	[kVA]	Apparent output power of inverter
M_r	[Nm]	Rated torque
f_{max}	[Hz]	Maximum frequency
L	[mH]	Inductance
R	[Ω]	Resistance

AC	Alternating current/voltage
DC	Direct current/voltage
DIN	Deutsches Institut für Normung
EMC	Electromagnetic compatibility
EN	European standard
IEC	International Electrotechnical Commission
IP	International Protection Code
NEMA	National Electrical Manufacturers Association
VDE	Verband deutscher Elektrotechniker
CE	Communauté Européene
UL	Underwriters Laboratories

1

8200 motec type key

`E 8 2 M V x x x _ x B 0 0 1`

E	Electronic product
8 2	8200 frequency inverter
M	**Design** High IP rating, suitable for mounting on the wall or directly on the motor
V	**Version** Vector-controlled inverter
7 5 1 **7 5 2**	**Power rating** e.g. 750 W e.g. 7,500 W
2 **4**	**Mains voltage** 230 V 400/500 V
B	Controller generation
0 0 1	Coated version

starttec type key

`E 7 1 M M x x x _ x A 0 x 0`

E	Electronic product
7 1	
M	**Design** High IP rating, suitable for mounting on the wall or directly on the motor
M	**Version** Motor starter
4 0 2	**Power rating** 4,000 W
F **_**	**Communication** Integrated AS-i No built-in BUS
2 **4**	**Brake assignment** Brake voltage 205 V Brake voltage 180 V
A	Controller generation
0 1 0 **0 2 0**	**Version/Type** Standalone drive 2-motor mode/Standalone drive with change of direction of rotation

We want to be sure that you receive the correct products in good time. In order to help us to do this, please make sure you provide the following information:

• Your address and ordering data

• Our order numbers/designations for each catalog product

• Your delivery data, i.e. delivery date and delivery address

How to order

You will find the order numbers/designations you require in this chapter (Quick selection guide) or on the relevant page in the product description.

• Make a photocopy of the fax order form which you will find on the last page of this catalog.

• Enter the order numbers/designations in the appropriate columns.

• Enter your customer details.

• Send the fax order form to your Lenze sales office.

You don't know where your Lenze sales office is?
No problem!
You will find all the information you need on the Internet at
www.Lenze.com.
We would be delighted to assist you.

Delivery

• All products are individually packed and checked prior to delivery.

• Orders are subject to the general terms of sale and delivery of Lenze Drive Systems GmbH:

  – Terms of delivery: Ex works according to the delivery method specified, excluding packaging.

1
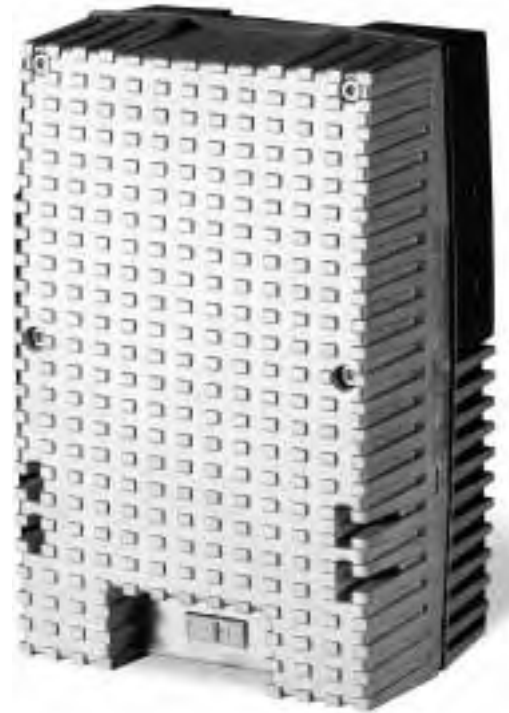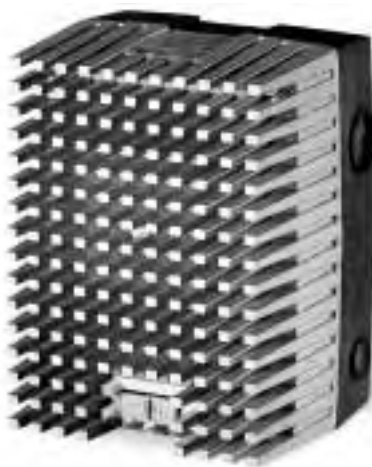
This catalog introduces you to Lenze's extensive range of 8200 motec frequency inverters and starttec motor starters for solving distributed drive tasks.

In addition to the standard controllers, numerous application-specific accessories are also available to meet your exact individual distributed drive system requirements.

Lenze can also provide components for automating your system, such as the distributed Drive PLC control unit with expansion options, programmable displays for process visualisation and much more - true system-based solutions.

To help you to select the right components for your drive system, we have put together
– a sequence diagram for project planning
– a basic configuration of inverters/motor starters to speed up the selection process

You will find these in the **selection guide on the following pages.**

This controller configuration can be used to solve most common applications. If you require a different configuration, simply refer to the appropriate chapter, select the product you require and enter the type designation in the fax order form.

The general table of contents will help you to find specific items.

Have fun making your selections!

The next section, "Distributed drive solutions with 8200 motec and starttec - Robust by design" contains information about the essential features and extensive options for solving distributed drive tasks.
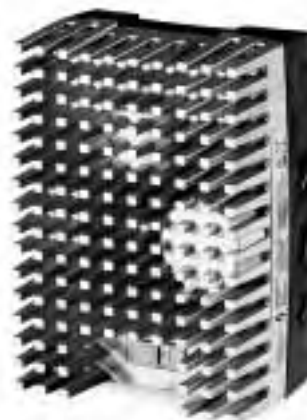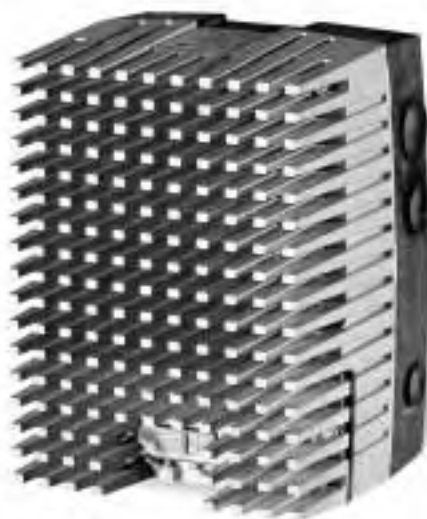
Current drive technology requirements in machine and system production can be attributed to the following key issues:

• Simple drive concepts minimise project planning
• Reduction in assembly times due to ease of handling, installation and assembly
• High system availability due to a reduction in maintenance requirements and an increase in the speed at which components can be replaced
• Reusability due to complete systems based on modular designs
• Adaptability due to the flexible use of drive components

Distributed drive solutions are ideal for these requirements. Lenze can provide you with the necessary components for consistent implementation.

The features and functions required to implement distributed drive solutions efficiently will be described in more detail later in this document.

Power range
8200 motec frequency inverters for single and three-phase mains connection
Power ratings   230 V, 0.25 - 0.37 kW
                   400/500 V, 0.55 - 7.5 kW
starttec motor starter for three-phase mains connection
Power rating   100-500 V, 0.25 - 4.0 kW

How this helps you:
– Consistent and universal implementation of distributed drive solutions throughout a wide power range
– Suitability for use all over the world due to an input voltage range of up to 500 V (+10%) and certification to international standards

Universal
The 8200 motec provides the same range of functions as the 8200 vector frequency inverter (IP20 protection). Many features, such as parameter settings, operation, diagnostics and fieldbus interface are the same, even on the starttec motor starter.

How this helps you:
– Any combination of central and distributed drive components are available for each system concept
– Reduction in the time and money spent on project planning and training

Adaptable
The modular structure enables the 8200 motec and starttec to be optimised for your application..

Whether you simply wish to start up motors or change speeds, run a "standalone" inverter with setpoint selection via potentiometer or as a networked inverter with speed feedback in master/slave mode, the range of functions can be adapted to the application on the basis of the features required.

How this helps you:
– Cost-effective drive solutions due to ideally matched components

Flexible
Both the 8200 motec and the starttec support most common fieldbus systems.

How this helps you:
- The ideal BUS system (CAN, PROFIBUS-DP, INTERBUS, AS-Interface) for every requirement and every application

1. Distributed standalone drives

Open-loop/closed-loop control with digital and analog inputs and outputs

PLC or host

Power supply

2. Distributed drive systems

PLC or host

BUS

Power supply
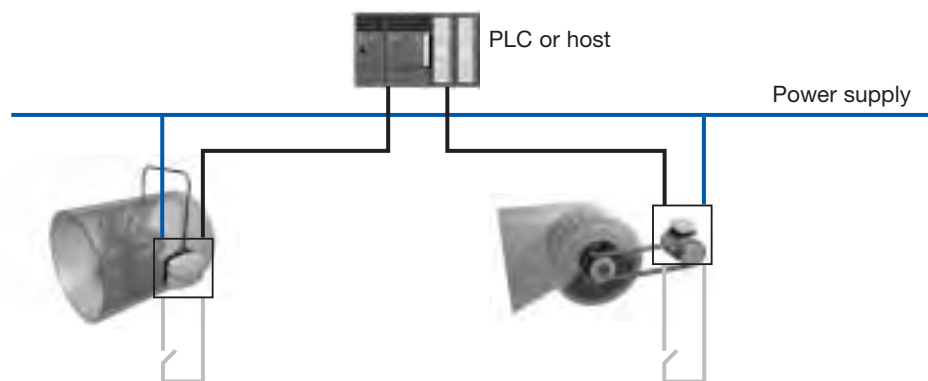
2.1 Networking via fieldbus, parameter settings and diagnostics also locally via local controls and PC
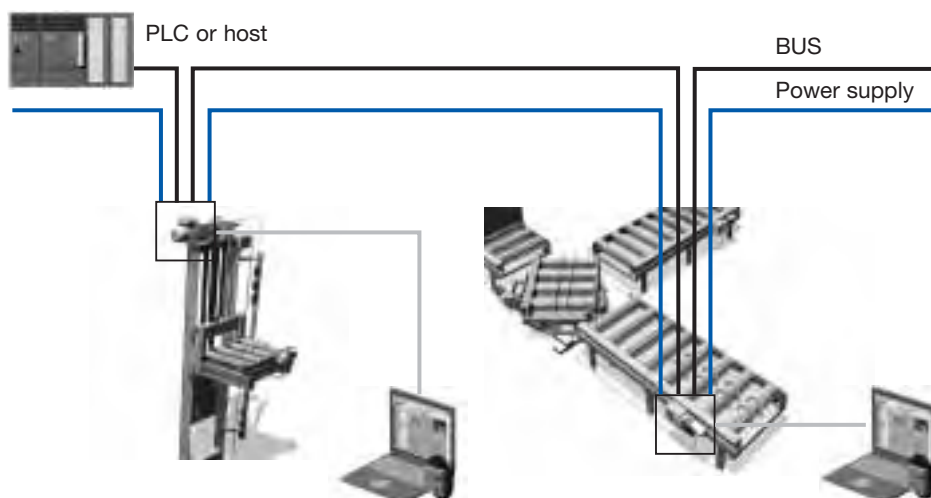
2.2 Networking via fieldbus and open-loop/closed-loop control with digital and analog inputs and outputs

PLC or host

BUS

Power supply

1
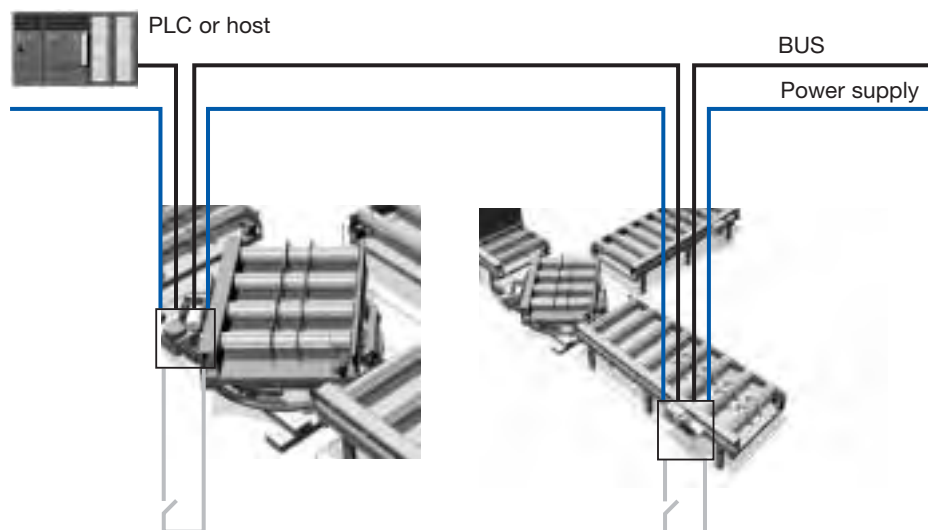
Installation and assembly

The robust design and high degree of protection (up to IP65) of the drive components means that they can be installed directly on the process in harsh environments without the need for additional protection.
The loop-trough option enables a power/energy bus to be set up in addition to the fieldbus.

Lenze can also supply the distributed 8200 motec and starttec drive components as compact drives.
The inverters/motor starters are pre-assembled ready for connection to Lenze geared motors or Lenze three-phase AC motors (see the G-motion motec and G-motion const catalogs).

How this helps you:
– Installation is quicker and easier
– Shielded motor cable minimised

You can mount the components in any mounting position directly on a Lenze geared motor/three-phase AC motor or alternatively on the wall, depending on the available assembly options.
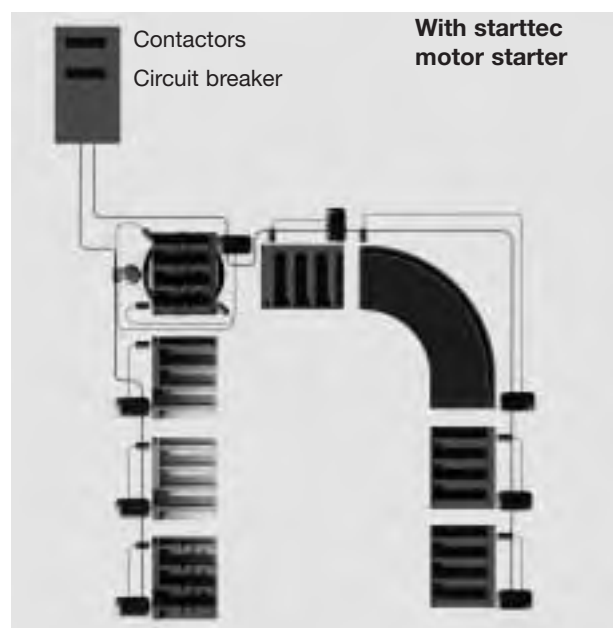
How this helps you:
- Optimum access for operation and diagnostics at all times

Comparison of installation effort
using the example of a materials handling application

Solved with conventional and central drive components/with the distributed starttec motor starter.

Contactors
Motor starter
Conventional

Contactors
Circuit breaker
With starttec motor starter

Cable lengths

Motor connection

Sensors

Mains supply

Sensors

Conventional solution with control cabinet components

Distributed solution with starttec motor starter

Sensors   Motor cable, mains supply
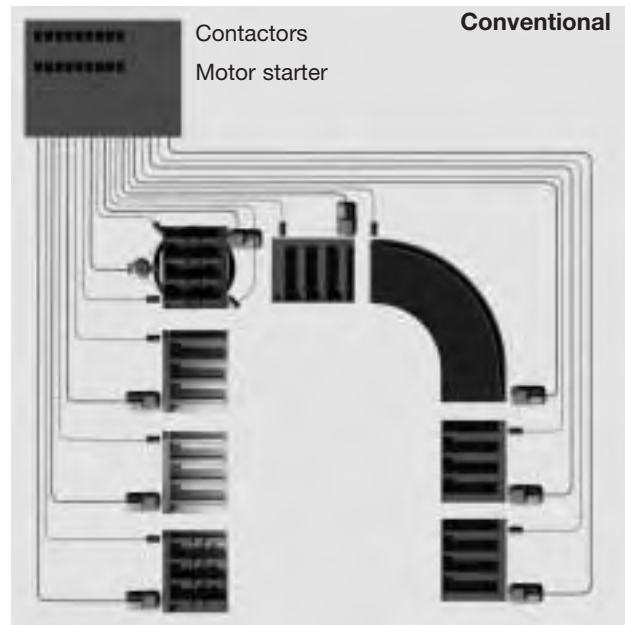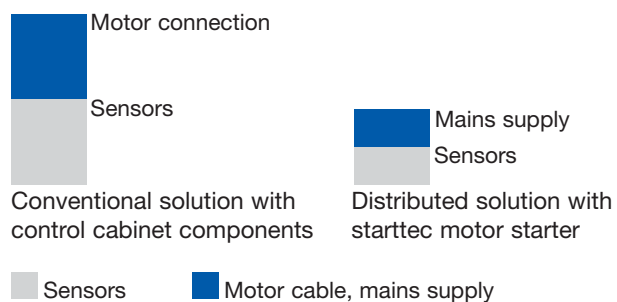
Operation and maintenance

All cables (mains and control cables) are housed in the carrier housing (terminal cradle) of the 8200 motec. Should maintenance be required, loosen the 4 screws to remove the inverter and then reconnect it to the carrier housing once the operation has been completed.
Status LEDs are provided for local diagnostics. Alternatively, all the necessary information can be accessed easily via a keypad or PC interface.

How this helps you:
– Reduction in machine downtimes as components can be
  replaced quickly and problems can be diagnosed locally

The Keypad or Keypad XT (8200 motec) is used to display the operating parameters. 8 keys and a text display provide quick and easy access to the inverter parameters via the transparent menu structure. The Keypad XT is also used for the purposes of status display and error diagnostics. In addition, its built-in memory can be used to transfer parameters to other drive components.

How this helps you:
– Easy to operate

The Global Drive Control (GDC) parameter setting software features a transparent menu structure and assisted commissioning.

How this helps you:
– Quick and uncomplicated parameter settings and
  diagnostics

1
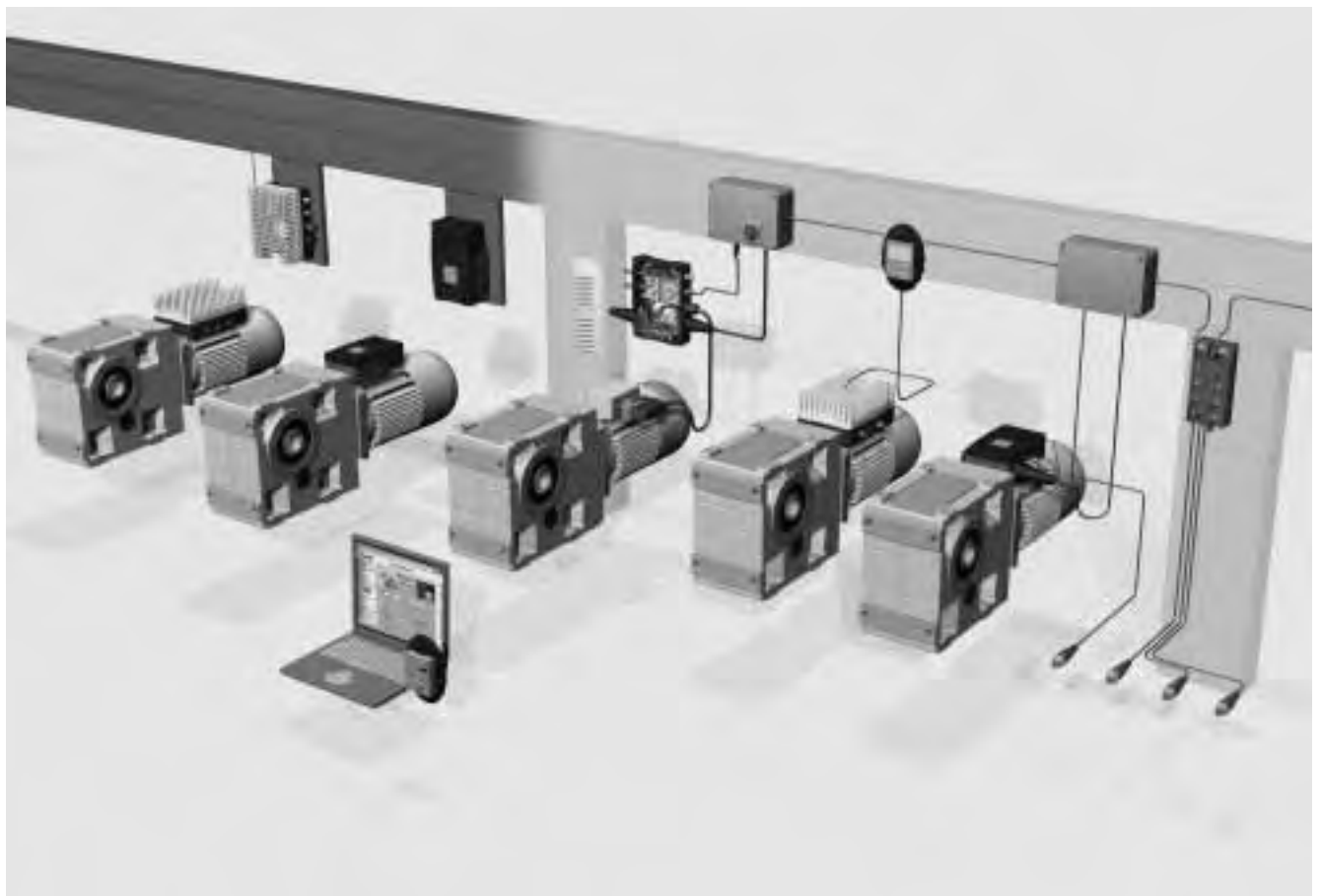
• Is Start/Stop sufficient or does the speed have to be controlled?
• What are the power and voltage requirements?
• How are the drive parameters to be set?

To help you set the parameters on your distributed drive system, we have put together a sequence diagram to assist you in making your selections. Simply answer a few questions to locate the ideal Lenze components for your requirements.

1

	starttec	motec
Is speed control required?	No	Yes
Mains voltage/Power range	3ph 100...500 V 0.25...4.0 kW >> page 2-20 ff.	1ph 230 V 0.25...0.37 kW 3ph 400/500 V 0.55...7.5 kW >> page 2-2 ff.
Mounted as a compact drive on Lenze motor/geared motor?	See catalog G-motion const	See catalog G-motion motec
Functions	– Standalone drive or 2-motor mode/ change of direction of rotation – Brake voltage 180/205 V – Integrated AS-i? >> page 2-20 ff. Integrated I/O	

Operation/Open-loop control	I/O	Keypad/RS232	fieldbus	I/O	Keypad/RS232	fieldbus
Open-loop control	x	x	x	x	x	x
Parameter settings	-	x	x	-	x	x

I/O function module (for motec) >> page 3-12 ff.	Diagnosis terminal with Keypad >> page 3-6 ff.	Fieldbus function module >> page 3-18 ff.

Mains connection Looping-through connection	Possible without additional accessories	Select wiring terminals >> page 4-18 ff.
Components for mains connection	Circuit breaker Automatic circuit breakers >> page 4-6 ff	Circuit breaker Mains choke automatic circuit breaker >> page 4-6 ff
Braking Braking with short ramps and high moment of inertia?		Select brake resistor >> page 4-8 ff.
Control of a spring-operated brake	Integrated brake control >> page 4-15 ff.	Brake control >> page 4-12 ff.
Control of a second spring-operated brake	Brake switch >> page 4-16 ff.	

1

Quick selection guide

The controller configuration which features in the quick selection guide is suitable for most common applications. Information about other configurations can be found in the corresponding chapters.

8200 motec

Operation at rated power (normal operation)
In normal operation, the inverter is set for the rated power of the motor.
Note: During operation at increased rated power, a larger motor may be used under certain circumstances at the same inverter power as in normal operation, e.g. in pump and fan applications. Please use the quick selection guide on page 1-14 to make your selections for "Operation at increased rated power".

Supply voltage	
230 V, 1-phase, 0.25 to 0.37 kW	page 1-12 ff.
400 V / 500 V, 3-phase, 0.55 to 7.5 kW	page 1-13 ff.

Operation at increased rated power
During operation at increased rated power, a larger motor may be used under certain circumstances at the same inverter power as in normal operation. The inverter may be operated at increased rated power under the following conditions:

– At the specified mains voltage ranges
– 2 kHz or 4 kHz switching frequency only
– Only with approved mains chokes, fuses and cable cross-sections

During operation at rated power (normal operation), the inverter is set for the rated power of the motor.
Please use the quick selection guide on page 1-12 to make your selections for "Normal operation".

Supply voltage	
230 V, 1-phase, 0.37 to 0.55 kW	page 1-14 ff.
400 V, 3-phase, 0.75 to 7.5 kW	page 1-15 ff.

starttec

Standalone drive 100 V to 500 V, 3-phase; 0.25 to 4.0 kW	page 1-16 ff.
2-motor mode/Standalone drive with change of direction of rotation 100 V to 500 V, 3-phase; 0.25 to 4.0 kW	page 1-16 ff.

1

230 V, 1-phase, normal operation				
	Motor power [kW]	**0.25**	**0.37**	**Technical information**
Required	Frequency inverter (Standard controller)	E82MV251_2B	E82MV371_2B	Chapter 2
	Open-loop control via digital/analog inputs/outputs (Standard I/O function module) [1]	E82ZAFSC001		Chapter 3
Optional	Operation and diagnostics (Keypad XT control module) [2]	E82ZBBXC		Chapter 3
	Looping-through connection	E82ZWKN2		Chapter 4

[1] Other I/O function modules and modules for fieldbus networking in chapter 3

[2] Other components for operation and diagnostics in chapter 3

400 V / 500 V, 3-phase, normal operation						
	Motor power [kW]	0.55	0.75	1.5	2.2	**Technical information**
Required	Frequency inverter (Standard controller)	E82MV551_4B	E82MV751_4B	E82MV152_4B	E82MV222_4B	Chapter 2
	Open-loop control via digital/analog inputs/outputs (Standard I/O function module) [1]	E82ZAFSC001				Chapter 3
Optional	Operation and diagnostics (Keypad XT control module) [2]	E82ZBBXC				Chapter 3
	Looping-through connection	E82ZWKN4				Chapter 4

400 V / 500 V, 3-phase, normal operation						
	Motor power [kW]	3.0	4.0	5.5	7.5	**Technical information**
Required	Frequency inverter (base controller)	E82MV302_4B	E82MV402_4B	E82MV552_4B	E82MV752_4B	Chapter 2
	Open-loop control via digital/analog inputs/outputs (Standard I/O PT function module) [1]	E82ZAFSC001				Chapter 3
Optional	Operation and diagnostics (Keypad XT control module) [2]	E82ZBBXC				Chapter 3
	Option board for wall mounting	E82ZMV				Chapter 4

[1] Other I/O function modules and modules for fieldbus networking in chapter 3

[2] Other components for operation and diagnostics in chapter 3

1

230 V, 1-phase, operation at increased rated power				
	Motor power [kW]	0.37	0.55	Technical information
Required	Frequency inverter (Standard controller)	E82MV251_2B	E82MV371_2B	Chapter 2
	Open-loop control via digital/analog inputs/outputs (Standard I/O function module) [1]	E82ZAFSC001		Chapter 3
Optional	Operation and diagnostics (Keypad XT control module) [2]	E82ZBBXC		Chapter 3
	Looping-through connection	E82ZWKN2		Chapter 4

[1] Other I/O function modules and modules for fieldbus networking in chapter 3

[2] Other components for operation and diagnostics in chapter 3

400 V, 3-phase, increased rated power

	Motor power [kW]	0.75	1.1	2.2	3.0	Technical information
Required	Frequency inverter (Standard controller)	E82MV551_4B	E82MV751_4B	E82MV152_4B	E82MV222_4B	Chapter 2
	Open-loop control via digital/analog inputs/outputs (Standard I/O function module [1])	E82ZAFSC001				Chapter 3
Optional	Operation and diagnostics (Keypad XT control module) [2]	E82ZBBXC				Chapter 3
	Looping-through connection	E82ZWKN4				Chapter 4

400 V, 3-phase, increased rated power

	Motor power [kW]	4	5.5	7.5	Technical information
Required	Frequency inverter (base controller)	E82MV302_4B	E82MV402_4B	E82MV552_4B	Chapter 2
	Open-loop control via digital/analog inputs/outputs (Standard I/O PT function module) [1]	E82ZAFSC001			Chapter 3
Optional	Operation and diagnostics (Keypad XT control module) [2]	E82ZBBXC			Chapter 3
	Option board for wall mounting	E82ZMV			Chapter 4

[1] Other I/O function modules and modules for fieldbus networking in chapter 3

[2] Other components for operation and diagnostics in chapter 3

1

100-500 V, 3-phase, standalone drive						
	Motor power [kW]	**0.25-4.0 kW**				**Technical information**
Required	Motor starter (Standard controller)	E71MM402_2A010	E71MM402_4A010	E71MM402F2A010	E71MM402F4A010	Chapter 2
	Brake voltage	205 V	180 V	205 V	180 V	
	Built-in AS-i [1]	No		Yes		
Optional	Operation and diagnostics (Keypad XT control module) [2]	E82ZBBXC				Chapter 3
	Function module bracket (always required in conjunction with function module)	E71ZJ001				Chapter 4

100-500 V, 3-phase, 2-motor mode/standalone drive with change of direction of rotation						
	Motor power [kW]	**0.25-4.0 kW**				**Technical information**
Required	Motor starter (Standard controller)	E71MM402_2A020	E71MM402_4A020	E71MM402F2A020	E71MM402F4A020	Chapter 2
	Brake voltage	205 V	180 V	205 V	180 V	
	Built-in AS-i [1]	No		Yes		
Optional	operation and diagnostics (Keypad XT control module) [2]	E82ZBBXC				Chapter 3
	Function module bracket (always required in conjunction with function module)	E71ZJ001				Chapter 4

[1] Other modules for fieldbus networking in chapter 3, function module bracket required, see above.

[2] Other components for operation and diagnostics in chapter 3

Standard controllers | 8200 motec
starttec

The concept of the 8200 motec frequency inverter is based on the modular system of complementary components for distributed drive systems. When used with a Lenze geared motor or Lenze three-phase AC motor, the inverter forms a high-performance electronic variable speed drive. These robust drives can be used for speed control in the most varied of industries and areas of application, including conveyor technology, HVAC engineering, automation, etc.

In addition to the features listed under the product information for distributed drive solutions, the 8200 motec frequency inverter is characterised by the following features:

Vector control
– 180% torque
– High speed control range – up to 1:50 without feedback
– Extremely smooth running
– Torque setting range up to 1:10
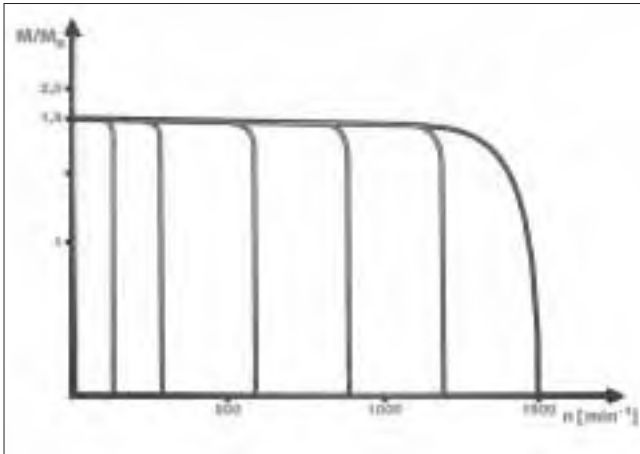
Versatile
Many different types of three-phase AC motors can be controlled:
– Three-phase asynchronous motors
– Three-phase reluctance motors
– Medium-frequency motors

It couldn't be easier to retrofit/expand systems
To operate the 8200 motec, no additional control voltage other than the mains supply is required. This means that systems which were previously uncontrolled can be retrofitted for process with relative ease.

Adaptable
The selectable form of the V/f characteristic enables the frequency inverter to be adapted to loads with constant or square-law torque.

Optimised performance
The performance of the frequency inverters can be optimised by operating them at increased rated power. This creates the following advantage:
– A high-performance motor can be used in continuous operation
Applications: e.g. pumps, air conditioning systems, etc.

Braking
You can use a brake rectifier (see Accessories) to supply power to and control an electromagnetic spring-operated brake directly from the 8200 motec.

Standard functions
- Flying restart with coasting motor
- Slip and mains voltage compensation
- PID controller
- Load loss/belt monitoring
- Smooth start/stop along S ramps
- DC braking
- Motor potentiometer
- Elimination of mechanical resonance
- Hand/remote switchover
- Up to 3/7 fixed frequencies per parameter set
- 4 freely parameterisable parameter sets which can be switched online
- Elapsed time meter

Protection functions
- Short-circuit-resistant, protected against earth faults during operation
- Configurable current limiting, warnings and error messages in the event of overcurrents
- Protected against overvoltages and undervoltages
- Warnings and error messages in the event of frequency inverter overtemperatures
- Input for PTC or thermal contact and I^2t monitoring for motor protection
- Motor phase failure detection
- Integrated brake transistor
- Integrated RFI filters to EN55011 Class A or B

Operation and control
- Keypad/Keypad XT with display in plain text and menu structure
- Copy function for transferring inverter settings
- Password protection
- Control and parameter setting software "Global Drive Control easy" (downloadable from the Internet)

Power range
0.25 kW...0.37 kW 230 V/240 V (+10%)
0.55 kW...7.5 kW 400 V/500 V (+10%)

Overload capacity
180% (rated torque for 60 seconds)

Control modes
- V/f linear
- V/f quadratic
- Vector control
- Sensorless torque control

Switching frequency 2, 4, 8, 16 kHz
Output frequency up to 650 Hz
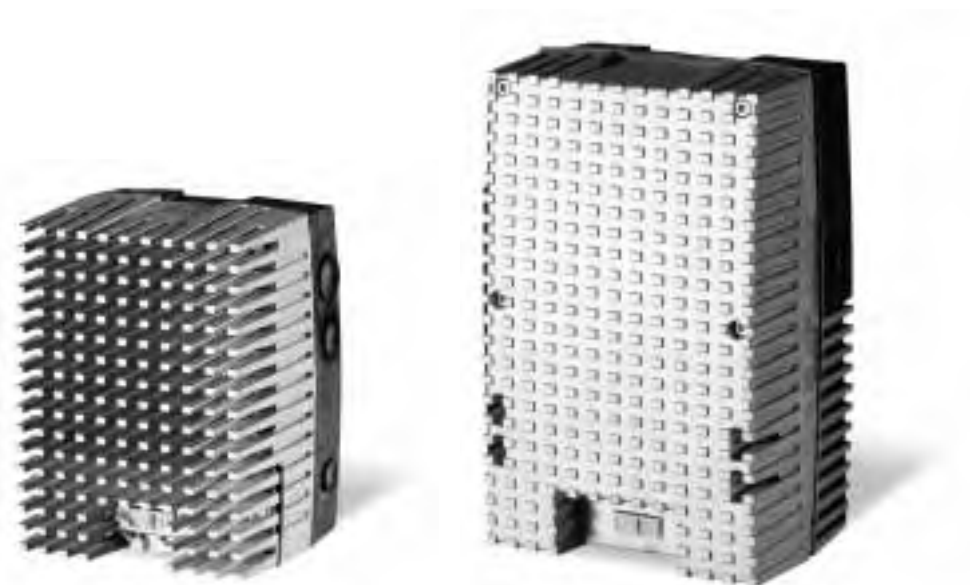
Fieldbus communication
- RS232 serial interfaces
- Bus interface to most common fieldbus systems (CAN, PROFIBUS-DP, INTERBUS, AS-Interface)

Input and output terminals
- Up to 2 analog inputs, bipolar as an option (0-10 V,-10 V...+10 V,0-20 mA,4-20 mA; 10-bit resolution)
- Up to 2 analog outputs (0-10 V,0-20 mA,4-20 mA; 10-bit resolution)
- Up to 6 potential-free digital inputs with switchable logic
- Up to 2 digital outputs and one frequency output 1 relay output (also for direct mains connection 240 V AC)
- Selection option for incremental encoder

Control
- Via digital I/O and/or
- Via fieldbuses

2

Standards and operating conditions

Conformity	CE	Low Voltage Directive (73/23/EEC)
Approvals	UL 508C	Underwriter Laboratories (File No. E132659) Power Conversion Equipment
Vibrational stability	Accelerational stability up to 2 g (Germanischer Lloyd, general conditions)	
Climatic conditions	Class 3K3 to EN 50178 (without condensation, average relative humidity 85%)	
Pollution degree	VDE 0110 Part 2, pollution degree 2	
Packaging (DIN 4180)	Dust packaging	
Permissible temperature ranges		
Transport	-25°C ... +70°C	
Storage	-25°C ... +60°C	
Operation	-20°C ... +60°C	At temperatures of +40°C, the rated output current should be derated by 2.5%/°C.
Permissible installation height	0 ... 4000 m above sea level	The rated output current should be derated by 5%/1000 m above 1000 m above sea level.
Mounting positions	All mounting positions and mounting orientations permitted	
Mounting space		
Above/below	≥100 mm	
To the side	≥100 mm	
DC bus connection	Not possible	

General electrical data

EMC	Complies with requirements to EN 61800-3/A11		
Noise emission	Mounting on the motor	Complies with requirements to limiting value classes A and B in accordance with EN 55011	
	Wall mounting	Complies with requirements to limiting value class A in accordance with EN 55011 (up to 10 m shielded motor cable) Complies with requirements to limiting value class B in accordance with EN 55011 (up to 1 m shielded motor cable)	
Noise immunity	Requirements to EN 61800-3 incl. noise immunity		
	Requirements	**Standard**	**Intensity of tests**
	ESD	EN 61000-4-2	3, i.e. 8 kV with air discharge, 6 kV with contact discharge
	Conducted interference	EN 61000-4-6	150 kHz ... 80 MHz, 10 V/m 80% AM (1 kHz)
	HF irradiated interference (housing)	EN 61000-4-3	80 MHz ... 1000 MHz, 10 V/m 80% AM (1 kHz)
	Burst	EN 61000-4-4	3/4, i.e. 2 kV/5 kHz
	Surge (voltage surge on mains cable)	EN 61000-4-5	3, i.e. 1.2/50 µs, 1 kV phase-phase, 2 kV phase-PE
Insulation strength	Overvoltage category III to VDE 0110		
Leakage current to PE (to EN 50178)	> 3.5 mA, i.e. fixed installation required, PE must be reinforced		
Degree of protection	IP65/NEMA4 (IP54 for 8200 motec 3.0-7.5 kW for operation with option board E82ZMV)		
Protective measures against	Short circuit, short to earth (protected against short to earth during operation, limited protection against short to earth on power-up), overvoltage, motor instability, motor overtemperature (input for PTC or thermal contact, I^2t monitoring)		
Total insulation of control circuits	Mains isolation: Double/reinforced insulation to EN 50178		
Permissible supply forms	Operation on TT systems, TN systems or systems with earthed neutral without additional measures		
Operation on public mains supplies	Limits for harmonic currents to EN 61000-3-2		
	Total power on mains	Adherence to requirements [1]	
	< 0.5 kW	with mains choke	
	0.5 kW...1 kW	with active filter (in preparation)	
	> 1 kW	without additional measures	

[1] The additional measures listed enable the drive controller alone to meet the requirements of EN 61000-3-2. Responsibility for adherence to requirements on the part of the machine/system lies with the machine/system manufacturer.

Inputs and outputs

Analog inputs **Analog outputs**	With Standard I/O	1 input, bipolar as an option 1 output
	With Application-I/O	2 inputs, bipolar as an option 2 outputs
Digital inputs **Digital outputs**	With Standard I/O	4 inputs, 1 optional single-track frequency input 0 ... 10 kHz; double-track 0 ... 1 kHz 1 input for controller inhibit 1 output
	With Application I/O	6 inputs, 1 optional single/double-track frequency input 0 ...100 kHz; 1 input for controller inhibit 2 outputs, 1 frequency output 50 Hz ... 10 kHz
Cycle times	Digital inputs	1 ms
	Digital outputs	4 ms
	Analog inputs	2 ms
	Analog outputs	4 ms (filter time: τ =10 ms)
Relay output		1 relay output AC 250 V/3 A, DC 24 V/2 A ... 240 V/0.22 A (changeover contact)
Generator **mode**		Integrated brake transistor

2

Open-loop and closed-loop control

Open-loop and closed-loop control methods		V/f characteristic control (linear or quadratic), vector control, torque provision	
Switching frequency		2 kHz, 4 kHz, 8 kHz, 16 kHz	
Torque response	Maximum torque	$1.8 \times M_r$ for 60 s	if rated motor power = drive controller rated power
	Setting range	1 :10	In speed range 3 ... 50 Hz, accuracy < 8%
	Torque/speed characteristic		
Sensorless speed control	Minimum Output frequency	1.0 Hz $(0 ... M_r)$	
	Setting range	1:50	Related to 50 Hz and M_r
	Accuracy	±0.5%	
	Smooth running	±0.1 Hz	In speed range 3 ... 50 Hz
Output frequency	Range	-650 Hz ... +650 Hz	
	Absolute resolution	0.02 Hz	
	Normal. resolution	Parameter data: 0.01%, process data: 0.006% $(= 2^{14})$	
Digital setpoint preselection	Accuracy	±0.005 Hz (= ±100 ppm)	
Analog setpoint preselection	Linearity	±0.5%	Related to momentary value
	Temp. sensitivity	+0.3% (0 ... +60 °C)	Related to momentary value
	Offset	±0%	
	A/D converter	10-bit resolution A/D converter	
	Error 1 digit	$\equiv$ 0.1% related to upper range value	

Ratings at 230 V mains voltage

Typical motor power	P_r [kW]	0.25	0.37
Three-phase asynchronous motor (4-pole)	P_r [hp]	0.34	0.5
8200 motec type		E82MV251_2B	E82MV371_2B
Mains voltage	U_{mains} [V]	1/N/PE AC 180 V-0%...264 V +0%; 45 Hz -0%...65 Hz +0%	
Data for operation at 1/N/PE 230 V AC			
Rated mains current	I_{mains} [A]	3.4	5.0
Output power U, V, W (at 8 kHz)	S_r [kVA]	0.68	1.0
Rated output current at switching frequency — 2 kHz	I_r [A]	2.0	2.9
Rated output current at switching frequency — 4 kHz	I_r [A]	2.0	2.9
Rated output current at switching frequency — 8 kHz	I_r [A]	1.7	2.4
Rated output current at switching frequency — 16 kHz [2]	I_r [A]	1.1	1.6
Max. permissible output current for 60 s at switching frequency [1] — 2 kHz	I_{max} [A]	2.5	3.6
Max. permissible output current for 60 s at switching frequency [1] — 4 kHz	I_{max} [A]	2.5	3.6
Max. permissible output current for 60 s at switching frequency [1] — 8 kHz	I_{max} [A]	2.5	3.6
Max. permissible output current for 60 s at switching frequency [1] — 16 kHz [2]	I_{max} [A]	1.7	2.3
Output voltage	U_M [V]	3~ 0 ... U_{mains} /0 ... 650 Hz	
Power loss (operation at I_r at 8 kHz)	P_v [W]	30	40
Dimensions H x B x T [mm]		190 x 138 x 100	
Weight	m [kg]	1.8	1.8

Bold text = Data for operation at a switching frequency of 8 kHz (Lenze setting)

[1] Currents for periodic load change cycle: 1 min overcurrent duration at I_{max} 2 min base load duration at 75% I_r

[2] To protect the inverter shutting down in the event of overtemperatures, before the shutdown temperature is reached, the switching frequency automatically drops to 4 kHz.

2

Ratings at 400 V mains voltage

Typical motor power	P_r [kW]	0.55	0.75	1.5	2.2
Three-phase asynchronous motor (4-pole)	P_r [hp]	0.75	1.0	2.0	3.0
8200 motec type		E82MV551_4B	E82MV751_4B	E82MV152_4B	E82MV222_4B
Mains voltage	U_{mains} [V]	3/PE AC 320 V - 0%...550 V + 0%; 45 Hz - 0%...65 Hz + 0%			
Data for operation at 3/PE AC 400 V					
Rated mains current	I_{mains} [A]	1.8	2.4	3.8	5.5
Output power U, V, W (at 8 kHz)	S_r [kVA]	1.3	1.7	2.7	3.9
Rated output current at switching frequency — 2 kHz	I_r [A]	2.1	2.9	4.6	6.7
Rated output current at switching frequency — 4 kHz	I_r [A]	2.1	2.9	4.6	6.7
Rated output current at switching frequency — 8 kHz	I_r [A]	1.8	2.4	3.9	5.6
Rated output current at switching frequency — 16 kHz [2]	I_r [A]	1.2	1.6	2.5	3.6
Max. permissible output current for 60 s at switching frequency [1] — 2 kHz	I_{max} [A]	2.7	3.6	5.8	8.4
Max. permissible output current for 60 s at switching frequency [1] — 4 kHz	I_{max} [A]	2.7	3.6	5.8	8.4
Max. permissible output current for 60 s at switching frequency [1] — 8 kHz	I_{max} [A]	2.7	3.6	5.8	8.4
Max. permissible output current for 60 s at switching frequency [1] — 16 kHz [2]	I_{max} [A]	1.8	2.4	3.9	5.3
Output voltage	U_M [V]	3~ 0 ... U_{mains} /0 ... 650 Hz			
Power loss (operation at I_r at 8 kHz)	P_v [W]	35	45	70	95
Dimensions H x B x T [mm]		202 x 156 x 151		230 x 176 x 167	
Weight	m [kg]	2.8		4.1	

Bold text = Data for operation at a switching frequency of 8 kHz (Lenze setting)

[1] Currents for periodic load change cycle: 1 min overcurrent duration at I_{max} and 2 min base load duration at 75% I_r

[2] To protect the inverter shutting down in the event of overtemperatures, before the shutdown temperature is reached, the switching frequency automatically drops to 4 kHz.

Ratings at 400 V mains voltage

Typical motor power		P_r [kW]	3.0	4.0	5.5	7.5
Three-phase asynchronous motor (4-pole)		P_r [hp]	4.1	5.4	7.5	10.2
8200 motec type			E82MV302_4B	E82MV402_4B	E82MV552_4B	E82MV752_4B
Mains voltage		U_{mains} [V]	3/PE AC 320 V - 0% ... 550 V + 0% ; 45 Hz - 0% ... 65 Hz + 0%			
Data for operation at 3/PE AC 400 V						
Rated mains current		I_{mains} [A]	9.5	12.3	16.8	21.5
Output power U, V, W (at 8 kHz)		S_r [kVA]	5.1	6.6	9.0	11.4
Rated output current at switching frequency	2 kHz	I_r [A]	8.8	11.4	15.6	16.5
	4 kHz					
	8 kHz	I_r [A]	7.3	9.5	13.0	16.5
	16 kHz [2]	I_r [A]	4.7	6.1	8.4	10.7
Max. permissible output current for 60 s at switching frequency [1]	2 kHz	I_{max} [A]	11.0	14.2	19.5	24.8
	4 kHz					
	8 kHz	I_{max} [A]	11.0	14.2	19.5	24.8
	16 kHz [2]	I_{max} [A]	7.1	9.1	12.7	16.1
Output voltage		U_M [V]	3~ 0 ... U_{mains} /0 ... 650 Hz			
Power loss (operation at I_r at 8 kHz)		P_v [W]	140	180	230	290
Dimensions		H x B x T [mm]	325 x 211 x 163 (223)[3]			
Weight		m [kg]	9.7 (11.4)[3]			

[1] Currents for periodic load change cycle: 1 min overcurrent duration at I_{max} 2 min base load duration at 75% I_r

[2] To protect the inverter shutting down in the event of overtemperatures, before the shutdown temperature is reached, the switching frequency automatically drops to 4 kHz.

[3] For wall mounting/with fan module E82MV

Current reduction

Depending on the application conditions and the use of the 8200 motec, the rated output current may need to be reduced on types E82MV302_4B to EMV752_4B:

| 8200 motec mounted on...	Current reduction
...Lenze motor/geared motor, forced-ventilated	Not necessary
...Lenze motor/geared motor, self-ventilated	See Figure 1
...Lenze motor/geared motor, self-ventilated with fan module E82ZMV	Not necessary
...**not** Lenze motor/geared motor ⇨ fan module E82ZMV always required	Not necessary
...the wall (wall mounting) ⇨ fan module E82ZMV always required	Not necessary

Figure 1:
Reduced rated output current in continuous operation at 40ºC ambient temperature and 4 kHz switching frequency/at 35ºC and 8 kHz.

I Reduced output current on the 8200 motec

I_r Rated output current on the 8200 motec at 4 kHz/8 kHz switching frequency

f 8200 motec output frequency [Hz]

Note the torque reduction on self-ventilated motors

## Ratings at 500 V mains voltage

Typical motor power	P_r [kW]	0.55	0.75	1.5	2.2
Three-phase asynchronous motor (4-pole)	P_r [hp]	0.75	1.0	2.0	3.0
8200 motec type		E82MV551_4B	E82MV751_4B	E82MV152_4B	E82MV222_4B
Mains voltage	U_{mains} [V]	3/PE AC 320 V - 0%...550 V + 0%; 45 Hz - 0%...65 Hz + 0%			
Data for operation at 3/PE AC 500 V					
Rated mains current	I_{mains} [A]	1.4	1.9	3.0	4.5
Output power U, V, W (at 8 kHz)	S_r [kVA]	1.3	1.7	2.7	3.9
Rated output current at switching frequency — 2 kHz	I_r [A]	1.8	2.4	3.9	5.6
Rated output current at switching frequency — 4 kHz					
Rated output current at switching frequency — 8 kHz	I_r [A]	1.6	2.1	3.5	5.0
Rated output current at switching frequency — 16 kHz [2]	I_r [A]	1.1	1.4	2.3	3.2
Max. permissible output current for 60 s at switching frequency [1] — 2 kHz	I_{max} [A]	2.4	3.2	5.2	7.6
Max. permissible output current for 60 s at switching frequency [1] — 4 kHz					
Max. permissible output current for 60 s at switching frequency [1] — 8 kHz	I_{max} [A]	2.4	3.2	5.2	7.6
Max. permissible output current for 60 s at switching frequency [1] — 16 kHz [2]	I_{max} [A]	1.6	2.1	3.5	4.8
Output voltage	U_M [V]	3~ 0 ... U_{mains} /0 ... 650 Hz			
Power loss (operation at I_r at 8 kHz)	P_v [W]	35	45	70	95
Dimensions	H x B x T [mm]	202 x 156 x151		230 x 176 x 167	
Weight	m [kg]	2.8		4.1	

[1] Currents for periodic load change cycle: 1 min overcurrent duration at I_{max} and 2 min base load duration at 75% I_r

[2] To protect the inverter shutting down in the event of overtemperatures, before the shutdown temperature is reached, the switching frequency automatically drops to 4 kHz.

Ratings at 500 V mains voltage

Typical motor power P_r [kW]		3.0	4.0	5.5	7.5	
Three-phase asynchronous motor (4-pole)	P_r [hp]	4.1	5.4	7.5	10.2	
8200 motec type			E82MV302_4B	E82MV402_4B	E82MV552_4B	E82MV752_4B
Mains voltage	U_{mains} [V]	3/PE AC 320 V - 0%...550 V + 0%; 45 Hz - 0%...65 Hz - 0%				
Data for operation at 3/PE AC 500 V						
Rated mains current	I_{mains} [A]	7.6	9.8	13.4	17.2	
Output power U, V, W (at 8 kHz)	S_r [kVA]	5.1	6.6	9.0	11.4	
Rated output current at switching-frequency	2 kHz	I_r [A]	7.0	9.2	12.5	13.2
	4 kHz					
	8 kHz	I_r [A]	5.8	7.6	10.4	13.2
	16 kHz [2]	I_r [A]	4.2	5.5	7.6	9.6
Max. permissible output current for 60 s at switching frequency [1]	2 kHz	I_{max} [A]	8.7	11.4	15.6	19.8
	4 kHz					
	8 kHz	I_{max} [A]	8.7	11.4	15.6	19.8
	16 kHz [2]	I_{max} [A]	6.4	8.2	11.4	14.5
Output voltage	U_M [V]	3~ 0 ... U_{mains} /0 ... 650 Hz				
Power loss (operation at I_r at 8 kHz)	P_v [W]	140	180	230	290	
Dimensions	H x B x T [mm]	325 x 211 x 163 (223)[3]				
Weight	m [kg]	9.7 (11.4)[3]				

[1] Currents for periodic load change cycle: 1 min overcurrent duration at I_{max} and 2 min base load duration at 75% I_r

[2] To protect the inverter shutting down in the event of overtemperatures, before the shutdown temperature is reached, the switching frequency automatically drops to 4 kHz.

[3] For wall mounting/with fan module E82MV

Current reduction

Depending on the application conditions and the use of the 8200 motec, the rated output current may need to be reduced on types E82MV302_4B to EMV752_4B:

| 8200 motec mounted on...	Current reduction
...Lenze motor/geared motor, forced-ventilated	Not necessary
...Lenze motor/geared motor, self-ventilated	See Figure 1
...Lenze motor/geared motor, self-ventilated with fan module E82ZMV	Not necessary
...**not** Lenze motor/geared motor ⇨ fan module E82ZMV always required	Not necessary
...the wall (wall mounting) ⇨ fan module E82ZMV always required	Not necessary

Figure 1:
Reduced rated output current in continuous operation at 40ºC ambient temperature and 4 kHz switching frequency/at 35ºC and 8 kHz.

I Reduced output current on the 8200 motec

I_r Rated output current on the 8200 motec at 4 kHz/8 kHz switching frequency

f 8200 motec output frequency [Hz]

Note the torque reduction on self-ventilated motors

Ratings at 230 V mains voltage

Maximum motor power	P_r [kW]	0.37	0.55
Three-phase asynchronous motor (4-pole)	P_r [hp]	0.5	0.75
8200 motec type		**E82MV251_2B**	**E82MV371_2B**
Mains voltage	U_{mains} [V]	1/N/PE AC 180 V- 0% ... 264 V	
Data for operation at 1/N/PE 230 V AC			
Rated mains current	I_{mains} [A]	4.1	6.0
Output power U, V, W (at 2/4 kHz)	S_r [kVA]	0.8	1.2
Rated output current at switching frequency 2 kHz / 4 kHz	I_r [A]	2.0	2.9
Max. permissible output current for 60 s at switching frequency [1] 2 kHz / 4 kHz	I_{max} [A]	2.5	3.6
Output voltage	U_M [V]	3~ 0 ... U_{mains} /0 ... 650 Hz	
Power loss (operation at I_r at 2/4 kHz)	P_v [W]	30	40
Dimensions	H x B x T [mm]	190 x 138 x 100	
Weight	m [kg]	1.8	

[1] Currents for periodic load change cycle: 1 min overcurrent duration at I_{max} 2 min base load duration at 75% I_r
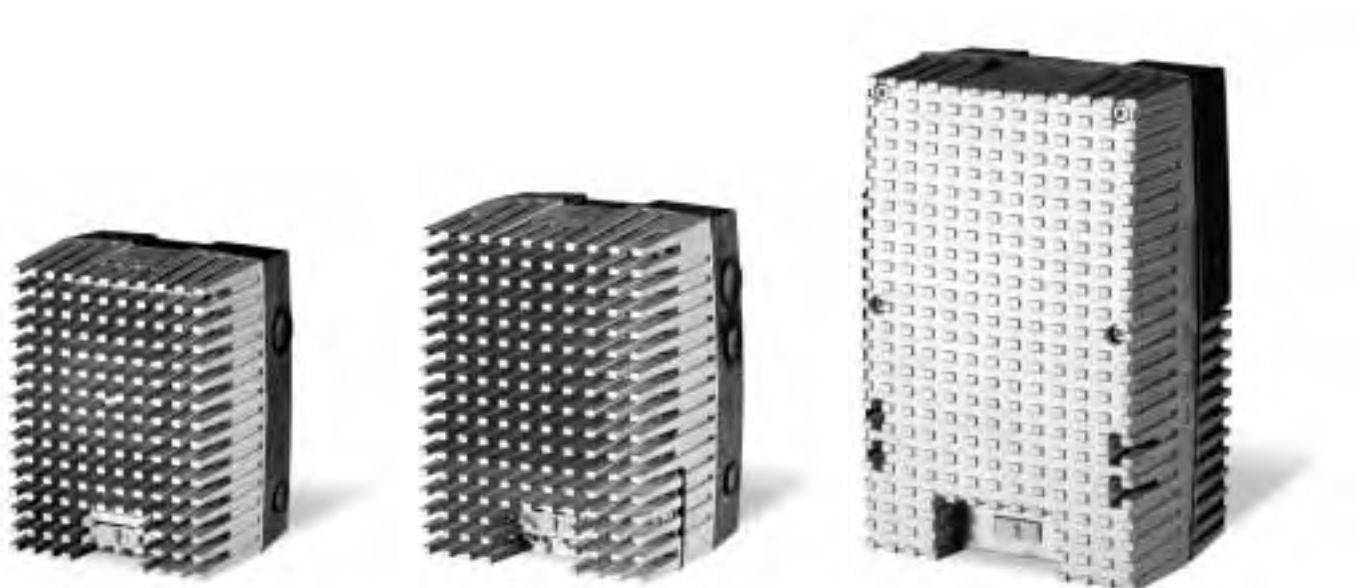
Ratings at 400 V mains voltage

Maximum motor power	P_r [kW]	0.75	1.1	2.2	3.0
Three-phase asynchronous motor (4-pole)	P_r [hp]	1.0	1.5	3.0	4.0
8200 motec type		E82MV551_4B	E82MV751_4B	E82MV152_4B	E82MV222_4B
Mains voltage	U_{mains} [V]	3/PE AC 320 V - 0%...440 V + 0%; 45 Hz - 0%...65 Hz + 0%			
Data for operation at 3/PE AC 400 V					
Rated mains current	I_{mains} [A]	2.2	2.8	4.6	6.6
Output power U, V, W (at 2/4 kHz)	S_r [kVA]	1.5	2.0	3.2	4.6
Rated output current at switching frequency — 2 kHz / 4 kHz	I_r [A]	2.1	2.9	4.6	6.7
Max. permissible output current for 60 s at switching frequency [1] — 2 kHz / 4 kHz	I_{max} [A]	2.7	3.6	5.8	8.4
Output voltage	U_M [V]	3~ 0 ... U_{mains} /0 ... 650 Hz			
Power loss (operation at I_r at 2/4 kHz)	P_v [W]	35	45	70	95
Dimensions	H x B x T [mm]	202 x 156 x151		230 x 176 x 167	
Weight	m [kg]	2.8		4.1	

[1] Currents for periodic load change cycle: 1 min overcurrent duration at I_{max} 2 min base load duration at 75% I_r

Ratings at 400 V mains voltage

Maximum motor power		P_r [kW]	4.0	5.5	7.5
Three-phase asynchronous motor (4-pole)		P_r [hp]	5.4	7.5	10.2
8200 motec type			E82MV302_4B	E82MV402_4B	E82MV552_4B
Mains voltage		U_{mains} [V]	3/PE AC 320 V - 0%...440 V + 0%; 45 Hz - 0%...65 Hz + 0%		
Data for operation at 3/PE AC 400 V					
Rated mains current		I_{mains} [A]	11.4	14.8	20.2
Output power U, V, W (at 2/4 kHz)		S_r [kVA]	6.0	7.9	10.8
Rated output current at switching frequency	2 kHz	I_r [A]	8.8	11.4	15.6
	4 kHz				
Max. permissible output current for 60 s at switching frequency [1]	2 kHz	I_{max} [A]	11.0	14.2	19.5
	4 kHz				
Output voltage		U_M [V]	3~ 0 ... U_{mains} /0 ... 650 Hz		
Power loss (operation at I_r at 2/4 kHz)		P_v [W]	140	180	230
Dimensions		H x B x T [mm]	325 x 211 x 163 (223)[2]		
Weight		m [kg]	9.7 (11.4)[2]		

[1] Currents for periodic load change cycle: 1 min overcurrent duration at
 I_{max} 2 min base load duration at 75% I_r
[2] For wall mounting/with fan module E82MV

Current reduction
Depending on the application conditions and the use of
the 8200 motec, the rated output current may need to be
reduced on types E82MV302_4B to EMV552_4B:

| 8200 motec mounted on...	Current reduction
...Lenze motor/geared motor, forced-ventilated	Not necessary
...Lenze motor/geared motor, self-ventilated	See Figure 1
...Lenze motor/geared motor, self-ventilated with fan module E82ZMV	Not necessary
...**not** Lenze motor/geared motor ⇨ fan module E82ZMV always required	Not necessary
...the wall (wall mounting) ⇨ fan module E82ZMV always required	Not necessary

Figure 1:
Reduced rated output current in continuous operation at
40ºC ambient temperature and 4 kHz switching frequency.

I   Reduced output current on the 8200 motec

I_r   Rated output current on the 8200 motec
4 kHz switching frequency

f   8200 motec output frequency [Hz]

Note the torque reduction on self-ventilated motors

You can mount the 8200 motec (0.25-2.2 kW) without additional accessories both to the wall and directly on motors. Only the 8200 motec 3.0-7.5 kW requires a fan module for wall mounting.

Assembly sequence (principle)

2

Wall mounting

Motor mounting

2
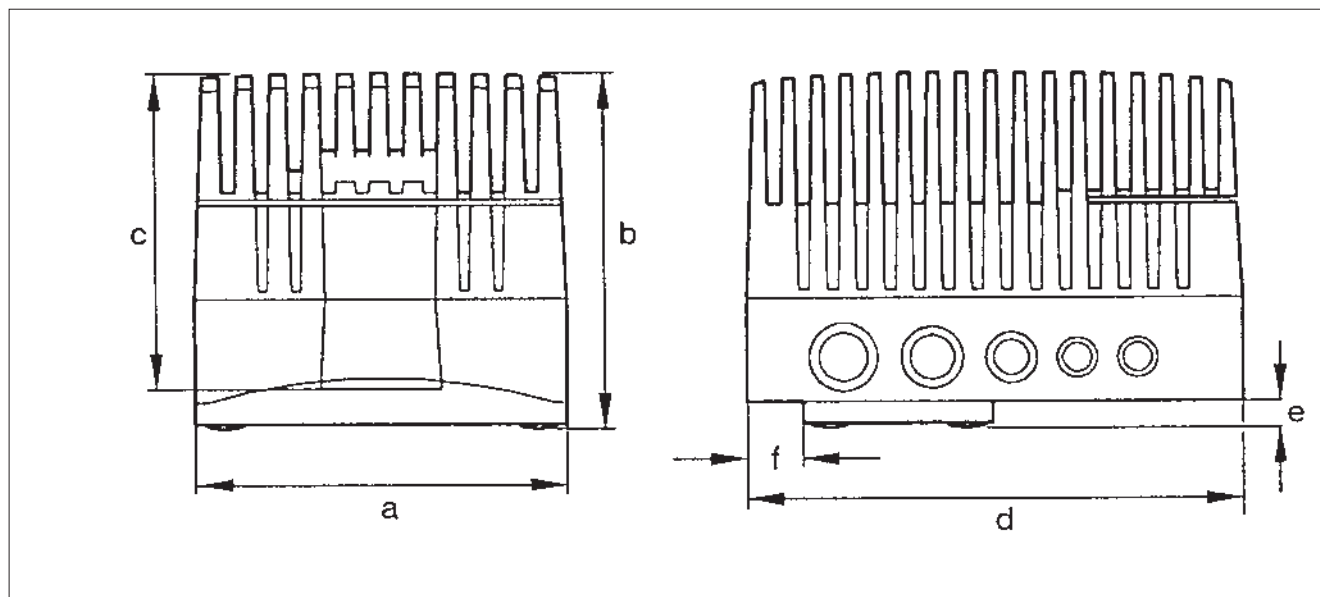
	a [mm]	b [mm]	c [mm]	d [mm]	e [mm]	f [mm]
E82MV251_2B	138	100 (135)[1]	90	190	7	12
E82MV371_2B	138	100 (135)[1]	90	190	7	12
E82MV551_4B	156	151	135	202	15	26
E82MV751_4B	156	151	135	202	15	26
E82MV152_4B	176	167	151	230	15	26
E82MV222_4B	176	167	151	230	15	26
E82MV302_4B	211	163 (223)[2]	148	325	15	27
E82MV402_4B	211	163 (223)[2]	148	325	15	27
E82MV552_4B	211	163 (223)[2]	148	325	15	27
E82MV752_4B	211	163 (223)[2]	148	325	15	27

[1] With additional terminal cradle (on Bus I/O function module E82ZMFB001
and brake rectifier E82ZMBR1)

[2] For wall mounting/with fan module (type E82ZMV, IP54, dimensions L x B x
H [mm]: 325 x 211 x 60), see also page 4-21.

Position of cable glands (view from above carrier housing)

– Features of metric cable glands
• With internal thread
  [1] Exception: Without internal thread
• 8200 motec 0.55-2.2 kW with plug screw
• 8200 motec 0.25-0.37 kW and 3.0-7.5 kW with
  designated breaking points

The starttec motor starter has been designed on the basis of our experience with the 8200 motec motor inverter and Lenze's expert knowledge of distributed drive systems. We are therefore able to offer an integral and seamless system for variable speed motors and motors which are "fixed on the mains".

In addition to the features listed under the product information for distributed drive solutions, the electronic motor starter is characterised by the following features:

Simple
The integrated controls (potentiometer) make it as easy to set the nominal motor current/upward and downward ramps as it is on conventional starting circuit breakers/soft starters. No other basic settings are needed. Expert knowledge is therefore not required for commissioning.

Wear-free
Due to the use of electronic circuit breakers instead of electromechanical switching elements, even at high switching rates.
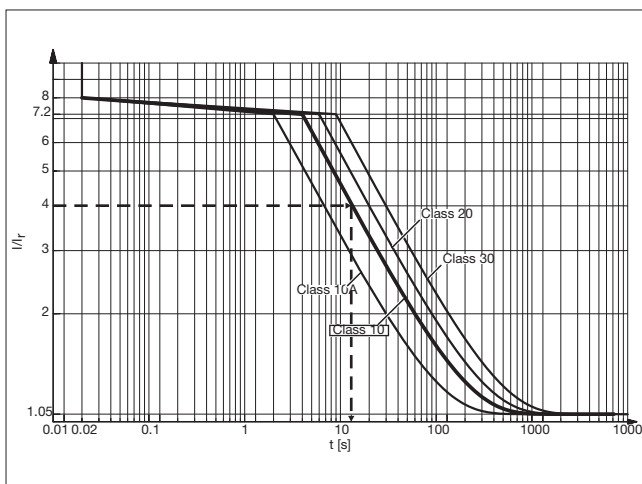
Intelligent
The load on the PLC is reduced by:
• Logic operations on the input signals
• Configurable time delays for digital outputs/ brake control

Safe
The starttec protects the motor by providing:
• Temperature monitoring (PTC/thermal contact)
• Overload protection (starting circuit breaker function) with configurable tripping characteristic (classes 10. 10E, 20. 30)

Characteristics of the various operating classes
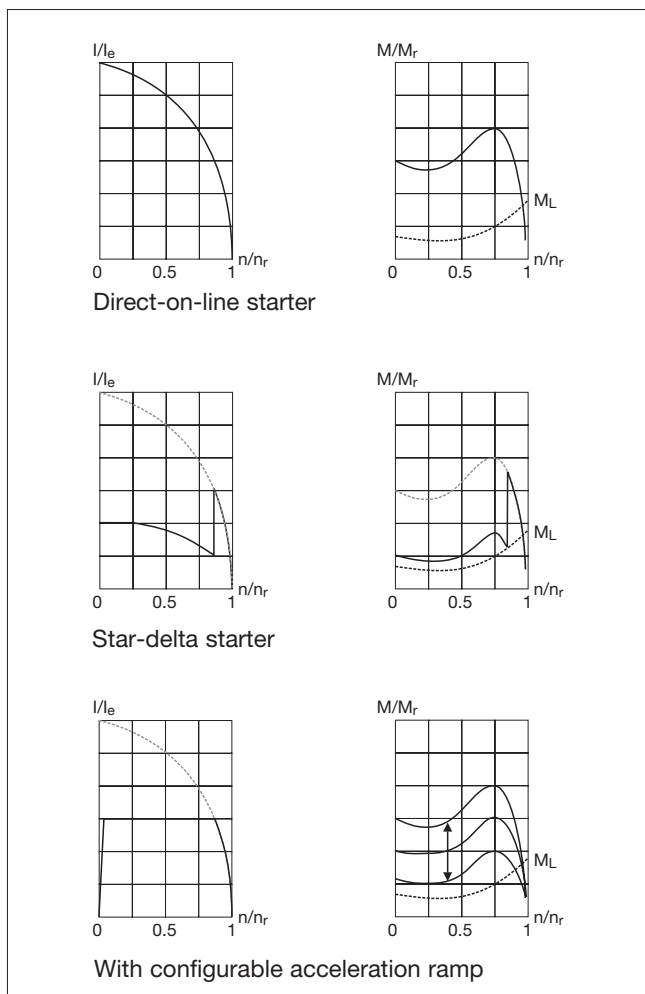
Component reduction – 1 motor starter for 2 motors
The starttec version for 2-motor mode can be used to control two motors. These may be configured and operated independently.

Configurable starting ramp to reduce starting current
Starting up motors direct on-line causes mechanical shock in the machine which inevitably reduces service life. The high starting current strains the mains supply and creates voltage dips. This prevents sensitive components from functioning correctly. These starting currents can be reduced by using a configurable starting ramp.

Principle starting current and torque response

Direct-on-line starter

Star-delta starter

With configurable acceleration ramp

n   Speed
n_r Rated motor speed
I   Starting current
I_r Rated motor current
M   Torque
M_r Rated motor torque

Standard functions
- Configurable starting/stopping ramps 0...3.0 s
  logic operations (AND, OR, XOR, NOT) can be applied to input signals
- Jog (start command with time base)
- Elapsed time meter
- Configurable current threshold
- Digital outputs with configurable delay

Protection functions
- Input for motor PTC or thermal contact
- I^2t monitoring for motor protection
- Configurable current limiting
- Warnings and error messages in the event of overcurrents
- Warnings and error messages in the event of motor starter overtemperatures
- Mains and mains phase failure detection

Operation and control
- Integrated controls (potentiometer) for setting the nominal motor current/starting and stopping ramps
- Keypad
- Copy function with Keypad for transferring starter settings
- Password protection
- Control and parameter setting software "Global Drive Control easy" (downloadable from the Internet)

Power range
0.25 kW...4.0 kW 110 V-500 V (+/-10%)
- Optional change of direction of rotation/multi-motor mode
- Electronic circuit-breaker

Fieldbus communication
- RS232 serial interfaces
- Bus interface to most common fieldbus systems (CAN, PROFIBUS-DP, INTERBUS)
- AS-Interface integrated into the standard controller as an option

Input and output terminals
- 5 digital inputs with switchable logic (freely configurable)
- 4 digital outputs (freely configurable)

Braking
- 1 output for direct control of spring-loaded brakes with configurable delay

Control
- Via digital I/O and/or
- Via fieldbuses
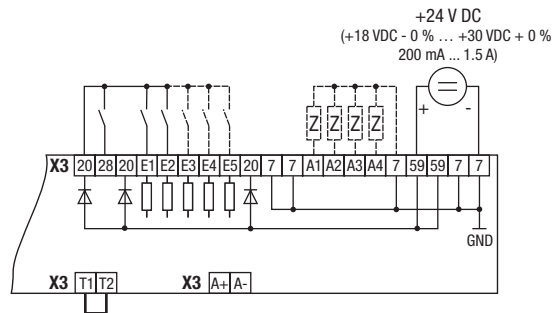
2

Standards and operating conditions

Conformity	CE	Low Voltage Directive (73/23/EEC)
Approvals	UL508	Industrial Control Equipment (File No. E221123)
Standards	DIN EN 60947-4-2	Semiconductor motor controllers and starters for alternating voltage
Vibrational stability	Accelerational stability up to 4 g (Germanischer Lloyd, general conditions)	
Climatic conditions	Class 3K3 to EN 50178 (without condensation, average relative humidity 85%)	
Pollution degree	VDE 0110 Part 2, pollution degree 2	
Packaging (DIN 4180)	Dust packaging	
Permissible temperature ranges		
Transport	-25°C ... +70°C	
Storage	-25°C ... +60°C	
Operation	-25°C ... +60°C -25°C ... +40°C	for motor mounting for wall mounting
Permissible installation height	0 ... 4000 m above sea level	The rated output current should be derated by 5%/1000 m above 1000 m above sea level.
Mounting positions	All mounting positions and mounting orientations permitted	
Mounting space		
Above/below	≥100 mm	
To the side	>100 mm	

General electrical data

EMC	Complies with requirements to EN60947-4-2
Noise emission	Complies with requirements to limiting class B to EN60947-4-2
Noise immunity	Requirements to EN60947-4-2
Insulation strength	Overvoltage category III to VDE 0110
Leakage current to PE (to EN 50178)	< 3.5 mA
Degree of protection	IP65; NEMA4
Protective measures against	Motor over temperature (input for PTC or thermal contact, I^2t monitoring)
Total insulation of control circuits	Mains isolation: Double/reinforced insulation to EN 50178
Control method	Generalised phase control

Lenze

Inputs and outputs

Terminal	Function (bold = Lenze setting)		Data
Digital inputs			
X3/28	starttec enable/ disable	HIGH starttec enable LOW starttec disabled	LOW (0 V ... +3 V) HIGH (+12 V ... +30 V) R_i = > 4 kΩ Function in C0410 free Assignable
X3/IN1	**Start motor 1**	HIGH Start motor 1 LOW Stop motor 1	
X3/IN2	**Start motor 2**	HIGH Start motor 2 LOW Stop motor 2	
X3/IN3	**Control brake**	HIGH Release brake LOW Apply brake	
X3/IN4	**Not used**		
X3/IN5			
Digital outputs			
X3/OUT1	**Status motor 1**	HIGH Motor 1 running LOW Motor 1 stopped	LOW (0 V ... +3 V) HIGH (+12 V ... +30 V) max. 200 mA per output Function in C0415 Freely assignable
X3/OUT2	**Status motor 2**	HIGH Motor 2 running LOW Motor 2 stopped	
X3/OUT3	**Status brake**	HIGH Brake released LOW Brake applied	
X3/OUT4	**Not used**		
Motor temperature monitoring			
X3/T1	Connection motor temperature monitoring with thermal contact (NC) (motor temperature monitoring with PTC only possible for one motor)		• Remove jumper between X3/T1 and T2 • Supply to X3/T1 and Install X3/T2 separately • Connect motor thermal contacts in series
X3/T2			
AS-interface			
X3/OUT+	Connection AS-interface		Only active on 71MM402FxAxxx
X3/OUT-			
Power supply			
X3/59	Connection supply voltage +24 VDC Reference: X3/7		+18 VDC - 0% ... +30 VDC + 0% min. 200 mA max. 1.5 A (all inputs and outputs connected)
X3/20	DC voltage output + 24 VDC Reference: X3/7		+18 VDC ... +30 VDC max. 500 mA
X3/7	Reference potential		

Digital inputs IN1-IN5 and digital outputs OUT1 to OUT4 can be freely assigned.

Standalone drive

Motor power	3/PE AC 230 V 3(/N)/PE AC 400 V 3(/N)/PE AC 500 V	P_r	0.25 ... 2.2 kW 0.25 ... 4.0 kW 0.37 ... 5.5 kW	
starttec type Standard version With integrated AS-interface [1]			E71MM402_2A010 E71MM402F2A010	E71MM402_4A010 E71MM402F4A010
Mains voltage (switched voltage) U_r			3/PE AC 100 V - 0% ... 550 V + 0% 45 Hz - 0% ... 65 Hz + 0%	
Max. output continuous current	I_r		9.5 A (total of output currents)	
Supply voltage Voltage range Current consumption at +24 VDC	U_{DC}		+24 VDC (+18 VDC - 0%... +30 VDC + 0%) min. 200 mA max. 1.5 A (all digital inputs and outputs connected)	
Brake control [2]				
Output voltage At 3/PE AC 230 V At 3(/N)/PE AC 400 V At 3(/N)/PE AC 500 V	U_b U_b U_b		205 VDC 205 VDC 257 VDC	103 VDC 180 VDC Not permitted
Max. output current	I_b		0.4 A	
Dimensions	H x B x T [mm]		228 x 129 x 71	
Weight	M [kg]		1.3	

[1] **Additional information about the ratings of the integrated AS-interface can be found in the Automation section on page 3-29.**

[2] **Additional information about brake control can be found in the Accessories section on page 4-15.**

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## 2-motor mode/Standalone drive with change of direction of rotation

Motor power	3/PE AC 230 V 3(/N)/PE AC 400 V 3(/N)/PE AC 500 V	P_r	0.25 ... 2.2 kW 0.25 ... 4.0 kW 0.37 ... 5.5 kW	
starttec type Standard version With integrated AS-interface [1]			E71MM402_2A020 E71MM402F2A020	E71MM402_4A020 E71MM402F4A020
Mains voltage (switched voltage)		U_r	3/PE AC 100 V - 0% ... 550 V + 0% 45 Hz - 0% ... 65 Hz + 0%	
Max. output continuous current		I_r	9.5 A (total of output currents)	
Supply voltage Voltage range Current consumption at +24 VDC		U_{DC}	+24 VDC (+18 VDC - 0% ... +30 VDC + 0%) min. 200 mA max. 1.5 A (all digital inputs and outputs connected)	
Brake control [2]				
	Output voltage At 3/PE AC 230 V At 3(/N)/PE AC 400 V At 3(/N)/PE AC 500 V	U_b U_b U_b	205 VDC 205 VDC 257 VDC	103 VDC 180 VDC Not permitted
	Max. output current	I_b	0.4 A	
Dimensions		H x B x T [mm]	228 x 129 x 71	
Weight		M [kg]	1.3	

[1] **Additional information about the ratings of the integrated AS-interface can be found in the Automation section on page 3-29.**

[2] **Additional information about brake control can be found in the Accessories section on page 4-15.**

Dimensions

a [mm]	b [mm]	c [mm]	d [mm]	e [mm]
228.0	10.0	104.5	129.0	71.0

Mechanical data

Housing	Cable connectors	Weight
Housing with electronics module made from die-cast aluminium Ⓐ PVC housing cover Ⓑ	4 x M20 (thread length 10 mm) 6 x M16 (thread length 10 mm)	1.3 kg

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You can mount the starttec without additional accessories both to the wall and directly on motors.

Assembly sequence (principle)

Wall mounting

Motor mounting

Automation | 8200 motec starttec

3
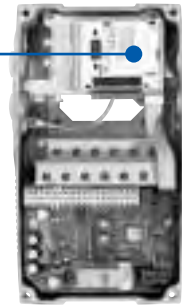
Function modules and communication modules

Lenze can provide a wide range of components for integration into the automation of the machine or system. The function modules and communication modules enable e.g. the inverter to be adapted according to the specific requirements of the application in terms of the number of digital and analog inputs and outputs and in terms of interfacing with the fieldbus. The distributed drive components have two interfaces, one of which can be fitted with a communication module and the other with a function module. Possible combinations of function modules and communication modules can be found in the table on page 3-3. The use of the BUS I/O provides the 8200 motec with another interface for an additional function module. This makes it possible for example to operate the frequency inverter in parallel during bus and I/O operation. This simplifies commissioning and diagnostics in complex applications (fieldbus and I/O mixed operation) in particular.

The starttec motor starter is supplied with the digital inputs and outputs and AS-interface (optional) already integrated. A function module is only required for communication with other fieldbuses such as PROFIBUS, INTERBUS or CAN.
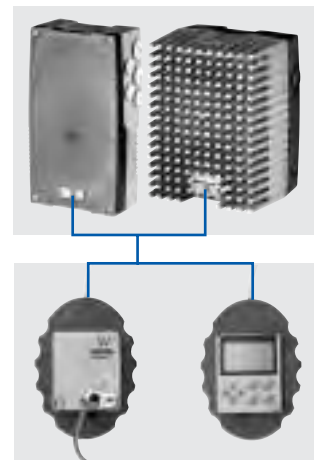
starttec
function module, e.g.

CAN (system bus)
PROFIBUS-DP
INTERBUS
LECOM-B (RS485)
Support E71ZJ001 is always required when using function modules
in the starttec

Connection
Communication module, e.g.

Keypad
LECOM-A (RS232)

8200 motec
Slot 1
e.g. for function module

Standard I/O
Application I/O
BUS I/O
CAN (system bus)
CAN I/O (system bus)
PROFIBUS-DP
INTERBUS
LECOM-B (RS485)
AS-interface

Slot 2
(only available if a
BUS-I/O is being used in
slot 1) e.g. for fieldbus function
module

CAN (system bus)
PROFIBUS-DP
INTERBUS
LECOM-B (RS485)

Application options for function modules and communication modules in the 8200 motec and starttec

|		starttec	motec	motec with BUS I/O
Communication modules	**Type**			
Keypad	E82ZBB	✓	✓	✓
Keypad XT	E82ZBBXC	✓	✓	✓
LECOM-A RS232	E82ZBL-C	✓	✓	✓
Function modules	**Type**			
Standard I/O	E82ZAFSC001	-	✓	-
Application I/O	E82ZAFAC001	-	✓	-
BUS-I/O	E82ZAFBxx1	-	✓	-
CAN (system bus)	E82ZAFCC001	✓ [1]	✓	✓
CAN I/O (system bus)	E82ZAFCC201	-	✓	-
PROFIBUS-DP	E82ZAFPC001	✓ [1]	✓	✓
INTERBUS	E82ZAFIC001	✓ [1]	✓	✓
LECOM-B (RS485)	E82ZAFLC001	✓ [1]	✓	✓
AS-interface	E82ZAFFC001	Function integrated as an option	✓	-

[1] Always in conjunction with support frame for function modules E71ZJ001

All function modules (with the exception of the BUS I/O) can also be used in conjunction with the 8200 vector. The Keypad XT and Global Drive Control easy (GDC easy) PC software, which simplify and speed up the operation of the inverter by means of a simple menu structure and assisted dialog boxes, are available for parameter settings and diagnostics.

3
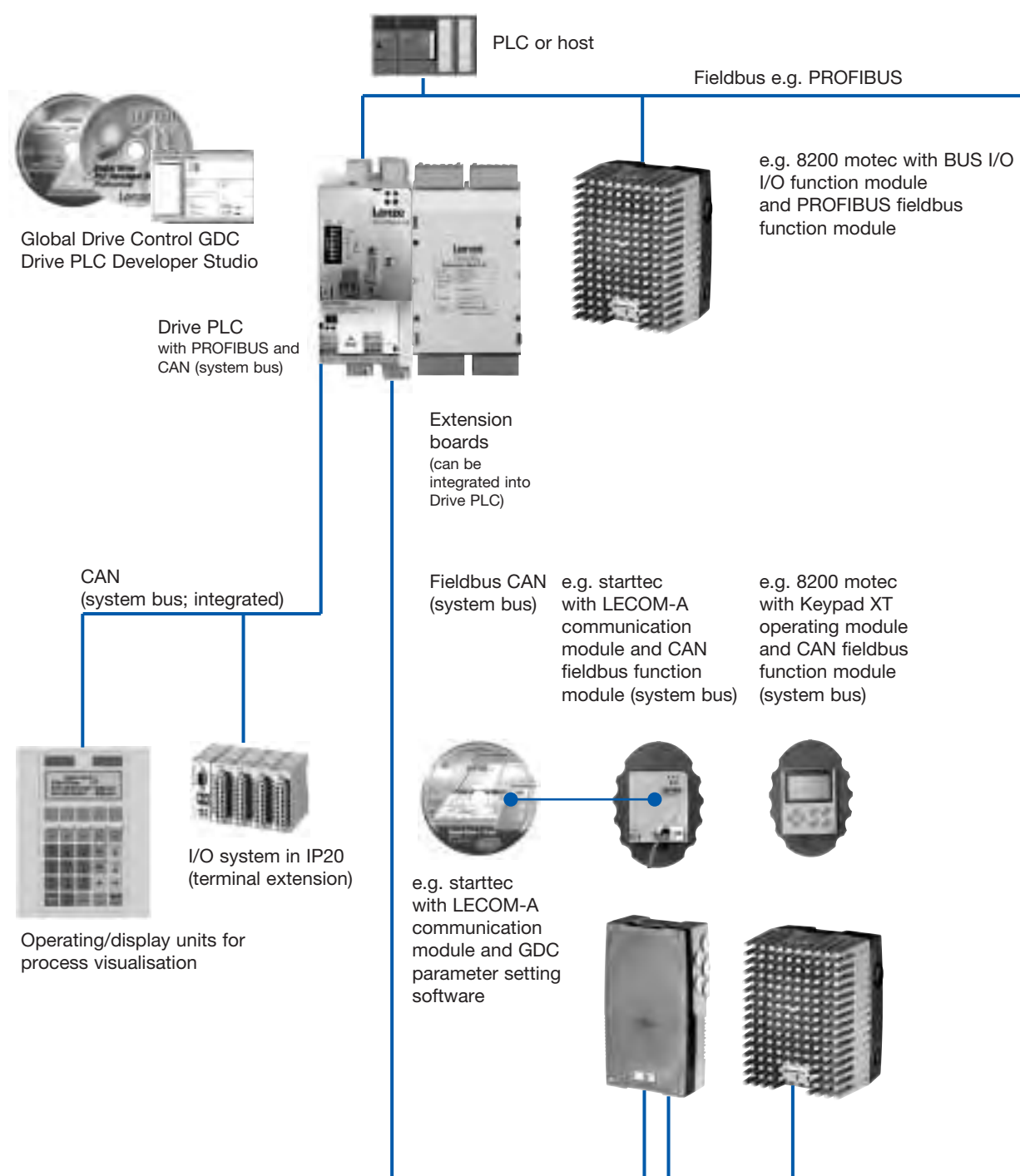
Automation components

Bus-compatible operating/display units for process visualisation which can be integrated into the control cabinet are available in various frame sizes for the visualisation of inverter parameters and process data. The DrivePLC is a freely programmable drive PLC which operates in accordance with international standard EN61131-3. In conjunction with the frequency inverter,

it can be used to set up distributed control tasks. Extension boards can be used to extend the DrivePLC input and output terminals.
The range is completed by bus-compatible, freely programmable I/O terminals, which are used for interfacing sensors and actuators with the bus.
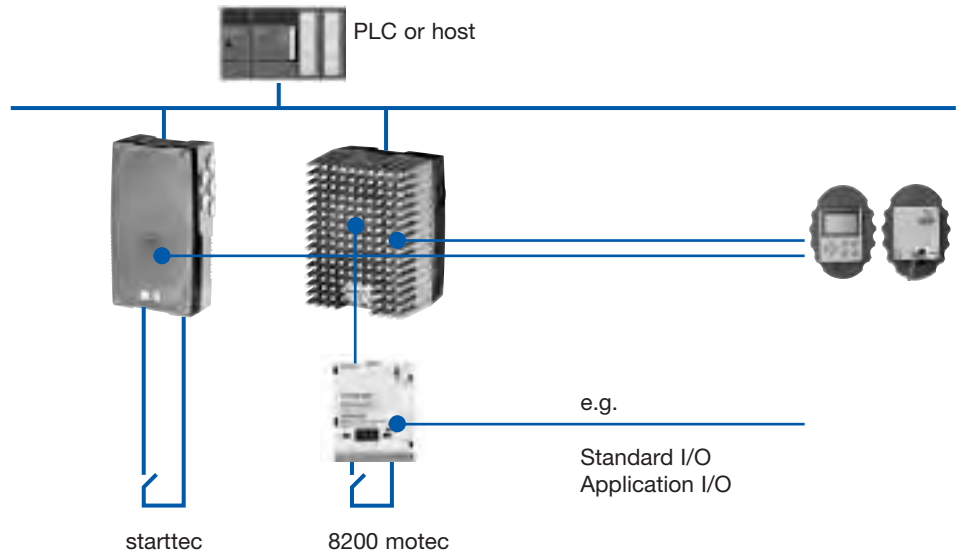
PLC or host

Fieldbus e.g. PROFIBUS

e.g. 8200 motec with BUS I/O
I/O function module
and PROFIBUS fieldbus
function module

Global Drive Control GDC
Drive PLC Developer Studio

Drive PLC
with PROFIBUS and
CAN (system bus)

Extension
boards
(can be
integrated into
Drive PLC)

CAN
(system bus; integrated)

Fieldbus CAN
(system bus)

e.g. starttec
with LECOM-A
communication
module and CAN
fieldbus function
module (system bus)

e.g. 8200 motec
with Keypad XT
operating module
and CAN fieldbus
function module
(system bus)

I/O system in IP20
(terminal extension)

e.g. starttec
with LECOM-A
communication
module and GDC
parameter setting
software

Operating/display units for
process visualisation

The large selection of function/communication modules enables various operation and communication concepts to be set up according to requirements. The overview illustrates example control, operation and parameter setting options:
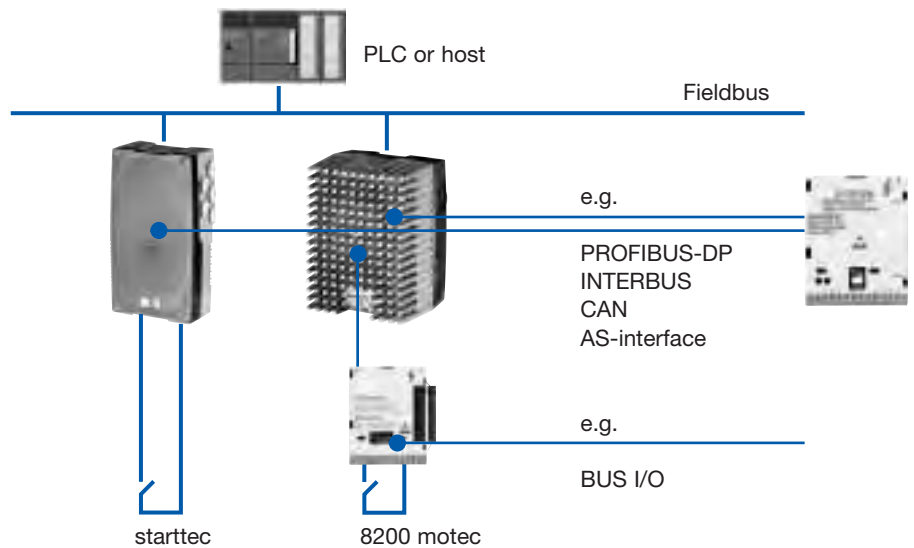
1.

**Control and operation via Keypad, RS232 (GDC) and/or control terminals**
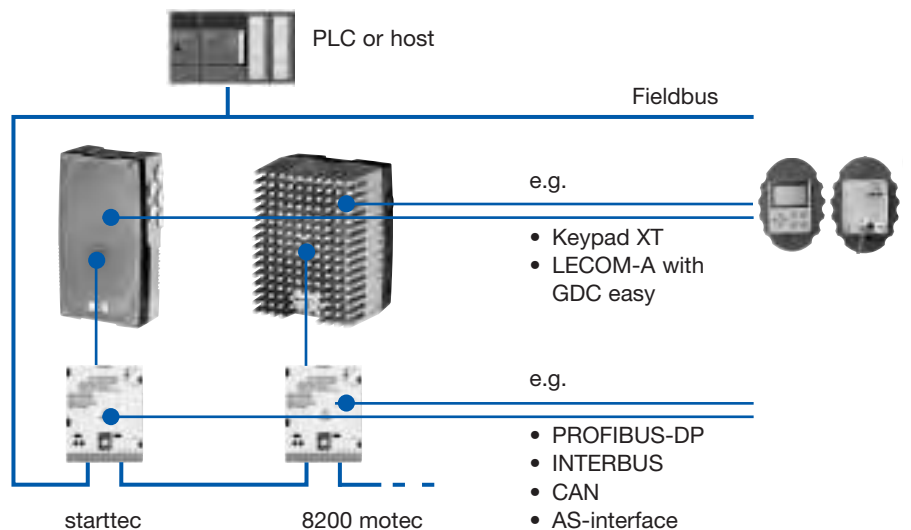
PLC or host

e.g.

Standard I/O
Application I/O

starttec   8200 motec

2.

Networking via fieldbus and open-loop/closed-loop control with digital and analog inputs and outputs

PLC or host

Fieldbus

e.g.

PROFIBUS-DP
INTERBUS
CAN
AS-interface

e.g.

BUS I/O

starttec   8200 motec

3.

Parameter settings and diagnostics during fieldbus operation

PLC or host

Fieldbus

e.g.

• Keypad XT
• LECOM-A with GDC easy

e.g.

• PROFIBUS-DP
• INTERBUS
• CAN
• AS-interface

starttec   8200 motec
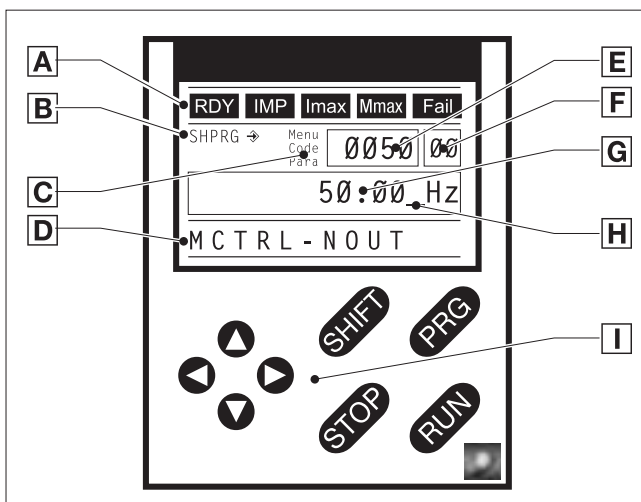
Keypad XT operating module

Diagnosis terminal (complete with Keypad XT)	Order no.	E82ZBBXC
Diagnosis terminal (complete with Keypad)	Order no.	E82ZBB

The Keypad XT is available for visualising operating parameters and parameter settings for the inverter. Eight keys and a text display provide quick and easy access to the inverter parameters via the transparent menu structure. The Keypad XT is also used for the purposes of status display and error diagnostics. In addition, its built-in memory can be used to transfer parameters to other inverters.
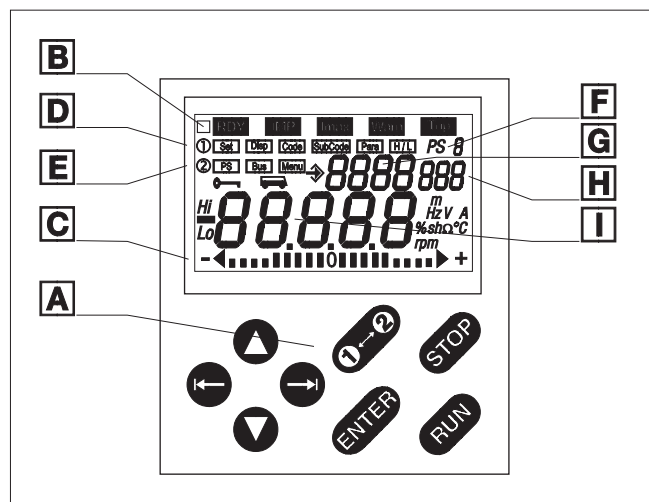
For ease of handling, the Keypad XT is housed in an easy-to-use diagnosis terminal. A connecting cable is required for the connection to the 8200 motec/starttec. The Keypad XT can also be used on 8200 vector, 9300 vector, 9300 servo and Drive PLC devices.
The Keypad is suitable for installation in the control cabinet. The differences between the Keypad XT and Keypad are listed in the "Features" overview.


Keypad XT
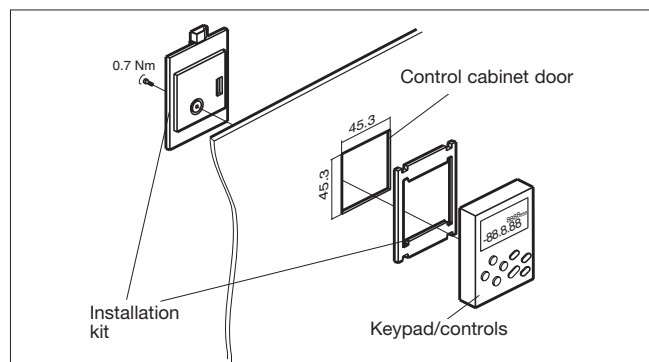
A	Status displays
B	Transfer parameters
C	Active level
D	Help text
E	Menu or code number
F	Menu or subcode number
G	Parameter
H	Cursor
I	Function keys

Keypad

A	Function keys
B	Status displays
C	Bar graph display
D	Function bar 1
E	Function bar 2
F	Parameters for change
G	Code number
H	Subcode number
I	Parameter value with unit

Dimensions of control cabinet assembly kit (Keypad only)

Features

	Keypad XT	Keypad
Plain text display	✓	-
Menu structure	✓	-
Predefined basic configurations	✓	-
Text display	✓	✓
Control keys	8	8
Non-volatile storage for parameter transfer	✓	✓
Password protection	✓	✓
Control cabinet installation	-	✓
Configurable menu ("user menu")	✓	✓
Application-specific menus	✓	-
"Quick start-up" menu	✓	-
Can be used with	8200 vector, 8200 motec, Drive PLC, 9300 vector, 9300 servo, starttec	8200 vector, 8200 motec, starttec
Diagnosis terminal	✓	✓
Degree of protection	IP 20	IP 55

Diagnosis terminal with Keypad XT and connecting cable

Additional accessories	Order no.
Keypad (without diagnosis terminal) [3]	E82ZBC
Control cabinet installation kit [2]	E82ZBHT
2.5 m connecting cable [1]	E82ZWL025
5 m connecting cable [1]	E82ZWL050
10 m connecting cable [1]	E82ZWL100

[1] The connecting cable is required to connect the diagnosis terminal or control cabinet installation kit with the 8200 motec or starttec.

[2] The additional control cabinet installation kit is required if the keypad (only E82ZBC) is to be installed in the door of the control cabinet. (IP55 protection)

[3] Can only be used on the 8200 motec and starttec in conjunction with control cabinet installation kit E82ZBHT.

LECOM-A (RS232)

LECOM-A (RS232); complete with diagnosis terminal – can be used with 8200 motec and starttec	Order no.	E82ZBL-C

Easy parameter settings with the RS232 interface and Global Drive parameter setting software.

This module can be used for communication with Lenze's LECOM protocol. This interface is used for parameter settings on the 8200 motec and starttec with the "Global Drive Control (GDC) easy"/"Global Drive Control" software. Global Drive Control is based on familiar Windows technology and is very easy to use. It ensures fast and secure commissioning.

Various monitor displays are also available for visualising process and controller response, e.g. device utilisation. Additional connecting cables are required for the connection to the 8200 motec/starttec and to the PC.

Protocol	LECOM-AB V2.0
Communication medium	RS232 (LECOM-A)
Transfer character format	7 Bit ASCII, 1 stop bit, 1 start bit, 1 parity bit (even)
Baud rate [bps]	1200, 2400, 4800, 9600, 19200
Network topology	Point-to-point
Max. no. of participants	1
Max. cable length	15 m
PC connection	9-pin Sub-D socket
Isolation voltage to reference earth/PE	50 V AC
Degree of protection	IP20
Ambient temperature	Operation: 0 ... +50°C Transport: -25 ... +70°C Storage: -25 ... +55°C
Humidity	Humidity class F, no condensation (average relative humidity 85%)

3

Pin assignment 9-pin Sub-D socket				Basic structure
Pin	**Designation**	**Input (I)/ Output (Q)**	**Explanation**	
1	–	–	Not assigned	
2	RxD	I	"Data receive" cable	
3	TxD	Q	"Data send" cable	
4	DTR	Q	Send control	
5	GND	–	Reference potential	
6	DSR	I	Not assigned	
7	–	–	Not assigned	
8	–	–	Not assigned	
9	GND		Reference potential for T/R (A), T/R (B) and +5 V	8200 motec/starttec

Diagnosis terminal with PC interface (RS232) (type E82ZBL-C) and RS232 PC system cable (EWL0048)

Additional connecting cables are required for the connection to 8200 motec/starttec and to the PC.

Additional accessories	Order no.
2.5 m connecting cable [1]	E82ZWL025
5 m connecting cable 1)	E82ZWL050
10 m connecting cable [1]	E82ZWL100
0.5 m PC system cable RS232	EWL0048
5 m PC system cable RS232	EWL0020
10 m PC system cable RS232	EWL0021

[1] The connecting cable is required to connect the diagnosis terminal or control cabinet installation kit with the 8200 motec or starttec.

3

Global Drive Control – GDC easy parameter setting software

GDC easy	Order no.	ESP-GDC2-E
GDC	Order no.	ESP-GDC2

The Global Drive Control easy software tool is an easy to understand and convenient tool for the operation, parameter setting, configuration and diagnostics of both 8200 range frequency inverters - including e.g. the 8200 motec - and starttec motor starters.

Essential features include:
• Dialog-assisted operation
• Monitor window for displaying operating parameters and diagnostics
• Extensive help functions
• Loading and saving of parameter files from and to the inverter
• Saving and printing out of parameter settings as code lists

Global Drive Control can for example be downloaded from the Internet at www.Lenze.com.

It offers the following advantages:
• Easy, intuitive operation
• Even suitable for beginners (no program knowledge required)

Lenze

Global Drive Control – GDC easy parameter setting software

The Global Drive Control parameter setting software incorporates all of the functions described here. If you wish only to set parameters for the frequency inverter, you can use Global Drive Control **easy**:

Feature Short setup:	GDC easy	GDC
starttec	✓	✓
8200	✓	✓
8200 vector/motec	✓	✓
9300 vector		✓
9300 Servo		✓
Technology functions [1]		✓
Code lists	✓	✓
Monitor window	✓	✓
Function block editor		✓
Oscilloscope functions [2]		✓
Order number:	**ESP-GDC2-E**	**ESP-GDC2**

[1] For 9300 Servo drives
[2] For 9300 drives

System requirements of GDC (easy)

Hardware:
- IBM-AT or compatible PC
- CPU
  – Pentium 90 or higher
- RAM
  – 64 MB
- At least 120 MB free hard disk space
- Super VGA graphics card
- CD-ROM drive
- One free serial interface for RS232 or one free parallel interface for system bus adapter (CAN)

Software:
  – Windows 95/98/Me/NT 4.0/2000/XP

3

Standard I/O

Standard I/O – can be used in the 8200 motec	Order no.	E82ZAFSC001

Tip: starttec is supplied with 5 integrated digital inputs and 4 integrated digital outputs.
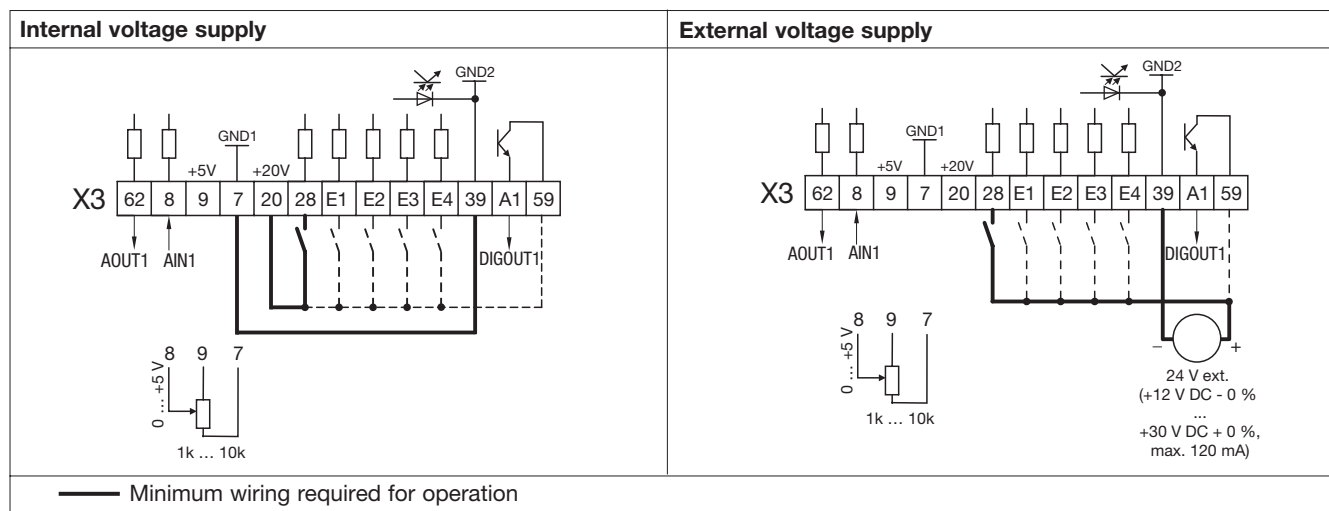
The Standard I/O I/O function module provides the inverter with digital input and outputs for complex applications.
The function module is mounted in the carrier housing of the 8200 motec.

Available I/O terminals

Analog IN	Analog OUT	Digital IN	Digital OUT
1	1	4 [1]	1

[1] Optional 0…10 kHz single-track (via I1) or 0…1 kHz two-track frequency input (via I1 and I2) 8200 motec E82MVxxx_xxxxxXXxxx2x or later

Terminal assignment

Minimum wiring required for operation

Standard I/O

X3	Signal type	Function (bold = Lenze setting)	Level			Technical data
8	Analog input	Actual or setpoint input	0 ... +5 V **0 ... +10 V** -10 V ... +10 V 0 ... +20 mA +4 ... +20 mA +4 ... +20 mA (monitored for open circuits)			Resolution: 10 bits Linearity error: ±0.5% Temperature error: 0.3% (0 ... +60°C) Input resistance – Voltage signal: > 50 kΩ – Current signal: 250 Ω
62	Analog output	**Output frequency**	0 ... +10 V			Resolution: 10 bits Linearity error: ±0.5% Temperature error: 0.3% (0 ... +60°C) Load capacity: max. 2 mA
28		Controller inhibit	1 = START			
I1 [1]		**Activation of fixed frequencies (JOG)**		I1	I2	
I2 [1]	Digital inputs	**JOG1 = 20 Hz**	JOG1	1	0	Input resistance: 3.3 kΩ
		JOG2 = 30 Hz	JOG2	0	1	1 = High (+12…+30 V)
		JOG3 = 40 Hz	JOG3	1	1	0 = Low (0…+3 V)
I3		**DC injection brake (DCB)**	1 = DCB active			
I4		**Change of direc. of rot.**		I4		(PLC level, HTL)
		Clock./count.-clock. rot.	CW	0		
		(CW/CCW)	CCW	1		
Q1	Digital output	**Ready for operation**	0 / +20 V on DC internal 0 / +24 V on DC external			Load capacity: 10 mA 50 mA
9	–	Internal, stabilised DC-Voltage source for-setpoint potentiometer	+5.2 V (reference: X3/7)			Load capacity: max. 10 mA
20	–	Internal DC voltage source for controlling digital inputs and outputs	+20 V ±10% (reference: X3/7)			Max. load capacity: ∑ I = 40 mA
59	–	DC supply for Q1	+20 V (internal, jumper to X3/20) +24 V (external)			
7	–	GND1, reference potential for analog signals	–			Isolated to GND2
39	–	GND2, reference potential for digital signals	–			Isolated to GND1

[1] Optional 0…10 kHz single-track (via I1) or 0…1 kHz two-track frequency
input (via I1 and I2) 8200 motec E82MVxxx_xxxxxXXxxx2x or later

Electrical connection	Screw terminals	
Connection options	Rigid: 1.5 mm² (AWG 16)	
	Flexible:	
	1.0 mm² (AWG 18)	without wire crimp cap
	0.5 mm² (AWG 20)	with wire crimp cap without plastic crimp cap
	0.5 mm² (AWG 20)	with wire crimp cap with plastic crimp cap

3

Application I/O

Application I/O – can be used in the 8200 motec	Order no.	E82ZAFAC001

Tip: starttec is supplied with 5 integrated digital inputs and 4 integrated digital outputs.
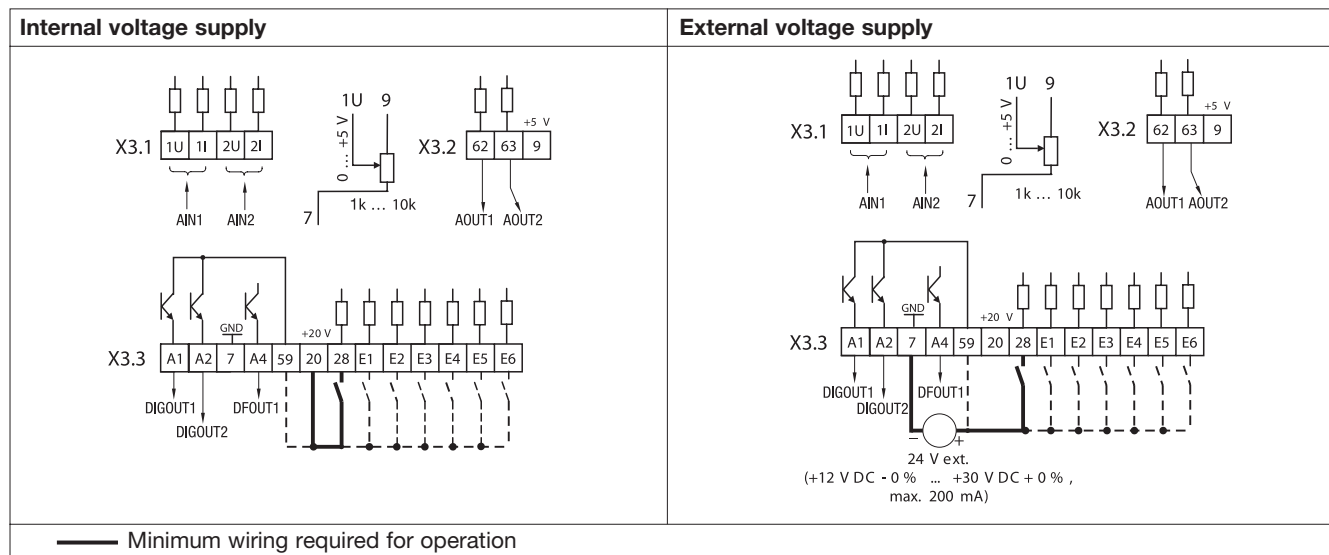
The Application I/O I/O function module provides the inverter with digital input and outputs for complex applications. The function module is mounted in the carrier housing of the 8200 motec.

Available I/O terminals

Analog IN	Analog OUT	Digital IN	Digital OUT	Frequency OUT
2	2	6 [1]	2	1

[1] Optionally includes 1 frequency input (0…102.4 kHz, single-track or two-track)

Terminal assignment

Internal voltage supply	External voltage supply
——— Minimum wiring required for operation	

Application I/O

X3	Signal type	Function (bold = Lenze setting)	Level			Technical data
1U/ 2U	Analog inputs	Actual or setpoint inputs (master reference voltage)	0 ... +5 V **0 ... +10 V** -10 V ... +10 V			Resolution: 10 bits Linearity error: ±0.5%
1I/2I		Actual or setpoint inputs (master reference current)	0 ... +20 mA +4 ... +20 mA +4 ... +20 mA (monitored for open circuits)			Input resistance – Voltage signal: > 50 kΩ – Current signal: 250 Ω
62	Analog outputs	**Output frequency**	**0 ... +10 V** 0 ... +20 mA +4 ... +20 mA			Resolution: 10 bits Linearity error: ±0.5% Temperature error: 0.6% (0 ... +60°C)
63		**Motors current**				Load capacity: (0...+10 V): max. 2 mA RL (0/4...20 mA) ≤ 500 Ω
28		Controller inhibit	1 = START			
I1 [1]		**Activation of fixed frequencies (JOG)**		I1	I2	
I2 [1]	Digital inputs	**JOG1 = 20 Hz**	JOG1	1	0	Input resistance: 3.2 kΩ
		JOG2 = 30 Hz	JOG2	0	1	1 = High (+12…+30 V)
		JOG3 = 40 Hz	JOG3	1	1	0 = Low (0…+3 V)
I3		**DC injection brake (DCB)**	1 = DCB active			
I4		**Change of direct. of rot.**		I4		(PLC level, HTL)
		Clock./count.-clock. rot.	CW	0		
		(CW/CCW)	CCW	1		
I5		**Not predefined**	–			
I6		**Not predefined**	–			
A1	Digital outputs	**Ready for operation**	0/+20 V on DC internal 0 / +24 V on DC external			Load capacity: 10 mA
A2		**Not predefined**				50 mA
A4	Frequency-output	**DC bus-voltage**	HIGH: +18 V ... +24 V (HTL) LOW: 0 V			0.05 kHz ...10 kHz Load capacity: max. 8 mA
9	–	Internal, stabilised DC-Voltage source for setpoint potentiometer	+5.2 V			Load capacity: max. 5 mA
20	–	Internal DC voltage source for controlling digital inputs and outputs	+20 V ±10%			Load capacity: max. 60 mA
59	–	DC supply for X3/A1 and X3/Q2	+20 V (internal, jumper to X3/20) +24 V (external)			
7	–	GND, Reference potential	–			

[1] Optionally includes frequency input 0 … 102.4 kHz, single-track or two-track

Electrical connection	Screw terminals	
Connection options		Rigid: 1.5 mm² (AWG 16)
		Flexible:
		1.0 mm² (AWG 18) without wire crimp cap
		0.5 mm² (AWG 20) with wire crimp cap without plastic crimp cap
		0.5 mm² (AWG 20) with wire crimp cap with plastic crimp cap

3

BUS I/O

BUS-I/O	– can be used in the 8200 motec 0.25-0.37 kW	Order no.	E82ZMFB001
	– can be used in the 8200 motec 0.55-2.2 kW	Order no.	E82ZAFB001
	– can be used in the 8200 motec 3.0-7.5 kW	Order no.	E82ZAFB201

Tip: starttec is supplied with 5 integrated digital inputs and 4 integrated digital outputs.

The BUS I/O I/O function module provides the inverter with digital input and outputs for standard applications. It can be used in conjunction with a fieldbus function module for fieldbus communication. The function module is mounted in the carrier housing of the 8200 motec.
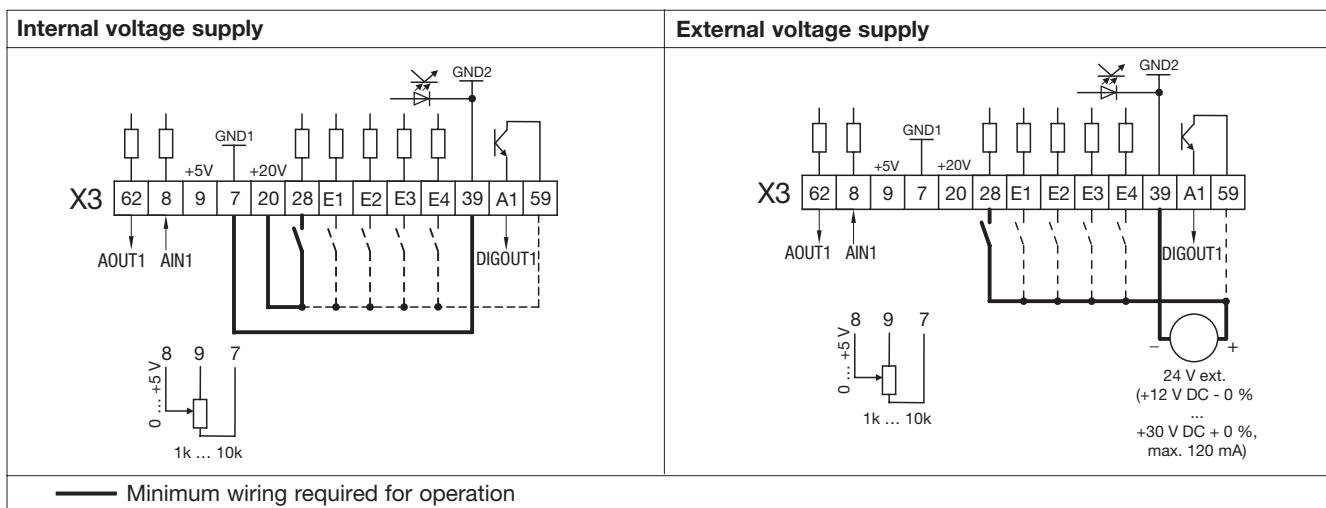
Note:
– On BUS I/O for 0.25/0.37 kW note the change in installation height (dimension b page 2-19)
– When ordering the BUS I/O always remember to select an additional fieldbus function module (page 3-18 et seqq.)

Available I/O terminals

Analog IN	Analog OUT	Digital IN	Digital OUT
1	1	4 [1]	1

[1] Optional 0…10 kHz single-track (via I1) or 0…1 kHz two-track frequency input (via I1 and I2) 8200 motec E82MVxxx_xxxxxxXXxxx2x or later

Terminal assignment

| Internal voltage supply | External voltage supply |

Minimum wiring required for operation

BUS I/O

X3	Signal type	Function (bold = Lenze setting)	Level			Technical data
8	Analog input	Actual or setpoint input	0 ... +5 V **0 ... +10 V** -10 V ... +10 V 0 ... +20 mA +4 ... +20 mA +4 ... +20 mA (monitored for open circuits)			Resolution: 10 bits Linearity error: ±0.5% Temperature error: 0.3% (0 ... +60°C) Input resistance – Voltage signal: > 50 kΩ – Current signal: 250 Ω
62	Analog output	**Output frequency**	0 ... +10 V			Resolution: 10 bits Linearity error: ±0.5% Temperature error: 0.3% (0 ... +60°C) Load capacity: max. 2 mA
28		Controller inhibit	1 = START			
I1 [1]		**Activation of fixed frequencies (JOG)**		I1	I2	
I2 [1]	Digital inputs	**JOG1 = 20 Hz**	JOG1	1	0	Input resistance: 3.3 kΩ
		JOG2 = 30 Hz	JOG2	0	1	1 = High (+12…+30 V)
		JOG3 = 40 Hz	JOG3	1	1	0 = Low (0…+3 V)
I3		**DC injection brake (DCB)**	1 = DCB active			
I4		**Change of direct. of rot.**		I4		(PLC level, HTL)
		Clock./count.-clock. rot.	CW	0		
		(CW/CCW)	CCW	1		
Q1	Digital output	**Ready for operation**	0 / +20 V on DC internal 0 / +24 V on DC external			Load capacity: 10 mA 50 mA
9	–	Internal, stabilised DC-Voltage source for setpoint potentiometer	+5.2 V (reference: X3/7)			Load capacity: max. 10 mA
20	–	Internal DC voltage source for controlling digital inputs and outputs	+20 V ±10% (reference: X3/7)			Max. load capacity: ∑ I = 40 mA
59	–	DC supply for Q1	+20 V (internal, jumper to X3/20) +24 V (external)			
7	–	GND1, reference potential for analog signals	–			Isolated to GND2
39	–	GND2, reference potential for digital signals	–			Isolated to GND1

[1] Optional 0…10 kHz single-track (via I1) or 0…1 kHz two-track frequency
input (via I1 and I2) 8200 motec E82MVxxx_xxxxxXXxxx2x or later

Electrical connection	Screw terminals	
Connection options	Rigid: 1.5 mm² (AWG 16)	
	Flexible:	
	1.0 mm² (AWG 18)	without wire crimp cap
	0.5 mm² (AWG 20)	with wire crimp cap without plastic crimp cap
	0.5 mm² (AWG 20)	with wire crimp cap with plastic crimp cap

Use of E82ZMFB001
in 8200 motec 0.25-0.37 kW

Use of E82ZAFB001
in 8200 motec 0.55-2.2 kW

Use of E82ZAFB201
in 8200 motec 3.0-7.5 kW

3

Lenze

CAN (system bus)

		Order no.	E82ZAFCC001
CAN (system bus)– can be used in the 8200 motec – can be used in the starttec, (always in conjunction with the support frame for function module E71ZJ001)			

The CAN (system bus) fieldbus function module can be used to interface the 8200 motec and starttec with the CAN (Controller Area Network) serial communication system.

The function module enables the 8200 motec and starttec to perform additional functions, e.g.:
- Parameter preselection/remote parameter setting
- Data transfer between inverters
- Connection to external controllers (e.g. Drive PLC) and host systems
- Optional connection to
  - I/O system in IP20
    (see also page 3-39)
  - Keypads

Terminal assignment

X3/	Designation	Function	:Level
39	GND2	Reference potential 2 (only for X3/28)	
28	CINH	Controller inhibit	• Start = HIGH (+12 V ... +30 V) • Stop = LOW (0 V ... +3 V)
7	GND1	Reference potential 1	
LO	CAN-LOW	System bus LOW (data line)	
HI	CAN-HIGH	System bus HIGH (data line)	
20		Internal DC voltage source for controller inhibit (CINH) power supply	+ 20 V (reference: X3/7)

Controller inhibit (CINH) power supply via internal voltage source (X3/20)	Controller inhibit (CINH) power supply via external voltage source

CAN (system bus)

General data and operating conditions

Communication medium	DIN ISO 11898				
Communication profile	Similar to CANopen (CiA DS301)				
Network topology	Line (terminated at both ends with 120 Ω)				
System bus stations	Master or slave				
Max. no. of stations	63				
Baud rate [kbps]	20	50	125	250	500
Max. bus length [m] [1]	3910	1510	590	250	80
Number of logical process data channels	2				
Number of logical parameter data channels	2				
Electrical connection	Screw terminals				
Connection options	Rigid: 1.5 mm² (AWG 16)				
	Flexible: 1.0 mm² (AWG 18) without wire crimp cap 0.5 mm² (AWG 20) with wire crimp cap without plastic crimp cap 0.5 mm² (AWG 20) with wire crimp cap with plastic crimp cap				
DC voltage supply for function module	Internal				
Isolation voltage to reference earth/PE	50 V AC				
Ambient temperature	Operation: –20 ... +60ºC Transport: –25 ... +70ºC Storage: –25 ... +60ºC				
Climatic conditions	Class 3K3 to EN 50178 (no condensation, average relative humidity 85%)				

[1] You should be aware of the additional effect of the number of stations and the cable cross-section used on the maximum bus cable lengths.

Note:
Two bus terminating resistors (120 Ω) are included in the scope of supply.

Wiring notes
We recommend the following signal cable::

System bus cable specification	Total length up to 300 m	Total length up to 1000 m
Cable type	LIYCY 2 x 2 x 0.5 mm² (shielded twisted pairs)	CYPIMF 2 x 2 x 0.5 mm² (shielded twisted pairs)
Cable resistance	≤ 40 Ω/km	≤ 40 Ω/km
Capacitance per unit length	≤ 130 nF/km	≤ 60 nF/km
Connection	Pair 1 (white/brown): CAN LOW and CAN HIGH Pair 2 (green/yellow): CAN GND	

3

CAN I/O (system bus)

CAN I/O – can be used in the 8200 motec	Order no.	E82ZAFCC201

The CAN I/O (system bus) fieldbus function module can be used to interface the 8200 motec and starttec with the CAN (Controller Area Network) serial communication system.
The module has two freely programmable digital inputs. They can be used to activate the controller inhibit and two additional freely selectable signals via a digital signal.
The node address and the baud rate can also be preselected easily using DIP switches.
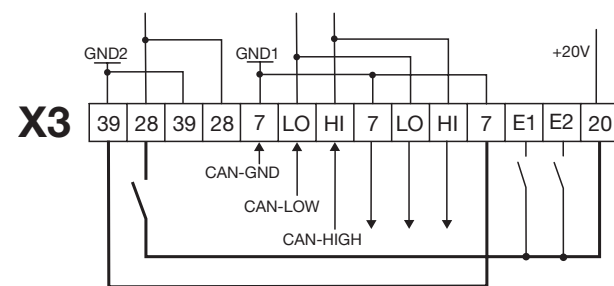
The function module enables the 8200 motec to perform additional functions, e.g.:
• Parameter preselection/remote parameter setting
• Data transfer between inverters
• Connection to external controllers (e.g. Drive PLC) and host systems
• Optional connection to
  – I/O system in IP20 (see also page 3-39)
  – Keypads

X3/	Designation	Function	:Level
39	GND2	Reference potential 2 for controller inhibit (CINH) at X3/28	
28	CINH	Controller inhibit	• Start = HIGH (+12 V ... +30 V) • Stop = LOW (0 V ... +3 V)
7	GND1	Reference potential 1	
LO	CAN-LOW	System bus LOW (data line)	
HI	CAN-HIGH	System bus HIGH (data line)	
I1	Digital inputs	User-defined	0 = LOW (0 … +3 V) 1 = HIGH (+12 … +30 V) (reference: GND1)
I2			
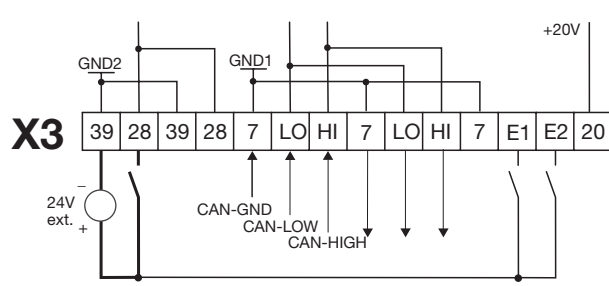
| Supply via internal voltage source (X3/20):	Supply via external voltage source:
• X3/28, controller inhibit (CINH) • X3/I1 and X3/I2, digital inputs	• X3/28, controller inhibit (CINH) • X3/I1 and X3/I2, digital inputs

Minimum wiring required for operation

Lenze

CAN I/O (system bus)

General data and operating conditions

Communication medium	DIN ISO 11898				
Communication profile	Similar to CANopen (CiA DS301)				
Network topology	Line (terminated at both ends with 120 Ω)				
System bus stations	Master or slave				
Max. no. of stations	63				
Baud rate [kbps]	20	50	125	250	500
Max. bus length [m] [1]	3910	1510	590	250	80
Number of logical process data channels	2				
Number of logical parameter data channels	2				
Electrical connection	Screw terminals				
Connection options	Rigid: 1.5 mm^2 (AWG 16)				
	Flexible: 1.0 mm^2 (AWG 18) without wire crimp cap 0.5 mm^2 (AWG 20) with wire crimp cap without plastic crimp cap 0.5 mm^2 (AWG 20) with wire crimp cap with plastic crimp cap				
DC voltage supply for function module	Internal				
Isolation voltage to reference earth/PE	50 V AC				
Ambient temperature	Operation: –20 ... +60ºC Transport: –25 ... +70ºC Storage: –25 ... +60ºC				
Climatic conditions	Class 3K3 to EN 50178 (no condensation, average relative humidity 85%)				

[1] You should be aware of the additional effect of the number of stations and the cable cross-section used on the maximum bus cable lengths.

Note:
Two bus terminating resistors (120 Ω) are included in the scope of supply.

Wiring notes
We recommend the following signal cable::

System bus cable specification	Total length up to 300 m	Total length up to 1000 m
Cable type	LIYCY 2 x 2 x 0.5 mm^2 (shielded twisted pairs)	CYPIMF 2 x 2 x 0.5 mm^2 (shielded twisted pairs)
Cable resistance	≤ 40 Ω/km	≤ 40 Ω/km
Capacitance per unit length	≤ 130 nF/km	≤ 60 nF/km
Connection	Pair 1 (white/brown): CAN LOW and CAN HIGH Pair 2 (green/yellow): CAN GND	

3

PROFIBUS-DP

PROFIBUS DP – can be used in the 8200 motec – can be used in the starttec (always in conjunction with the support frame for function modules E71ZJ001)	Order no.	E82ZAFPC001

The PROFIBUS-DP function module is a slave connection module with the PROFIBUS-DP communication profile.
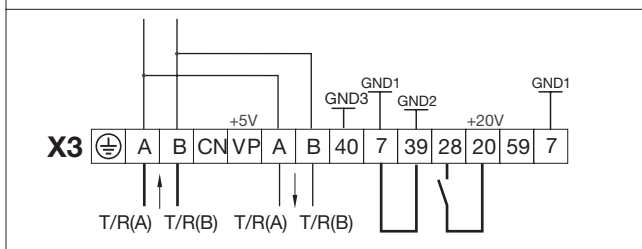
It is used for networking between the host and 8200 motec/starttec.

Terminal assignment
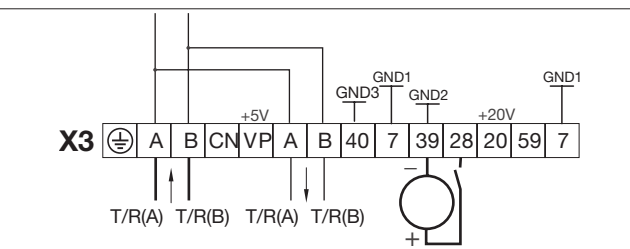
| X3/	Designation	Function	:Level
⏚	PES	Additional HF screen termination	
A	T/R(A)	RS485 data line A	
B	T/R(B)	RS485 data line B	
CN	CNTR	see PROFIBUS-DP standard [1]	When sending data: CNTR = HIGH (+5 V, reference: GND3)
VP		see PROFIBUS-DP standard [1]	+5 V (reference: GND3)
40	GND3	Reference potential for PROFIBUS-DP network [1]	
7	GND1	Reference potential for X3/20	
39	GND2	Reference potential for contr. inhibit (CINH) on X3/28	
28	CINH	Controller inhibit	• Start = HIGH (+12 V ... +30 V) • Stop = LOW (0 ... +3 V)
20		DC voltage source for internal controller inhibit (CINH) power supply	+20 V (reference: GND1)
59		External DC power supply for function module	U(ext.) = +24 VDC ±10% (reference: GND1)

[1] e.g. connection of a repeater
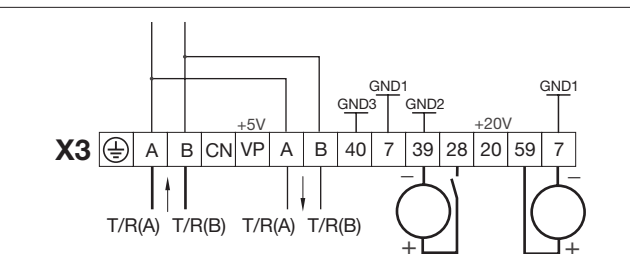
Controller inhibit (CINH) power supply via internal voltage source (X3/20)

Controller inhibit (CINH) power supply via external voltage source

**Function module and controller inhibit (CINH) power supply via external voltage source**

—— Minimum wiring required for operation

PROFIBUS-DP

General data and operating conditions

Communication medium	RS485
Communication profile	PROFIBUS-DP (DIN 19245 Part 1 and Part 3)
Drive profile	DRIVECOM profile "Drive technology 20" [1] or Lenze device control
Baud rate [kbps]	9.6 ... 12000 (automatic detection)
PROFIBUS-DP participant	Slave
Network topology	Without repeaters: Line With repeaters: Line or tree
Process data words (PZD) (16 bits)	1 word... 10 words
DP user data length	Parameter channel (4 words) + process data words
No. of stations	Standard: 32 (= 1 bus segment) including control system With repeaters: 128 including control system and repeaters
Max. cable length per bus segment	1200 m (depending on baud rate and cable type used)

Communication time	• Sum of scan time and processing time in the
	  fieldbus participants. The times are independent of one another.
	• Processing time in the controller:
	  – Parameter data and process data are independent of each other
	  – Parameter data: Approx. 30 ms + 20 ms tolerance
	  – Process data: Approx. 3 ms + 2 ms tolerance

Electrical connection	Screw terminals
Connection options	Rigid: 1.5 mm² (AWG 16)
	Flexible: 1.0 mm² (AWG 18) without wire crimp cap 0.5 mm² (AWG 20) with wire crimp cap without plastic crimp cap 0.5 mm² (AWG 20) with wire crimp cap with plastic crimp cap

**DC voltage supply
for the function module**
	Internal
	• External
	  – Only required for bus devices which are to be disconnected from the
	    mains, but communication with the master is to be maintained
	  – Required for bus devices with activated bus terminating resistor,
	    which are to be disconnected from the mains, but the bus system is
	    to remain active
	  – Power is being provided via a separate power supply
	  – +24 VDC ± 10%, max. 80 mA per function module

Isolation voltage to reference earth/PE	50 V AC
Ambient temperature	Operation: –20 ... +60ºC Transport: –25 ... +70ºC Storage: –25 ... +60ºC
Climatic conditions	Class 3K3 to EN 50178 (no condensation, average relative humidity 85%)

[1] Not supported when using the fieldbus function module with
  starttec.

Note:
• Two LEDs are located on the function module to indicate the communication status.
• A configuration diskette for PROFIBUS-DP containing description files for the devices (EDS files) is included in the scope
  of supply.

Important:
The internal or external DC supply to the "controller inhibit" terminal (X3/28) is provided
independently of the internal or external DC supply to the function module.

Tip:
The external DC supply to the function module is provided via terminals X3/59 and X3/7.
The connection diagrams above indicate the internal DC supply to the function module as an alternative option.

3

INTERBUS

INTERBUS – can be used in the 8200 motec – can be used in the starttec (always in conjunction with the support frame for function modules E71ZJ001)	Order no.	E82ZAFIC001

The INTERBUS fieldbus function module is used to interface the 8200 motec and starttec directly with the remote bus. The 8200 motec interface supports DRIVECOM profile 20.
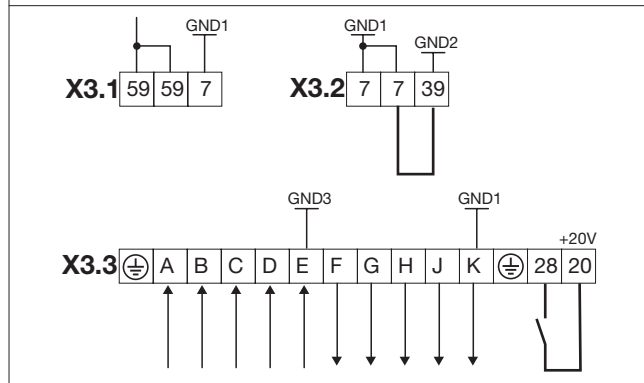
DIP switches are used to set the process data volume, PCP communication and the last physical bus station.

Terminal assignment
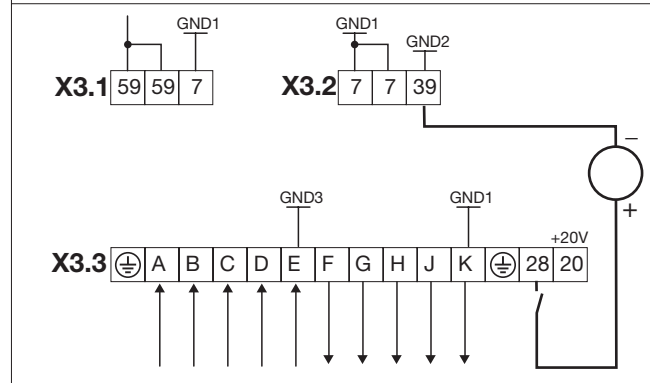
X3.1/	Designation	Function
59		External DC power supply for function module
7	GND1	Reference potential for X3.3/20
X3.2/		
7	GND1	Reference potential for X3.3/20
39	GND2	Reference potential for controller inhibit (CINH) on X3.3/28
X3.3/		
⏚	PES	Additional HF screen termination
A	/DO1	
B	DO1	RS485 data line (incoming)
C	/DI1	
D	DI1	

| X3.3/	Designation	Function
E	GND3	Reference potential for incoming data line
F	/DO2	
G	DO2	RS485 data line (outgoing)
H	/DI2	
J	DI2	
K	GND1	Reference potential for outgoing data line
⏚	PES	Additional HF screen termination
28	CINH	Controller inhibit • Start = HIGH (+12 V … +30 V) • Stop = LOW (0 … +3 V)
20		DC voltage supply for internal controller inhibit (CINH) power supply +20 V (reference: GND1)
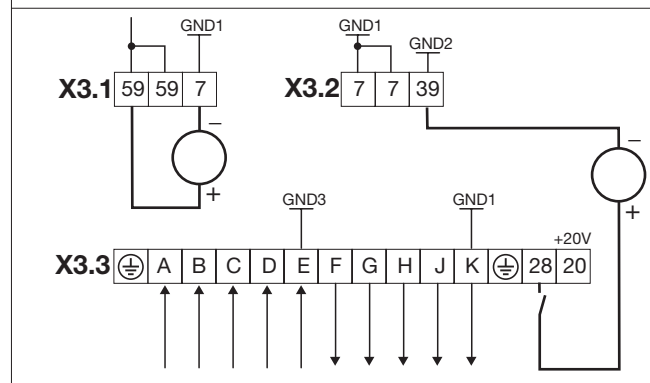
Controller inhibit (CINH) power supply via internal voltage source (X3.3/20)

Controller inhibit (CINH) power supply via external voltage source

Function module and controller inhibit (CINH) power supply via external voltage source


—— Minimum wiring required for operation

Lenze

INTERBUS

General data and operating conditions

Communication medium	RS485
Drive profile	DRIVECOM profile "Drive technology 20" [1] or Lenze device control
Baud rate [kbps]	500
INTERBUS station	Slave
Network topology	Ring (go and return lines in the same bus cable)
Process data words (PZD) (16 bits)	1 word... 6 words
Parameter data words (PCP) (16 bits)	0/1 word
INTERBUS code (ID code)	Decimal: 227 or 3 (no PCP); hex: I3 or 3 (no PCP)
Maximum PDU length	64 bytes
PCP services supported	Initiate, Abort, Status, Identify, Get-OV-Long, Read, Write
No. of stations	Depends on the host system (I/O range), max. 63
Max. distance between 2 stations	400 m

Communication time	• Sum of scan time and processing time in the fieldbus stations. The times are independent of one another.
	• Processing time in the controller:
	  – Parameter data and process data are independent of each other
	  – Parameter data (PCP): Approx. 30 ms + 20 ms tolerance
	  – Process data: Approx. 3 ms + 2 ms tolerance

Electrical connection	Screw terminals
Connection options	Rigid: 1.5 mm² (AWG 16)
	Flexible: 1.0 mm² (AWG 18) without wire crimp cap 0.5 mm² (AWG 20) with wire crimp cap without plastic crimp cap 0.5 mm² (AWG 20) with wire crimp cap with plastic crimp cap

DC voltage supply for the function module	Internal
	• External,
	  – Only required if the communication ring must not be interrupted by a bus device being switched off or failing
	  – Power is being provided via a separate power supply
	  – +24 VDC ± 10%, max. 90 mA per function module
	  – X3/59 can be loaded with a maximum of 3A when the supply voltage is looped through to other bus devices

Isolation voltage to reference earth/PE	50 V AC
Ambient temperature	Operation: –20 ... +60ºC Transport: –25 ... +70ºC Storage: –25 ... +60ºC
Climatic conditions	Class 3K3 to EN 50178 (no condensation, average relative humidity 85%)

[1] Not supported when using the fieldbus function module with start-tec.

Note:
Two LEDs are located on the function module to indicate the communication status.

Important:
The internal or external DC supply to the "controller inhibit" terminal (X3/28) is provided **independently** of the internal or external DC supply to the function module.

Tip:
The external DC supply to the function module is provided via terminals X3/59 and X3/7 (see connection diagrams above).

LECOM-B (RS485)

| LECOM-B (RS485) – can be used in the 8200 motec – can be used in the starttec (always in conjunction with support frame for function modules E71ZJ001)	Order no.	E82ZAFLC001
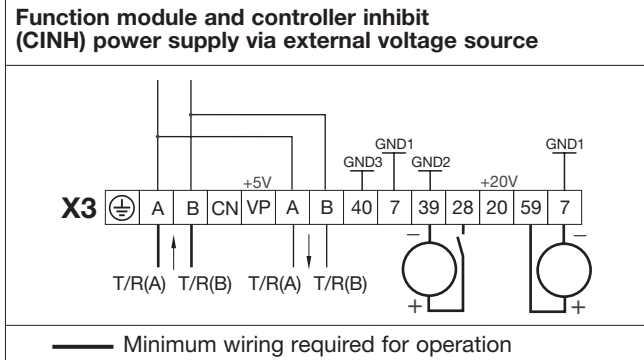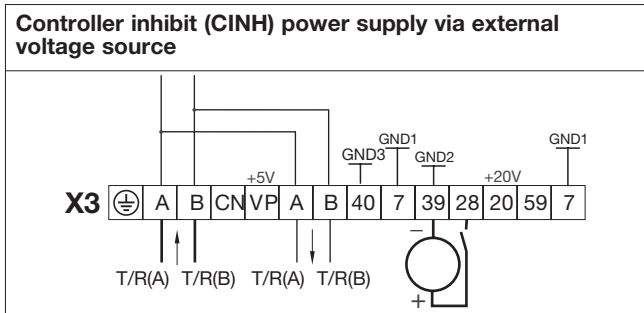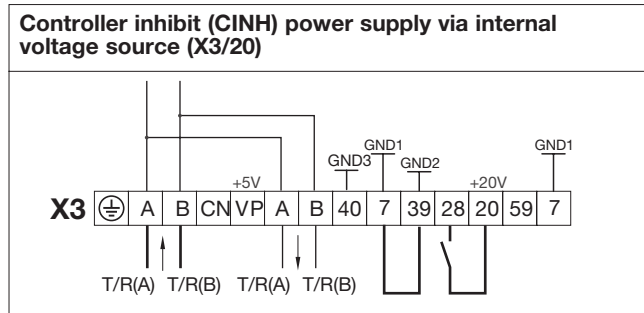
Communication via the function module LECOM-B (RS485) uses the Lenze LECOM protocol. This protocol is open to the user.

Components which support this protocol are available for various systems (e.g. Simatic S5).

Terminal assignment

X3/	Designation	Function	:Level
⏚	PES	Additional HF screen termination	
A	T/R(A)	RS485 data line A	
B	T/R(B)	RS485 data line B	
CN	CNTR	[1]	When sending data: CNTR = HIGH (+5 V, reference: GND3)
VP		[1]	+5 V (reference: GND3)
40	GND3	Reference potential 3 for LECOM-B network[1]	
7	GND1	Reference potential 1	
39	GND2	Reference potential 2 for controller inhibit (CINH) on X3/28	
28	CINH	Controller inhibit	• Start = HIGH (+12 V ... +30 V) • Stop = LOW (0 … +3 V)
20		DC voltage source for internal controller inhibit (CINH) power supply	+20 V (reference: GND1)
59		External DC power supply for function module	U(ext.) = +24 VDC ±10% (reference: GND1)

[1] e.g. connection of a repeater

Controller inhibit (CINH) power supply via internal voltage source (X3/20)

Controller inhibit (CINH) power supply via external voltage source

Function module and controller inhibit (CINH) power supply via external voltage source

—— Minimum wiring required for operation

LECOM-B (RS485)

General data and operating conditions

Communication medium	RS485 (LECOM-B)
Communication protocol	LECOM-AB V2.0
Transfer character format	7E1: 7 Bit ASCII, 1 stop bit, 1 start bit, 1 parity bit (even)
Baud rate [bps]	1200, 2400, 4800, 9600, 19200, 38400, 57600
LECOM-B station	Slave
Network topology	Without repeaters: Line With repeaters: Line or tree
Process data words (PZD) (16 bits)	2 words
Max. no. of stations	Standard: 32 (= 1 bus segment) including control system With repeaters: 90 slaves
Max. cable length per bus segment	1000 m (depending on baud rate and cable type used)
Electrical connection	Screw terminals
Connection options	Rigid: 1.5 mm² (AWG 16)
	Flexible: 1.0 mm² (AWG 18) without wire crimp cap 0.5 mm² (AWG 20) with wire crimp cap without plastic crimp cap 0.5 mm² (AWG 20) with wire crimp cap with plastic crimp cap
DC voltage supply for the function module	Internal • External – Only required for bus stations which are to be disconnected from the mains, but communication with the master is to be maintained – Required for bus devices with activated bus terminating resistor, which are to be disconnected from the mains, but the bus system is to remain active – Power is being provided via a separate power supply – +24 VDC ± 10%, max. 70 mA per function module
Isolation voltage to reference earth/PE	50 V AC
Ambient temperature	Operation: –20 ... +60°C Transport: –25 ... +70°C Storage: –25 ... +60°C
Climatic conditions	Class 3K3 to EN 50178 (no condensation, average relative humidity 85%)

Note:
Two LEDs are located on the function module to indicate the communication status.

Important:
The internal or external DC supply to the "controller inhibit" terminal (X3/28) is provided **independently** of the internal or external DC supply to the function module.

Tip:
The external DC supply to the function module is provided via terminals X3/59 and X3/7.
The connection diagrams above indicate the internal DC supply to the function module as an alternative option.

AS-interface

AS-interface – can be used in the 8200 motec		Order no.	E82ZAFFC001
	The option for control via AS-interface is integrated into the following starttec products as standard.	Order no.	E71MM402F4A010
		Order no.	E71MM402F2A010
		Order no.	E71MM402F4A020
		Order no.	E71MM402F2A020

The AS-interface fieldbus function module enables the 8200 motec to be controlled with digital control signals via the "AS-interface" bus system. This function is featured in the starttec as an option. The "AS-interface" (AS-i) bus system has established itself for use at the lowest field level, particularly for digital signal transfer.
It is designed for applications that do not necessarily require powerful fieldbus systems, but do nonetheless need to exploit the advantages of serial communication.

The advantages of this system are:
• Easy to use and to set up
• Less wiring required
• Easy to integrate into existing systems
• Cost reductions

Terminal assignment for the E82ZAFL001 function module

X3.1/	Wire colour (IEC 757)	Function
+	BN (brown)	Please refer to the information included in the description of the AS-i system about the electrical connection of peripheral devices.
-	BU (blue)	

X3.2/	Designation	Function	Level
7	GND	Reference potential for X3.2/20	
39		Reference potential for controller inhibit (CINH) on X3.2/28	
28	CINH	Controller inhibit	• Start = HIGH (+12 V ... +30 V) • Stop = LOW (0 … +3 V)
20		DC voltage source for internal controller inhibit (CINH) power supply	+20 V (reference: GND)

Controller inhibit (CINH) power supply Supply via internal voltage source (X3.2/20):	Controller inhibit (CINH) power supply via external voltage source

─── Minimum wiring required for operation

AS-interface

General data and operating conditions

Protocol/communication medium	AS-i
Network topology	Tree
Bus station	Slave
Max. no. of nodes	31
Baud rate [kbps]	167
Cycle time [ms]	5 ms (with 31 nodes)
Max. bus length [m]	100
Electrical connection (terminal strip X3)	Screw terminals
Connection options (terminal strip X3.2)	Rigid: 1.5 mm² (AWG 16)
	Flexible: 1.0 mm² (AWG 18) without wire crimp cap 0.5 mm² (AWG 20) with wire crimp cap without plastic crimp cap 0.5 mm² (AWG 20) with wire crimp cap with plastic crimp cap
Connection options (terminal strip X3.1)	1.5 mm² (AWG 16) with wire crimp cap with plastic crimp cap
DC voltage supply for the function module	Via the bus
Isolation voltage to reference earth/PE	50 V AC
Ambient temperature	Operation: –20 ... +60ºC Transport: –25 ... +70ºC Storage: –25 ... +60ºC
Climatic conditions	Class 3K3 to EN 50178 (no condensation, average relative humidity 85%)

3

Function module E82ZAFFC001
The following are available:
• 4 AS-i data bits from the 8200 motec (control)
The bits can be freely assigned on the 8200 motec.
Example:
– Bit 1 assigned with the function "Fixed setpoint value 1"
– Bit 2 assigned with the function Fixed setpoint value 2"
– Bit 3 assigned with the function "DC injection brake"
– Bit 4 assigned with the function "Change of direction of rotation"

Note: Two LEDs are located on the function module to indicate the communication status.

• 1 AS-i data bit from the 8200 motec (feedback)
The bit can be freely assigned in the 8200 motec, e.g. with a a trip error message.
• 1 AS-i monitoring bit from the AS-i module

starttec with integrated AS-interface
Slave profile   S-7.F (IO code: 7hex, ID code: Fhex)
Operating parameter Fhex

The following are available:
• 3 AS-i data bits from the starttec (control)
The bits can be freely assigned in the starttec.
Example:
– Bit 1 assigned with the function "starttec enable/disable 1"
– Bit 2 assigned with the function "Start/stop motor"
– Bit 3 assigned with the function "Release/apply brake"

• 2 AS-i data bits for the starttec (feedback)
The bits can be freely assigned in the starttec, e.g. with a trip error message.

Connecting the AS-i network cables
The network cables can be connected quickly and easily using AS-i flexible PCB (type E82ZMFF). The cables are fixed in place in a cable entry fitting in the carrier housing (M16).

AS-i flexible PCB connection (type E82ZMFF)

Lenze

Drive PLC – Description

Would you like to...

- Rationalise the electrical part of your machine?
- Have more transparent PLC programs?
- Ease the load on your bus system?
- Not have to keep learning new programming languages?
- Be able to implement drive-based control functions in the drive?
- Be able to use tried and tested systems for more complex drive solutions?

...then you should take a closer look at the Drive PLC.
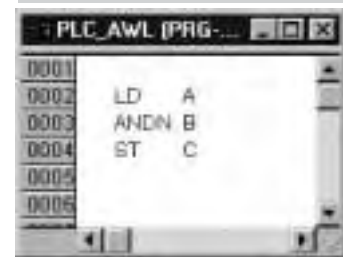
This is because the Drive PLC can offer:

- Programming in all five IEC 1131-3 programming languages along with a high-performance CFC editor to simplify graphic programming
- Continued complex drive technology solutions implemented via preconfigured technology functions
- The option of integrating the technology functions into the PLC program
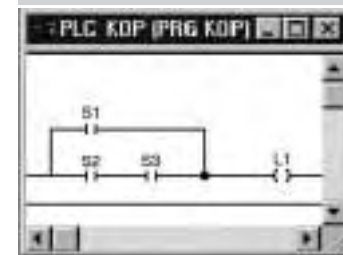
...and this is what you get:

- Distributed control of your machine
- The electrical part of the machine becomes more cost-effective whilst maintaining the same level of performance
- Faster set-up times through the high-performance "Drive PLC Developer Studio" software development environment
- Increased availability due to the reduction in number of individual control components
- Less programming training required: IEC 61131-3 is an international standard
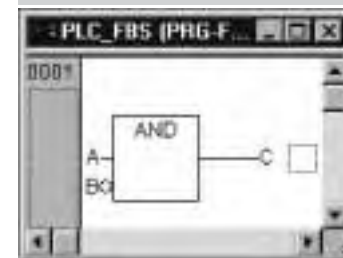
Instruction List
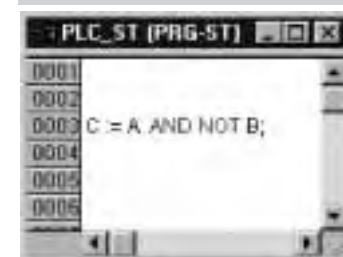
Ladder Diagram
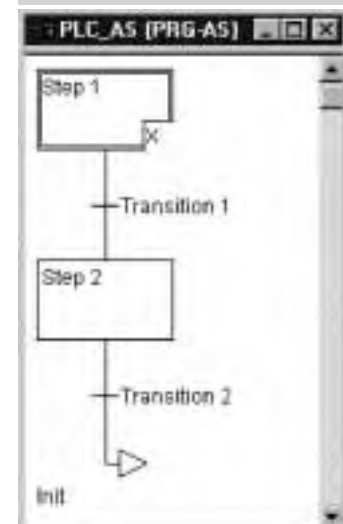
Function Block Diagram

Structured Text

Sequential Function Chart

Lenze

Drive PLC – Description

The Drive PLC adds a freely programmable PLC to the 8200 motec frequency inverter.
This combination will not only control movement in your machine, but can also manage the distributed control functions. The system is programmed using the PLC languages of the international standard IEC 61131-3 with the user-friendly Drive PLC Developer Studio software development environment. Please refer to the Lenze "Automation" catalog for further details.

Lenze can offer a full automation system for your application, ranging from the operating and display units (keypads) to the geared motors.
As an additional bonus, Lenze can now save you time by providing the software that brings your machines to life from the basic configurations and technology functions, using the IEC 61131-3 languages you are already familiar with.

Why a Drive PLC?

What benefits does the Drive PLC offer over a standard PLC?

• Reduction of parallel wiring and unnecessary terminals through an integrated system bus interface (CAN) to the 8200 motec frequency inverter
• Straightforward engineering through a special software library for simple integration of the 8200 motec into the PLC program
• Straightforward integration of the most varied fieldbuses through plug-on modules
• A cost-effective system with extensive basic functions
• No additional costs for gateway functions to higher-level bus systems such as INTERBUS or PROFIBUS

3

3

Drive PLC – Technical data

Conformity	CE	Low Voltage Directive (73/23/EEC)
Approvals	UL 508C	Underwriter Laboratories (File No. E132659) Power Conversion Equipment
Program memory	191 kB	
Data memory	9.5 kB (1.3 KB marker + 7 KB variables)	
EEprom buffered memory	800 bytes	
Residual memory	200 bytes	
Task types	1 cyclic task 8 tasks (time or event-controlled)	
Processing time for a bit operation	1.0 µs	
Number of counters/timers	Freely selectable in accordance with IEC 61131-3	
Digital inputs	8 (3 of which have interrupt capability)	
Extendable	Via extension board and distributed terminals	
Digital outputs	4 (1 A each up to 40°C, derating 2.5%/°C from 40°C…55°C)	
Extendable	Via extension board and distributed terminals	
Analog inputs	3 (± 10 V, 10 bits + sign)	
Analog outputs	1 (±10 V or ±20 mA, 10 bits + sign, ±0.5%)	
Communication interfaces	System bus (similar to CANopen) integrated	
	Plug-on communications modules (e.g. INTERBUS, PROFIBUS-DP)	
Dimensions (H x B x T) / [mm]	120 x 60 x 140	
Operational reserve	To IEC 1131	
Programming software	Drive PLC Developer Studio with IL, LD and ST programming languages, ST, AS, CFC, debugging and monitoring, visualisation	
Voltage supply	+18…30 VDC	
Current (at 24 VDC)	200 mA (without output loads)	

Designation	Order no.
Drive PLC	EPL-10200

Required components for programming:

Designation	Order no.
Drive PLC Developer Studio BASIC	ESP-DDS1-B
Drive PLC Developer Studio PROFESSIONAL	ESP-DDS1-P
PC system bus converter (voltage supply via keyboard with DIN connection)	EMF2173IB
PC system bus converter (voltage supply via keyboard with PS2 connection)	EMF2173IB-V002
RS232 system cable (0.5 m)	EWL0048
RS232 system cable (5.0 m)	EWL0020
RS232 system cable (10 m)	EWL0021

Note:
The Drive PLC is programmed on the PC via the system bus.

Drive PLC – Mechanical installation

- The devices must only be used as built-in units.
- If the exhaust air contains pollutants (dust, lint, grease, aggressive gases) then appropriate counter-measures must be in place. (e.g. installation of filters, regular cleaning etc.)
- Ensure there is enough mounting space.
  - Several units can be mounted directly adjacent to one another without clearance.
  - Make sure that there is free access for cooling air and that the outlet for used air is not blocked.
  - Ensure a clearance of 100 mm above and below.
- In the event of continuous oscillations or vibrations: Check the use of vibration dampers.
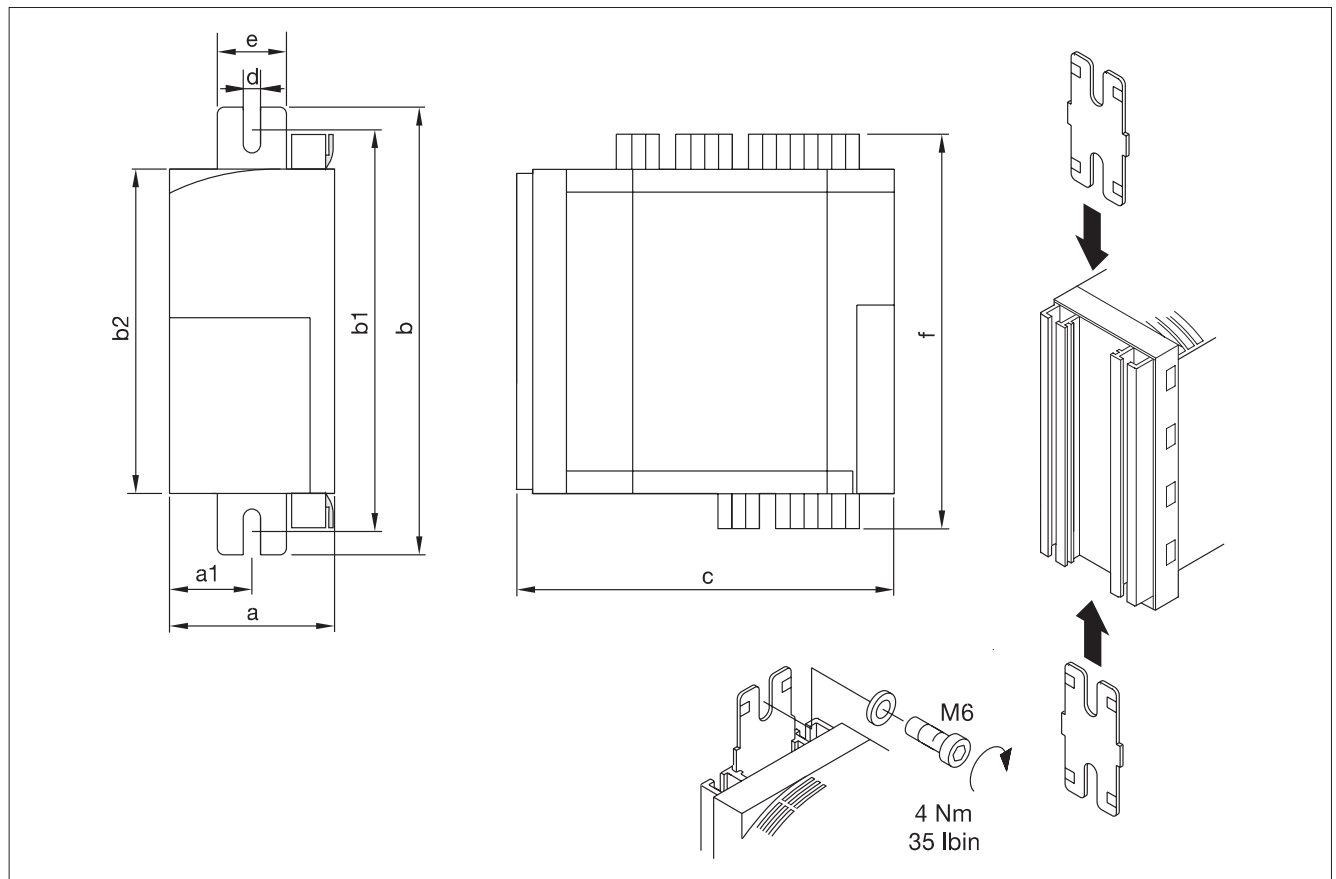
The Drive PLC can be fitted as follows into a control cabinet:

- With the **standard fixtures included in the** scope of supply
- With **swivel bracket** (accessories)
- With **DIN rail fixtures** (accessories)

Tip:
E82ZWEK (with bracket) or E82ZWES (with clamp) fixings can be used (accessories) for quick and easy installation.

Standard mounting

Dimensions [mm]								
a	a1	b	b1	b2	c	d	e	f
60	30	167	147...157	120	140	6.5	27.5	148
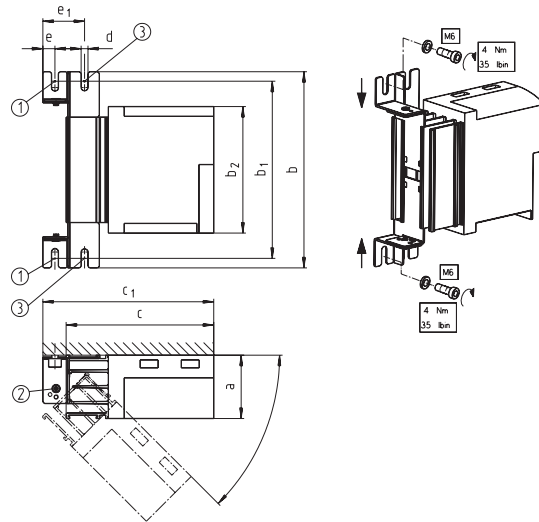
Drive PLC – Mechanical installation

Mounting with a swivel bracket/Side mounting
In housings where installation space is limited, the Drive PLC can be installed with a swivel mounting rail.

The Drive PLC can be swung out laterally by 90º for the purposes of installation, setting and diagnostics (locking mechanisms at 45°, 90°, 135°, 180°). The swivel bracket can also be used for fixed sideways mounting.

Schematic diagram
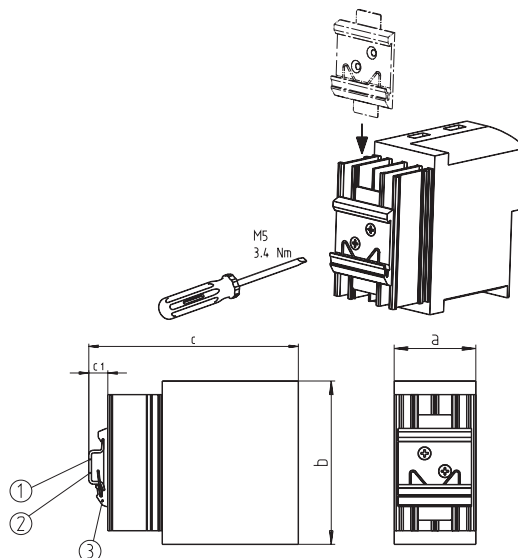
① Bolt here   ② Pivot point   ③ Bolt here to keep the Drive PLC fixed in the 0º position

Order no.	a [mm]	b [mm]	b_1 [mm]	b_2 [mm]	c [mm]	c_1 [mm]	d [mm]	e [mm]	e_1 [mm]
E82ZJ001	60	203	177...192	120	140	162	6.5	11.5	39

DIN rail fixtures

Schematic diagram

	a [mm]	b [mm]	c [mm]		c_1 [mm]	
Order no.			①	②	①	②
E82ZJ002	60	120	158	151	18	11
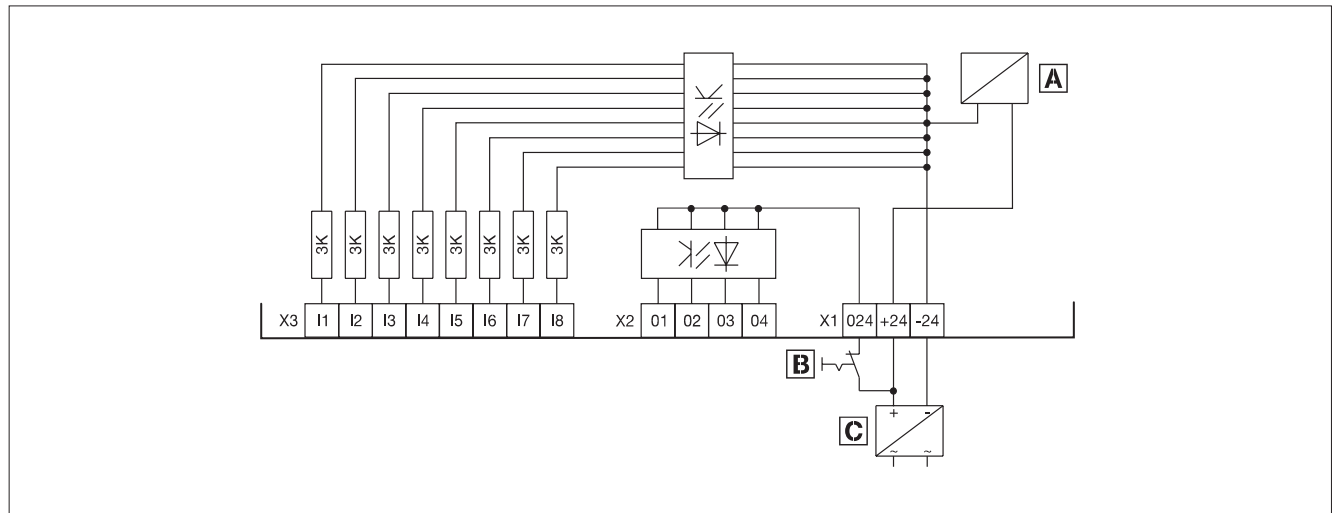
① DIN rail 35 x 15 or ② DIN rail 35 x 7.5 ③ DIN rail fixtures

Tip: The DIN rail fixture can be moved flexibly on the rear panel of the Drive PLC.

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Drive PLC – Electrical installation

Terminals on the upper side of the device

| A | Control electronics power supply | B | Emergency stop | C | External DC voltage source |
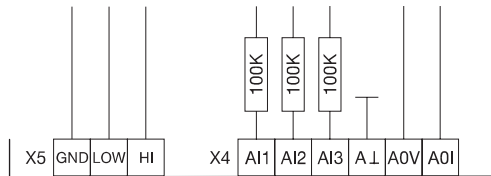
X1	Voltage supply	Level
⊥24	GND supply voltage	Reference potential
+24	Supply voltage	+18 . . . +30 V DC
+024	Supply voltage for digital outputs	+18 . . . +30 VDC

X2	Digital outputs	Level
01	Output 1	LOW level 0 . . . +4 V DC
:	:	HIGH level +13 . . . +30 V DC
04	Output 4	HIGH active max. 1 A (up to 40°C, derating 2.5%/°C from 40 °C…55 °C) Shortest update cycle 1 ms (depending on where the process image is created)

X3	Digital inputs	Level
I1	Input1	LOW level 0 . . . +4 V DC
:	:	HIGH level +13 . . . +30 V DC
I8	Input 8	Input current 8 mA at 24 VDC Shortest update cycle 1 ms (depending on where the process image is created)

3

Drive PLC – Electrical installation

Terminals on the underside of the device

X4	Analog I/O	Level
AI1	Analog input 1	
AI2	Analog input 2	± 10 V (10 bits + sign)
AI3	Analog input 3	
A⊥	Analog GND	Reference potential
A0V	Analog output voltage	± 10 V (10 bits + sign); ± 0.5%
A0i	Analog output current	± 20 mA (10 bits + sign); ± 0.5%

X5	System bus (CAN)	Level
GND		Reference potential
LOW	CAN-LOW	System bus LOW (data line)
HI	CAN-HIGH	System bus HIGH (data line)

3

Extension Board

The extension boards can be fitted sideways into the
Drive PLC. This makes extending the type and number of
I/O terminals quick and easy using this method.

Extension Board 1	Connections

For the connection of three-wire sensors and outputs for 24 V brake control	6 digital inputs,
	    LOW level: 0…+4 V DC
	    HIGH level: +13…+30 V DC

	4 digital outputs,
	    LOW level: 0…+4 V DC
	    HIGH level: +13…+30 V DC
	    Max. 1 A (up to 40°C, derating 2.5%/°C from 40 °C…55 °C)

	2 digital outputs,
	    LOW level: 0…+4 V DC
	    HIGH level: +13…+30 V DC
	    Max. 2 A (up to 40°C, derating 2.5%/°C from 40 °C…55 °C)
	    5 terminals each for +24 V DC and GND
	    (for three-wire sensors)

Extension Board 2	Connections

For the most cost-effective connection of digital sensors and actuators	14 digital inputs
	    LOW level: 0…+4 V DC
	    HIGH level: +13…+30 V DC

	8 digital outputs,
	    LOW level: 0…+4 V DC
	    HIGH level: +13…+30 V DC
	    Max. 1 A (up to 40°C, derating 2.5%/°C from 40 °C…55 °C)

Extension Board 3	Connections
For high-speed counting, length measurements and control technology applications	1 encoder input, TTL, HTL, 500 kHz, two-track with inverted signals and zero track

	8 digital inputs,
	    24 V potential-free
	    LOW level: 0…+4 V DC
	    HIGH level: +13…+30 V DC

	4 digital outputs,
	    LOW level: 0…+4 V DC
	    HIGH level: +13…+30 V DC
	    Max. 1 A (up to 40°C, derating 2.5%/°C from 40 °C…55 °C)

	2 analog inputs (± 10 V, 10 bits + sign)

| Designation	Order no.
Extension Board 1	**EPZ-10201**
Extension Board 2	**EPZ-10202**
Extension Board 3	**EPZ-10203**

Operating/Display units
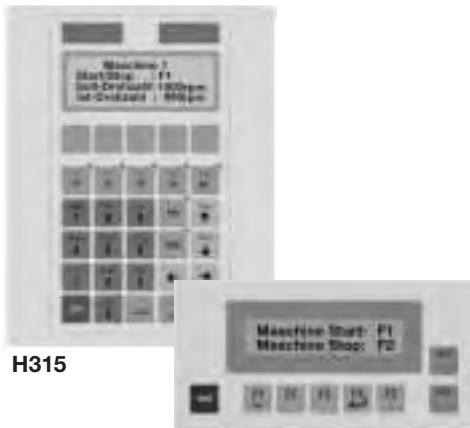
The task of improving the efficiency and effectiveness of the machines and systems we use today is never-ending. The ability to use complex machines easily and monitor them reliably is becoming an ever-increasing priority. Lenze can provide you with a comprehensive range of operating/display unit products ranging from text displays to graphical displays and beyond to touchscreen units.

Each type provides a multiplicity of functions, e.g.:
• Display of text, images, bar graphs, bitmap images and animated graphics
• Recipe handling
• Display of system and alarm messages
• Windows fonts
• Automatic operations
• Communication via Lenze system bus

Text displays
Text displays provide an affordable, compact solution for simple applications used for automating machines.
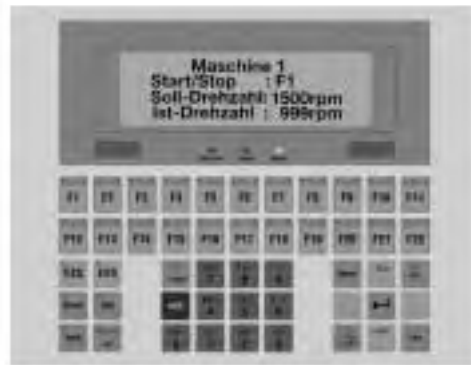
H315

H310

Graphical displays
The modern design of the graphical display combines cost-effectiveness, functionality and a high level of user-friendliness.

H410

Touchscreen
Based on the range of touchscreen products available, we can offer you screens ranging from an affordable entry-level screen right up to a 10.4" TFT screen with 256 colours.

H510

H520

Type	Order no.
Text, backlit LED LC display	**EPM-H310**
Text, backlit LED LC display	**EPM-H315**
Graphic, backlit LED LC display	**EPM-H410**
Touchscreen, LCD monochrome STN 5.5¨	**EPM-H510**
Touchscreen, LCD 256 colours TFT 10.4¨	**EPM-H520**

You will find more information about operating/display units in the Automation catalog.

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Lenze

I/O system in IP20

Automation is playing an ever more important part in machines and systems. The increasing number of I/O devices this has given rise to has in turn increased the amount of wiring required. This is where distributed I/O systems bring order to the chaos.

Lenze has developed two new product concepts which are suitable for both basic digital applications and more complex automation tasks.

The compact system

The system comprises a range of compact products with a fixed number of digital inputs and outputs.
It has a built-in communication interface in the form of the CAN-based Lenze system bus.

The modular system

Lenze can now provide a range of completely new I/O systems for complex automation applications. The range comprises three components: a gateway, electronic modules and a backplane bus.

The compact system is available in four different versions - one of which is bound to meet your exact application requirements.

8, 16 and 32-channel modules can be supplied in one or three-wire technology with up to 24 inputs and 8 outputs.

The modules have a SUB-D connector for the connection of the system bus, plug-in spring-clamp terminal strips to speed up the wiring process and a switch for the node address. The compact system offers maximum operational reliability, can be mounted quickly and easily on 35 mm DIN rails and is even easy to configure. All in all, this speeds up the commissioning.

The modular system is connected to the Lenze system bus via the gateway. An internal backplane bus is used for the intra-station communication of process and parameter data, as well as diagnostic data.

The electronics modules manage the actual I/O functions. Up to 32 units can be combined as required to form an overall station in which each module is optimised for the individual application in which it is to be used.
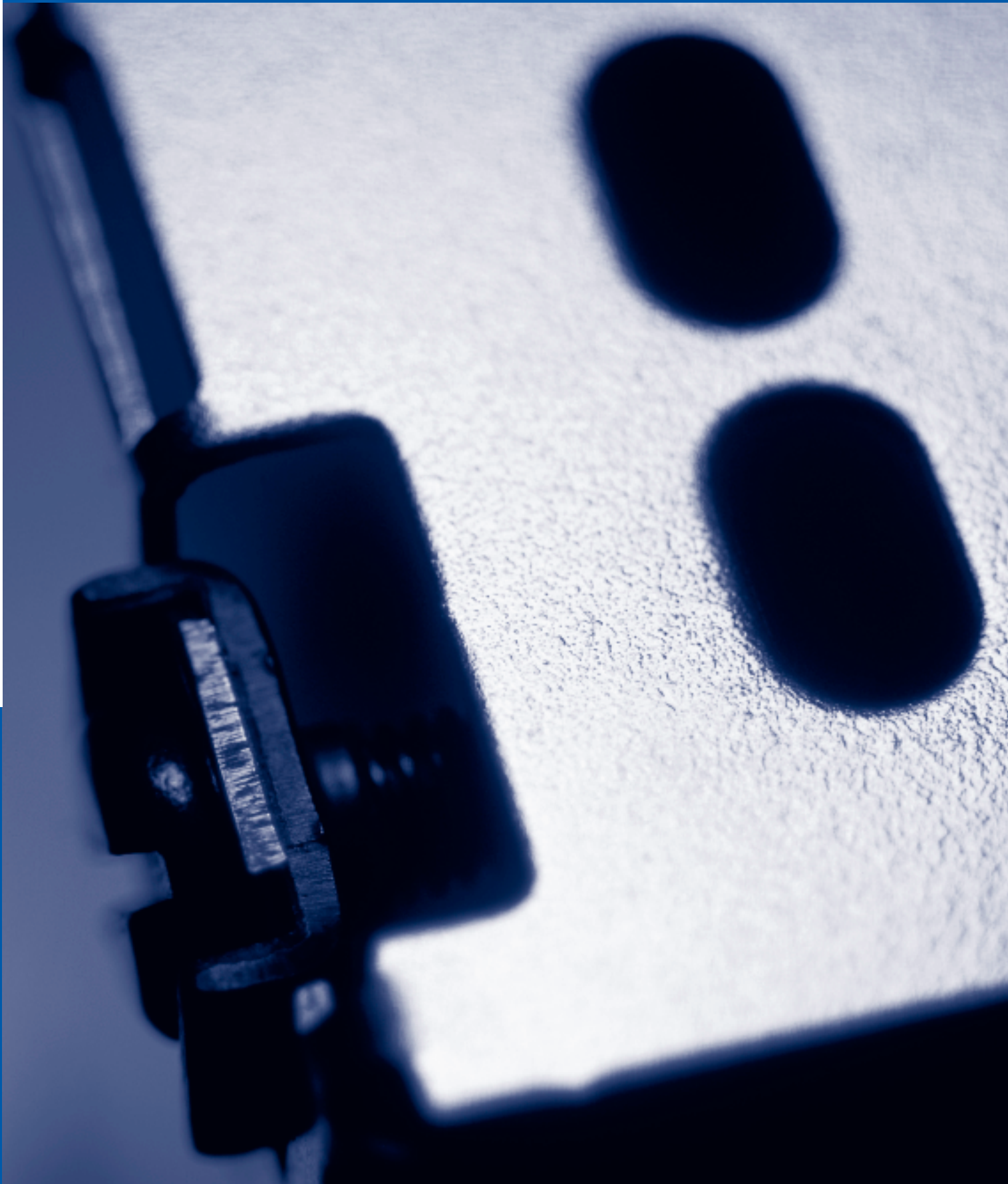
The electronics module range comprises the following modules:
• Digital input – 8 channels
• Digital output – 8 channels – 1 A-, 2 A
• Digital output – 4 channels - 5 A relay
• Digital I/O – 8 channels
• Analog input – 4 channels
• Analog output – 4 channels
• Counter – 1 MHz

Type	Order no.
8xdig. I/O compact	**EPM-T830** (3-wire)
16xdig. I/O compact	**EPM-T831** (1-wire) **EPM-T833** (3-wire)
32xdig. I/O compact	**EPM-T832** (1-wire)

Type	Order no.
CAN gateway	**EPM-T110**
8xdigital input	**EPM-T210**
8xdigital output 1A	**EPM-T220**
8xdigital output 2A	**EPM-T221**
4xrelay	**EPM-T222**
8xdigital input/output	**EPM-T230**
4xanalog input	**EPM-T310**
4xanalog output	**EPM-T320**
2/4xcounter	**EPM-T410**

You will find more information about the I/O system in the Automation catalog.

Accessories | 8200 motec starttec

4

Mains

Cable protection (fuses)
or
Cable protection (circuit breakers)

Cable protection (fuses)
or
Cable protection (circuit breakers)

Mains choke

Mains

Integrated mains bus connector options

24 V power supply

Mains bus connectors

Switch unit
Potentiometer unit

8200 vector frequency inverter

starttec motor starter

Support for function modules

Switch/Potentiometer unit

Fan module for wall mounting 3.0 – 7.5 kW

Brake rectifier

Integrated brake control

Brake resistors with high degree of protection

Adaptor plates for installation on third-party motors

Adaptor plates for installation on third-party motors

Motor

Motor

4

In addition to the 8200 motec and starttec, you will find numerous accessories for setting up distributed drive solutions.
Brake resistors with high degrees of protection for converting braking energy into heat are available for braking large loads and for dynamic applications.

A range of adaptor plates enables the 8200 motec and starttec to be combined with any type of motor. Spring-operated brakes can be supplied with power and control directly from the 8200 motec and starttec.

Fuses and cable cross-sections

Type	Normal operation (150% overload)					Operation with increased power rating (120% overload)				
	Fuse F1, F2, F3		Circuit breaker	Cable cross-section		Fuse F1, F2, F3		Circuit breaker	Cable cross-section	
	VDE	UL	VDE	mm^2	AWG	VDE	UL	VDE	mm^2	AWG
8200 motec										
E82MV251_2B	M 10A	10A	C 10A	1.0	18	M 10A	10A	C 10A	1.0	18
E82MV371_2B	M 10A	10A	C 10A	1.5	16	M 10A	10A	C 10A	1.5	16
E82MV551_4B	M 6A	5A	B 6A	1	18	M 6A	5A	B 6A	1	18
E82MV751_4B	M 6A	5A	B 6A	1	18	M 6A	5A	B 6A	1	18
E82MV152_4B	M 6A	5A	B 6A	1	18	M 10A	10A	B 10A	1.5	16
E82MV222_4B	M 10A	10A	B 10A	1.5	16	M 10A	10A	B 10A	1.5	16
E82MV302_4B	M 16A	15A	B 16A	2.5	14	M 16A	15A	B 16A	2.5	14
E82MV402_4B	M 20A	20A	B 20A	4.0	12	M 20A	20A	B 20A	4.0	12
E82MV552_4B	M 25A	25A	B 25A	4.0	10	M 32A	25A	B 32A	6.0	10
E82MV752_4B	M 32A	35A	B 32A	6.0	8	–	–	–	–	–
starttec										
E71MM402xxA	M25A	25A	B25A	4.0	10	–	–	–	–	–

Please observe national and regional regulations.

For operation in UL approved installations, use only UL approved cables,
fuses and fuse holders.
UL fuse: Voltage 240 V or 500...600 V,
tripping characteristic "H" or "K5"
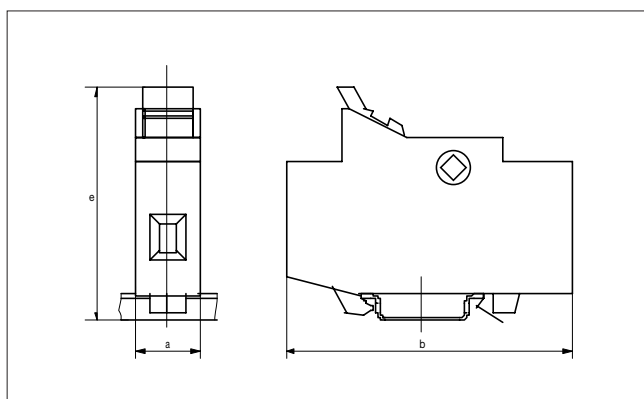
4

Cable protection (fuses) with corresponding holders.

Type	Fuse			Required quantity	Fuse holder	
	Rated current	Size	Order number		Order number	Required quantity
8200 motec						
E82MV251_2B	M 10A	10 x 38	EFSM-0100AWE	1	EFH10001	1
E82MV371_2B	M 10A	10 x 38	EFSM-0100AWE	1	EFH10001	1
E82MV551_4B	M 6A	10 x 38	EFSM-0060AWE	3	EFH10001	3
E82MV751_4B	M 6A	10 x 38	EFSM-0060AWE	3	EFH10001	3
E82MV152_4B	M 6A M 10A [1]	10 x 38	EFSM-0060AWE EFSM-0100AWE[1]	3	EFH10001	3
E82MV222_4B	M 10A	10 x 38	EFSM-0100AWE	3	EFH10001	3
E82MV302_4B	M 16A	10 x 38	EFSM-0160AWE	3	EFH10001	3
E82MV402_4B	M 20A	10 x 38	EFSM-0200AWE	3	EFH10001	3
E82MV552_4B	M 25A M 32A [1]	14 x 51	EFSM-0250AXH EFSM-0320AWH[1]	3	EFH10002	3
E82MV752_4B	M 32A	14 x 51	EFSM-0320AWH	3	EFH10002	3
starttec						
E71MM402xxA	M25A	14 x 51	EFSM_0250AXH	3	EFH10002	3

[1] Must be used when operating the system with increased power rating

Fuse holder dimensions

| Type	a [mm]	b [mm]	e [mm]	Fuse dimensions
EFH10001	17.5	81	68	10 x 38
EFH10002	26	81	68	14 x 51
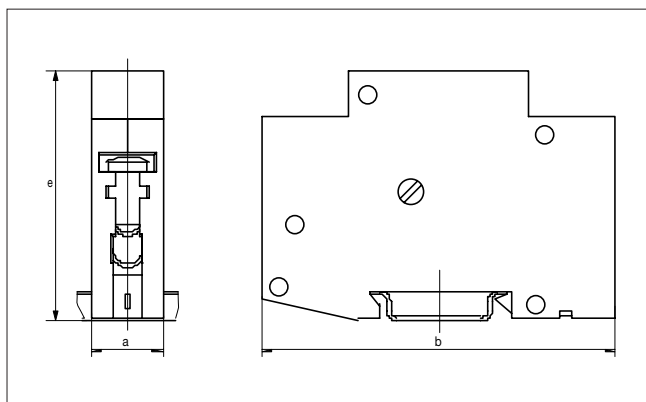
Cable protection (miniature circuit breakers)

| Type | Miniature circuit breakers | | | |
	Normal operation (150% overload)	Operation with increased rated power (120% overload)	Order number	Required quantity
8200 motec				
E82MV251_2B	C 10A	C 10A	EFA1C10A	1
E82MV371_2B	C 10A	C 10A	EFA1C10A	1
E82MV551_4B	B 6A	B 6A	EFA3B06A	1
E82MV751_4B	B 6A	B 6A	EFA3B06A	1
E82MV152_4B	B 6A	B 10A	EFA3B06A[1]	1
E82MV222_4B	B 10A	B 10A	EFA3B10A	1
E82MV302_4B	B 16A	B 16A	EFA3B16A	1
E82MV402_4B	B 20A	B 20A	EFA3B20A	1
E82MV552_4B	B 25A	B 32A	EFA3B25A[2]	1
E82MV752_4B	B 32A	–	EFA3B32A	1
starttec				
E71MM402xxA	B25A	–	EFA3B25A	1

[1] EFA3B10A must be used when operating the system with increased power rating
[2] EFA3B32A must be used when operating the system with increased power rating

Dimensions of miniature circuit breakers

EFA1xxxxA   EFA3BxxxA

Type	a [mm]	b [mm]	e [mm]
EFA1XXXXA	17.5	80	63
EFA3BXXXA	53	90	63

Mains chokes (EN61000-3-2)

European Standard EN 61000-3-2 specifies limits for harmonic currents in the mains supply. Non-linear consumers (e.g. frequency inverters) generate harmonic currents which "contaminate" the supply network and can therefore cause interference to other consumers. The aim of these standards is to secure the quality of **public** mains supply networks and to reduce loads on the mains supply.

The following mains choke assigned below must be used with the 8200 motec frequency inverters listed to ensure that they conform with the limits specified in EN 61000-3-2:

Important: This standard only applies to public mains supplies. Networks with their own transformer stations (as found commonly in industrial plants) do not fall under the public domain and are therefore **not** affected by this standard.
If more than one component (e.g. 8200 motec) is installed in a single device or piece of machinery, then the standard should only be applied to the **entire machine**.
Therefore the limits must be satisfied by any device which is to be connected to the mains supply.

| 8200 motec			Mains choke			
Type	**Voltage [V]**	**Power [kW]**	**Order no.**	**Inductance [mH]**	**In [A]**	**m [kg]**
E82MV251_2B	1 x 230	0.25	ELN1-0900H005	9.0	5.0	1.0
E82MV371_2B		0.37				
E82MV551_4B	3 x 400	0.55	EZN3A1500H003	15.0	2.5	0.5
E82MV751_4B		0.75				
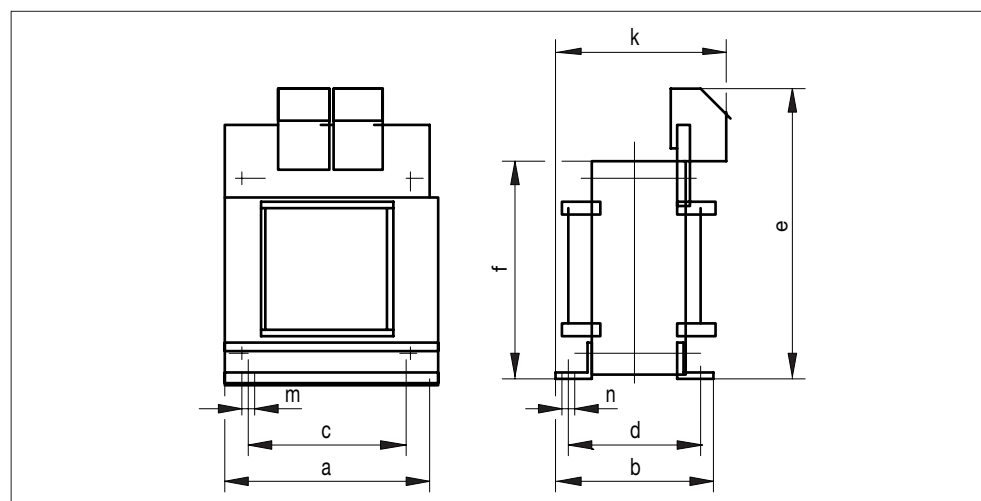
Please note:
– When using a mains choke, the maximum possible output voltage does not reach the value of the mains voltage – the typical mains voltage drop at the rated value is around 6%.
– 8200 motec frequency inverters are "professional devices in accordance with EN 61000-3-2" [1].

[1] Definition: "A device, designed for industrial use in certain professions or industries and not destined for general sale to the public. The application of the device must be specified by the manufacturer."

Dimensions of mains chokes

Mains choke	a [mm]	b [mm]	c [mm]	d [mm]	e [mm]	f [mm]	k [mm]	m [mm]	n [mm]
ELN1-0900H005	66	67	50	53	80	62	80	4.8	9
EZN3A1500H003	95	82	56	35	115	_	_	5	9

8200 motec – Braking operation with brake resistor

External brake resistors are required to brake high moments of inertia or for extended generator mode operation. Brake resistors convert mechanical braking energy into heat.

The brake transistor integrated in the 8200 motec connects the external brake resistor when the DC bus voltage exceeds a certain switching threshold. This prevents the frequency inverter from setting a pulse inhibit because of an overvoltage, which would cause the drive to coast to standstill. Braking is always controlled when using an external brake resistor.

Selection of brake resistors

The Lenze brake resistors recommended in the tables are appropriate for each frequency inverter (related to 150 % generative power. They are suitable for most applications. For special applications, e.g. centrifuges, materials handling systems etc., the suitable brake resistor must meet the following requirements:

Brake resistor	Application	
Criterion	With active load	With passive load
Continuous braking power [W]	$\geq P_{max} \cdot \eta_e \cdot \eta_m \cdot \dfrac{t_1}{t_{cycl}}$	$\geq \dfrac{P_{max} \cdot \eta_e \cdot \eta_m}{2} \cdot \dfrac{t_1}{t_{cycl}}$
Thermal capacity [Ws]	$\geq P_{max} \cdot \eta_e \cdot \eta_m \cdot t_1$	$\geq \dfrac{P_{max} \cdot \eta_e \cdot \eta_m}{2} \cdot t_1$
Resistance [Ω]	$R_{min} \leq R \leq \dfrac{U_{DC}^2}{P_{max} \cdot \eta_e \cdot \eta_m}$	

Active load	Can move by itself without any influence from the drive (e.g. materials handling systems, unwinders)
Passive load	Stops by itself without any influence from the drive (e.g. horizontal traversing drives, centrifuges, fans)
U_{DC} [V]	Threshold for brake transistor
P_{max} [W]	Maximum braking power defined by the application
η_e	Electrical efficiency (controller + motor) Guide values: 0.54 (0.25 kW) … 0.85 (11 kW)
η_m	Mechanical efficiency (gearbox, machine)
t_1 [s]	Braking time
t_{cycl} [s]	Cycle time = Time between two subsequent braking cycles (= t1 + break time)

The brake resistors for the 8200 motec are supplied with high degrees of protection so that they can be installed outside the control cabinet. This means that expensive cooling equipment does not have to be installed to dissipate consequential power loss from the control cabinet.

8200 motec – Braking operation with brake resistor

Rated data for the integrated brake transistor

Brake transistor		8200 motec, 230 V	
		E82MV 251_2B	E82MV 371_2B
Threshold U_{DC}	[V DC]	375	
Peak current ↑	[A DC]	0.85	
Max. continuous current	[A DC]	0.85	
Peak brake power at U_{DC}	[kW]	0.3	
Continuous braking power	[kW]	0.3	
Smallest permissible brake resistor R_{min}	[Ω]	470	
Power derating		40ºC < T < 60ºC: 2%/K 1000 m amsl < h < 4000 m amsl: 5%/1000 m	
Switch-on cycle		Max. 60 s peak brake power, then at least 60 s break	
Recommended Lenze brake resistor	Order no.	ERBM470R110W	
Enclosure of brake resistor		IP55	

Brake transistor		8200 motec, 400 V			
		E82MV551_4B	E82MV751_4B	E82MV152_4B	E82MV222_4B
Threshold U_{DC}	[V DC]	780			
Peak current ↑	[A DC]	1.8		4.0	
Max. continuous current	[A DC]	1.0		2.5	
Peak brake power at U_{DC}	[kW]	1.4		3.2	
Continuous braking power	[kW]	0.8		2.0	
Smallest permissible brake resistor	[Ω]	450		200	
Power derating		40ºC < T < 60ºC: 2%/K 1000 m amsl < h < 4000 m amsl: 5%/1000 m			
Switch-on cycle		Max. 60 s peak brake power, then at least 60 s break			
Recommended Lenze brake resistor [1]	Order no.	ERBM470R110W		ERBM240R220W	
Enclosure of brake resistor		IP55			

Brake transistor		8200 motec, 400 V			
		E82MV302_4B	E82MV402_4B	E82MV552_4B	E82MV752_4B
Threshold U_{DC}	[V DC]	780			
Peak current ↑	[A DC]	7.8	7.8	11.4	16.5
Max. continuous current	[A DC]	3.8	5.1	7.0	9.6
Peak brake power at U_{DC}	[kW]	6.1	6.1	8.9	12.9
Continuous braking power	[kW]	3.0	4.0	5.5	7.5
Smallest permissible brake resistor	[Ω]	100	100	68	47
Power derating		40ºC < T < 60ºC: 2%/K 1000 m amsl < h < 4000 m amsl: 5%/1000 m			
Switch-on cycle		Max. 60 s peak brake power, then at least 60 s break			
		E82MV302_4B	E82MV402_4B	E82MV552_4B	E82MV752_4B
Recommended Lenze brake resistor [1]	Order no.	ERBS180R350W	ERBS100R625W	ERBS100R625W	ERBS082R780W
Enclosure of brake resistor		IP65			

[1] The brake resistors are set to a switch-on cycle of 1:10 (max. 15 s braking, then at least 150 s recovery time)
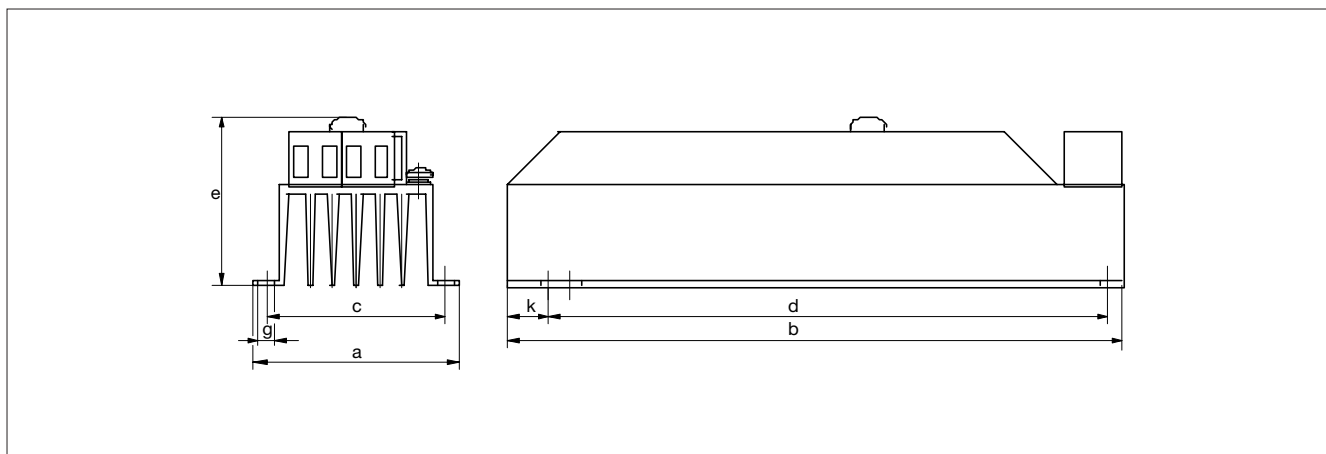
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8200 motec – Braking operation with brake resistor

Rated data for brake resistors

Order number	R	Braking power Peak	Duration	Thermal capacity	Switch-on cycle	Cable cross-section	
	[Ω]	[kW]	[kW]	[kWs]		[mm²]	AWG
ERBM470R110W	470	1.3	0.11	16.5	1:10 Max. 15 s braking at peak brake power, followed by at least 150 s recovery time	1.5	16
ERBM240R220W	240	2.5	0.22	33		1.5	16
ERBS180R350W	180	3.5	0.35	52.5		1.5	18
ERBS100R625W	100	6.25	0.625	93.75		1.5	18
ERBS082R780W	82	7.8	0.78	117		2.5	14

Note: The brake resistors are fitted with a thermostat (NC contact) as standard.
The product catalog for the 8200 vector frequency inverter contains more brake resistors with IP20 degree of protection.

Dimensions of brake resistors ERBM... (IP55)

**Note:** ERBM...(IP55) brake resistors are prefabricated with 2.5 m connecting cable
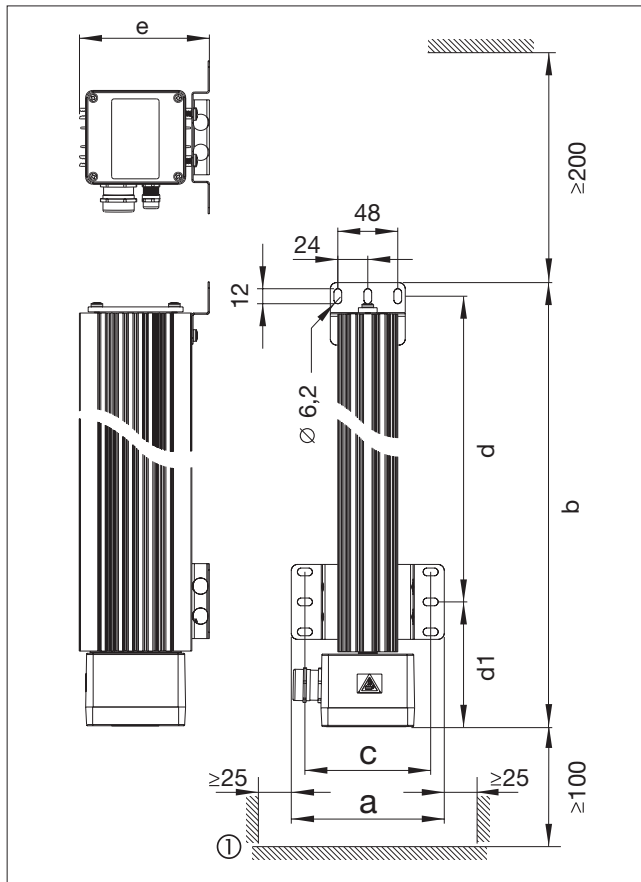
Brake resistor	a [mm]	b [mm]	c [mm]	d [mm]	e [mm]	g [mm]	k [mm]
ERBM470R110W	80	160	70	145	75	5	7.5
ERBM240R220W	80	340	70	325	75	5	7.5

Brake resistor ERBM... with integrated connecting cable in IP55

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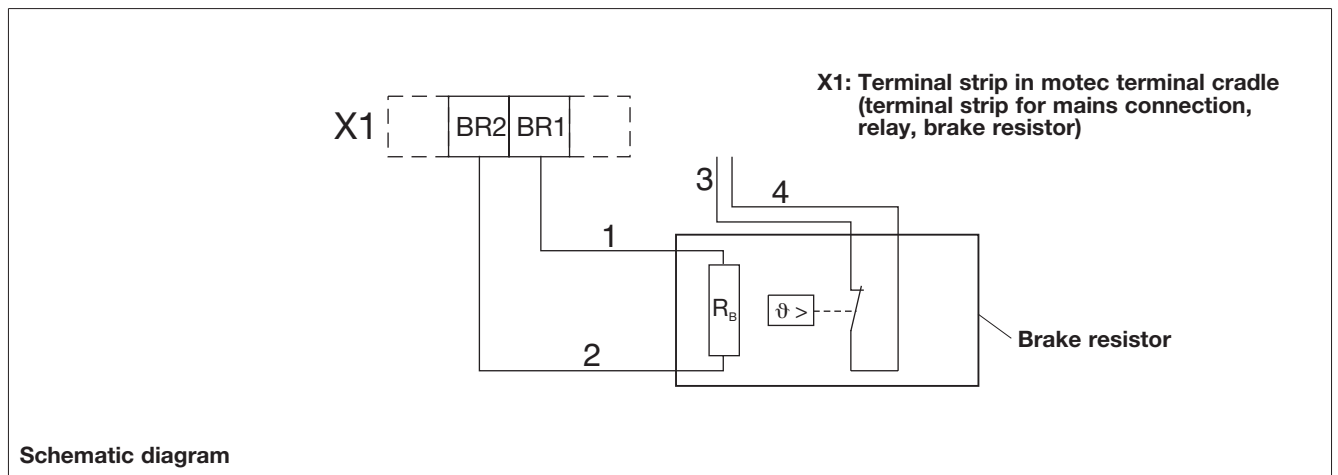
8200 motec – Braking operation with brake resistor

Dimensions of brake resistors ERBS...(IP65)

Brake resistor	[mm]						Weight [kg]
	a	b	c	d	d1	e	
ERBS082R780W	123	666	101	554	101	104	3.7
ERBS100R625W		566		454			3.2
ERBS180R350W		381		269			2.1

Connecting a brake resistor

X1: Terminal strip in motec terminal cradle (terminal strip for mains connection, relay, brake resistor)

Brake resistor

Schematic diagram

1, 2: Resistance

3, 4: Temperature monitoring (temperature switch/NC contact) to be integrated for example into the locking of the relevant mains supply protection

starttec – Braking operation with brake motors
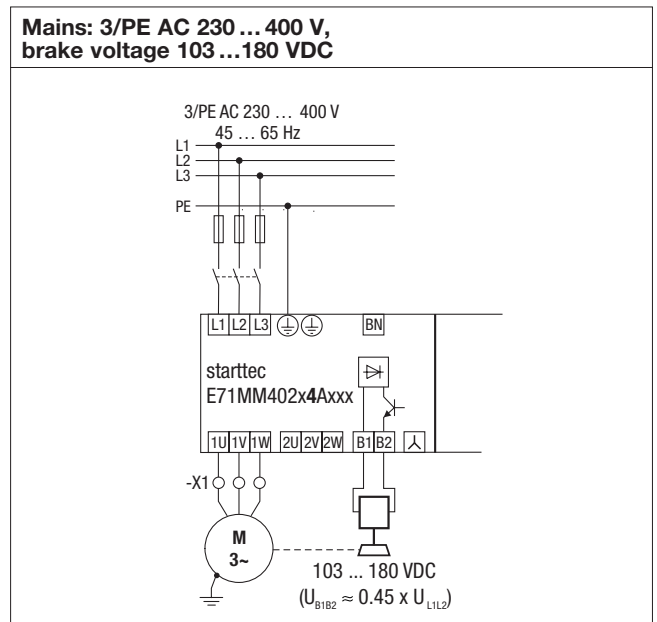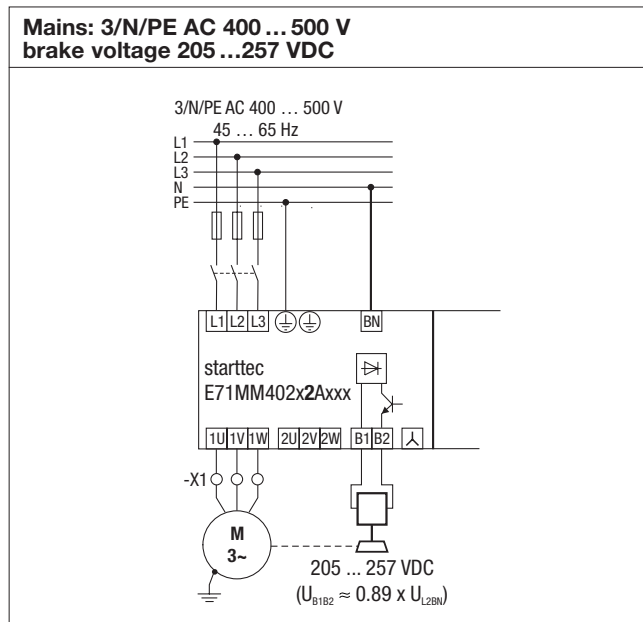
The starttec can be used to control a spring-operated brake without additional accessories. An electronic circuit breaker is integrated for this purpose. Depending on the type selected, the required brake voltage is generated via a half-wave rectifier or a full-wave rectifier. Examples of typical brake voltages in relation to the mains voltage and braking function are listed in the tables. The brake can be activated and deactivated via the starttec subject to a time delay.
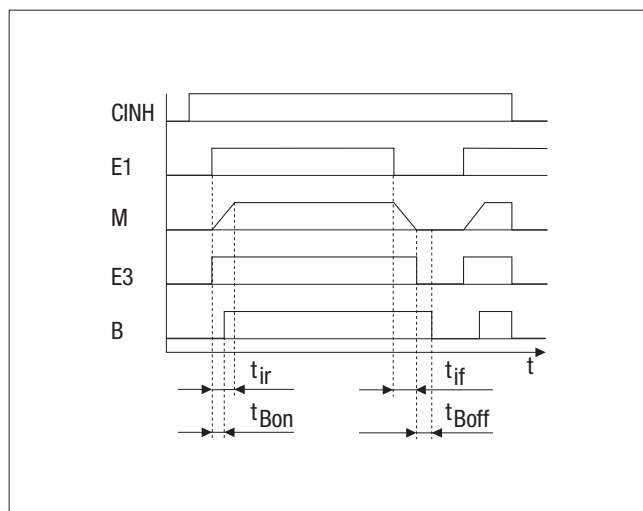
Mains voltage	starttec E71MM402x2Axxx	starttec E71MM402x4Axxx
	Brake voltage at B1, B2	
	$U_{B1B2} \sim 0.89 \times U_{L2BN}$	$U_{B1B2} \sim 0.45 \times U_{L1L2}$
3/PE AC 230 V	205 VDC	103 VDC
3(/N)/PE AC 400 V	205 VDC	180 VDC
3(/N)/PE AC 500 V	257 VDC	Operation not permitted

The brake voltage at B1, B2 is determined by the mains voltage.

Example connections: starttec with spring-operated brake

**Mains: 3/N/PE AC 400 … 500 V
brake voltage 205 … 257 VDC**

**Mains: 3/PE AC 230 … 400 V,
brake voltage 103 … 180 VDC**

**Configurable time delay for brake control
(operating principle)**

CINH	Enable starttec via X3/28
E1	Start motor 1
M	Voltage characteristic 1U, 1V, 1W (motor 1)
E3	Activation of the brake B1, B2
B	Brake voltage characteristic B1, B2
t_{ir}	Acceleration time
t_{if}	Deceleration time
t_{Bon}	Delay until brake released
t_{Boff}	Delay until brake locks

General features

Wiring terminals can be used to loop and wire mains cables
and control cables in the motec carrier housing.

Wiring terminal	Version	Area of application

Mains bus connector	• 2.5 mm^2 (0.25 - 0.37 kW, 230 V)
	  4 mm^2 (0.55 - 2.2 kW, 400 V)
	  4 mm^2 (3-0 -7.5 kW)
	  using Twin wire end
	  ferrules supplied by Phoenix
	  Contact AI-TWIN 2x4-12GY
	• Dimension a fuse for the cross-section used, ensuring confor-mance with applicable legislation.
		Looping and connecting of mains cables

Connection terminal fan	• 2 x 2.5 mm^2 (plug-in terminals)	Connect a separate fan for the motor with a fan power supply cable
System terminals	• 12 x 1.5 mm^2 (plug-in terminals) • 10 x 1.5 mm^2 (for motec 0.25/0.37 kW)	Looping and connecting of control cables

Mains bus connector E82ZWKN2 for use in
8200 motec 0.55 to 2.2 kW

Mains bus connector E82ZWKN2 for use in
8200 motec 0.25 to 0.37 kW

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Mains bus connectors

Mains bus connectors can be used to set up a "power bus", i.e. the supply voltage is "looped" in the 8200 motec frequency inverter terminal cradles.

8200 motec 0.25-2.2 kW

8200 motec		Mains bus connector	
Type	Mains current [A]	Max. rated current [A]	Order no.
0.25 kW, 230 V 0.37 kW, 230 V	3.4 5.0	16	E82ZWKN2
0.55 kW, 400 V 0.75 kW, 400 V 1.5 kW, 400 V 2.2 kW, 400 V	1.8 2.4 3.8 5.5	24	E82ZWKN4
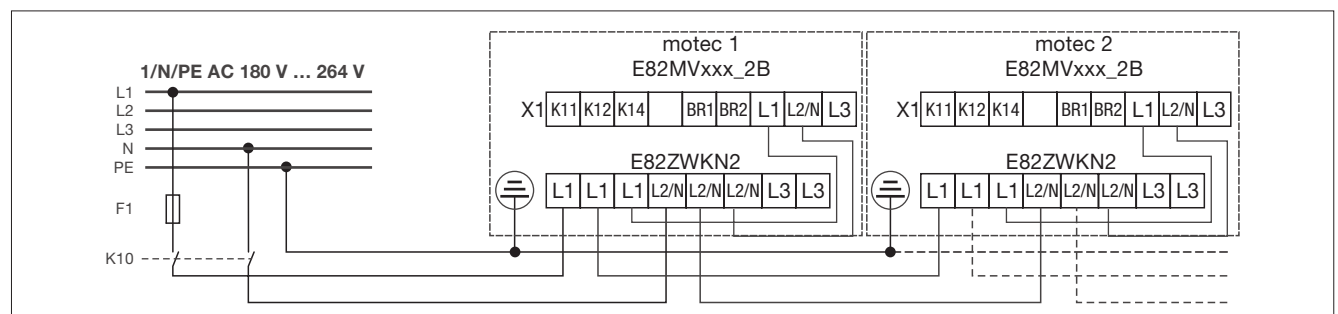
8200 motec 3.0-7.5 kW
The use of Twin wire end ferrules enables mains cables of up to 4 mm^2 to be "looped" directly on the terminal strips in the terminal cradle.
Order example for Twin wire end ferrules supplied by Phoenix Contact AI-TWIN 2x4-12GY.
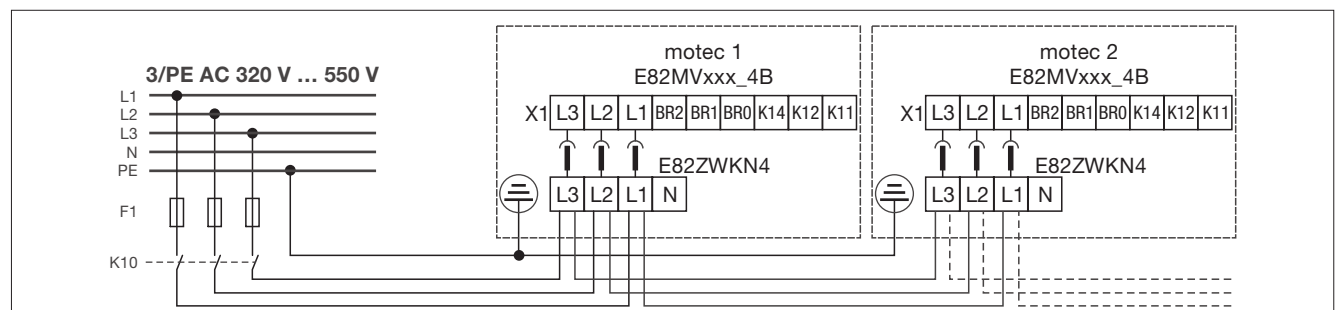
starttec
Mains cables of up to 4 mm^2 can be "looped" directly on the terminal strips in the terminal cradle.

Block diagram 8200 motec 1 ~ 230 V, 0.25...0.37 kW

Block diagram 8200 motec 3 ~ 400 V, 0.55...2.2 kW

Tip: When using mains contactors, current limiting modules can be used to reduce starting currents (see page 4-20).

A current limiting module reduces the current peak when the 8200 motec(s) is (are) started up on the mains supply.

Assignment

8200 motec	Mains contactor [kW] with current limiting module when connecting...						Current limiting measures
	1 motec	2 motec	3 motec	4 motec	5 motec	6 motec	
0.25 kW, 230 V 0.37 kW, 230 V	4 kW				–	–	Current limiting module Order no. E82ZJ004
0.55 kW, 400 V 0.75 kW, 400 V 1.5 kW, 400 V 2.2 kW, 400 V	4 kW	5.5 kW	7.5 kW	11 kW			Mains choke/filter Order no. EZN3A0150H024[1]

[1] E82ZJ004 also possible (use one module per phase)

Technical data
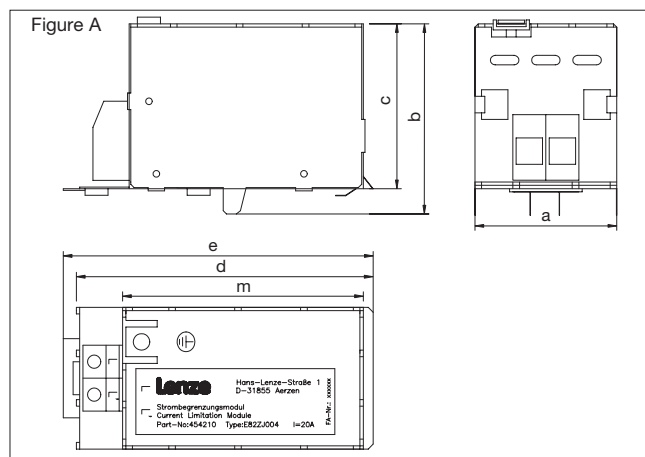
Order no.	I_N [A]	m [kg]
E82ZJ004[1]/current limiting module	20	0.13
EZN3A0150H024/mains choke/mains filter	24	8.2

[1] For DIN rail mounting to EN50022 35 x 7.5 and 35 x 15
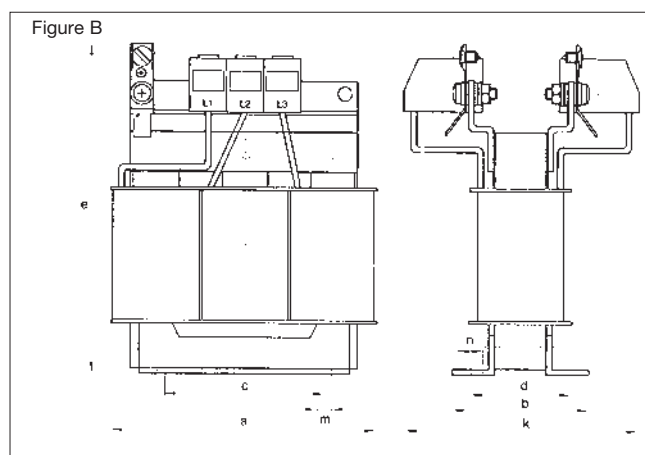
Dimensions

Order no.	Figure	a [mm]	b [mm]	c [mm]	d [mm]	e [mm]	m [mm]	n [mm]
E82ZJ004[1]/current limiting module	A	43	57	50	86	91	70	–
EZN3A0150H024/mains choke/mains filter	B	180	120	136	67	192	7	12

[1] For DIN rail mounting to EN50022 35 x 7.5 and 35 x 15

Figure A

Figure B

Current limiting module E82ZJ004

Mains choke/filter EZN3A0150H024

Lenze

E82ZMV fan module for 8200 motec 3.0-7.5 kW

| Fan module in IP54 protection	Order no.	E82ZMV
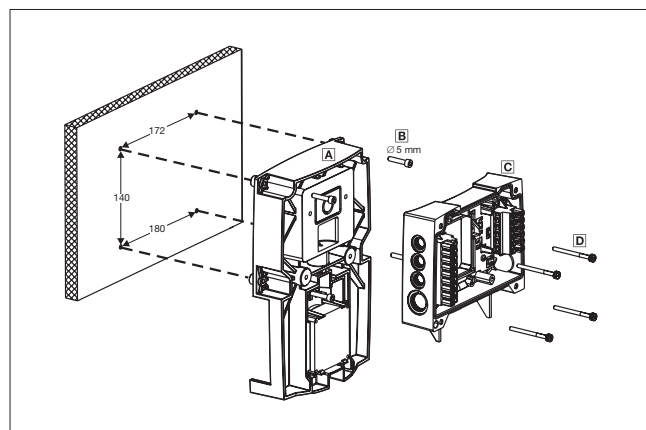
The E82ZMV fan module features an electronic fan with IP54 degree of protection which is powered directly from the 8200 motec.

The module is required for:
– Wall mounting of the 8200 motec 3.0-7.5 kW
– Non-Lenze motors/geared motors
– Self-ventilated Lenze motors/geared motors which operate without derating of the rated output current.
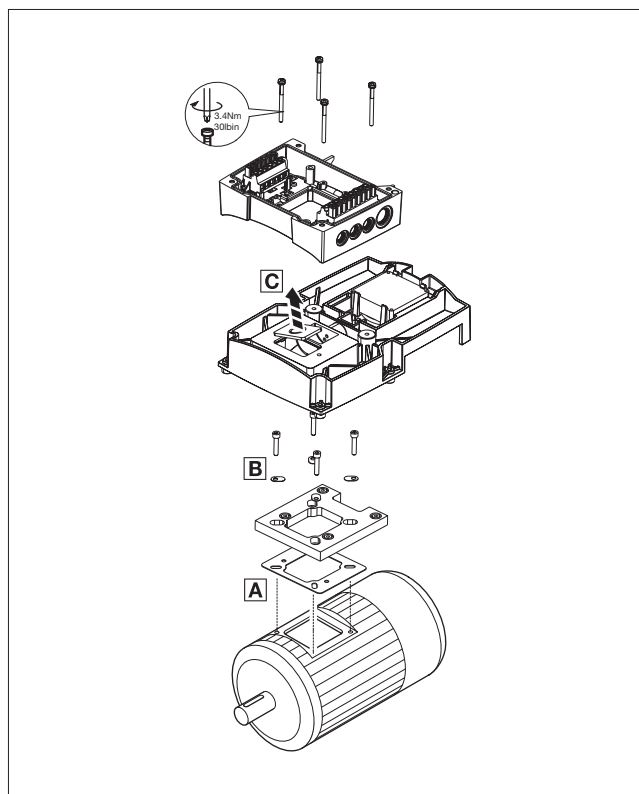
Assembly examples (schematic diagram)

Wall mounting
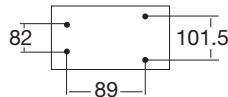
Motor mounting

Lenze

Adaptor plates

Adaptor plates are available for mounting the 8200 motec and starttec on motors with hole patterns which do not correspond to the Lenze standard. The plates are designed to be drilled by the user in accordance with the motor to be adapted.

Use with	Dimensions	Hole pattern for motec	Order no.
8200 motec 0.25-0.37 kW	120 x 120 x 15	☐ 68 mm, M 5 thread	**EJ0048**
8200 motec 0.55-2.2 kW	85 x 85 x 15	☐ 73 mm, M 5 thread	**EJ0047**
starttec	120 x 120 x 15	☐ 68 mm, M 5 thread	**EJ0048**
8200 motec 3-7.5 kW	125 x 140 x 15	82 101.5 ⌐ 89 ⌐ M5 thread	**EJ0050** [1]

[1] In preparation

starttec – Support for function modules

Support for function modules	Order no.	E71ZJ001

The E71ZJ001 support for function modules must always be used in conjunction with the following fieldbus modules:
- CAN (system bus)
- INTERBUS
- PROFIBUS-DP and
- LECOM-B

4

Switch/Potentiometer unit

| Switch/Potentiometer unit – can be used in the 8200 motec	Order no.	E82ZBU
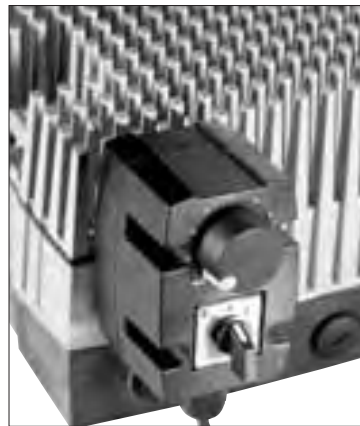
The switch/potentiometer unit (IP65 degree of protection) is mounted directly on the 8200 motec frequency inverter or, for ease of access, on the machine.

With the switch/potentiometer unit and an I/O function module (Standard I/O, Application I/O, Bus I/O), an analog setpoint can be preset on the frequency inverter with the integrated potentiometer; the drive can for example be started/stopped or the direction of rotation changed using the rotary switch.

Note:

An application example with the switch/potentiometer unit appears on page 4-25.

Switch/Potentiometer unit

Scope of supply

- 1 switch/potentiometer unit prefabricated with 2.5 m connecting cable
- 1 mounting plate 60 mm x 60 mm
- 4 M4 x 30 screws for fastening the switch/ potentiometer unit to the mounting plate
- 2 M4 x 20 screws with spring steel sheets for fastening to the heatsink of the 8200 motec

General data and operating conditions

Degree of protection	IP65	
Dimensions (W x H x D)	Approx. 65 mm x 115 mm x 85 mm	
Assembly options	On the heatsink of the motec	On a wall

Potentiometer unit

Potentiometer unit/Potentiometer 10 kΩ – can be used in the 8200 motec	Order no.	E82ZBR020

The potentiometer unit is installed directly in an M20 cable gland (e.g. in the terminal cradle of the 8200 motec). Together with an I/O function module (Standard I/O, Application I/O, Bus I/O), an analog setpoint can be preset on the frequency inverter with the integrated potentiometer.
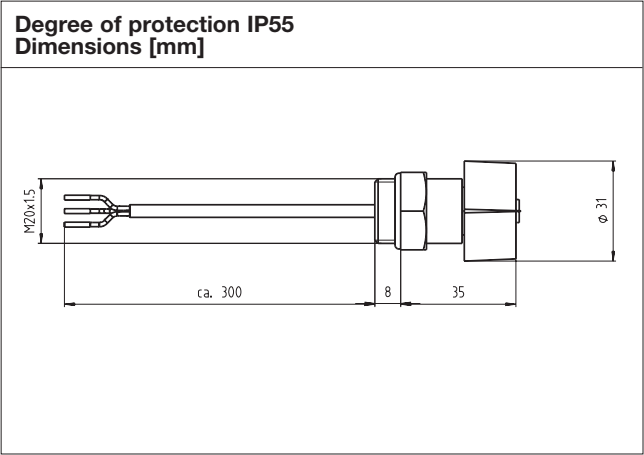
Switch unit

Switch unit – can be used in the 8200 motec and starttec	Order no.	E82ZBS020

The switch unit is installed directly in an M20 cable gland (e.g. in the terminal cradle of the 8200 motec or starttec). The controller can be controlled easily via the digital inputs (Standard I/O, Application I/O, BUS I/O on the 8200 motec) with the integrated switch.

General data and operating conditions for the potentiometer unit and switch unit

Degree of protection IP55
Dimensions [mm]

M20x1.5   ca. 300   8   35   ⌀ 31

Assembly options
The unit is mounted in an M20 bore.

General accessories 8200 motec

Accessories	Designation		Order no.
Communication modules	Operating module Keypad XT complete with diagnosis terminal Keypad complete with diagnosis terminal LECOM-A (RS232) with diagnosis terminal		E82ZBBXC E82ZBB E82ZBL-C
I/O function modules	Standard I/O Application I/O BUS I/O		E82ZAFSC001 E82ZAFAC001 see type-spec. accessories
Fieldbus function modules	CAN (system bus) CAN-I/O (system bus) PROFIBUS-DP INTERBUS LECOM-B (RS485) AS-Interface		E82ZAFCC001 E82ZAFCC201 E82ZAFPC001 E82ZAFIC001 E82ZAFLC001 E82ZAFFC001
Braking operation	Brake resistors, rectifiers Brake switch (in preparation)		see type-spec. accessories E82ZWBRU
Wiring terminals			see type-spec. accessories
Current limiting modules			see type-spec. accessories
Assembly tools	Adaptor plates		see type-spec. accessories
Controls	Switch/Potentiometer unit Pot. unit Switch unit		E82ZBU E82ZBR020 E82ZBS020
Miscellaneous	Connecting cable Connecting cable Connecting cable PC system cable RS232 PC system cable RS232 PC system cable RS232 Control cabinet installation kit AS-i flexible PCB connector	2.5 m 5.0 m 10.0 m 0.5 m 5.0 m 10.0 m	E82ZWL025 E82ZWL050 E82ZWL100 EWL0048 EWL0020 EWL0021 E82ZBHT E82ZMFF
Operating Instructions 8200 motec [1]	German English French		EDB82MV752
Communication manual LECOM [1]	German English French		EDSLECOM
Communication manual CAN [1]	German English French		EDSCAN
Communication manual PROFIBUS [1]	German English French		EDSPBUS
Communication manual INTERBUS [1]	German English French		EDSIBUS

[1] Please specify the required language when ordering documentation.

4

General accessories starttec

Accessories	Designation		Order no.
Communication modules	Keypad XT complete with diagnosis terminal Keypad complete with diagnosis terminal LECOM-A (RS232) with hand-held		E82ZBBXC E82ZBB E82ZBL-C
Fieldbus function modules	CAN (system bus) PROFIBUS-DP INTERBUS LECOM-B (RS485)		E82ZAFCC001 E82ZAFPC001 E82ZAFIC001 E82ZAFLC001
Assembly tools	Adaptor plates Support for function modules		EJ0047 EJ0048 E71ZJ001
Controls	Switch unit		E82ZBS020
Miscellaneous	Connecting cable Connecting cable Connecting cable PC system cable RS232 PC system cable RS232 PC system cable RS232 AS-i flexible PCB connector	2.5 m 5.0 m 10.0 m 0.5 m 5 ,0 m 10.0 m	E82ZWL025 E82ZWL050 E82ZWL100 EWL0048 EWL0020 EWL0021 E82ZMFF
Communication manual LECOM [1]	German English French		EDSLECOM
Communication manual CAN [1]	German English French		EDSCAN
Communication manual PROFIBUS [1]	German English French		EDSPBUS
Communication manual INTERBUS [1]	German English French		EDSIBUS

[1] Please specify the required language when ordering documentation.

4

Type-specific accessories
8200 motec 0.25/0.37 kW (1~230 V)

Designation	Type	
8200 motec	**E82MV251_2B**	**E82MV371_2B**
Miniature circuit breaker	EFA1C10A	EFA1C10A
Fuse	EFSM-0100AWE	EFSM-0100AWE
Fuse holder	EFH10001	EFH10001
Brake resistor IP55	ERBM470R110W	
Mains bus connector	E82ZWKN2	
Brake rectifier	Bridge rectifier E82ZMBR1	
Current limiting module E82ZJ004		
Mains choke	ELN 1-0900H005	
BUS I/O	E82ZMFBC001	
Adaptor plates	EJ0048	

8200 motec 0.55 - 2.2 kW (3~400 V)

Designation	Type			
8200 motec	**E82MV551_4B**	**E82MV751_4B**	**E82MV152_4B**	**E82MV222_4B**
Miniature circuit breaker	EFA3B06A	EFA3B06A	EFA3B06A(EFA3B10A[1])	EFA3B10A
Fuse	EFSM-0060AWE	EFSM-0060AWE	EFSM-0060AWE EFSM-0100AWE[1]	EFSM-0100AWE
Fuse holder	EFH10001	EFH10001	EFH10001	EFH10001
Brake resistor IP55	ERBM470R110W		ERBM240R220W	
Mains bus connector	E82ZWKN4			
System terminals	E82ZWKS			
Brake rectifier	Bridge rectifier E82ZWBR1 (type 14.630.32.016) Half-wave rectifier E82ZWBR3 (type 14.630.33.016)			
Current limiting module	EZN3A0150H024 or 3 x E82ZJ004			
Mains choke	EZN3A1500H003		–	
BUS I/O	E82ZAFBC001			
Adaptor plates	EJ0047/EJ0048			

8200 motec 3.0 - 7.5 kW (3~400 V)

Designation	Type			
8200 motec	**E82MV302_4B**	**E82MV402_4B**	**E82MV552_4B**	**E82MV752_4B**
Miniature circuit breaker	EFA3B16A	EFA3B20A	EFA3B25A EFA3B32A[1]	EFA3B32A
Fuse	EFSM-0160AWE	EFSM-0200AWE	EFSM-0250AXH EFSM-0320AWH[1]	EFSM-0320AWH
Fuse holder	EFH10001	EFH10001	EFH10002	EFH10002
Fan module	E82ZMV			
Brake resistor IP65	ERBS180R350W	ERBS100R625W	ERBS100R625W	ERBS082R780W
Brake rectifier	Bridge rectifier E82ZWBR1 (type 14.630.32.016) Half-wave rectifier E82ZWBR3 (type 14.630.33.016)			
BUS I/O	E82ZAFBC201			
Adaptor plates	EJ0050			

[1] For operation with increased power rating

8200 motec 0.25/0.37 kW, 230 V combination options

Options	can be combined with								
	Switch/Pot. unit	Brake resistor (IP55)	Fieldbus-function module INTERBUS or PROFIBUS or LECOM-B or system bus (CAN)	mains bus terminal	Brake rectifier [1] **or** system terminals [1]	Diagnosis terminal [2] **or** hand-held with PC interface (RS232) [2]	Brake switch	Switch unit	Pot. unit
motec with I/O function module Standard I/O	✓	✓	-	✓	✓	✓	✓	✓	✓
motec with I/O function module Application I/O	✓	✓	-	✓	✓	✓	✓	✓	✓
motec with I/O function module Bus I/O [1]	✓	✓	✓	✓	✓	✓	✓	✓	✎
motec with fieldbus function module CAN (system bus)	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module CAN I/O (system bus)	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module PROFIBUS-DP	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module INTERBUS	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module LECOM-B (RS485)	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module AS-Interface	✓	✓	-	✓	✓	✓	✓	✓	-
motec without function module	-	✓	-	✓	✓	✓	✓	-	-

[1] Note the change in the installation height. A fieldbus function module must be selected.
[2] Connecting cable E82ZWLxxx also required
(PC system cable EWL00xx also required for PC interface)

4

## 8200 motec 0.55-2.2 kW, 400 V combination options
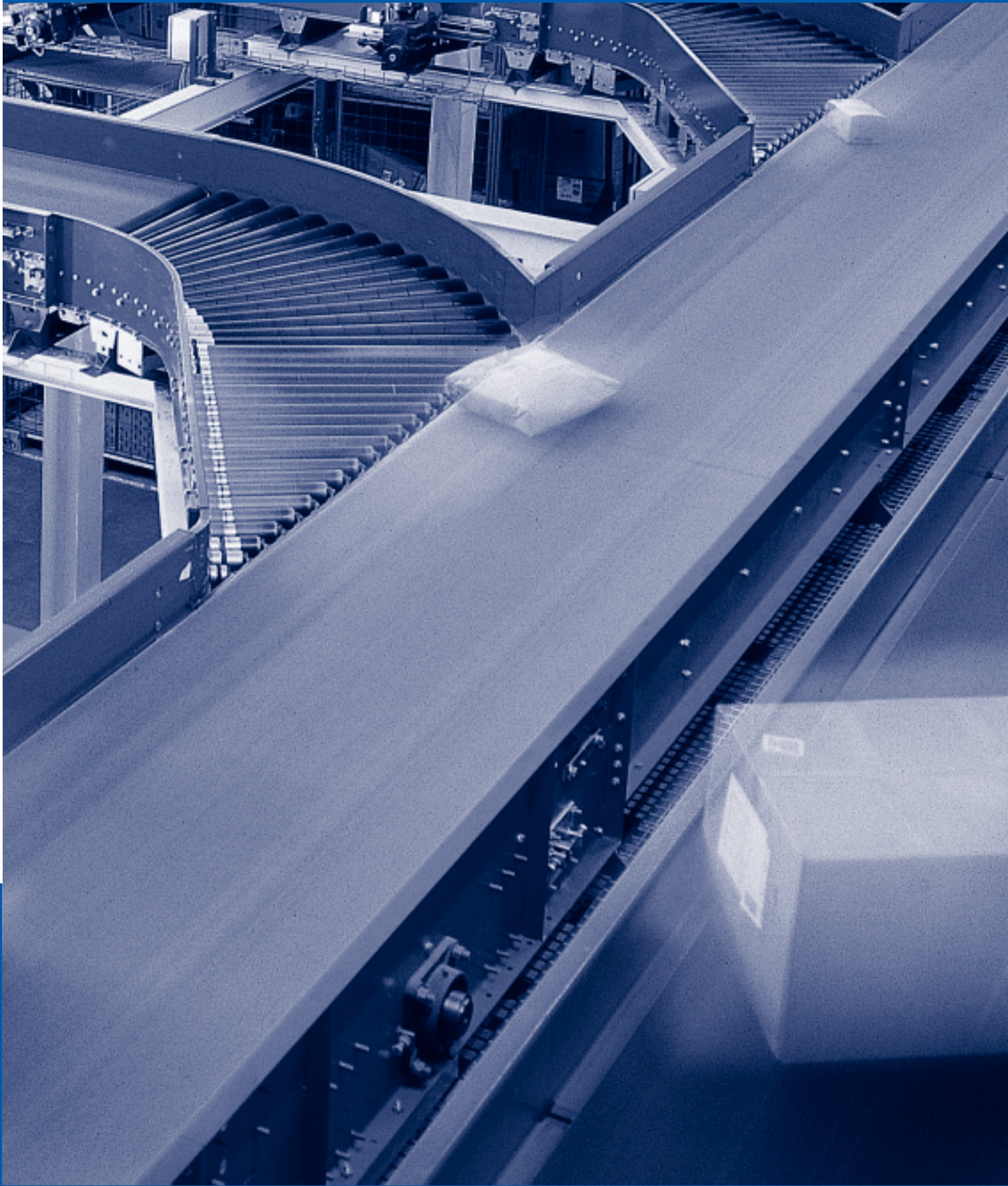
Options	can be combined with								
	Switch/Pot. unit	Brake resistor (IP55)	Fieldbus function module INTERBUS or PROFIBUS or LECOM-B or system bus (CAN)	mains bus terminal	Brake rectifier **or** system terminals **or** fan connector terminal	Diagnosis terminal [2] **or** Hand-held with PC interface (RS232) [2]	Brake switch	Switch unit	Pot. unit
motec with I/O function module Standard I/O	✓	✓	-	✓	✓	✓	✓	✓	✓
motec with I/O function module Application I/O	✓	✓	-	✓	✓	✓	✓	✓	✓
motec with I/O function module Bus I/O [1]	✓	✓	✓	✓	✓	✓	✓	✓	-
motec with fieldbus function module CAN (system bus)	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module CAN I/O (system bus)	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module PROFIBUS-DP	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module INTERBUS	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module LECOM-B (RS485)	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module AS-Interface	✓	✓	-	✓	✓	✓	✓	✓	-
motec without function module	-	✓	-	✓	✓	✓	✓	-	-

8200 motec 3.0-7.5 kW, 400 V combination options

Options	can be combined with								
	Switch/Pot. unit	Brake resistor (IP65)	Fieldbus function module INTERBUS or PROFIBUS or LECOM-B or system bus (CAN)	Fan module e.g. for wall mounting	Brake rectifier	Diagnosis terminal [2] **or** Hand-held with PC interface (RS232) [2]	Brake switch	Switch unit	Pot. unit
motec with I/O function module Standard I/O	✓	✓	-	✓	✓	✓	✓	✓	✓
motec with I/O function module Application I/O	✓	✓	-	✓	✓	✓	✓	✓	✓
motec with I/O function module Bus I/O [1]	✓	✓	✓	✓	✓	✓	✓	✓	✓
motec with fieldbus function module CAN (system bus)	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module CAN I/O (system bus)	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module PROFIBUS-DP	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module INTERBUS	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module LECOM-B (RS485)	✓	✓	-	✓	✓	✓	✓	✓	-
motec with fieldbus function module AS-Interface	✓	✓	-	✓	✓	✓	✓	✓	-
motec without function module	-	✓	-	✓	✓	✓	✓	-	-

[1] A fieldbus function module MUST be selected
[2] Connecting cable E82ZWLxxx also required (PC system cable EWL00xx also required for PC interface)

4

Application examples

5

Goods distribution centre with conveyor technology components roller conveyor, rotary table and lifting station

Pallets containing packaged goods are transported via roller conveyors. The goods are stacked on high-bay shelves. For this purpose, the pallets must be taken off the conveyor belt. This task is solved using turntables. Lifting stations with lifting and transportation functions are used to switch transport levels. A frequency inverter provides the ideal solution for lifting due to its drive technology features.

A motor starter can be used for the transportation function. Examples of how these tasks can be solved using Lenze distributed drive components appear on the following pages.

5

Lenze

Roller conveyor - Pallet transport

A roller conveyor serves as a drive component for the trans-portation of pallets, for example. When the material to be conveyed reaches the roller conveyor, it is detected by a sensor. The sensor tells the drive controller to activate the drive. When the material to be conveyed leaves the roller conveyor, this is detected by another sensor, which switches the following drive e.g. to a different roller conveyor. Speed variation is not required. To protect the mechanical drive components and to stop the material tipping off the conveyor belt, a soft start is required. The motor used is fitted with a thermistor for monitoring the temperature of the drive and with a spring-operated brake. Control is via AS-interface, whereby the ready-for-operation command is sent by the higher-level controller. Drive errors and statuses must be fed back.

Two sensors are fitted on the roller conveyor for monitoring material to be conveyed.

Technical data:

Motor power: 0.55 kW
Mains voltage: 3 x 400 V
Brake voltage: 180 V

Drive components needed for optimum solutions to requirements

1 Lenze geared motor with spring-loaded brake with
1 starttec motor starter, type E71MM402F4A010
(for standalone drive with integrated AS-interface)

As the starttec is supplied mounted directly on the geared motor, no other assembly operations are required. Should installation conditions prove unsuitable, the starttec can also be mounted individually, e.g. on the conveyor belt.
The integrated soft start can be set up very easily using the controls integrated into the starttec.
The spring-loaded brake is supplied and controlled via the starttec without additional components.
The AS-interface integrated into the starttec enables communication with the higher-level system controller.
The sensors and thermistor are connected to the starttec and signals are also evaluated there. Internal logic operations are used to generate the Start/Stop signal directly in the starttec without having to establish a connection with the higher-level PLC.

Mains
24 V
BUS (AS-interface)
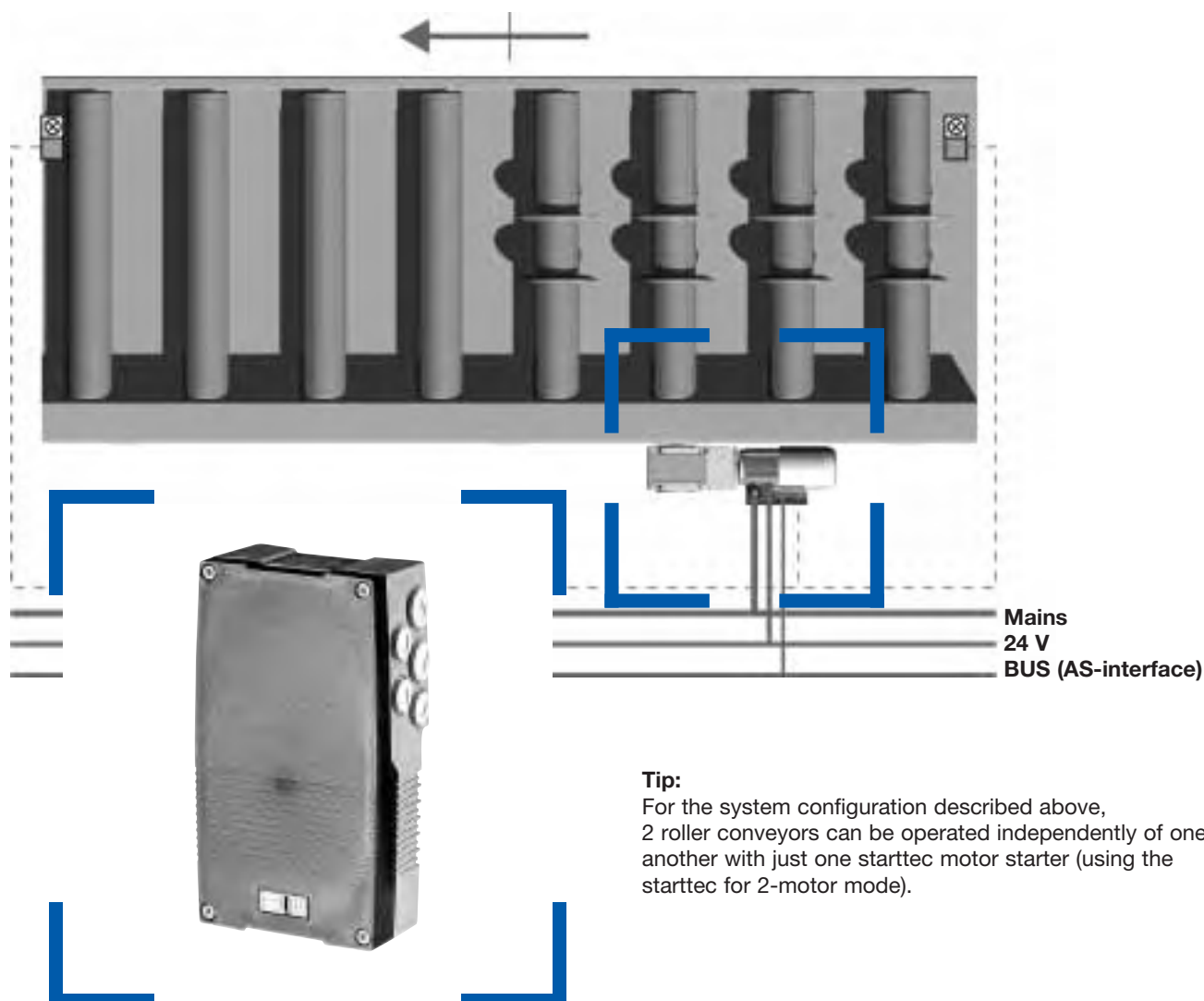
Tip:
For the system configuration described above,
2 roller conveyors can be operated independently of one another with just one starttec motor starter (using the starttec for 2-motor mode).

Lenze

8200 motec/starttec en 12/03   5-3
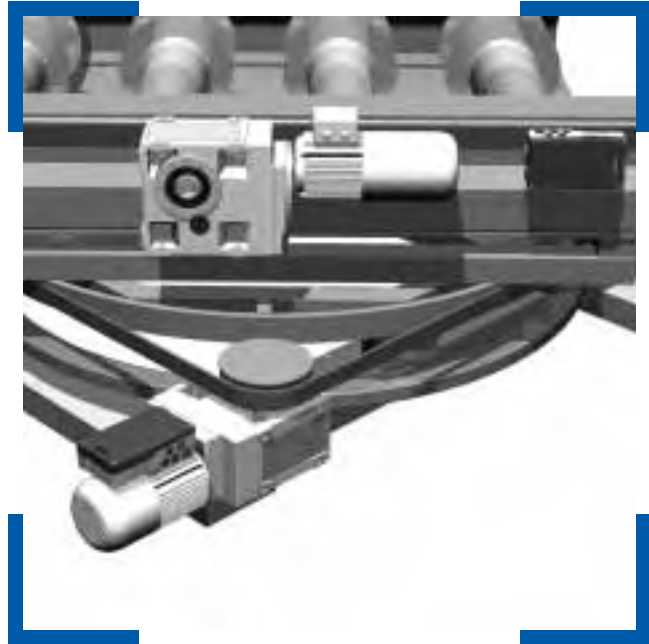
Turntable - Pallet transport

A turntable is used as a drive component for transporting pallets for example with one possible change of direction of rotation, for cases such as sorting/transferring goods. This module comprises a roller conveyor (as a drive component for transportation, see above) and a turning gear for changing the direction of rotation. The drives do not require speed variation.

To protect the mechanical drive components and to stop the material tipping off the conveyor belt, a soft start is required both for the turning gear and for the roller conveyor. In order to set the turning gear back to its starting position, it must be possible to preset the direction of rotation. A drive with change of direction of rotation is not required.

The motors used are each fitted with a thermistor for monitoring the temperature of the drive and with a spring-loaded brake.

Control is via PROFIBUS, whereby the commands for Controller enable, Change of direction of rotation and Start/Stop are sent by the higher-level controller. Error and status are amongst the signals which must be fed back. Two sensors are fitted on the roller conveyor for monitoring material to be conveyed and two on the turning gear for monitoring its position.

Technical data:
Motor power: 0.55 kW
Mains voltage: 3 x 400 V
Brake voltage: 180 V

Drive components needed for optimum solutions to requirements
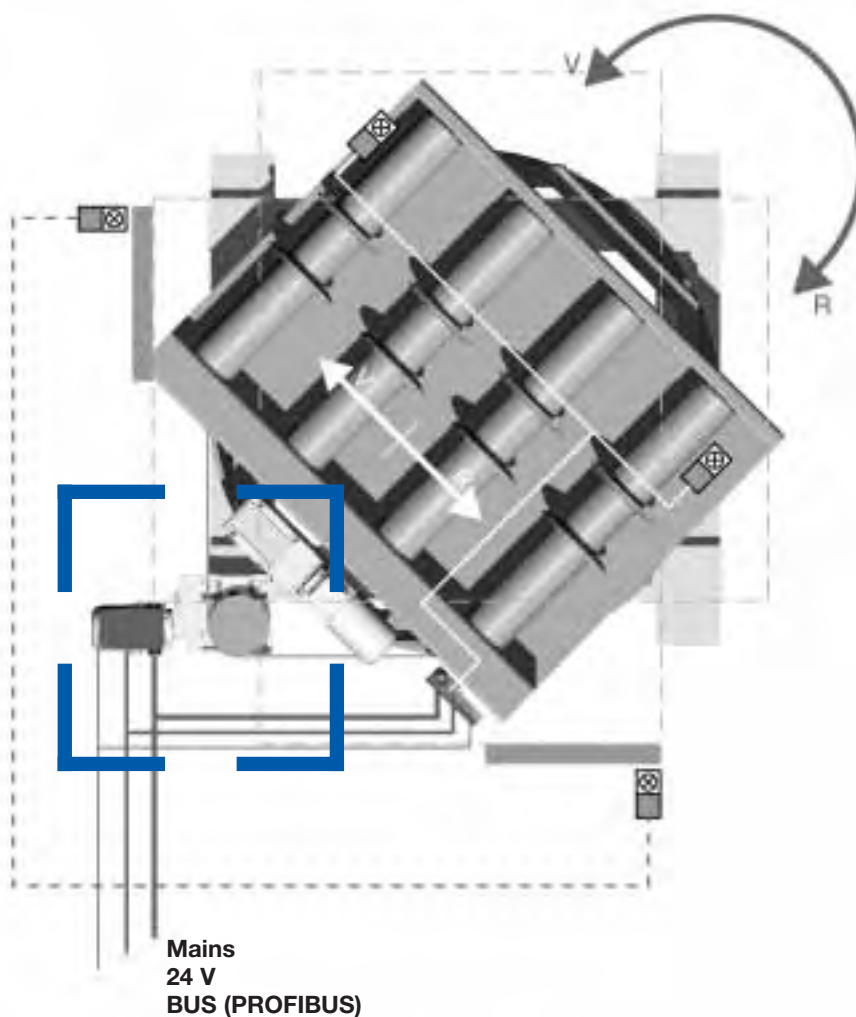
Roller conveyor
1 Lenze geared motor with spring-loaded brake with mounted starttec motor starter type
E71MM402_4A010
(for standalone drive)
1 PROFIBUS DP fieldbus function module
E82ZAFPC001
1 function module bracket E71ZJ001

Turning gear
1 Lenze geared motor with spring-loaded brake
1 starttec motor starter type E71MM402_4A020
(for change of direction of rotation)
1 PROFIBUS DP fieldbus function module
E82ZAFPC001
1 function module bracket E71ZJ001

Because of the unsuitable installation conditions, the starttec cannot be mounted on the geared motor but must be fixed to the machine frame of the turning gear. A jumper on the starttec connection terminals manages changes of direction of rotation. Without the jumper, this starttec can be used for the independent control of 2 motors. The change of direction for the soft start can also be set very easily using the controls integrated into the starttec. Communication with the higher-level system controller takes place via the PROFIBUS fieldbus function module. The function module bracket is required for mounting this module.

The required functions, such as soft start and sensor evaluation, are implemented as described above for the roller conveyor.

Mains
24 V
BUS (PROFIBUS)

Lifting station

A lifting station is used for connecting two transport levels and conveying goods between them
The material to be conveyed, for example a pallet, is transported in a roller conveyor. This roller conveyor is lifted/dropped to a different level together with the pallet.
It is for this purpose that a lift is required.
Once this level has been reached, the pallet is conveyed to the left/right. For this purpose, the drive must be able to change the direction of rotation.

A frequency inverter which switches in accordance with the operational sequence is provided for the lifting function. Two sensors are available for each lifting position (up/down) in order to approach the end position of the lifting station slowly. On reaching the first initiator, the frequency inverter reduces the speed of the drive, so that when the shutdown position is reached, the speed is already sufficiently low.

The roller conveyor features two more sensors for monitoring the material to be conveyed.
A motor starter serves as the drive for the roller conveyor (see Roller conveyor application example, with the addition of change of direction of rotation). Speed variation is not required.

The motors used are fitted with a thermistor for monitoring the temperature of the drive and with a spring-operated brake on the roller conveyor.
Control is via PROFIBUS, whereby the commands for Controller enable, Change of direction of rotation and Start/Stop are sent by the higher-level controller. Error and status are amongst the signals which must be fed back.
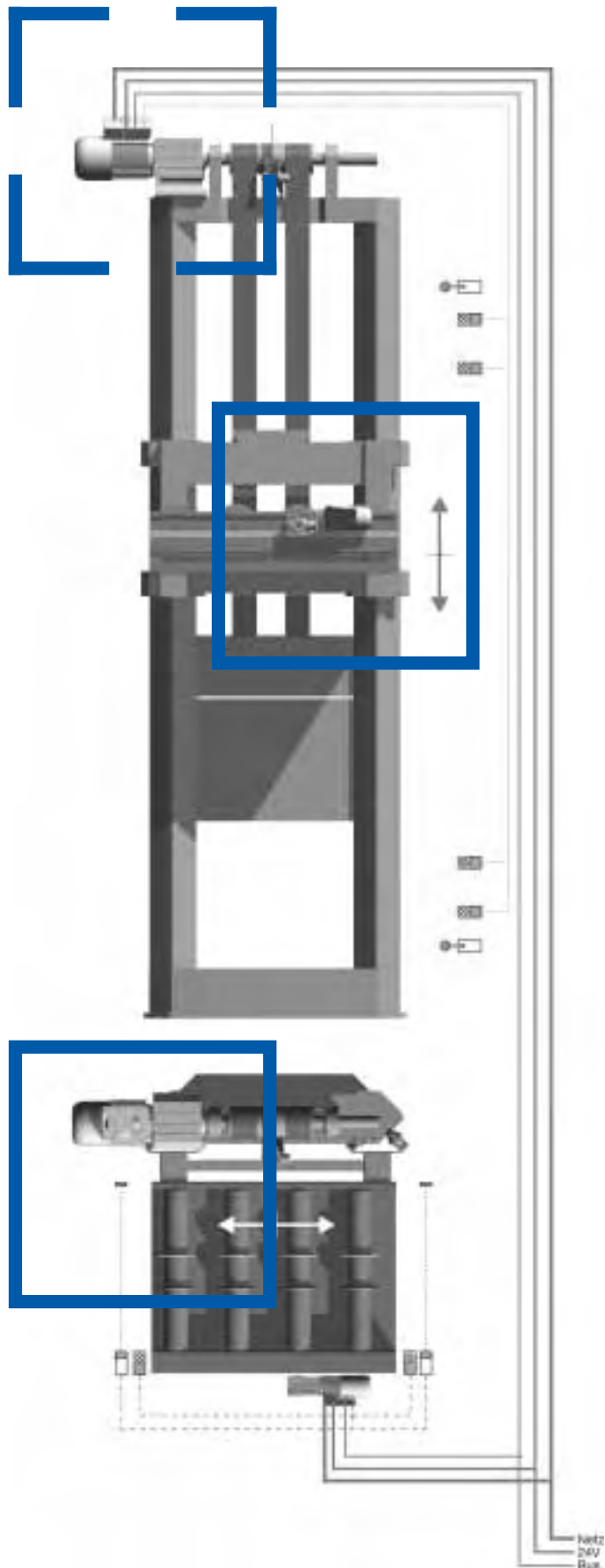
Technical data:
"Lifting" function
Motor power: 2.2 kW
Mains voltage: 3 x 400 V
Brake voltage   205 V

Roller conveyor
Motor power: 0.55 kW
Mains voltage: 3 x 400 V
Brake voltage: 180 V

5

Drive components needed for optimum solutions to requirements
Lifting function
1 Lenze geared motor with
1 8200 motec frequency inverter E82MV222_4B
1 PROFIBUS DP fieldbus function module E82ZAFPC001
1 BUS I/O I/O function module E82ZAFB001
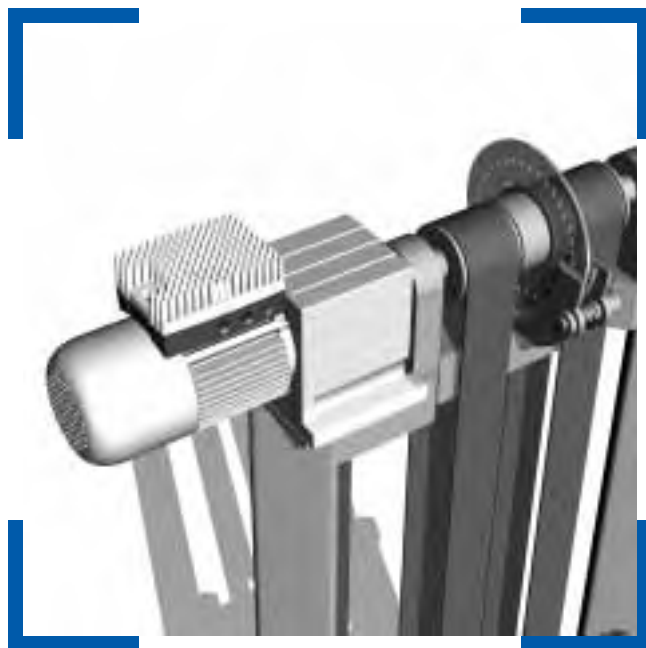
Roller conveyor
1 Lenze geared motor with spring-operated brake and
   mounted starttec motor starter type E71MM402_4A020
   (for change of direction of rotation)
1 PROFIBUS DP fieldbus function module E82ZAFPC001
1 support frame for function modules E71ZJ001

To make installation easier, 8200 motec and starttec are supplied mounted on geared motors.
Communication with the higher-level system controller takes place via the PROFIBUS fieldbus function module. The sensor signals are read in directly on the starttec and via the BUS I/O on the 8200 motec and are made available to the higher-level system controller via PROFIBUS.
Other required functions, such as soft start and sensor evaluation, are implemented as described above for the roller conveyor.
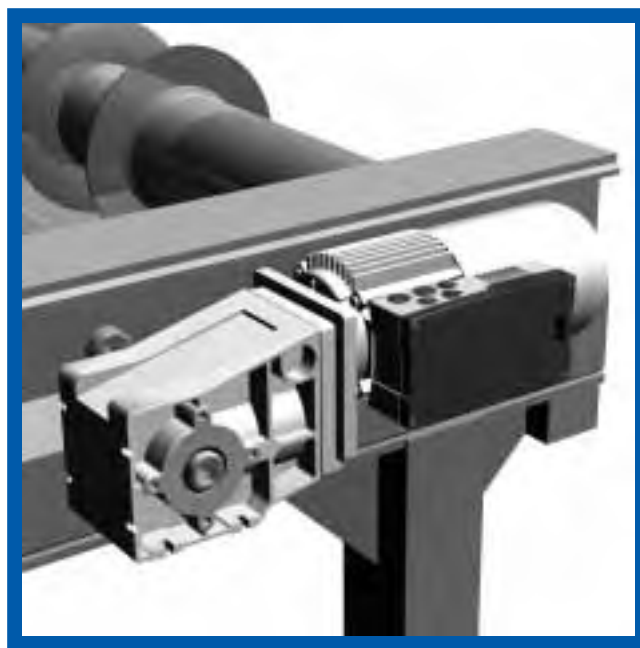
8200 motec frequency inverter, mounted on geared motor

starttec motor starter for changing the direction of rotation, mounted on geared motor

5

On 400-V three-phase mains, operation with 87 Hz characteristic releases power and torque reserves in accordance with the following simple but effective principle:
A standard three-phase AC motor (230/400 V) is delta-connected and operated with an 8200 motec frequency inverter. In a delta connection, the motor current is greater than that in a star connection by the factor $\sqrt{3} = 1.73$.
If the power of the 8200 motec is increased, it will be able to supply up to 1.73 times more power at the motor.
The rated torque (in relation to the 1.73x power) remains constant in the range between approximately 0 and 87 Hz. The maximum torque is determined by the 1.5x current of the 8200 motec.
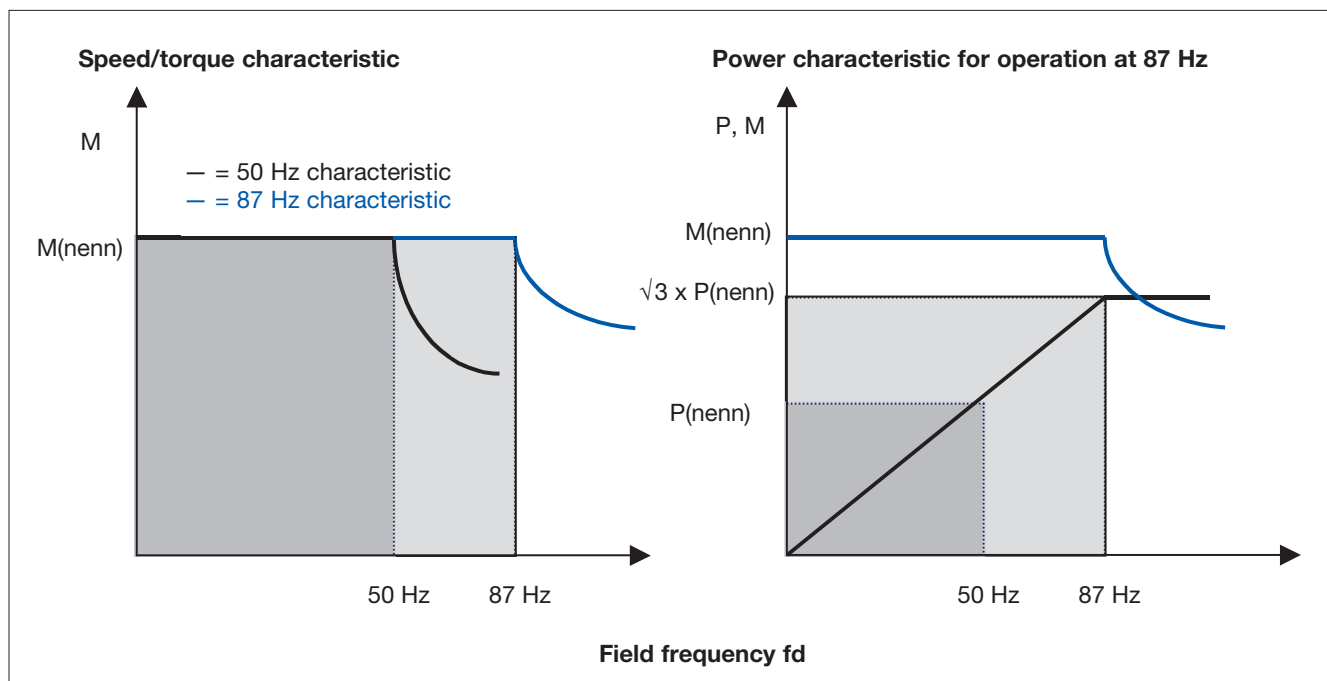
Voltage characteristic
The 8200 motec sets voltage and frequency simultaneously between 0 and maximum. At 50 Hz, the 8200 motec supplies the motor with the required 230 V phase voltage. Above 50 Hz, the voltage and frequency increase in a linear fashion until they reach the level of the mains voltage.
The motor current and torque remain almost constant.

At constant torque (controlled via the 8200 motec using V/f characteristic), the ratio $P = M \cdot \omega$
($\omega\sim$ proportional field frequency/speed)
produces a power which increases in a linear fashion with the speed.

Advantages of this combination:
– The operating range increases by 173%.
– It may be possible to select a motor one frame size smaller.
– The self-ventilation of the motor improves, as it is turning 1.73 times more quickly. In many cases, a separate fan does not have to be used.

Speed/torque characteristic

M

— = 50 Hz characteristic
— = 87 Hz characteristic

M(nenn)

50 Hz   87 Hz

Power characteristic for operation at 87 Hz

P, M

M(nenn)
$\sqrt{3}$ x P(nenn)

P(nenn)

50 Hz   87 Hz

Field frequency fd

The diagrams below illustrate example power characteristics for various drive combinations in relation to motor and frequency inverter rated power.
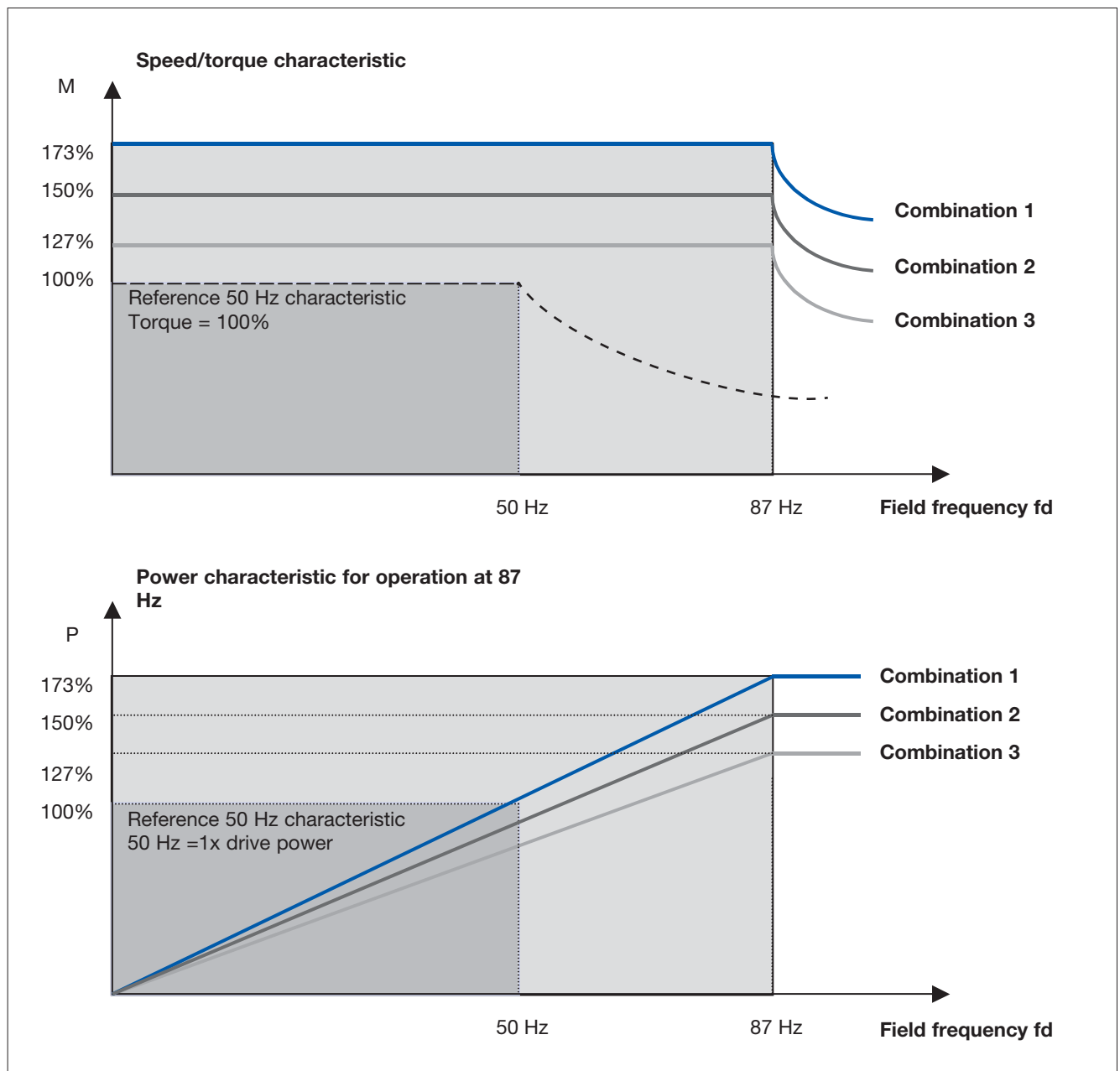
Combination 1
8200 motec   Rated power 2.2 kW
Motor   Rated power 1.1 kW

Combination 2
8200 motec   Rated power 2.2 kW
Motor   Rated power 1.5 kW

Combination 3
8200 motec   Rated power 0.75 kW
Motor   Rated power 0.55 kW

Speed/torque characteristic

Power characteristic for operation at 87 Hz

Setpoint preselection via a potentiometer
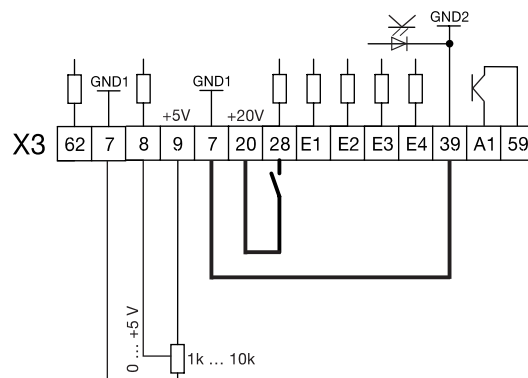
The setpoint for the 8200 motec frequency inverter is preset via a rotary potentiometer. The frequency inverter is started/stopped via a digital signal.

Accessories required for the 8200 motec:
– Standard I/O function module
– Setpoint potentiometer (1 k...10 k)
– Keypad

Tip: We recommend the switch/potentiometer unit (E82ZBU) or potentiometer (E82ZBR020).
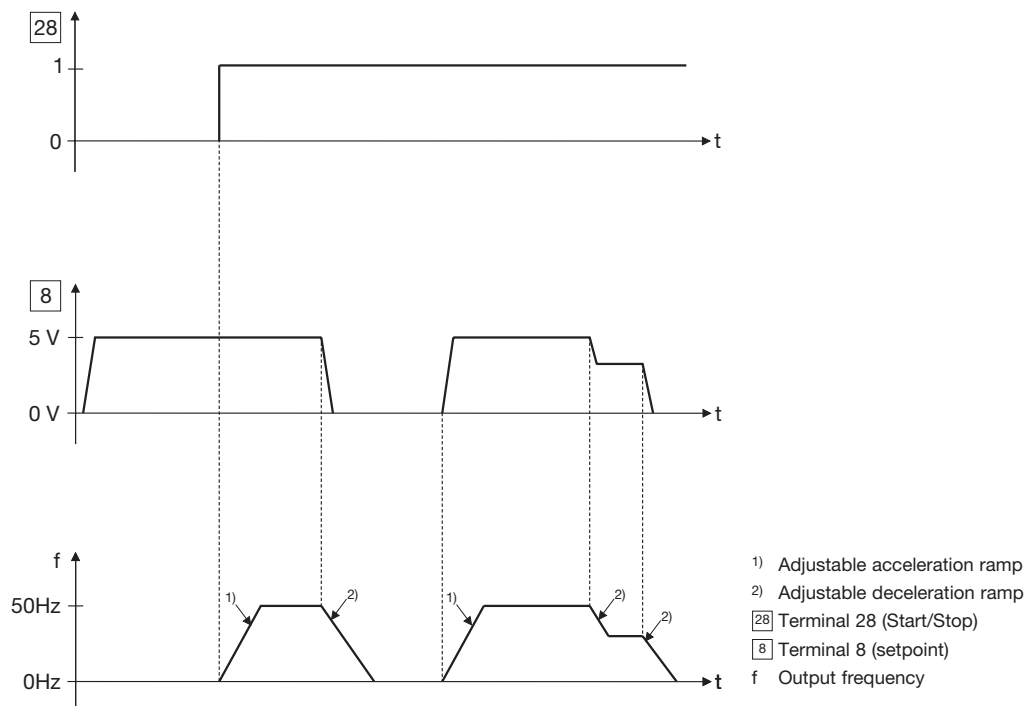
Terminal assignment on Standard I/O function module:

Terminal assignment
7, 8, 9: Potentiometer connection
28: Digital signal for START/STOP

Sequence diagram:

1) Adjustable acceleration ramp
2) Adjustable deceleration ramp
28 Terminal 28 (Start/Stop)
8 Terminal 8 (setpoint)
f Output frequency
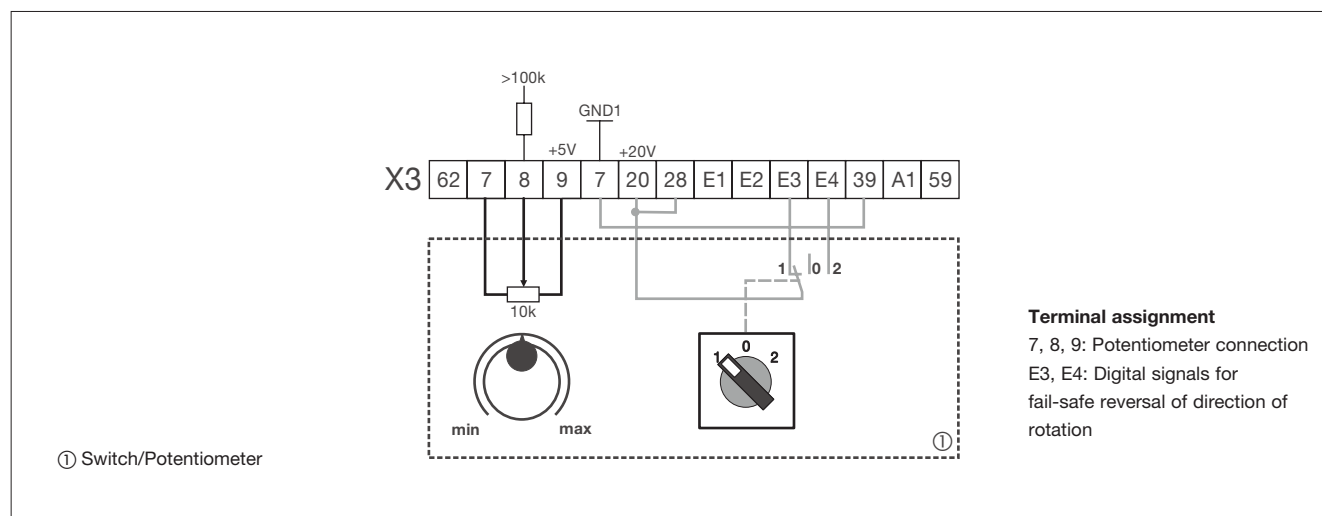
Setpoint preselection via switch and potentiometer

The setpoint and the direction of rotation (CCW-Stop-CW) for the 8200 motec frequency inverter is preset via the switch/potentiometer. Operation after shutdown (Stop) takes place on a configurable deceleration ramp. The reversal of direction of rotation is fail-safe.
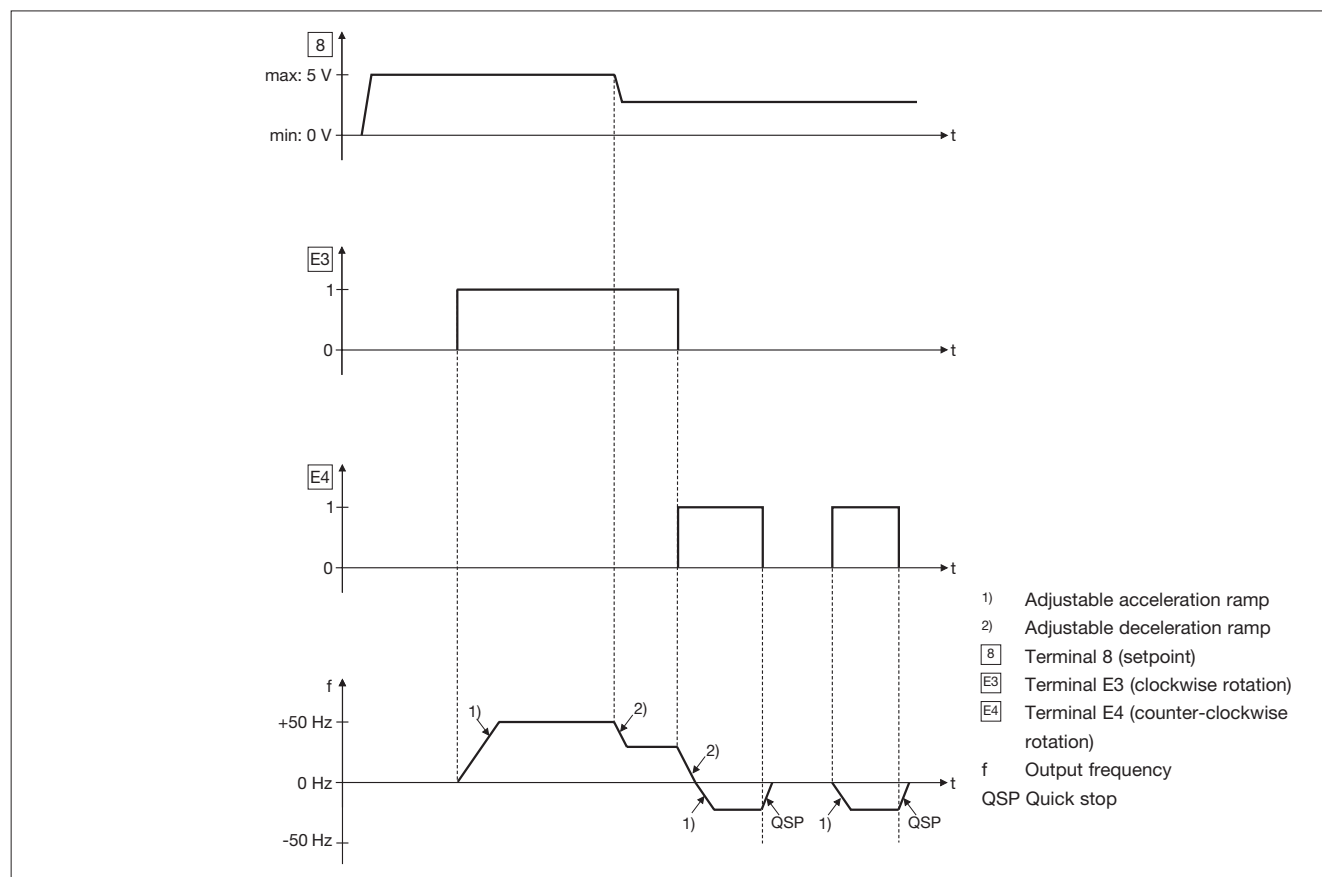
Accessories required for the 8200 motec:
– Standard I/O function module
– Switch/potentiometer
– Keypad

Terminal assignment on Standard I/O function module:

① Switch/Potentiometer

Terminal assignment
7, 8, 9: Potentiometer connection
E3, E4: Digital signals for
fail-safe reversal of direction of rotation

Sequence diagram:

1)   Adjustable acceleration ramp
2)   Adjustable deceleration ramp
8   Terminal 8 (setpoint)
E3   Terminal E3 (clockwise rotation)
E4   Terminal E4 (counter-clockwise rotation)
f   Output frequency
QSP Quick stop
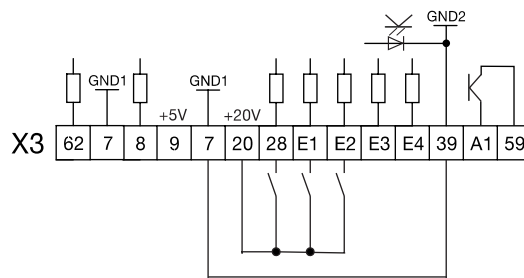
Preselection of fixed setpoints

The setpoint for the 8200 motec frequency inverter is preset using two fixed setpoints (JOG). Three setpoints are entered on the 8200 motec via the keypad. These setpoints are then activated via two digital signals. An additional digital signal is used to start/stop the frequency inverter.

Accessories required for the 8200 motec:
– Standard I/O function module
– Keypad
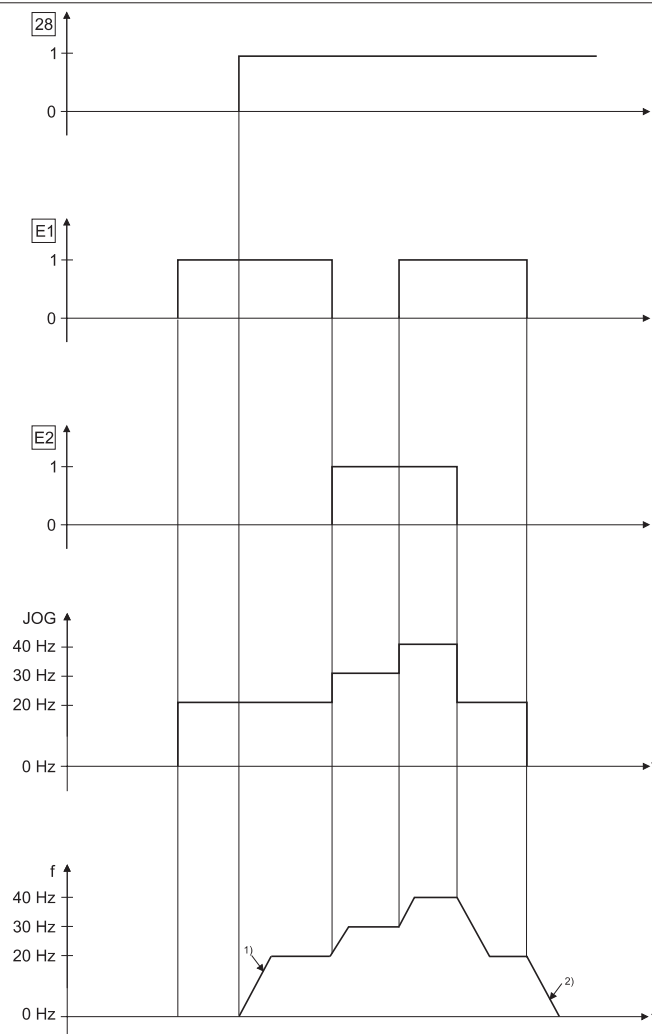
Terminal assignment on Standard I/O function module:

Terminal assignment
28: Digital signal for START/STOP
E1, E2: Digital signals for activating fixed setpoints
JOG1, JOG2, JOG3
(e.g. 20 Hz, 30 Hz, 40 Hz)

Sequence diagram:

1) Adjustable acceleration ramp
2) Adjustable deceleration ramp
28 Terminal 28 (Start/Stop)
E1 Terminal E1 (activate JOG1)
E2 Terminal E1 (activate JOG2)
JOG fixed setpoint
f Output frequency

Lenze
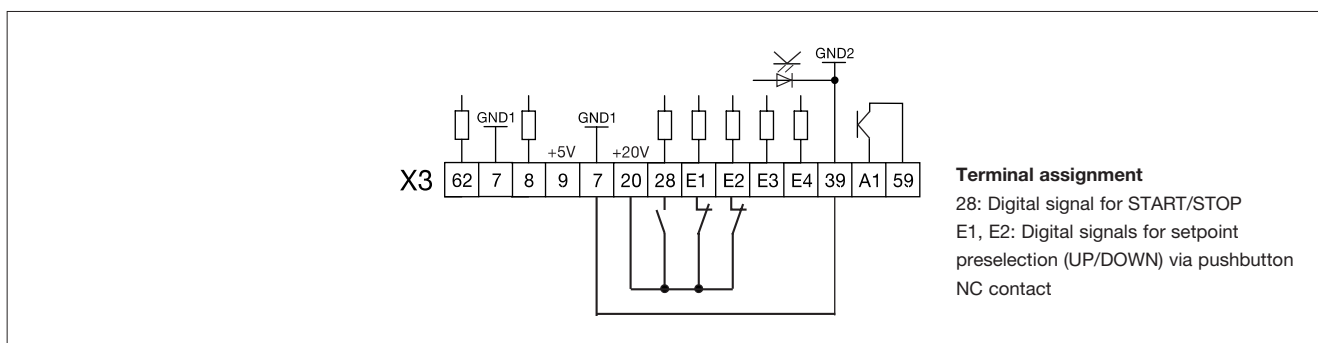
Setpoint preselection via the UP/DOWN function

Two digital signals (UP and DOWN) are used to set the fail-safe setpoint for the frequency inverter. The signals can e.g. be generated using simple buttons. An additional digital signal is used to start/stop the frequency inverter.
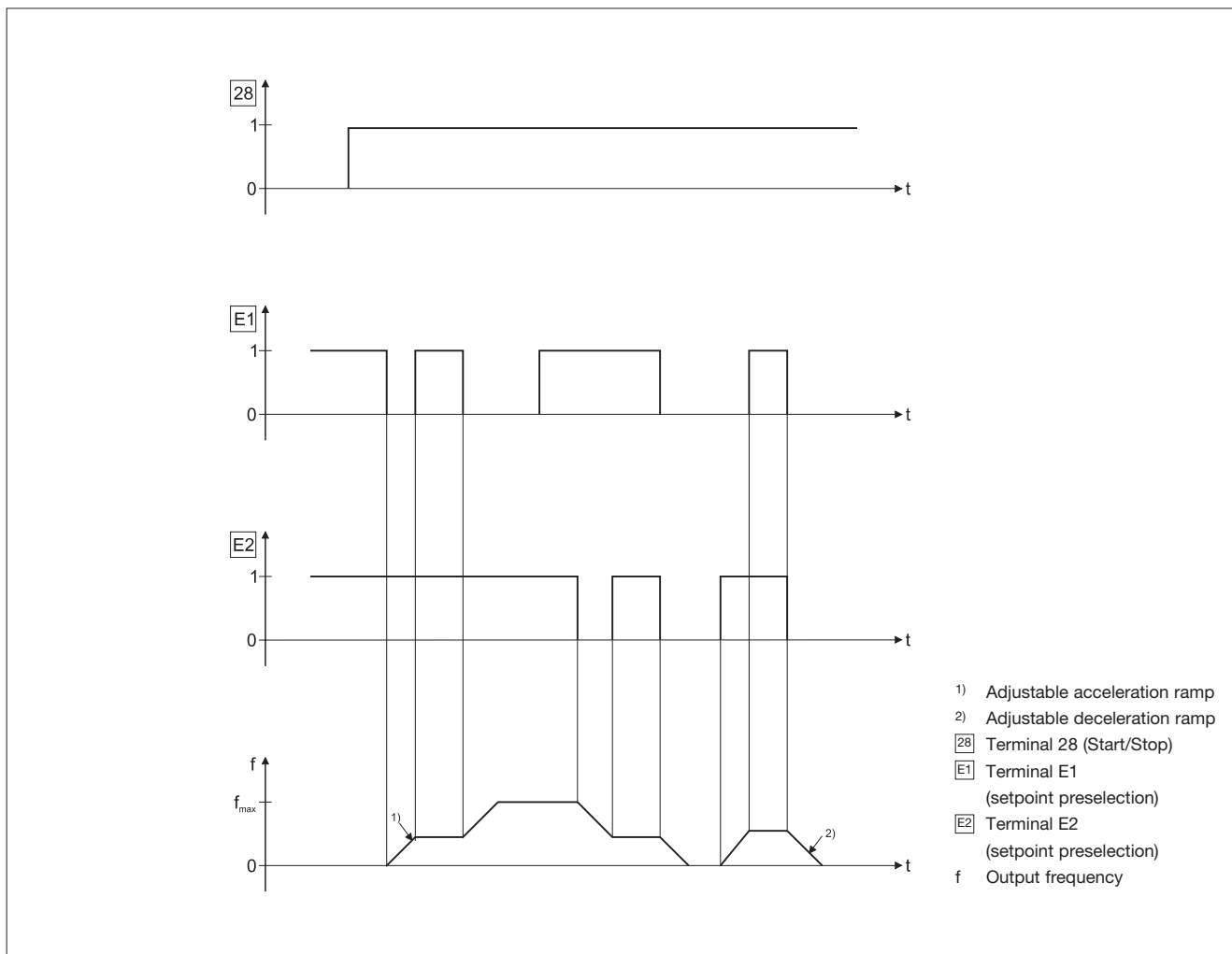
Accessories required for the 8200 motec:
– Standard I/O function module
– Keypad

Terminal assignment on Standard I/O function module:

Terminal assignment

28: Digital signal for START/STOP
E1, E2: Digital signals for setpoint preselection (UP/DOWN) via pushbutton NC contact

Sequence diagram:

[1] Adjustable acceleration ramp
[2] Adjustable deceleration ramp
28 Terminal 28 (Start/Stop)
E1 Terminal E1 (setpoint preselection)
E2 Terminal E2 (setpoint preselection)
f   Output frequency

Setpoint preselection via the Keypad
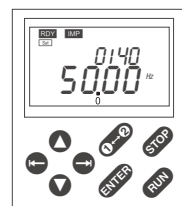
The setpoint for the 8200 motec frequency inverter is preset using keys ⊙ and ⊙ on the Keypad. A change of direction of rotation is possible. The ⬤RUN and ⬤STOP keys are used to start/stop the frequency inverter.

Accessories required for the 8200 motec:
– Keypad

Setpoint preselection:

The setpoint is preselected using the ⌷Set⌷ function.

⬅ | Set |
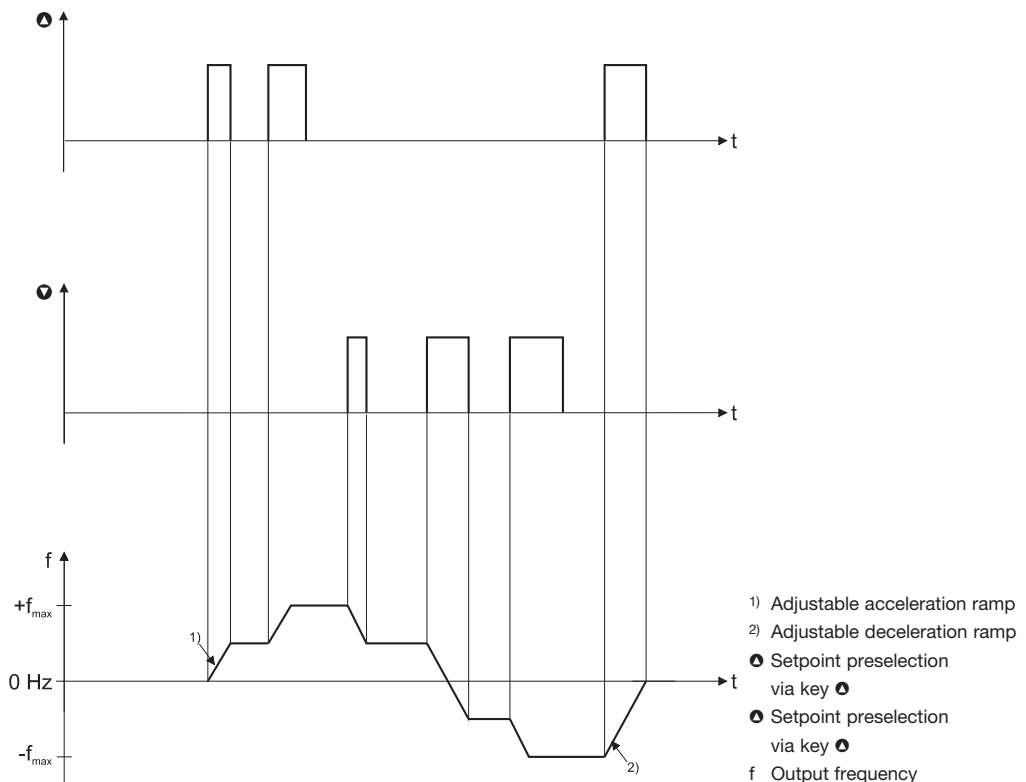
⊙ 0....+50 Hz ⇨ ⟳

⊙ 0....- 50 Hz ⇨ ⟲

Note:
The setpoint is saved on mains disconnection.

Sequence diagram:

1) Adjustable acceleration ramp
2) Adjustable deceleration ramp
⊙ Setpoint preselection via key ⊙
⊙ Setpoint preselection via key ⊙
f Output frequency
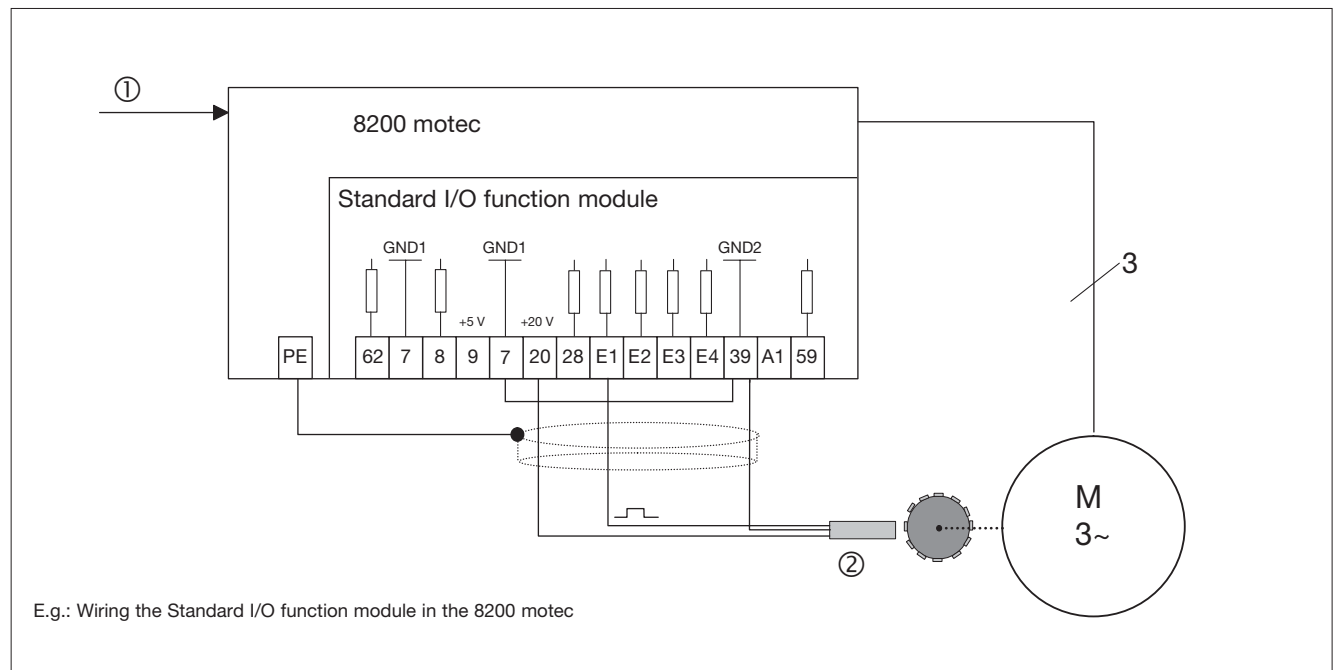
Speed control

Speed control with inductive single-track three-wire sensor. The speed control is designed to correct the deviation between the actual speed and the setpoint speed caused by the effect of the load (motive and generative). In order to detect the motor speed, the inductive sensor scans e.g. a gear, a metallic fan impeller or cam. Scanning should take place directly on the motor or within the machine.

Functions used
- Internal process controller for speed control.
- Speed setpoint e.g. via diagnosis terminal (hand-held keypad)
- Actual speed value as pulse train via digital input (configured as frequency input).
- DC braking, if the value of the setpoint is less than a configurable threshold.

Speed control with three-wire sensor

E.g.: Wiring the Standard I/O function module in the 8200 motec

① Setpoint via keypad
② 3-wire sensor

You will find more detailed information about this application example in the Operating Instructions for the 8200 motec.

Tip:
Lenze three-phase AC motors and Lenze geared motors can be supplied with the Lenze pulse encoder ITD21 (512/2048 increments, HTL output signals). This makes it possible to set up **two-track** speed feedback (tracks A and B) when using the Application I/O function module.

Pressure control

A centrifugal pump (square load characteristic) is to maintain constant pressure in a pipe system (e.g. water supply for private households or industrial plants).
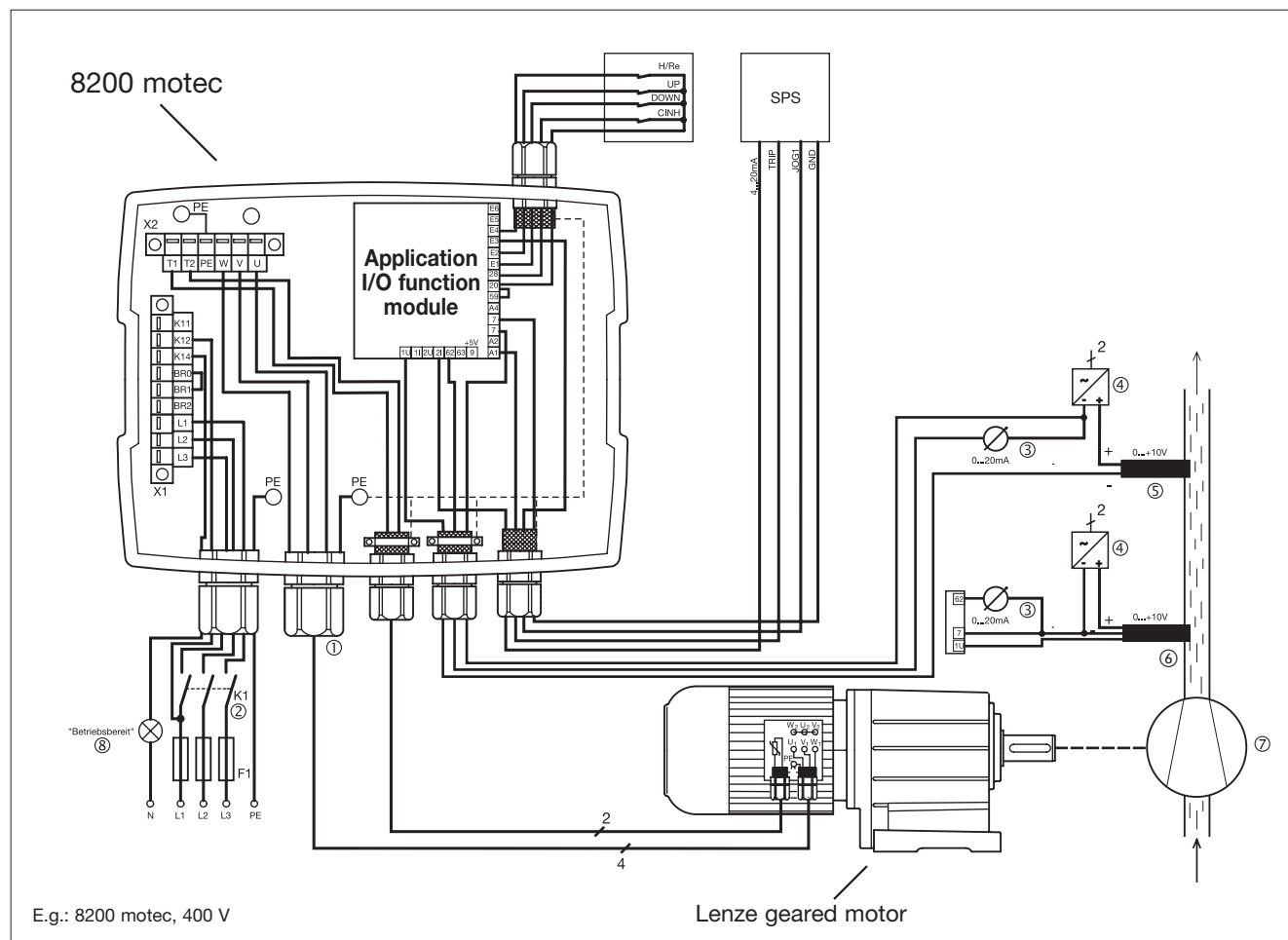
Operating conditions
- PLC operation (preselection of the pressure setpoint, night-time pressure reduction)
- On-site set-up is possible
- During the night the pressure is reduced, and the pump then operates at an unregulated, low constant speed
- Under no operating circumstances must the pump be operated at an output frequency of less than 10 Hz (running dry)
- Avoidance of pressure surges in the water network
- Avoidance of mechanical resonance at an output frequency of approx. 30 Hz
- Overtemperature protection for the motor.
- Collective fault messaging to the PLC
- On-site display of readiness for operation and the actual pressure value
- On-site facility for stopping the pump

- Required drive components:
  - Lenze gearbox/three-phase AC motor
  - 8200 motec frequency inverter with Application I/O function module

Functions used
- Internal process controller for pressure control
  - Pressure setpoint from the PLC (4 ... 20 mA)
  - Actual pressure value from the sensor (0 ... 10 V)
- Manual/remote switchover for on-site set-up
  - Manual: Pressure setpoint entered via a pushbutton with motor potentiometer function (UP/DOWN)
  - Remote: Pressure setpoint from the PLC
- Fixed speed (JOG) for pressure reduction during the night (activated via the PLC)
- Protection against running dry (setpoint-independent minimum speed)
- Smooth and jerk-free starting action with S-ramps
- Masking of mechanical resonances with a cancelling frequency
- PTC motor monitoring
- Trip error message via a digital output
- Readiness for operation signalled via a relay output
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Lenze

Basic circuit for a pressure control system

8200 motec

Application I/O function module

SPS

Lenze geared motor

E.g.: 8200 motec, 400 V

"Betriebsbereit"

① Metal screw connections for the cables
② Mains contactor
③ Analog display instrument for actual pressure value
④ External mains supply
⑤ 2-wire pressure sensor
⑥ 3-wire pressure sensor
⑦ Pump
⑧ Lamp on = ready for operation
⑤, ⑥: Only use one pressure sensor

You will find more detailed information about this application example
in the Operating Instructions for the 8200 motec.

5

Dancer position control

Dancer position control is used in ongoing processes to give constant material tension. In the example described, the continuous material speed v_2 is synchronised with the line speed v_1.
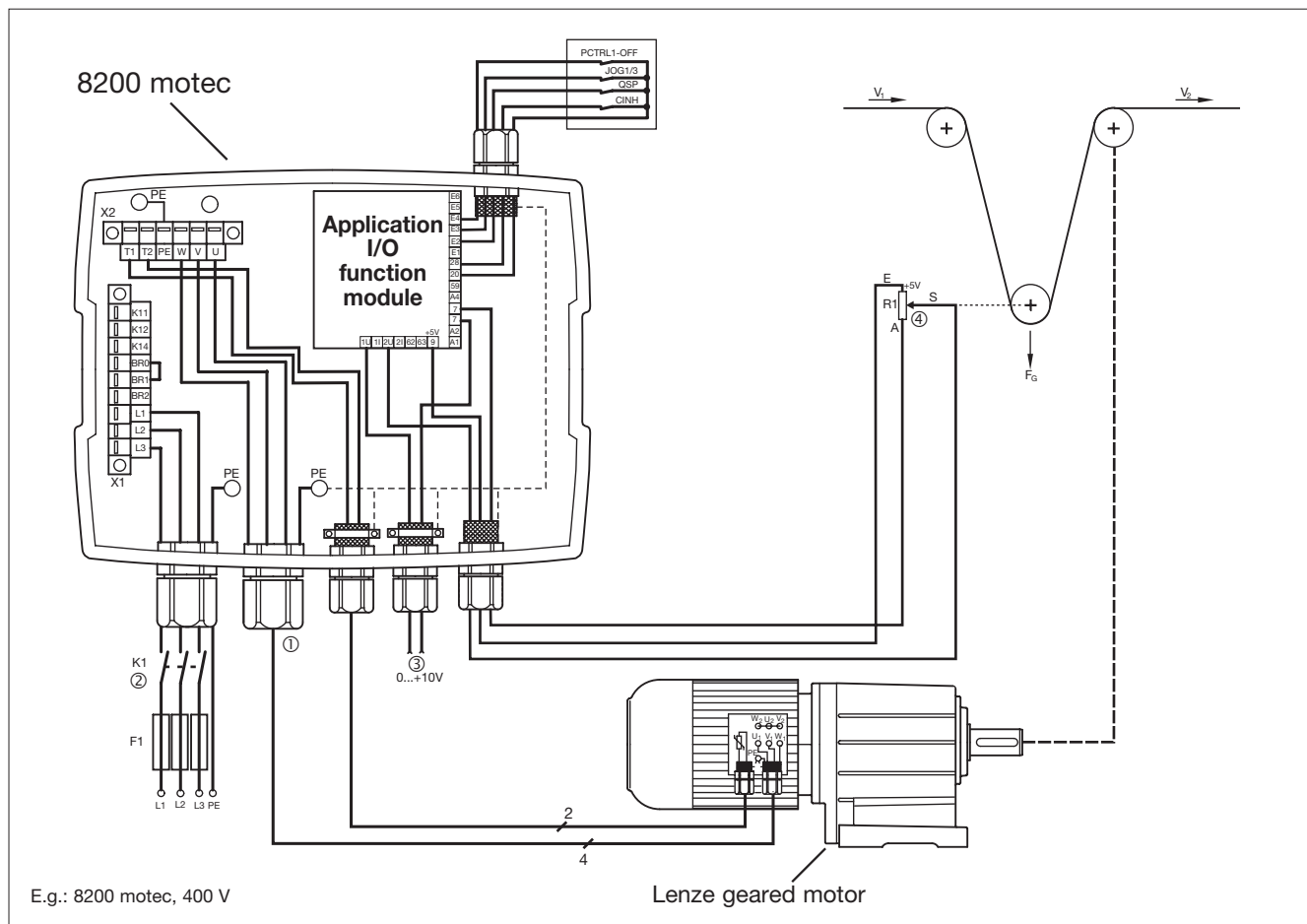
Required drive components
– Lenze gearbox/ three-phase AC motor
– 8200 motec frequency inverter with Application I/O function module

Functions used
• Internal process controller as a position controller
• Preselection of the line speed v_1 via analog input at the function module (terminal 1U).
• Actual dancer position value from the dancer potentiometer via an analog input at the function module (terminal 2U).
• Set-up speed via digital input at the function module (fixed speed/JOG via E3).
• Shut-off of the dancer controller via X3/E4 (external), also possible internally via an adjustable frequency threshold

Basic circuit for a dancer position control system

E.g.: 8200 motec, 400 V

Lenze geared motor

① Metal screw connections for the cables
② Main contactor
③ Master setpoint ~V_1
④ Dancer potentiometer

You will find more detailed information about this application example in the Operating Instructions for the 8200 motec.

Lenze
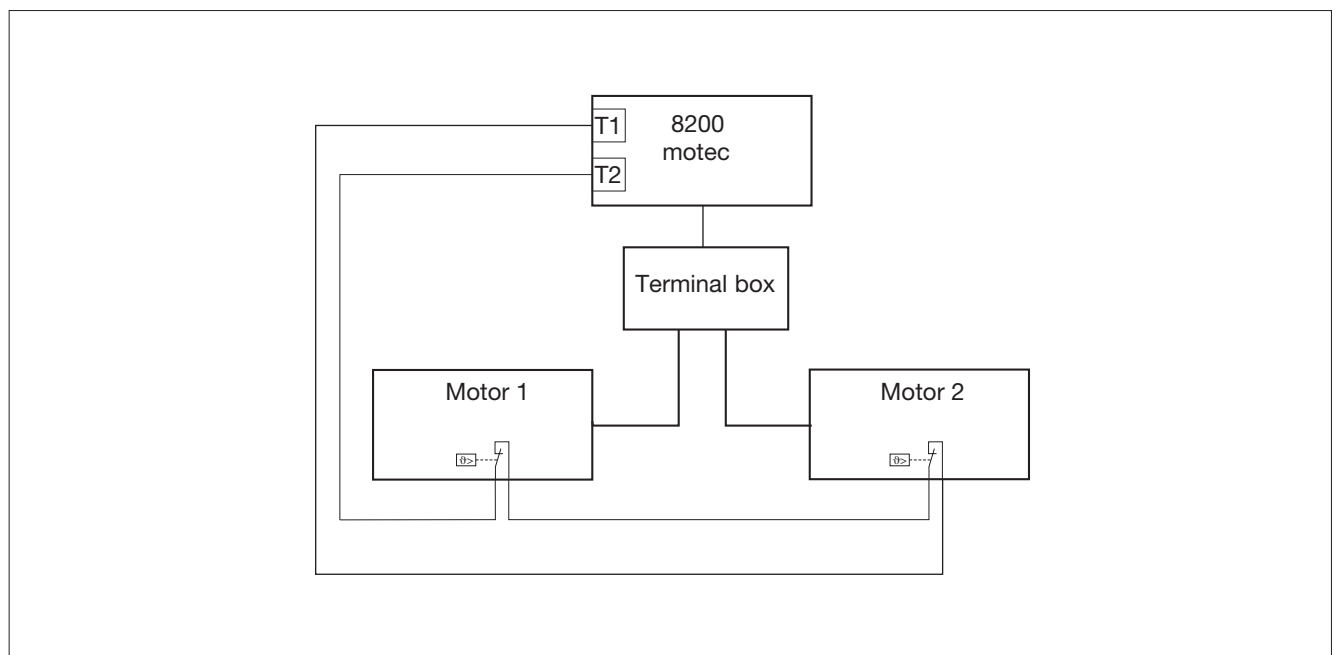
If the 8200 motec is mounted on the wall, a number of motors can be connected to the motec in parallel in "V/f characteristic control" control mode.

The total sum of the individual motor power ratings must not exceed the current rating of the motec.

Installation information
- The parallel wiring is connected outside the motec, e.g. in a terminal box
- Every motor must be equipped with a temperature switch (NC contact), which is connected in series to X2/T1 and X2/T2.
- Only use shielded cables. Ensure wide contact between the shield and PE.
- Do not exceed the resulting cable length l_{res} = 1 m (radio interference level B) or l_{res} = 10 m (radio interference level A):

l_{res} = Sum of all motor cable lengths x $\sqrt{}$ number of motor cables

Basic circuit for a group drive

You will find more detailed information about this application example in the Operating Instructions for the 8200 motec.

Two refrigeration compressors supply several cooling consumers, which are switched on and off at irregular intervals.
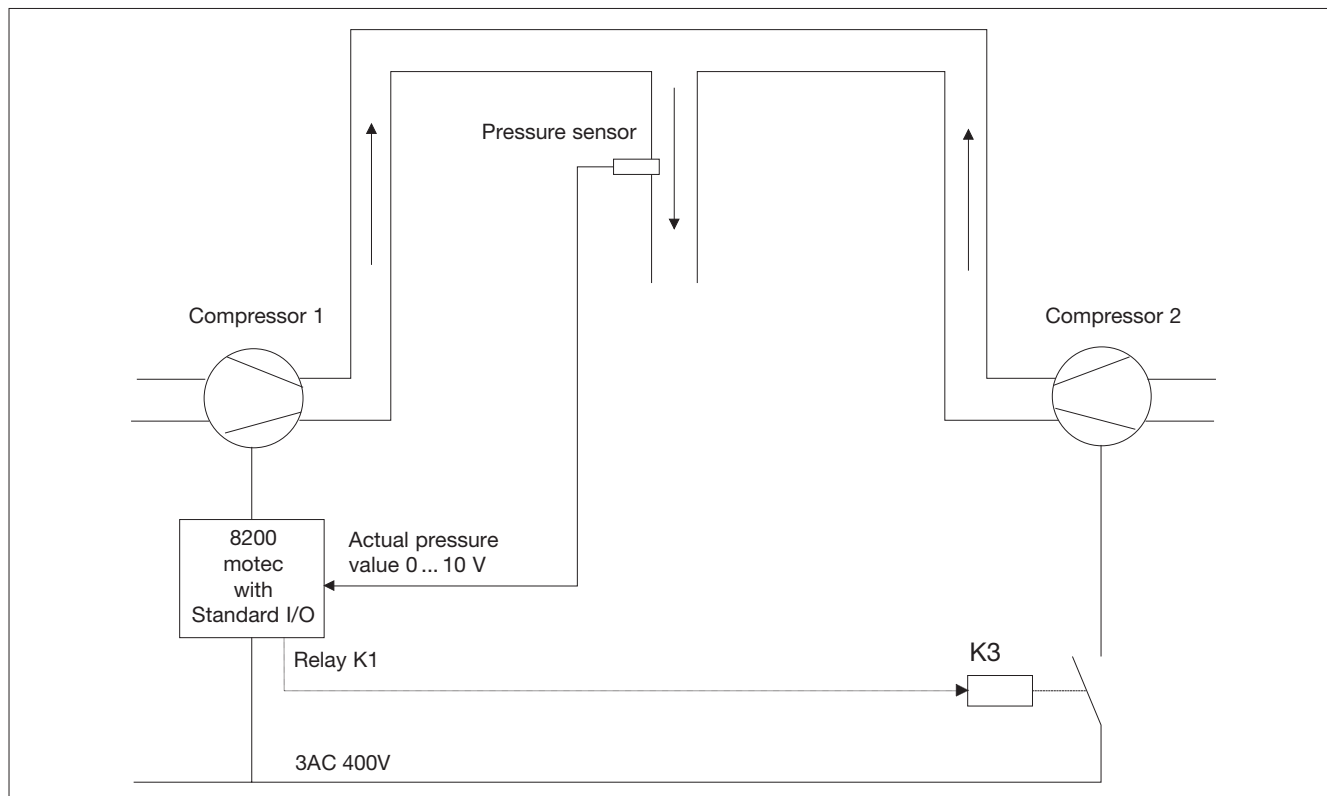
Conditions
- Compressor 1 runs under the control of an 8200 motec.
- Compressor 2 has a fixed connection to the mains and is switched on or off by the 8200 motec depending on the cooling requirements.
- The selection of the pressure setpoint of the refrigeration process is fixed in the motec.

Functions used
- Controller enable/inhibit function for starting and stopping
- Internal process controller for pressure control.
- Fixed frequency
- Programmable relay output K1
- Adjustable switching thresholds
- Parameter set transfer

Basic sequential circuit
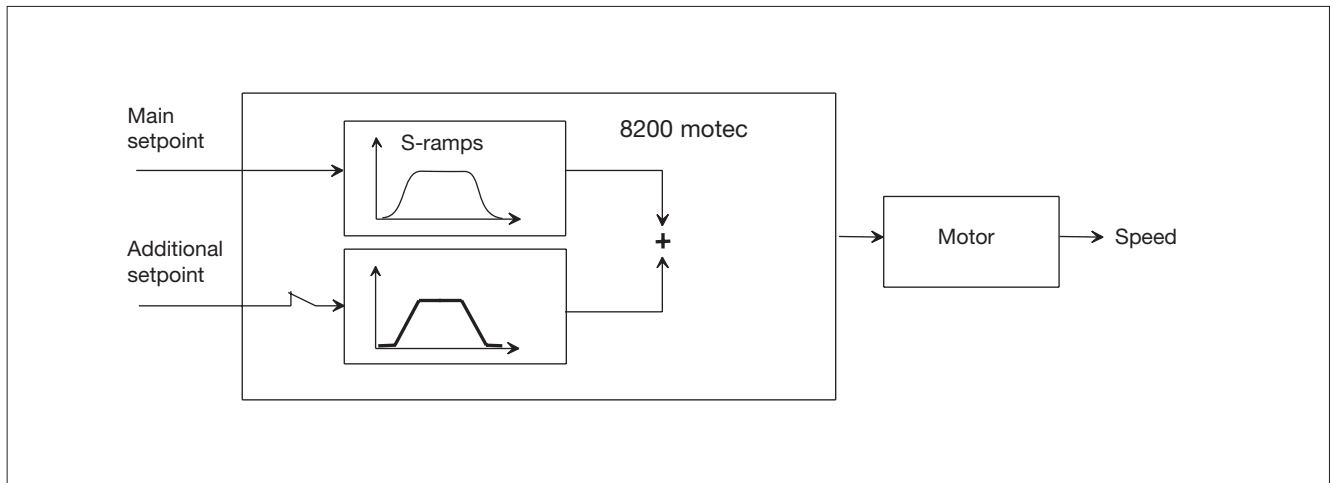
Tip:
When using the Application I/O function module, time delays at relay output K1 may render the otherwise necessary external time delay element unnecessary. The time delay element prevents compressor 2 from switching on during temporary fluctuations in actual value.

You will find more detailed information about this application example in the Operating Instructions for the 8200 motec.

Conveyor systems, pumps etc. are often operated at a basic speed which can be increased as required. Here, the speed is implemented by the 8200 motec by preselection of a main setpoint and an additional setpoint. These setpoints may originate from different sources (e.g. PLC and setpoint potentiometer).

The 8200 motec adds the two analog setpoints and then increases the speed of the motor accordingly. The upward and downward ramps for both setpoints are variable and can be adjusted to ensure smooth acceleration. The main setpoint ramp can also be set as an S-ramp.

Block diagram for setpoint summation

You will find more detailed information about this application example in the operating instructions for the 8200 motec.

5
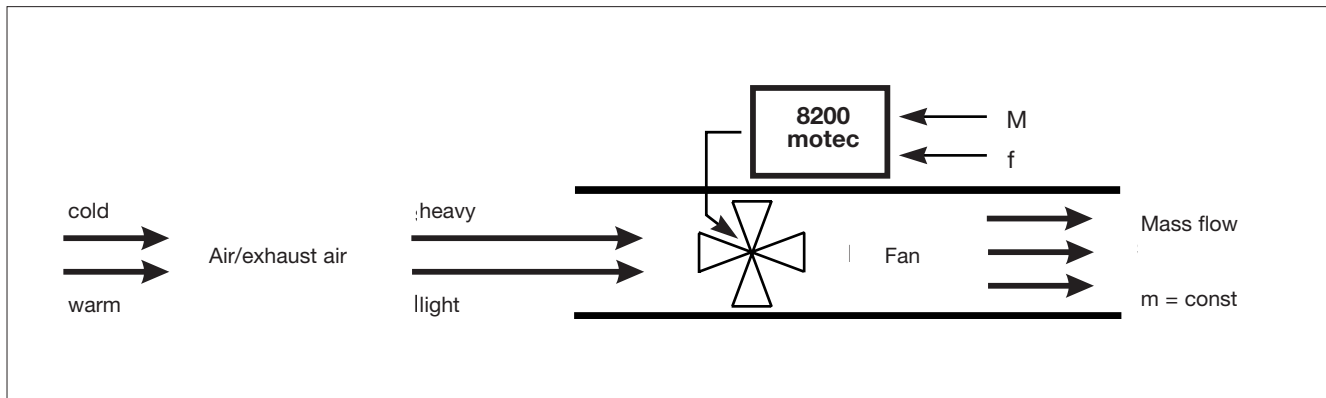
Power control (torque limitation) is used for example to ensure a constant flow of mass when media which change their specific gravity are moved, usually air at different temperatures. Here, a torque limit and a rotational speed setpoint are preselected for the motec.

Automatic adaptation of the rotational speed ensures that the torque limit is adhered to when the specific gravity changes, provided that the value of the rotational speed setpoint is selected high enough to not have a limiting effect.

The principle of power control demonstrated with a fan

You will find more detailed information about this application example in the Operating Instructions for the 8200 motec.

Example: Screw conveyor (eccentric screw pump) with paddle shaft

These pumps are capable of steady delivery flow at largely constant delivery pressure proportional to the speed of the screw.

The paddle shafts in the feed hopper allow the continuous reduction/topping up of the material to be conveyed or the mixing in of an additional material (e.g. mixing in of quick lime for conditioning sludge).

The screw conveyor and paddle shafts are set for stepless speed control.

8200 motec frequency inverters can be used as an alternative to mechanical variable speed drives.
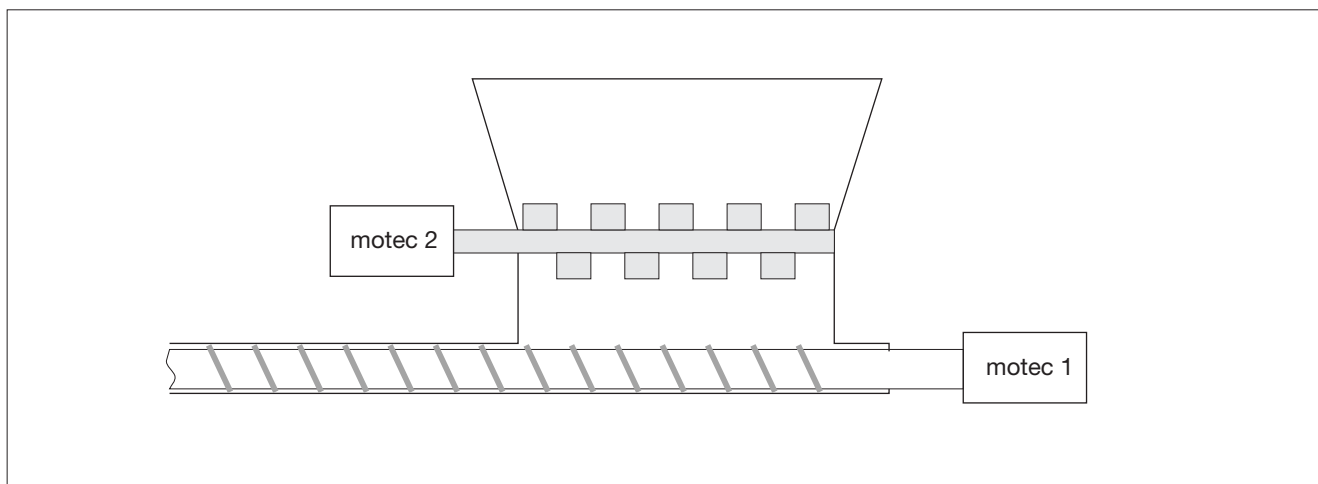
Conditions

For reasons relating to the process, the motor speed of the paddle shaft drive must always be half the motor speed of the screw conveyor drive.

Required components
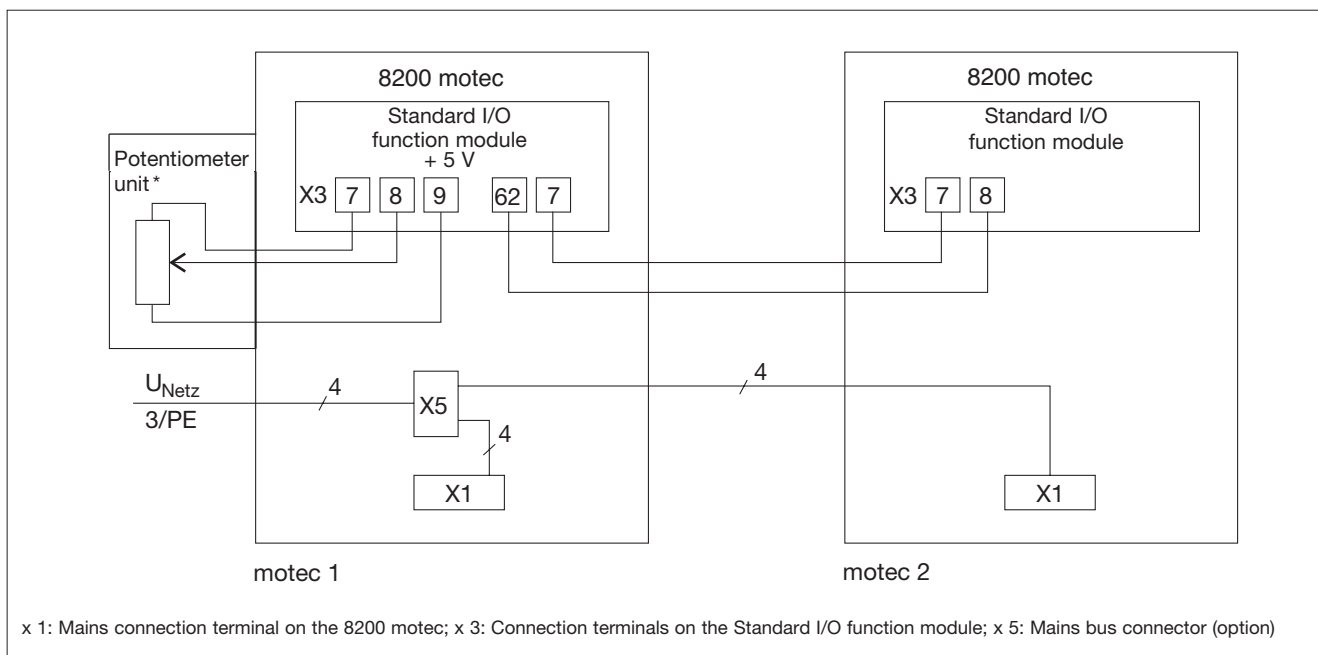
• 2 x motec with Standard I/O (motec 1 and motec 2)
• A potentiometer for motec 1.*

Basic circuit for a screw conveyor with the 8200 motec

motec 1: Paddle shaft drive
motec 2: Screw conveyor drive

Drive controller circuit for a screw conveyor with paddle shaft

x 1: Mains connection terminal on the 8200 motec; x 3: Connection terminals on the Standard I/O function module; x 5: Mains bus connector (option)

* Use a switch/potentiometer unit (type E82ZBU) (see page 4-24)

5

6

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Technical documentation at a glance

Documentation	Contents	Target group	Available languages
Installation guidelines	Safety instructions, handling and installation	installation personnel	In three languages: German, English, French
System manual Communication manual Operating instructions	Extensive and comprehensive information for design, construction, development and programming	Planning engineers, design engineers and developers of machines and systems	Single-language version: German, English or French
User's manual	Safety instructions, handling troubleshooting and fault elimination	Operators and users of machines and systems	Single-language version German, English or French. Other languages will shortly be available on request

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