

Inverters

# Inverter Drives 8400 protec

0.75 ... 4.0 kW





# Inverter Drives 8400 protec

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# Inverter Drives 8400 protec

Accessories

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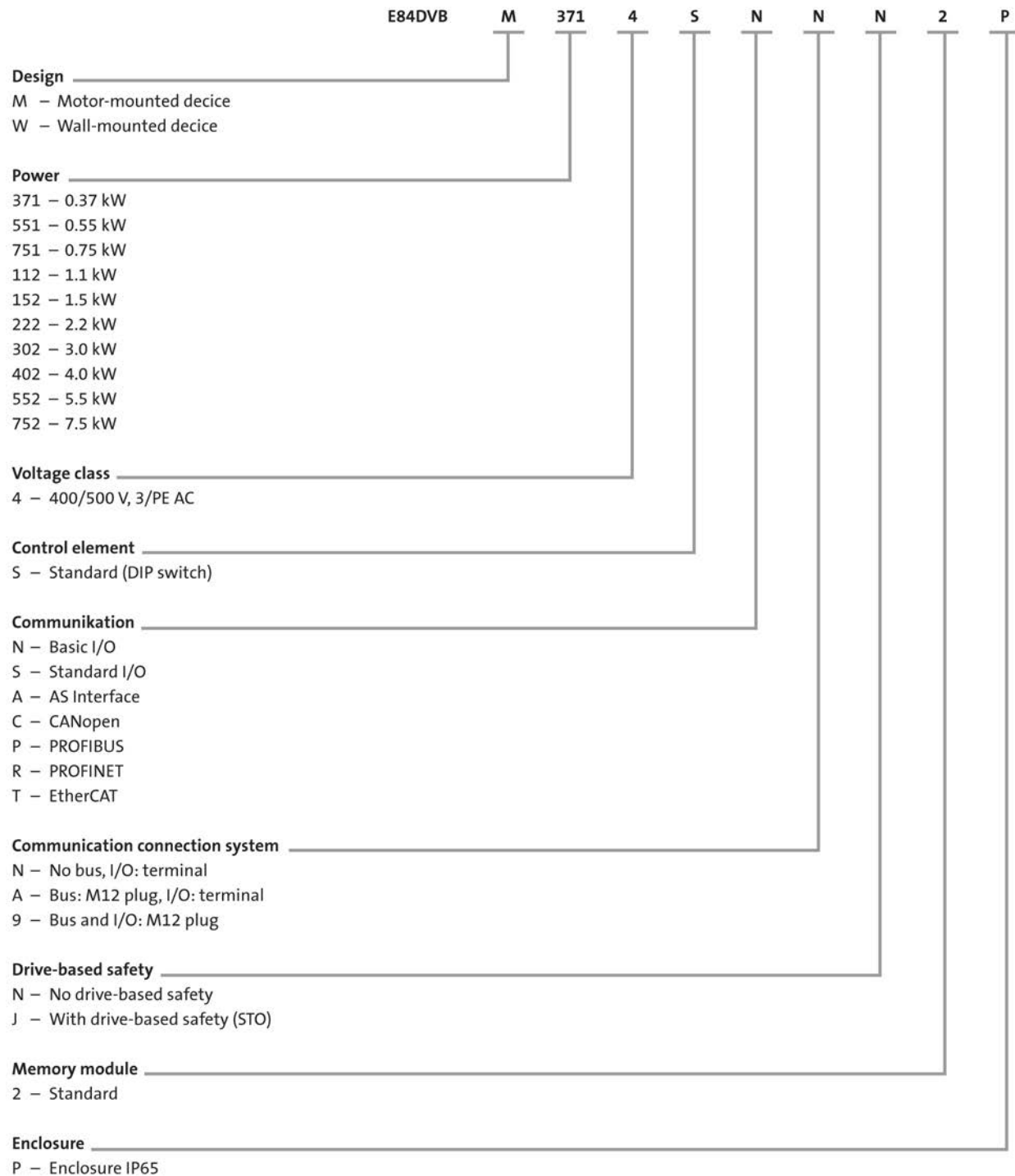


# Inverter Drives 8400 protec

## General information



### Product key



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# Inverter Drives 8400 protec

General information



## Equipment

### Display and diagnostics

Status LEDs  
L-force diagnostic interface

### Safety system

optional

### Mains connection

Pluggable in loop-through technique

### Pluggable control connections

For communication purposes and inputs/outputs



### Brake resistor

Plug connection

### Motor connection

Connection via hybrid cable

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# Inverter Drives 8400 protec

## General information



### List of abbreviations

b	[mm]	Dimensions
C <sub>th</sub>	[kWs]	Thermal capacity
f <sub>ch</sub>	[kHz]	Rated switching frequency
h	[mm]	Dimensions
I <sub>N, out</sub>	[A]	Rated output current
I <sub>N, AC</sub>	[A]	Rated mains current
m	[kg]	Mass
n <sub>max</sub>	[r/min]	Max. speed
P	[kW]	Typical motor power
P <sub>V</sub>	[kW]	Power loss
P <sub>N</sub>	[kW]	Rated power
R <sub>N</sub>	[Ω]	Rated resistance
t	[mm]	Dimensions
U <sub>AC</sub>	[V]	Mains voltage
U <sub>DC</sub>	[V]	DC supply
U <sub>N, AC</sub>	[V]	Rated voltage
U <sub>out</sub>	[V]	Max. output voltage

ASM	Asynchronous motor
DIAG	Slot for diagnostic adapter
DIN	Deutsches Institut für Normung e.V.
EN	European standard
EN 60529	Degrees of protection provided by enclosures (IP code)
EN 60721-3	Classification of environmental conditions; Part 3: Classes of environmental parameters and their limit values
EN 61800-3	Electrical variable speed drives Part 3: EMC requirements including special test methods
IEC	International Electrotechnical Commission
IEC 61508	Functional safety of electrical/electronic/programmable electronic safety-related systems
IM	International Mounting Code
IP	International Protection Code
MCI	Slot for communication module (module communication interface)
NEMA	National Electrical Manufacturers Association
UL	Underwriters Laboratory Listed Product
UR	Underwriters Laboratory Recognized Product
VDE	Verband deutscher Elektrotechniker (Association of German Electrical Engineers)

# Inverter Drives 8400 protec

General information

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# Inverter Drives 8400 protec

## General information

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### 8400 protec

**The wall-mounted device with a high degree of integration for complex decentralised systems. It excels through its robust design, high degree of operational reliability and fast installation.**

This inverter with a high level of functionality facilitates both basic and servo-based applications. The Inverter Drives 8400 protec is supplied with all modules and interfaces ready to be connected.

#### On-site diagnostics

- A large display provide constant information on the operating status of the device.
- The clearly laid out LEDs provide additional diagnostics information. The fast diagnostics system thereby makes an effective contribution to increasing system availability.

#### Decentralised integrated positioning

- Implementing affordable and decentralised positioning applications with asynchronous motors. Whether switch-off, tabular or absolute positioning: the Inverter Drives 8400 protec offers integrated solutions for these applications. The ability to connect incremental and absolute value encoders rounds off this scope of functions.
- The parameters are set conveniently using the "L-force Engineer" here. The range also has a freely editable function block interconnection for integration of logic, arithmetic and mathematic program through graphic programming.

#### Safety engineering in accordance with EN ISO 13849-1

- The certified safety system enables not only the connection of local safety elements and safe communication via PROFIsafe but also a series of safety functions.
- Safe torque off (STO)
- Safe stop 1 (SS1)
- Safe stop emergency (SSE)
- Safe operation mode selector (OMS)
- Safe enable switch (ES)

#### Other benefits

- 200% overload current (3s)
- V/f control with and without encoder
- Sensorless vector control
- Servo control
- Resistant to short circuits and earth faults
- DC-injection braking
- S-ramp for smooth acceleration
- Max. output frequency 1000 Hz
- 15 fixed frequencies
- Standardised connectors
- CANopen, PROFIBUS, PROFINET

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Inverter Drives 8400 protec

# Inverter Drives 8400 protec

## General information



### Functions and features

<b>Mode</b>	8400 protec
<b>Control types, motor control</b>	V/f control (linear or quadratic) V/f control with feedback Sensorless vector control (torque/speed) Servo control (asynchronous motor)
<b>Basic functions</b>	Application-oriented commissioning (predefined applications) Freely assignable user menu DC brake function Flying restart circuit S-shaped ramps for smooth acceleration Max. output frequency 1000Hz PID controller 15 fixed frequencies Parameter change-over (4x 32) Masking frequencies Logic functions, comparator, counter, arithmetic function Freely interconnectable function blocks Point-to-point positioning
<b>Monitoring and protective measures</b>	Short circuit Earth fault Overvoltage Motor stalling I <sup>2</sup> x t-Motor monitoring Motor phase failure Mains phase failure Protection against restart for cyclic mains switching (up to 22 kW) Motor overtemperature (input for PTC or thermal contact)
<b>Diagnostics</b>	
Diagnostic interface	Integrated For USB diagnostic adapter with PC connection or keypad
Status display	18 LEDs
<b>Braking operation</b>	
Brake chopper	Integrated
Brake resistor	Internal or external

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# Inverter Drives 8400 protec



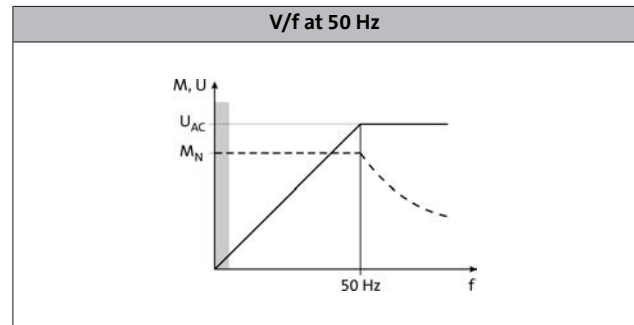
## General information

### Operating modes

An inverter enables energy-efficient operation of a system in virtually all application cases. The various operating modes, which can be created by making just a few simple settings, facilitate this. The following characteristics and corresponding specifications listed on the following pages can be used to calculate the optimum operating mode during the project planning phase.

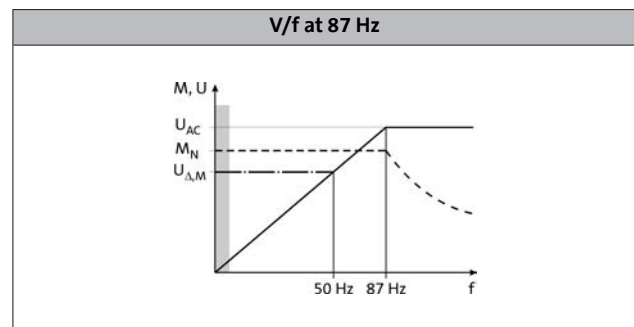
#### Standard setting

In its initial state when delivered, the inverter is set up for basic operation with a three-phase AC motor with V/f control. When operated in this mode, the rated torque of the motor is available in a setting range up to 50 Hz.



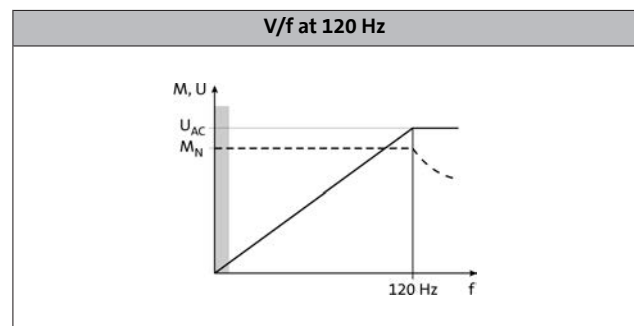
#### Extended setting range up to 87 Hz

If the V/f switchover point on the inverter is set to 87 Hz, the rated torque can be used across an extended setting range. Here, a 230/400V motor is for example used and operated in a delta layout with a 400V inverter. The setting range is then increased by 40 %. The inverter must be dimensioned for a rated motor current of 230 V.



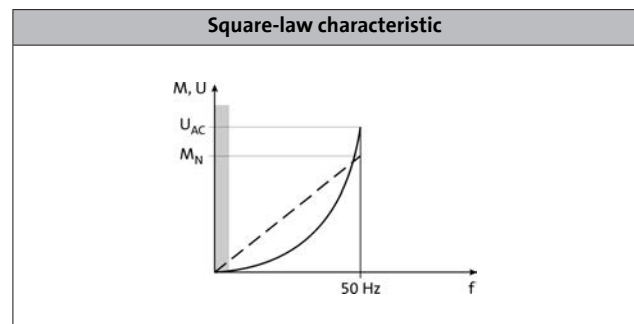
#### Operation with inverter-optimised MF motors

Large setting ranges and optimum operation at the rated torque: these are the strengths of the MF motor when used in combination with an inverter. The motors are optimised for a setting range up to 120 Hz. Compared to conventional 50Hz operation, the setting range increases by 250 %. It is quite simply not possible for a drive to be operated any more efficiently in a machine.



#### Operation with low loads

This operating mode can be used for various applications, e.g. for fans and pumps: In fan and pump applications, the load behaviour follows a square-law characteristic depending on the speed. Often, an overload capacity of 120% is sufficient. This serves to operate the inverter during operation with increased power, i.e. the inverter can be dimensioned one power size smaller. The square-law characteristic which corresponds to the load behaviour can be set in the inverter.



# Inverter Drives 8400 protec

## General information



## Operating modes

### VFC-eco energy saving mode

The Inverter Drives 8400 make energy saving especially easy with the "VFC eco" function. Particularly in the partial load operational range, this function significantly reduces energy requirements. Combined with the new L-force MF three-phase AC motors, this drive solution impresses with the maximum energy efficiency of a Lenze BlueGreen solution.

The "VFC eco" mode adjusts the magnetising current of a motor intelligently to actual requirements. This is particularly useful in partial load operational range, as this is precisely where three-phase AC motors need to be supplied with a greater magnetising current than the operating conditions actually require. The "VFC eco" mode allows losses to be reduced so much that savings of up to 30% can be achieved.

Energy efficiency can then be increased even further with the MF three-phase AC motors. These motors have been specifically designed for operation with frequency inverters. They operate at 120 Hz instead of 50 Hz, as 4-pole three-phase AC motors are at their most efficient at this frequency.

### Overcurrent operation

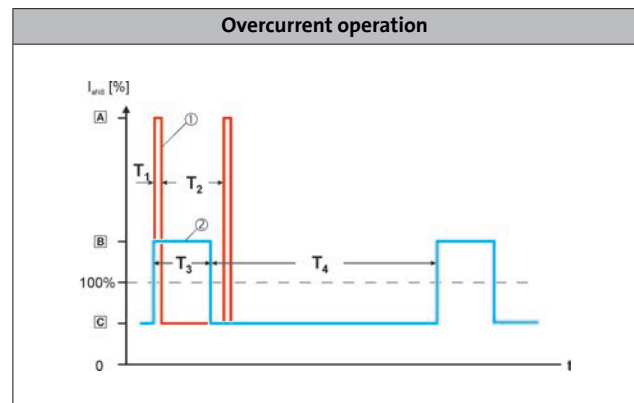
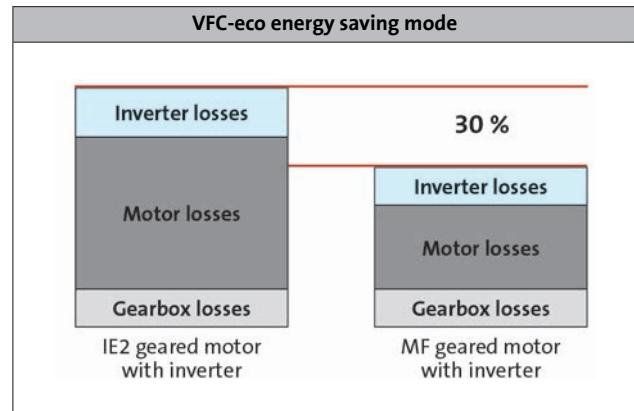
The inverters can be driven at higher amperages beyond the rated current if the duration of this overcurrent operation is time limited. Two utilisation cycles with a duration of 15 s and 180 s are defined. Within these utilisation cycles, an overcurrent is possible for a certain time if afterwards an accordingly long recovery phase takes place. For both utilisation cycles, a moving average is determined separately. The adjacent diagram shows both cycles: 15 s in red and 180 s in blue. The overload times  $t_{o1}$  are 3 s ( $T_1$ ) and 60 s ( $T_3$ ) respectively, the corresponding recovery times  $t_{re}$  are 12 s ( $T_2$ ) and 120 s ( $T_4$ ) respectively. The following tables show the resulting maximum output currents. Monitoring of the device utilisation ( $I \times t$ ) activates the set error response (trip or warning if one of the two utilisation values exceeds the limit of 100 %).

### Switching frequencies

"Switching frequency" in connection with inverters means the switching on/off processes of the output modules. The switching frequency for an inverter can usually be between 2 and 16 kHz, depending on the power.

As switching the modules causes losses and thus heat, the inverter can provide a higher output current with a switching frequency of 2 kHz. Additionally, a distinction is made between the operation with permanently set switching frequency and a variable switching frequency. Here, the switching frequency is lowered depending on the current.

The data for the operation with increased power are permissible for the operation with a constant switching frequency of 2 or 4 kHz and an ambient temperature of 40 °C.



# Inverter Drives 8400 protec

Technical data

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# Inverter Drives 8400 protec

Technical data



## Standards and operating conditions

<b>Mode</b>			
Product			8400 protec
<b>Conformity</b>			
CE			Low-Voltage Directive 2006/95/EG
<b>Approval</b>			
UL 508C			
CSA			
<b>Certification</b>			
<b>Degree of protection</b>			
EN 60529			IP65 with control element "C" IP54
NEMA 250			
<b>Climatic conditions</b>			
Storage (EN 60721-3-1)			1K3 (temperature: -25 °C ... +60 °C)
Transport (EN 60721-3-2)			2K3 (temperature: -25 °C ... +75 °C)
Operation (EN 60721-3-3)			3K3 (temperature: -25 °C ... +55 °C)
Current derating at over 45°C			2.5% / K
<b>Site altitude</b>			
Amsl	H <sub>max</sub>	[m]	4000
Current derating at over 1000 m		[%/1000 m]	5
<b>Vibration resistance</b>			
Transport (EN 60721-3-2)			2M2
Operation (EN 61800-5-1)			
Operation (Germanischer Lloyd)			

<b>Mode</b>			
Product			8400 protec
<b>Supply form</b>			
			Systems with earthed star point (TN and TT systems)
<b>Noise emission</b>			
EN 61800-3			Integrated RFI suppression: cable-guided, category C2 up to 20 m shielded motor cable
<b>Insulation resistance</b>			
EN 61800-5-1			≤ 2000 m amsl overvoltage category III > 2000 m amsl overvoltage category II
<b>Degree of pollution</b>			
EN 61800-5-1			2
<b>Protective insulation of control circuits</b>			
EN 61800-5-1			Safe mains isolation: double/reinforced insulation

<sup>1)</sup> In preparation.


# Inverter Drives 8400 protec

Technical data



## Rated data 400 V

- The data is valid for operation at 400 V AC.
- Unless otherwise specified, the data refers to the default setting.

				
<b>Typical motor power</b>				
4-pole asynchronous motor	P	[kW]	0.75	1.50
<b>Product key</b>				
Inverter			E84D□□□7514□□□□	E84D□□□1524□□□□
<b>Mains voltage range</b>				
	$U_{AC}$	[V]	3/PE AC 320 V-0% ... 440 V+0%, 45 Hz-0 % ... 65 Hz+0%	
<b>Rated mains current</b>				
	$I_{N,AC}$	[A]	4.1	5.5
<b>Rated output current</b>				
	$I_{N,out}$	[A]	2.4	3.9
<b>Rated switching frequency</b>				
	$f_{ch}$	[kHz]	8	
<b>Output current</b>				
2 kHz	$I_{out}$	[A]	2.4	3.9
4 kHz	$I_{out}$	[A]	2.4	3.9
8 kHz	$I_{out}$	[A]	2.4	3.9
16 kHz	$I_{out}$	[A]	1.6	2.3

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## Data for 60 s overload

<b>Max. output current</b>				
	$I_{max,out}$	[A]	3.6	5.9
<b>Overload time</b>				
	$t_{ol}$	[s]	60.0	
<b>Recovery time</b>				
	$t_{re}$	[s]	120.0	

## Data for 3 s overload

<b>Max. short-time output current</b>				
	$I_{max,out}$	[A]	4.8	7.8
<b>Overload time</b>				
	$t_{ol}$	[s]	3.0	
<b>Recovery time</b>				
	$t_{re}$	[s]	75.0	


# Inverter Drives 8400 protec

## Technical data



### Rated data 400 V

- The data is valid for operation at 400 V AC.
- Unless otherwise specified, the data refers to the default setting.

				
<b>Typical motor power</b>				
4-pole asynchronous motor	P	[kW]	0.75	1.50
<b>Product key</b>				
Inverter			E84D□□□7514□□S□	E84D□□□1524□□S□
<b>Power loss</b>				
	P <sub>V</sub>	[kW]	0.1 <sup>2)</sup>	
<b>Mass</b>				
	m	[kg]	7.6	
<b>Max. cable length</b>				
Shielded motor cable	I <sub>max</sub>	[m]	20	

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### Brake chopper rated data

<b>Rated power, Brake chopper</b>			0.9	2.0
	P <sub>N</sub>	[kW]		
<b>Max. output power, Brake chopper</b>				
	P <sub>max,1</sub>	[kW]	3.5	
<b>Min. brake resistance</b>				
	R <sub>min</sub>	[Ω]	150.0	

### Dimensions

<b>Dimensions</b>			
Height	h	[mm]	260 <sup>3)</sup>
Width	b	[mm]	353
Depth	t	[mm]	110

<sup>1)</sup> Technically possible cable lengths, irrespective of EMC requirements

<sup>2)</sup> Operation at rated output current I<sub>N, out</sub>

<sup>3)</sup> + 30 mm with connector shell.




# Inverter Drives 8400 protec

Technical data



## Rated data 400 V

- The data is valid for operation at 400 V AC.
- Unless otherwise specified, the data refers to the default setting.

				
<b>Typical motor power</b>				
4-pole asynchronous motor	P	[kW]	0.75	4.00
<b>Product key</b>				
Inverter			E84D□□□7514□□□□	E84D□□□4024□□□□
<b>Mains voltage range</b>				
	$U_{AC}$	[V]	3/PE AC 320 V-0% ... 440 V+0%, 45 Hz-0 % ... 65 Hz+0%	
<b>Rated mains current</b>				
	$I_{N,AC}$	[A]	4.1	12.9
<b>Rated output current</b>				
	$I_{N,out}$	[A]	2.4	9.5
<b>Rated switching frequency</b>				
	$f_{ch}$	[kHz]	8	
<b>Output current</b>				
2 kHz	$I_{out}$	[A]	2.4	9.5
4 kHz	$I_{out}$	[A]	2.4	9.5
8 kHz	$I_{out}$	[A]	2.4	9.5
16 kHz	$I_{out}$	[A]	1.6	6.3

4.1

## Data for 60 s overload

<b>Max. output current</b>				
	$I_{max,out}$	[A]	11.0	14.3
<b>Overload time</b>				
	$t_{ol}$	[s]	60.0	
<b>Recovery time</b>				
	$t_{re}$	[s]	120.0	

## Data for 3 s overload

<b>Max. short-time output current</b>				
	$I_{max,out}$	[A]	14.6	19.0
<b>Overload time</b>				
	$t_{ol}$	[s]	3.0	
<b>Recovery time</b>				
	$t_{re}$	[s]	75.0	


# Inverter Drives 8400 protec

## Technical data



### Rated data 400 V

- The data is valid for operation at 400 V AC.
- Unless otherwise specified, the data refers to the default setting.

				
<b>Typical motor power</b>				
4-pole asynchronous motor	P	[kW]	3.00	4.00
<b>Product key</b>				
Inverter			E84D□□□3024□□S□	E84D□□□4024□□S□
<b>Power loss</b>				
	P <sub>V</sub>	[kW]	0.1 <sup>2)</sup>	0.2 <sup>2)</sup>
<b>Mass</b>				
	m	[kg]	11.3	
<b>Max. cable length</b>				
Shielded motor cable	I <sub>max</sub>	[m]	50	

4.1

### Brake chopper rated data

<b>Rated power, Brake chopper</b>			3.9	5.2
	P <sub>N</sub>	[kW]		
<b>Max. output power, Brake chopper</b>				
	P <sub>max,1</sub>	[kW]	11.2	
<b>Min. brake resistance</b>				
	R <sub>min</sub>	[Ω]	47.0	

### Dimensions

<b>Dimensions</b>				
Height	h	[mm]	260 <sup>3)</sup>	
Width	b	[mm]	434	
Depth	t	[mm]	148	

<sup>1)</sup> Technically possible cable lengths, irrespective of EMC requirements

<sup>2)</sup> Operation at rated output current I<sub>N, out</sub>

<sup>3)</sup> + 30 mm with connector shell.

# Inverter Drives 8400 protec

Technical data



## Mains connection

- ▶ The mains fuse and cable cross-section specifications are for a mains connection of 1 x 230V or 3 x 400V.
- ▶ Class gG/gI fuses or class gRL semiconductor fuses.
- ▶ The cable cross-sections apply to PVC-insulated copper cables.
- ▶ Use for installation with UL-approved cables, fuses and brackets.

Typical motor power	Mains voltage	Product key	Circuit breaker	Fuse		Mains connection
				EN 60204-1	UL	
4-pole asynchronous motor		Inverter		I	I	Cross-section (without mains choke)
P	$U_{AC}$		I	I	I	q
[kW]	[V]		[A]	[A]	[A]	[mm <sup>2</sup> ]
0.75	3 AC 320... 440	E84D□□□7514□□S□	C16	16	15	2.5
1.50		E84D□□□1524□□S□				
3.00		E84D□□□3024□□S□				
4.00		E84D□□□4024□□S□	C20	20	20	

4.1

## Motor connection

- ▶ Keep motor cables as short as possible, as this has a positive effect on the drive behaviour.
- ▶ In group drives (multiple motors on one controller), the resulting cable length is the crucial factor. Please consult Lenze for detailed information.
- ▶ Electric strength of the motor cable: 1 kV as per VDE 250-1.

Typical motor power	Mains voltage	Product key	Max. cable length	
			shielded C2 without external measures	shielded C2 with external measures
4-pole asynchronous motor		Inverter		
P	$U_{AC}$		$l_{max}$	$l_{max}$
[kW]	[V]		[m]	[m]
0.75	3 AC 320... 440	E84D□□□7514□□S□	20	20
1.50		E84D□□□1524□□S□		
3.00		E84D□□□3024□□S□		
4.00		E84D□□□4024□□S□		

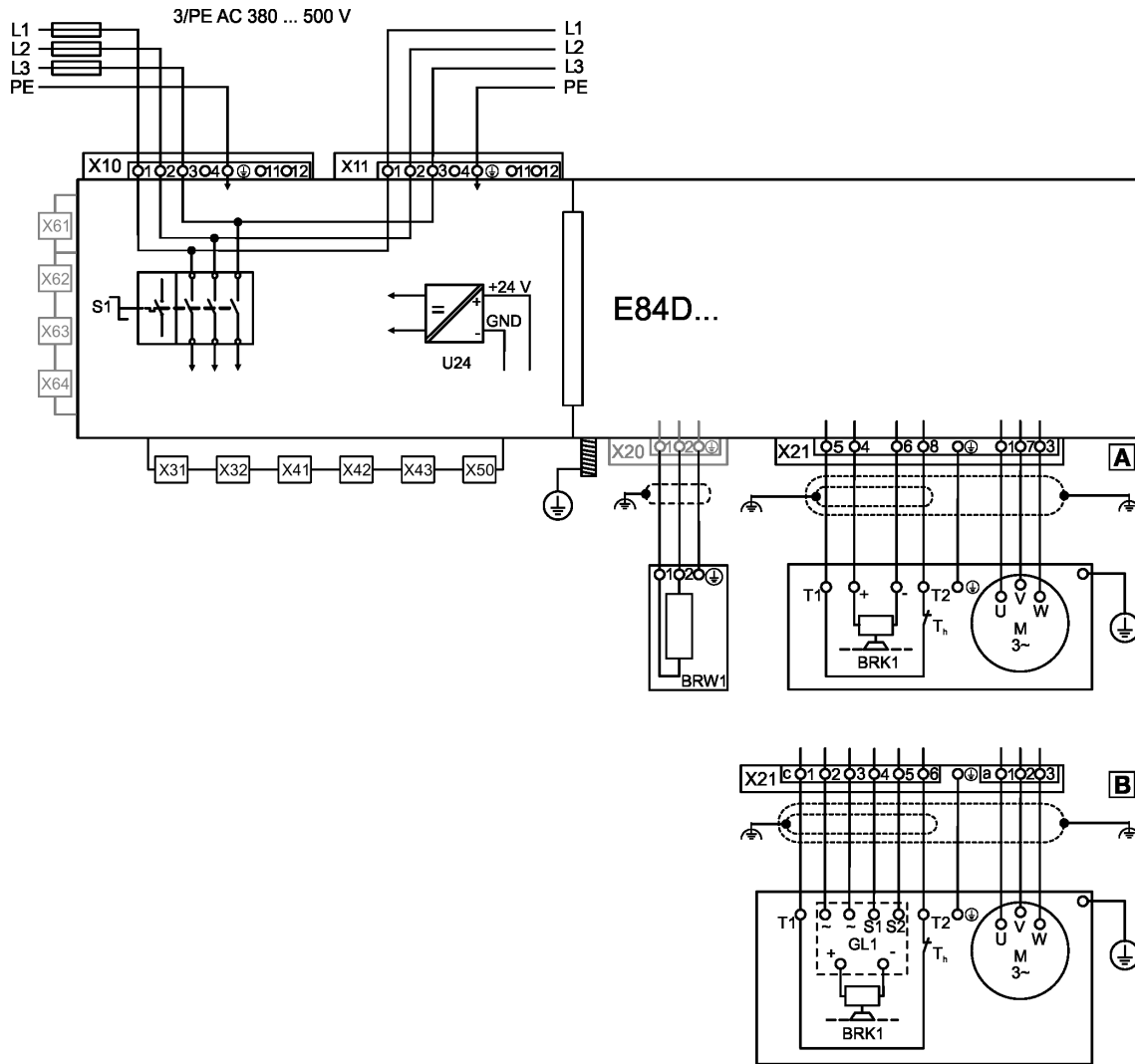
# Inverter Drives 8400 protec

Technical data



## Connection plans

Wiring example for connecting Inverter Drives 8400 protec to 3 x 400V



4.1

# Inverter Drives 8400 protec

Technical data



## Control connections

<b>Mode</b>	
Product	8400 protec
<b>Analog inputs</b>	
Number	1 Optional: voltage or current input
Resolution	10 bits
Value range	0 ... 10V, 0/4 ... 20mA
<b>Digital inputs</b>	
Number	6/0 or 4/2 (configurable)
Switching level	PLC (IEC 61131-2)
Max. input current	11 mA
Function	
<b>Digital outputs</b>	
Number	0 or 2 (configurable)
Switching level	PLC (IEC 61131-2)
Max. output current	200 mA per output
<b>Relay</b>	
Number	
Contact	
AC connection	
DC connection	
<b>External 24 V DC supply</b>	
	To support communication when the 400 V is switched off
<b>Internal 24 V DC supply</b>	
	max. 1 A für Ein- /Ausgänge sowie Sensorspeisungen
<b>Interfaces</b>	
CANopen	On board optional
Extensions	Integrated fieldbus communication
Safety engineering	1-2 safe inputs for passive/active actuators/PROFIsafe/PROFIsafe, depending on the safety option selected
<b>Drive interface</b>	
Encoder input	Via 2 digital inputs, HTL, 2-track, 10 kHz 100 kHz, can also be used as a frequency input, SSI input (instead of analog input),

<sup>1)</sup> For mains-independent control electronics supply

## Additional connections

All connections are generally connected internally to terminals. The most common connections of the Communication Unit already have plug connectors. If additional connections are to be implemented, these can be designed as standard PG glands.

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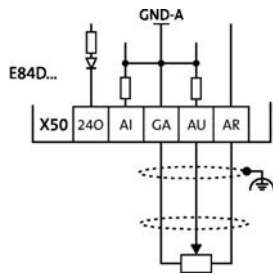
# Inverter Drives 8400 protec

Technical data



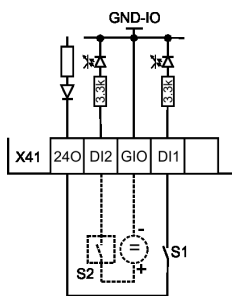
## Control connections

Connection of analog inputs and outputs

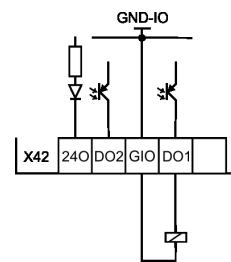


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Connection of digital inputs and outputs



Connection of digital inputs and outputs



# Inverter Drives 8400 protec

## Modules



### Memory module

All drive settings for the 8400 are stored on the memory module, which is a pluggable memory chip. The memory module ensures that drives can be replaced quickly and without errors being made.

Mode	Features	Product key
Memory module	<ul style="list-style-type: none"> <li>For 8400 StateLine, HighLine, Topline and protec</li> <li>Packaging unit: 5 items</li> </ul>	E84AYM10S/M

### Safety engineering

The following safety functions are integrated into the communication modules depending on the device version:

#### Safety option 10

- Safe torque off (STO)
- The drive is safely disconnected when a request is sent via connected active or passive sensors

#### Safety option 20

- Safe torque off (STO)
- Safety stop 1 (SS1)
- Safe stop emergency (SSE)
- Safe operation mode selector (OMS)
- Safe enable switch (ES)
- The drive is safely disconnected by a higher-level safety PLC by means of PROFIsafe/PROFINET

#### Safety option 30

- Safe torque off (STO)
- Safe stop 1 (SS1)
- Safe stop emergency (SSE)
- Safe operation mode selector (OMS)
- Safe enable switch (ES)
- The drive is safely disconnected by a higher-level safety PLC by means of PROFIsafe/PROFINET and via connected active or passive sensors

4.1

Safety functions	10	20	30
Basic error limit (at 25 °C)	10	20	30
<b>Certification</b>	Category 4 / Ple		Category 3 / Ple
EN ISO 13849-1	Category 4 / Ple		Category 3 / Ple
EN 61800-5-2	SIL 3		SIL 3
EN 62061	SIL 3		SIL 3
IEC 61508	SIL 3		SIL 3
<b>Fail-safe state</b>	Safe torque off		

### Communication modules

Inverter Drives 8400 protec are supplied with permanently installed communication modules. As well as containing the components for fieldbus communication, these modules also include the digital inputs and outputs. An analog input or a synchronous serial interface (SSI) can also be provided as an option.

#### Overview

Communication module	Digital inputs	Digital outputs	Analog inputs
	Number	Number	Number
CANopen	6 or 4 (configurable)	0 or 2 (configurable)	1 <sup>1)</sup>
PROFIBUS	6 or 4 (configurable)	0 or 2 (configurable)	1 <sup>1)</sup>
PROFINET	6 or 4 (configurable)	0 or 2 (configurable)	1 <sup>1)</sup>

<sup>1)</sup> Or as a synchronous serial interface (SSI).

# Inverter Drives 8400 protec

## Modules



### Communication module: CANopen

The CANopen communication module allows the 8400 protec to be controlled via the "CANopen" bus system using digital control signals. It is integrated in the inverter with the product key E84D□□□□□□□□C.

The benefits of this system include:

- Easy, yet very powerful bus system
- Easy system integration, as a wide range of sensors and actuators is available in the market.

Mode	Features
Communication module	
CANopen	• Addressing via DIP switches or parameters

4.1

### Technical data

Mode			
Communication module			CANopen
Communication			
Medium			DIN ISO 11898
Communication profile			CANopen, DS301 V4.02 Lenze system bus
Device profile			Lenze device control
Baud rate			
	b	[kBit/s]	20 50 125 250 500 800 1000
Node			
			Slave Multi-master
Network topology			
			Line with terminating resistors (120 ohm) at both ends
Number of logical process data channels			
			4 (each with 1 - 8 bytes)
Number of logic parameter data channels			
			5
Number of bus nodes			
			63
Max. cable length			
per bus segment	$l_{max}$	[m]	17 for 1000 kbps 40 for 800 kbps 110 for 500 kbps 290 for 250 kbps 630 for 125 kbps 1500 for 50 kbps 3900 for 20 kbps 8000 for 10 kbps



# Inverter Drives 8400 protec

## Modules



### PROFIBUS communication modules

With the PROFIBUS communication module, the 8400 protec supports the most widespread current fieldbus system. It is integrated in the inverter with the product key E84D□□□□□□□□P.

The benefits of this system include:

- Widespread and very powerful fieldbus system
- Integrated I/O node. Capable of communication and reading inputs even when the 400V supply is switched off.

Mode	Features
Communication module	
PROFIBUS	<ul style="list-style-type: none"> <li>• DPVO: basic functionalities such as cyclical data exchange and diagnostics</li> <li>• DPV1: supports acyclical data exchange for parameter setting, operation and alarm handling</li> </ul>

### Technical data

4.1

Mode			
Communication module			PROFIBUS
<b>Communication</b>			
Medium			RS 485
Communication profile			PROFIBUS-DP-V1 PROFIBUS-DP-V0
Device profile			PROFIDrive, version 3
<b>Baud rate</b>			
	b	[kBit/s]	9.6 ... 12 000 (automatic detection)
<b>Node</b>			
			Slave
<b>Network topology</b>			
			with repeater: line or tree without repeater: line
<b>Process data words (PCD)</b>			
16 Bit			1 ... 16
<b>DP user data length</b>			
			Optional parameter channel (4 words) + process data words
<b>Number of bus nodes</b>			
			31 slaves + 1 master per bus segment With repeaters: 125
<b>Max. cable length</b>			
per bus segment	$I_{max}$	[m]	1200 (depending on the baud rate and the cable type used)

# Inverter Drives 8400 protec

## Modules



### PROFINET communication modules

With the PROFINET communication module, the 8400 protec supports a fieldbus system for continuous communication from the field level right through to company management level. It is integrated in the inverter with the product key E84D□□□□□□□□R.

The benefits of this system include:

- Fieldbus system capable of handling large data volumes
- Use of IT standards
- Integrated switch allows direct looping of PROFINET via the inverters
- Integrated I/O node. Capable of communication and reading inputs even when the 400V supply is switched off.

Mode	Features
Communication module	
PROFINET	<ul style="list-style-type: none"> <li>• Automatic detection of the 100 Mbps baud rate</li> <li>• Creation of a line topology through integrated 2-port switch</li> <li>• Support for I&amp;M 0...4 functionality for identification of the standard device</li> <li>• Link / Activity</li> </ul>

4.1

### Technical data

Mode			
Communication module			PROFINET
<b>Communication</b>			
Medium			CAT5e S/FTP according to ISO/ICE11801 (2002)
Communication profile			PROFINET RT Conf. Class B
<b>Baud rate</b>			
	b	[MBit/s]	10/100
<b>Node</b>			
			Slave (Device)
<b>Network topology</b>			
			Tree, star and line
<b>Number of logical process data channels</b>			
			1 ring as client (media redundancy)
<b>Process data words (PCD)</b>			
16 Bit			1 ... 16
<b>Max. cable length</b>			
between two nodes	$l_{max}$	[m]	100



### Brake resistors

An external brake resistor is required to brake high moments of inertia or in the event of prolonged operation in generator mode; this resistor converts braking energy into heat.

The brake resistors recommended in the table below have been dimensioned for approx. 1.5 times the regenerative power, with a cycle time of 15/135 s (brake/rest ratio). These brake resistors generally meet the usual requirements of standard applications.

The brake resistors are fitted with a thermostat (potential-free NC contact).



Brake resistor

Typical motor power	Mains voltage	Product key		Rated resistance	Rated power	Thermal capacity	Dimensions	Mass
		Inverter	Brake resistor					
4-pole asynchronous motor								
P	U <sub>AC</sub>			R <sub>N</sub>	P <sub>N</sub>	C <sub>th</sub>	h x b x t	m
[kW]	[V]			[Ω]	[kW]	[KW <sub>s</sub> ]	[mm]	[kg]
0.75	3 AC 320 ... 440	E84D□□□7514□□S□	ERBS240R300W	240.0	300.0	45	382 x 124 x 122	2.0
1.50		E84D□□□1524□□S□	ERBS180R350W	180.0	350.0	53		
3.00		E84D□□□3024□□S□	ERBS047R400W	47.0	400.0	60	400 x 110 x 105	2.3
4.00		E84D□□□4024□□S□						

# Inverter Drives 8400 protec

## Accessories



### USB diagnostic adapter

The operation, parameter setting and diagnostics of the Inverter Drives 8400 and the Servo Drives 9400 via the L-force diagnostics is made with the keypad X400 or a PC. The connection of a PC can be made via a USB interface and the USB diagnostic adapter.


For connecting the USB diagnostic adapter with the L-force diagnostics interface (DIAG) at the inverter, three different connecting cables are separately available in the lengths 2.5 m, 5 m and 10 m. The connection can be established during operation. The engineering tools EASY Starter or Engineer can be used to carry out the operation, parameter setting or diagnostics of the inverters. Both tools have simple intuitive surfaces. This enables a quick and easy commissioning.

Optionally to the USB diagnostic adapter, the PC system bus adapter can be used. For this purpose, a CANopen interface must be available at the inverter.



USB diagnostic adapter incl. connecting cable to the PC

- The engineering tools EASY Starter or Engineer are used for operation, parameter setting and diagnostics of the inverters.

Mode		Features	Product key
USB diagnostic adapter		<ul style="list-style-type: none"> <li>• Input-side voltage supply via USB connection on PC</li> <li>• Output-side voltage supply via inverter's diagnostic interface</li> <li>• Diagnostic LEDs</li> <li>• Electrical isolation of PC and inverter</li> <li>• Hot-pluggable</li> </ul>	E94AZCUS

### Connecting cables for USB diagnostic adapter

Mode	Features	Product key
Connecting cable for USB diagnostic adapter	• Length: 2.5 m	EWL0070
	• Length: 5 m	EWL0071
	• Length: 10 m	EWL0072

# Inverter Drives 8400 protec

## Accessories



### Diagnosis terminal

The diagnosis terminal can be used as an alternative to a PC if you are looking for an easy way to operate the inverter, set parameters or carry out diagnostics locally. The structured menus and plain text display provide quick access to data.

The diagnosis terminal can be plugged into the inverter's L-force diagnostic interface (DIAG) from the outside.



Diagnosis terminal

Mode	Features	Slot	Product key
Diagnosis terminal	<ul style="list-style-type: none"><li>• Diagnosis terminal inside robust housing</li><li>• incl. 2.5 m cable</li><li>• Enclosure: IP20</li><li>• For 8400 motec and protec.</li></ul>	DIAG	EZAEBK2003

4.1

### Switch/potentiometer unit

The switch/potentiometer unit is fitted directly to the 8400 motec or in a different position within the system. An analogue setpoint can be specified with the switch/potentiometer unit and the control connections integrated in the inverter by using the integrated potentiometer; the rotary switch can, for example, be used to start/stop the drive or change the direction of rotation. The switch/potentiometer unit is supplied with a 2.5 m connection cable.



Switch/potentiometer unit

Mode	Product key
Switch/potentiometer unit (IP65)	E82ZBU

# Inverter Drives 8400 protec

## Accessories



### System cables

For connection of the motor, Lenze provides finished hybrid cables. They are optimally matched to the connection between the Drive Package components. Motor connection, blower connection, brake connection and temperature monitoring are integrated in the cables. Cables up to a length of 100 m can be selected in increments of 0.1 m.

#### 10-pole cables

Available with cross-sections 1.5<sup>2</sup> and 2.5<sup>2</sup> with connection for brake or thermal contact.

4.1

Product series	Cable type	Connection cable	Cable length in decimetres	Cable end on the motor side (socket)	Cable end on the controller side
E Y P Motor		A	0 0 0 3 5 0 0 0 Minimum length Maximum length		
Fixed installation	0 0 3 9	1.5 mm <sup>2</sup>		H 0 7 Modular 16A	A 0 0 Without plug-in connector Q 0 8 Modular 40A
	0 0 4 0	2.5 mm <sup>2</sup>		A 0 0 Without plug-in connector	Q 0 8 Modular 40A
	0 0 4 6	4.0 mm <sup>2</sup>		H 0 8 Modular 16A	A 0 0 Without plug-in connector Q 0 9 Modular 40A
	0 0 4 7	10.0 mm <sup>2</sup>		H 0 9 Modular 40A	A 0 0 Without plug-in connector Q 0 9 Modular 40A
				A 0 0 Without plug-in connector	Q 0 9 Modular 40A
				H 1 4 Modular 40A	A 0 0 Without plug-in connector
				H 1 5 Modular 40A	A 0 0 Without plug-in connector

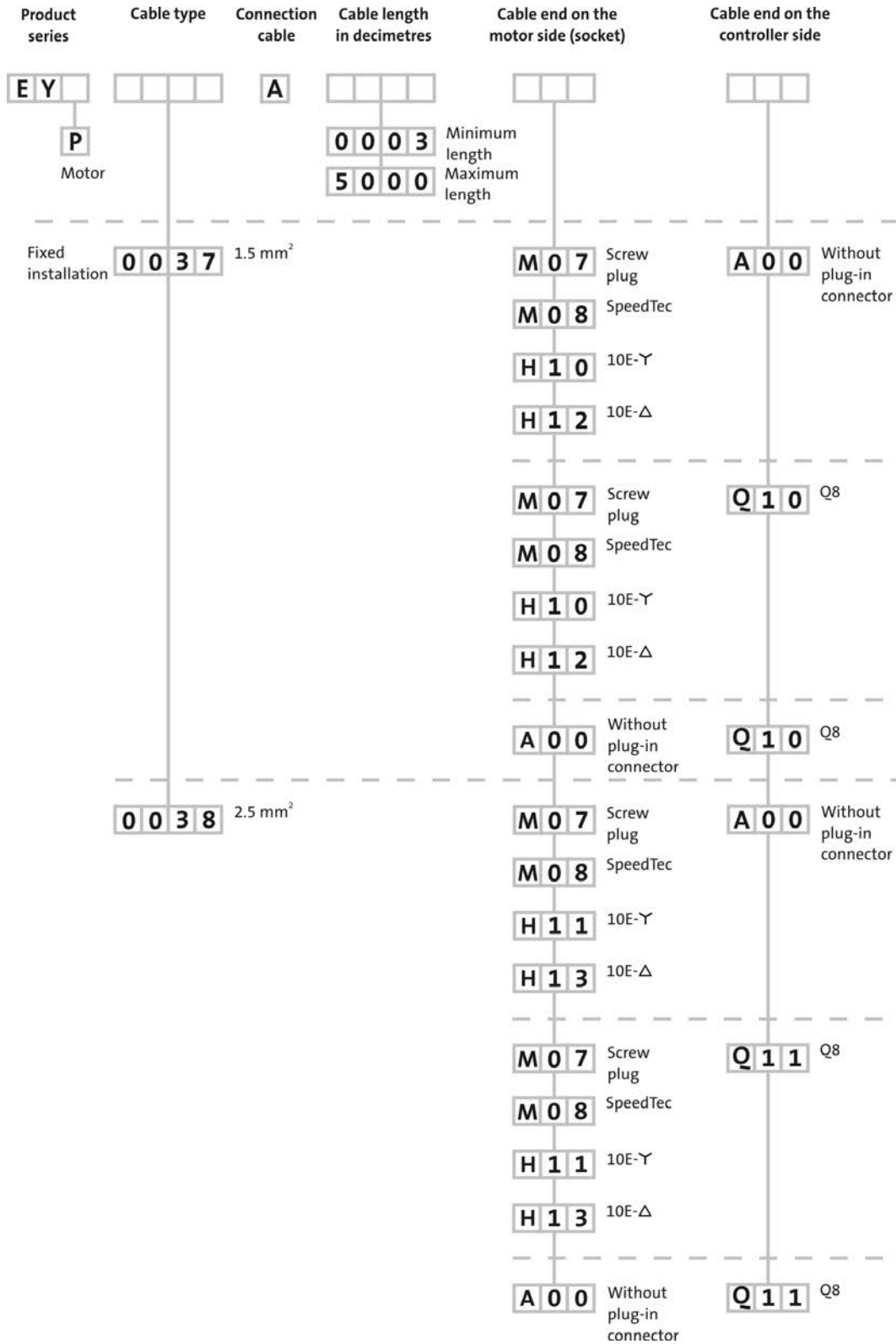
# Inverter Drives 8400 protec

## Accessories



### 8-pole cables

Available with cross-sections 1.5<sup>2</sup> and 2.5<sup>2</sup> with connection for brake and thermal contact.



4.1