

i510 protec frequency inverter



0.37 ... 11 kW
0.5 ... 15 hp

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1 About this document

1.1 Document description

This document is intended for all persons who want to configure inverters with the products described.

This document assists you with the configuration and selection of your product. It contains information on mechanical and electrical installation, on product expansions, and on accessories.



1.2 Further documents

For certain tasks, information is available in further documents.

Document	Contents/topics
Mounting sheet	General safety instructions and important UL/CSA instructions, connection diagram and technical data. • The mounting sheet is included in the delivery of the product.
Operating instructions	Basic information on installing and commissioning the product.
Commissioning manual	Detailed information on setting and parameterizing the product.

More information

For certain tasks, information is available in other media.

Medium	Contents/topics
Engineering Tools	For commissioning
AKB articles	Additional technical information for users in the Application Knowledge Base
CAD data	Download in different formats from the EASY Product Finder
EPLAN macros	Project planning, documentation and management of projects for EPLAN P8.
Device descriptions	Standardized files for network configuration



Information and tools with regard to the Lenze products can be found on the Internet:

www.lenze.com → Downloads



1.3 Notations and conventions

Conventions are used in this document to distinguish between different types of information.

Numeric notation		
Decimal separator	Point	Generally shown as a decimal point. Example: 1 234.56
Warnings		
UL Warnings	UL	Are used in English and French.
UR warnings	UR	
Text		
Engineering Tools	" "	Software Example: "EASY Starter", "PLC Designer"
Icons		
Page reference		Reference to another page with additional information. Example:  16 = see page 16
Documentation reference		Reference to other documentation with additional information. Example:  EDKxxx = see documentation EDKxxx

Layout of the safety instructions

DANGER!

Indicates an extremely hazardous situation. Failure to comply with this instruction will result in severe irreparable injury and even death.

WARNING!

Indicates an extremely hazardous situation. Failure to comply with this instruction may result in severe irreparable injury and even death.

CAUTION!

Indicates a hazardous situation. Failure to comply with this instruction may result in slight to medium injury.

NOTICE

Indicates a material hazard. Failure to comply with this instruction may result in material damage.



2 Product information

2.1 Product description

The i510 protec frequency inverter uses the same tried-and-tested technology used in control cabinet inverters. It only differs in terms of an adapted design. If there is not enough space in the control cabinet or if the inverter is to be mounted on the machine structure, then this versatile and reliable device is the right solution.

The requirements of the Ecodesign Directive, standard EN IEC 61800-9-2, are met.

Application areas: Conveyor drives, traveling drives, pumps, fans, ...

Overview						
Power range	0.5 ... 15 hp 0.37 ... 11 kW					
Mains connection	1 x 120 V	1 x 230 V	3 x 230 V	3 x 400 V	3 x 480 V	3 x 600 V
Degree of protection	UL Type 1 (comparable to NEMA 1) IP20					
Communication	CANopen, Modbus RTU					

Highlights

- Versions with keypad, USB module or WLAN module for easy commissioning
- Industry standard fieldbus network options: [▶ Topologies / network](#) 12
- The "Light Duty" load characteristic enables a higher output current
- High internal functional range: [▶ Overview](#) 13

2.1.1 Load characteristics

The inverters have two different load characteristics: "Light Duty" and "Heavy Duty".

The "Light Duty" load characteristic allows for a higher output current with restrictions regarding overload capacity, ambient temperature and switching frequency. This allows the motor required for the application to be driven by a less powerful inverter. Select the load characteristic according to the application.

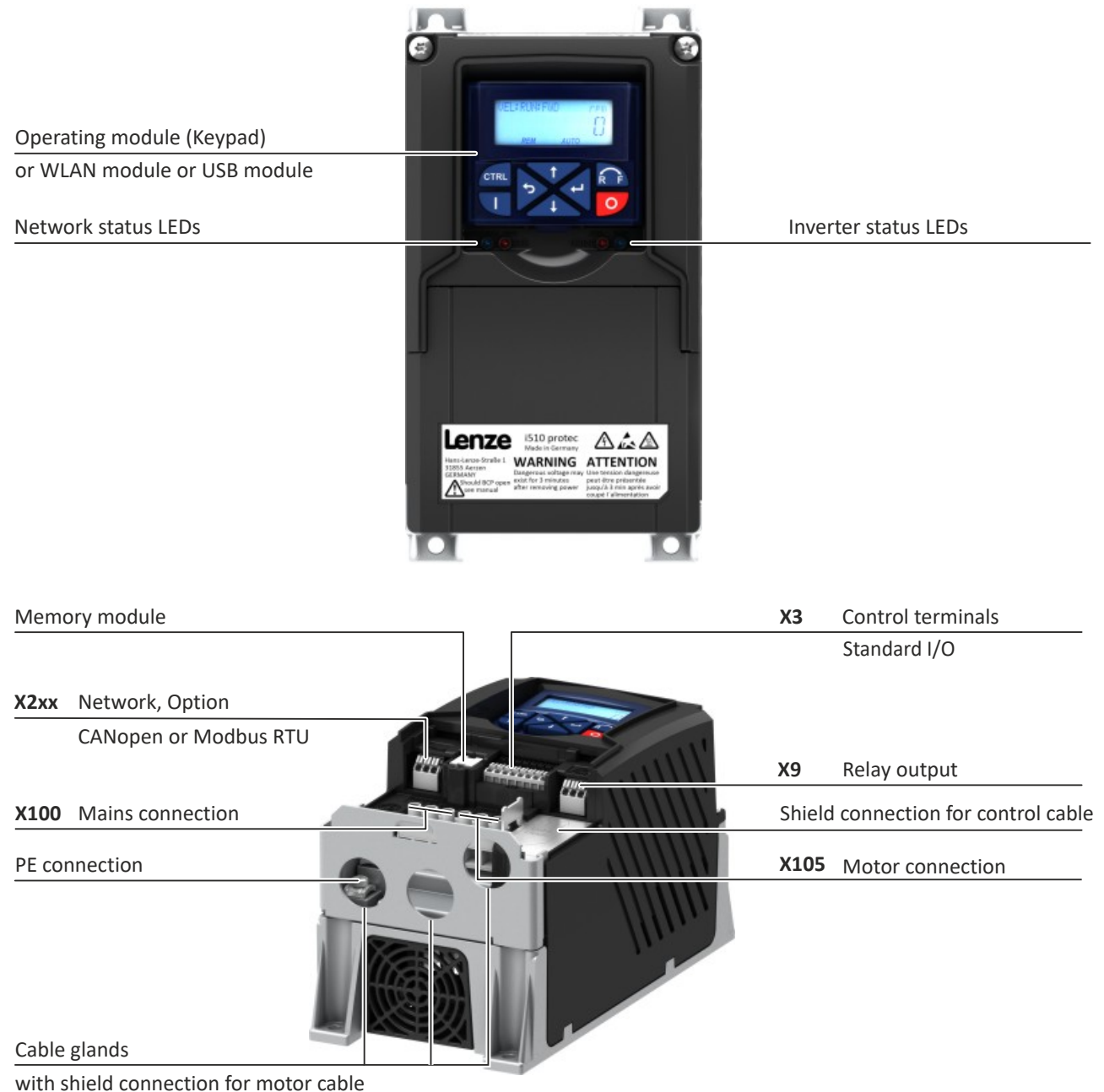
	Heavy Duty	Light Duty
Characteristic	High dynamic requirements	Low dynamic requirements
Typical applications	Main tool drives, travelling drives, hoist drives, winders, forming drives and conveyors	Pumps, fans, general horizontal materials handling technology and line drives
Overload capacity	3 s/200 %, 60 s/150 % See technical data	Restricted See technical data



2.2 Features

2.2.1 Connections and interfaces

The following figure gives an overview of the elements and connections on the devices. Position, size and appearance of elements and connections may vary depending on the performance and size of the equipment.





The i510 protec frequency inverters have these interfaces:

- Standard I/O:
 - 5x digital input
 - 1x digital output
 - 2x analog input
 - 1x analog output
 - PNP/NPN logic
 - Cycle time: 1 ms
- Frequency input: 0 ... 100 kHz
- 1x NO/NC relay (DC 24 V max. 2 A; AC 240 V max. 3 A)
- External 24 V supply and internal 24 V power supply unit
- Spring terminals
- Diagnostic interface (USB module or WLAN module required)

2.2.2 Topologies / network

The inverters can be equipped with different fieldbus networks.

The topologies and protocols typical for the prevailing networks are supported.

Currently available networks:

	CANopen® is a communication protocol based on CAN. CANopen® is a registered community trademark of the CAN user organisation CiA® (CAN in Automation e. V.). Device descriptions for the download: EDS files for Lenze devices
	The Modbus protocol is an open communication protocol based on a client/server architecture and developed for the communication with programmable logic controllers. Further development is carried out by the international user organisation Modbus Organization, USA.



2.3 Functions

2.3.1 Overview

The functions of the frequency inverters i510 protec are adapted to extensive applications.

Functions	
Motor control	Monitoring
V/f characteristic control linear/square-law (VFC plus)	Short circuit
Energy saving function (VFC-ECO)	earth fault
Sensorless vector control (SLVC)	Device overload monitoring (i^*t)
Sensorless control for synchronous motors (SL-PSM/SLSM-PSM)	Motor overload monitoring (i^2*t)
Torque mode	Mains phase failure
Motor functions	Stalling protection
Flying restart circuit	Motor current limit
Slip compensation	Maximum torque
DC braking	Ultimate motor current
Oscillation damping	Motor speed monitoring
Skip frequencies	Load loss detection
Automatic identification of the motor data	Diagnostics
Brake energy management	Error history buffer
Holding brake control	Logbook
Voltage add – function	LED status displays
Rotational Energy Ride Through (RERT)	Keypad language selection German, English
Application functions	Network
Process controller	CANopen
Process controller - idle state and rinse function	Modbus RTU
Freely assignable favourite menu	
Parameter change-over	
S-shaped ramps for smooth acceleration	
Motor potentiometer	
Flexible I/O configuration	
Access protection	
Automatic restart	
OEM parameter set	
Sequencer	
Complete control with 8-key keypad	
UPS operation	
"Light Duty" load characteristic can be adjusted for selected inverters	

2.3.2 Motor control types

The following table contains the possible control types with Lenze motors.

Motors	V/f characteristic control VFCplus	Sensorless vector control SLVC	ASM servo control SC ASM
Three-phase AC motors			
MD	•	•	•
MF	•	•	•
mH	•	•	•
m500	•	•	•

Lenze synchronous servo motors are not suitable for use with inverters, e.g. the types MCS, MCM or m850.

Product information

Functions
Motor functions
Motor setting range



2.3.3 Motor functions

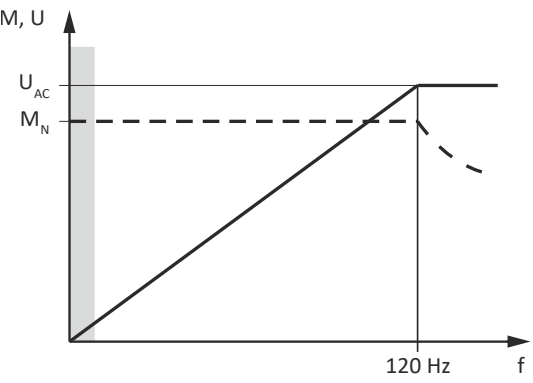
2.3.3.1 Motor setting range

Rated point 120 Hz

 Only possible with Lenze MF motors.

The rated motor torque is available up to 120 Hz.
Compared to the 50-Hz operation, the setting range increases by 2.5 times.
Thus, a smaller motor can be selected at the same rated power.

V/f at 120 Hz



V	Voltage	V _{AC}	Mains voltage
M	Torque	M _N	Rated torque
f	Frequency		



Rated point 87 Hz

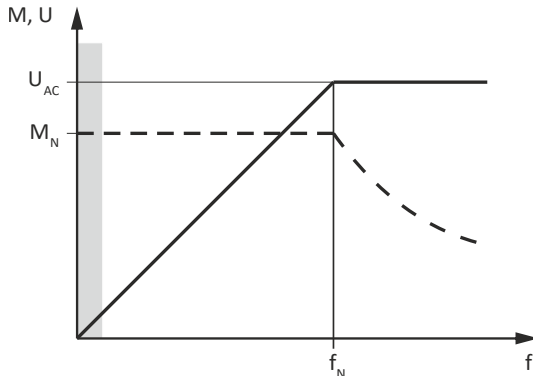
The rated motor torque is available up to 87 Hz.

Compared to the 50-Hz operation, the setting range increases by 1.74 times.

For this purpose, a motor with 230/400 V in a triangle is driven by a 400 V inverter.

The inverter must be dimensioned for a rated motor current of 230 V.

V/f at 87 Hz

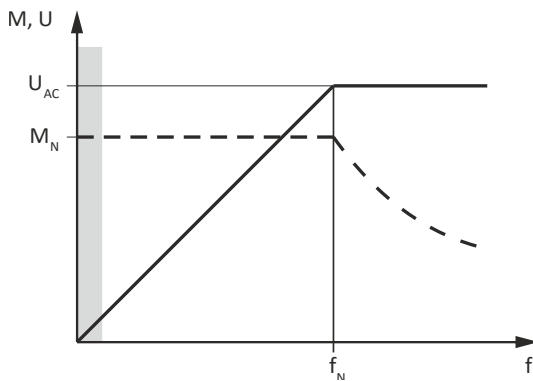


V	Voltage	U_{AC}	Mains voltage
M	Torque	M_{rated}	Rated torque
f	Frequency	f_{rated}	Rated frequency

Rated point 50 Hz

The rated motor torque is available up to 50 Hz.

V/f at 50 Hz



V	Voltage	U_{AC}	Mains voltage
M	Torque	M_{rated}	Rated torque
f	Frequency	f_{rated}	Rated frequency



2.4 Identification of the products

Product name

The product name is used when listing the technical data of the various product variants and for the assignment of accessories. You can find the assignment of product names to type codes in chapter "[Purchase order](#)". [143](#)

The product name contains:

- the designation of the product range – e.g. i5xx
- the type – "P" for "protec" = inverter for decentralized mounting locations
- its power rating – in kW for the load characteristic "Heavy Duty"
- the mains voltage class – e.g. 120 V, 230 V or 400 V
- the number of mains phases – the 1/3-phase inverters are labelled with "-2".

In tables, the first 9 digits of the corresponding product code are used to identify the products:

Device series	Design	Rated power		Rated mains voltage	No. of phases	Product name	Degree of protection
		Light Duty	Heavy Duty				
		kW	kW	V			
i510	P	-	0.37	120	1	i510-P0.37/120-1	IP20, UL 50E Type 1 (NEMA 1)
			0.75			i510-P0.75/120-1	
			1.1			i510-P1.1/120-1	

Device series	Design	Rated power		Rated mains voltage	No. of phases	Product name	Degree of protection
		Light Duty	Heavy Duty				
		kW	kW	V			
i510	P	0.55	0.37	230	1	i510-P0.37/230-2	IP20, UL 50E Type 1 (NEMA 1)
		1.1	0.75			i510-P0.75/230-2	
		1.5	1.1			i510-P1.1/230-2	
		2.2	1.5			i510-P1.5/230-2	
		-	2.2			i510-P2.2/230-2	
		4	3			i510-P3.0/230-2	

Device series	Design	Rated power		Rated mains voltage	No. of phases	Product name	Degree of protection
		Light Duty	Heavy Duty				
		kW	kW	V			
i510	P	0.55	0.37	240	3	i510-P0.37/230-2	IP20, UL 50E Type 1 (NEMA 1)
		1.1	0.75			i510-P0.75/230-2	
		1.5	1.1			i510-P1.1/230-2	
		2.2	1.5			i510-P1.5/230-2	
		-	2.2			i510-P2.2/230-2	
		4	3			i510-P3.0/230-2	
						i510-P3.0/230-3	
		5.5	4			i510-P4.0/230-3	
		7.5	5.5			i510-P5.5/230-3	



Product information

Identification of the products

Device series	Design	Rated power		Rated mains voltage	No. of phases	Product name	Degree of protection
		Light Duty	Heavy Duty				
		kW	kW	V			
i510	P	1.1	0.75	400	3	i510-P0.75/400-3	IP20, UL 50E Type 1 (NEMA 1)
		1.5	1.1			i510-P1.1/400-3	
		2.2	1.5			i510-P1.5/400-3	
		3	2.2			i510-P2.2/400-3	
		4	3			i510-P3.0/400-3	
		5.5	4			i510-P4.0/400-3	
		7.5	5.5			i510-P5.5/400-3	
		11	7.5			i510-P7.5/400-3	

Device series	Design	Rated power		Rated mains voltage	No. of phases	Product name	Degree of protection
		Light Duty	Heavy Duty				
		kW	kW	V			
i510	P	1.1	0.75	480	3	i510-P0.75/400-3	IP20, UL 50E Type 1 (NEMA 1)
		1.5	1.1			i510-P1.1/400-3	
		2.2	1.5			i510-P1.5/400-3	
		3	2.2			i510-P2.2/400-3	
		4	3			i510-P3.0/400-3	
		5.5	4			i510-P4.0/400-3	
		7.5	5.5			i510-P5.5/400-3	
		11	7.5			i510-P7.5/400-3	

Device series	Design	Rated power		Rated mains voltage	No. of phases	Product name	Degree of protection
		Light Duty	Heavy Duty				
		kW	kW	V			
i510	P	1.1	0.75	600	3	i510-P0.75/600-3	IP20, UL 50E Type 1 (NEMA 1)
		2.2	1.5			i510-P1.5/600-3	
		3	2.2			i510-P2.2/600-3	
		5.5	4			i510-P4.0/600-3	
		7.5	5.5			i510-P5.5/600-3	
		11	7.5			i510-P7.5/600-3	



Type code structure

		I	5	1		P					0	0	0	0				
Product type	Inverter	I																
Product family	i500		5															
Product	i510			1														
Product generation	Generation 1				A													
	Generation 2				B													
Mounting type	Wall mounting					P												
Rated power	0.37 kW																	137
	0.75 kW																	175
	1.1 kW																	211
	1.5 kW																	215
	2.2 kW																	222
	3 kW																	230
	4 kW																	240
	5.5 kW																	255
	7.5 kW																	275
Mains voltage and connection type	1/N/PE AC 120 V																A	
	3/PE AC 230/240 V																C	
	1/N/PE AC 230/240 V																D	
	3/PE AC 230/240 V																F	
	3/PE AC 400 V																G	
	3/PE AC 480 V																	
	3/PE AC 480 V																	
Product variant	Standard																	0
Integrated functional safety	Without safety function																	0
Degree of protection	IP20, uncoated																	0
	IP20, uncoated																	T
Interference suppression	Without																	0
Application area	Default parameter setting: Region EU (50-Hz networks)																	0
	Default parameter setting: Region US (60-Hz networks)																	1
Product extension	Standard I/O ...																	0
	Keypad module with Standard I/O ...																	K
	USB module with Standard I/O ...																	U
	WLAN module with Standard I/O ...																	W
	... without network																	00S
	... with CANopen																	02S
	... with Modbus RTU																	03S



2.5 Information on EC-Dual-Use Regulation



By limiting the maximum output frequency to ± 599 Hz, the devices are not subject to the export restrictions of the EU Dual-Use Regulation 2021/821.



2.6 Ways of commissioning

There are three ways to commission the inverter quickly and easily.

Thanks to Lenze's engineering philosophy, the high functionality is still easy to grasp. Parameterization and commissioning are a breeze thanks to clear structure and simple dialogs, leading to the desired outcome quickly and reliably.

Keypad

If it's only a matter of setting a few key parameters such as acceleration and deceleration time, this can be done quickly on the keypad.



»EASY Starter«

If functions such as the holding brake control or sequencer need to be set, it's best to use the »EASY Starter« engineering tool.



SMART Keypad App

The Lenze SMART Keypad App for Android or iOS allows you to diagnose and parameterize an inverter. A WLAN module on the inverter is required for communication.

- Ideal for the parameterization of simple applications such as a conveyor belt.
- Ideal for the diagnostics of the inverter.

The app can be found in the Google Play Store or in the Apple App Store.



Android



iOS



3 Safety instructions

3.1 Basic safety instructions

Disregarding the following basic safety instructions and safety information may lead to severe personal injury and damage to property!

- Only use the product as directed.
- Never commission the product in the event of visible damage.
- Never modify the product technically.
- Never commission the product before assembly has been completed.
- Never operate the product without the required covers.
- Connect/disconnect all pluggable connections only in deenergized condition!
- Only remove the product from the installation in the deenergized state.
- The product can – depending on their degree of protection – have live, movable or rotating parts during or after operation. Surfaces can be hot.
- Observe the specifications of the corresponding documentation. This is the condition for safe and trouble-free operation and the achievement of the specified product features.
- The procedural notes and circuit details given in the associated documentation are suggestions and their transferability to the respective application has to be checked. The manufacturer of the product does not take responsibility for the suitability of the process and circuit proposals.
- All work with and on the product may only be carried out by qualified personnel. IEC 60364 and CENELEC HD 384 define the qualifications of these persons:
 - They are familiar with installing, mounting, commissioning, and operating the product.
 - They have the corresponding qualifications for their work.
 - They know and can apply all regulations for the prevention of accidents, directives, and laws applicable at the place of use.

Please observe the specific safety information in the other sections!



3.2 Application as directed

- The product is a professional equipment intended for use by trades, specific professions or industry and not for sale to the general public. IEC 60050 [IEV 161-05-05]
- To prevent personal injury and damage to property, higher-level safety and protection systems must be used!
- All transport locks must be removed.
- The product may only be operated under the specified operating conditions and in the specified mounting positions.
- The product is exclusively suitable for installation in control cabinets and, depending on the protection class and design, for wall and motor mounting.
- The product must only be actuated with motors that are suitable for the operation with inverters.
- The product must not be operated in private areas, in potentially explosive atmospheres and in areas with harmful gases, oils, acids and radiation.

Additional information for the intended use in North America:

The cables must be installed in accordance with US National Electrical Code NFPA 70 or Canadian Electrical Code C22.1.

Use of explosion-protected motors

Explosion-protected motors that are not designed for use with an inverter lose their approval if they are used for variable speed applications. Due to the many areas of liability that may arise when handling these applications, the following policy statement applies:



Lenze inverters are sold without warranty of suitability for use with explosion-protected motors. Lenze assumes no responsibility for direct, incidental or consequential damages, costs or losses that may result from the use of AC inverters with explosion-protected motors. Buyer expressly agrees to assume any risk of loss, expense or damage that may result from such application.



3.3 Foreseeable misuse

Inverters are not to be operated with DC motors.



3.4 Handling

Transport, storage

Observe the notes regarding transport, storage and correct handling. Ensure proper handling and avoid mechanical stress. Do not bend any components and do not change any insulation distances during transport or handling. Do not touch any electronic components and contacts. Inverters contain electrostatically sensitive components which can easily be damaged by inappropriate handling. Do not damage or destroy any electrical components since thereby your health could be endangered!

Installation

The technical data and supply conditions can be obtained from the nameplate and the documentation. They must be strictly observed.

The inverters must be installed and cooled according to the instructions given in the corresponding documentation. Observe the climatic conditions according to the technical data.

Recommendation: Protect the inverter from direct sunlight and other weather influences.

Electrical connection

When working on energized inverters, comply with the applicable national accident prevention regulations.

The electrical installation must be carried out according to the appropriate regulations (e. g. cable cross-sections, fuses, PE connection). Additional information can be obtained from the documentation.

The documentation contains information about installation according to EMC regulations (shielding, grounding, filters and cable routing). Please also observe this information for CE-marked inverters. The manufacturer of the system or machine is responsible for adherence to the limit values required in connection with EMC legislation.

Protection in the event of short circuit or earth fault

To ensure protection according to EN 61800-5-1 in the event of an electrical short circuit or earth fault (protection against electric shock, thermal hazards and fire), the following must be taken into account in the installation:

- Use fuses according to the technical data.
- The installation must meet the requirements of the IEC 60364.
- The continuity of all associated protective conductors and equipotential bonding conductors including all connection points must be ensured.
- If the maximum permissible switch-off time according to IEC 60364 is exceeded with a high system impedance (especially with TT mains) or a high loop impedance with the prescribed fuses, a residual current device (RCD) can be used. Alternatively, other protective measures can be used, e. g. isolation from the environment by means of double or reinforced insulation, or isolation from the supply system by using a transformer.
- If a residual current device (RCD) is connected upstream of the inverter for protection in the event of an earth fault, only type B is permitted for three-phase devices.

Operation

If necessary, systems including inverters must be equipped with additional monitoring and protection devices. Also comply with the safety regulations and provisions valid at the installation site.

After the inverter has been disconnected from the supply voltage, all live components and power terminals must not be touched immediately because capacitors can still be charged. Please observe the corresponding stickers on the inverter.

All protection covers and doors must be shut during operation.



You may adapt the inverters to your application by parameter setting within the limits available. For this, observe the notes in the documentation.

Maintenance and servicing

The inverters do not require any maintenance if the prescribed operating conditions are observed.

Disposal

In accordance with the current provisions, Lenze products and accessories have to be disposed of by means of professional recycling. Lenze products contain recyclable raw material such as metal, plastics and electronic components.



3.5 Residual hazards

Even if notes given are taken into consideration and protective measures are implemented, the occurrence of residual risks cannot be fully prevented.

The user must take the residual hazards mentioned into consideration in the risk assessment for his/her machine/system.

If the above is disregarded, this can lead to severe injuries to persons and damage to property!

Product

Observe the warning labels on the product!



Dangerous electrical voltage:

Before working on the product, make sure there is no voltage applied to the power terminals! After mains disconnection, the power terminals will still carry the hazardous electrical voltage for the time given next to the symbol!



Electrostatic sensitive devices:

Before working on the product, the staff must ensure to be free of electrostatic charge!



High leakage current:

Carry out fixed installation and PE connection in compliance with:
EN 61800-5-1 / EN 60204-1



Hot surface:

Use personal protective equipment or wait until the device has cooled down!

Degree of protection - protection of persons and device protection

- Information applies to the mounted and ready-for-use state.

Protection of persons

Before working on the inverter, check if no voltage is applied to the power terminals.

- Depending on the device, the power terminals X105 remain live for up to 20 minutes.
- The power terminals X100 and X105 remain live even when the motor is stopped.

Device protection

- The maximum test voltage for insulation tests between a control potential of 24 V and PE must not exceed 110 V DC (EN 61800-5-1).

Motor protection

With some settings of the inverter, the connected motor can be overheated.

- E. g. by longer operation of self-ventilated motors at low speed.
- E. g. by longer operation of DC-injection braking.

Protection of the machine/system

Drives can reach dangerous overspeeds.

- E. g. by setting high output frequencies in connection with motors and machines not suitable for this purpose.
- The inverters do not provide protection against such operating conditions. For this purpose, use additional components.

Motor

If there is a short circuit of two power transistors, a residual movement of up to $180^\circ/\text{number of pole pairs}$ can occur at the motor! (e. g. 4-pole motor: residual movement max. $180^\circ/2 = 90^\circ$).



4 Information on project planning

4.1 Project planning process

4.1.1 Dimensioning

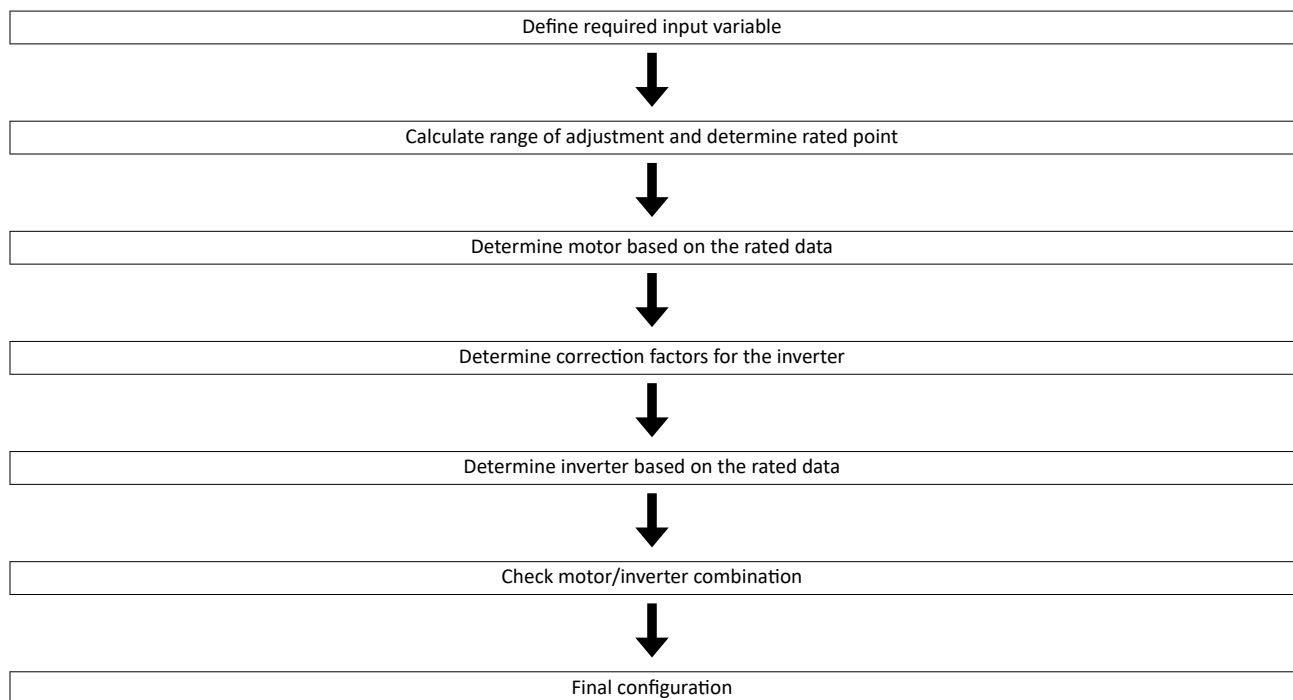
3 methods for dimensioning

Fast: Selection of the inverter based on the motor data of a 4-pole asynchronous motor.

Detailed: In order to optimize the selection of the inverter and all drive components, it is worthwhile to execute the detailed system dimensioning based on the physical requirements of the application. For this purpose, Lenze provides the Drive Solution Designer (DSD) design program.

Manual: The following chapter guides you step by step through the selection of a drive system.

Workflow of a configuration process



Define required input variables

Operating mode			S1 or S6
Max. load torque	$M_{L,max}$	Nm	
Max. load speed	$n_{L,max}$	rpm	
Min. load speed	$n_{L,min}$	rpm	
Site altitude	H	m	
Ambient temperature (inverter)	T_U	°C	



Calculate range of adjustment and determine rated point

	Calculation	
Setting range	$V = \frac{n_{L,max}}{n_{L,min}}$	
	Setting range	Rated point
Motor with integral fan	≤ 2.50 (20 - 50 Hz)	50 Hz
	≤ 4.35 (20 - 87Hz)	87 Hz
	≤ 6 (20 - 120Hz)	120 Hz
Motor with blower	≤ 10.0 (5 - 50 Hz)	50 Hz
Motor with integral fan (reduced torque)	≤ 17.4 (5 - 87Hz)	87 Hz
	≤ 24 (5 - 120Hz)	120 Hz

Determine motor based on the rated data

			Check
Rated torque			
Operating mode S1	M_{rated}	Nm	$M_N \geq \frac{M_{L,max}}{T_{H,Mot} \times T_{U,Mot}}$
Operating mode S6	M_{rated}	Nm	$M_N \geq \frac{M_{L,max}}{2 \times T_{H,Mot} \times T_{U,Mot}}$
Rated speed	n_{rated}	rpm	$n_{rated} \geq n_{L,max}$ $\frac{n_n}{V} \leq n_{L,min}$

			Note
Rated torque	M_{rated}	Nm	→ Rated motor data
Rated speed	n_{rated}	rpm	
Rated point at		Hz	→ setting range
Power factor	$\cos \phi$		→ Rated motor data
Rated current	$I_{N,MOT}$	A	
Rated power	P_{rated}	kW	
Correction factor - site altitude	$T_{H,MOT}$		→ Technical motor data
Correction factor - ambient temperature	$T_{U,MOT}$		
Select motor			

Correction factors for the inverter

Site altitude Amsl		H				
		[m]	≤ 1000	≤ 2000	≤ 3000	≤ 4000
k _{H,INV}			1.00	0.95	0.90	0.85
Temperature in the control cabinet		T _U				
		[°C]	≤ 40	≤ 45	≤ 50	≤ 55
Switching frequency						
2 or 4 kHz	k _{TU,INV}		1.00	1.00	0.875	0.750
8 or 16 kHz			1.00	0.875	0.750	0.625
Switching frequency with the "Light Duty" load characteristic						
2 or 4 kHz	k _{TU,INV}		1.00	0.875	0.750	-
8 or 16 kHz			-	-	-	-



Determine the inverter based on the rated data

			Check
Output current			
Continuous operation	I_{out}	A	$I_{out} \geq I_{N,Mot} / (k_{H,INV} \times k_{TU,INV})$
Overcurrent operation cycle 15 s	I_{out}	A	$I_{out} \geq I_{N,Mot} \times 2 / (k_{H,INV} \times k_{TU,INV})$
Overcurrent operation cycle 180 s	I_{out}	A	$I_{out} \geq I_{N,Mot} \times 1.5 / (k_{H,INV} \times k_{TU,INV})$

Determine the inverter based on the rated data for the "Light Duty" load characteristic

			Check
Output current			
Continuous operation	I_{out}	A	$I_{out} \geq I_{N,Mot} / (k_{H,INV} \times k_{TU,INV})$
Overcurrent operation cycle 15 s	I_{out}	A	$I_{out} \geq I_{N,Mot} \times 1.65 / (k_{H,INV} \times k_{TU,INV})$
Overcurrent operation cycle 180 s	I_{out}	A	$I_{out} \geq I_{N,Mot} \times 1.25 / (k_{H,INV} \times k_{TU,INV})$

Check motor/inverter combination

			Calculation
Motor torque	M	Nm	$M = \sqrt{\left(\frac{I_{out,INV}}{I_{N,MOT}}\right)^2 - (1 - \cos \varphi^2)} \times \frac{M_N}{\cos \varphi}$
			Check
Inverter overload capacity			$\frac{M_{L,max}}{M} \leq 1.5$

Braking operation without additional measures

To decelerate small masses, the "DC injection brake DCB" function can be parameterised. DC-injection braking enables a quick deceleration of the drive to standstill without the need for an external brake resistor.

- A code can be used to select the braking current.
- The maximum braking torque to be realised by the DC braking current amounts to approx. 20 ... 30 % of the rated motor torque.
- Automatic DC-injection braking (Auto-DCB) improves the starting performance of the motor when the operation mode without speed feedback is used.

Final configuration

Product extensions and accessories can be found here:

► [Product extensions](#) 128

► [Accessories](#) 136

4.1.2 Operation in motor and generator mode

The energy analysis differs between operation in motor mode and generator mode.

During operation in motor mode, the energy flows from the supplying mains via the inverter to the motor which converts electrical energy into mechanical energy (e. g. for lifting a load).

During operation in generator mode, the energy flows back from the motor to the inverter. The motor converts the mechanical energy into electrical energy - it acts as a generator (e. g. when lowering a load).

The drive brakes the load in a controlled manner.

The energy recovery causes a rise in the DC-bus voltage. If this voltage exceeds an upper limit, the output stage of the inverter will be blocked to prevent the device from being destroyed.

The drive coasts until the DC-bus voltage reaches the permissible value range again.



4.1.3 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 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.

Cycle 15 s

During this operation, the inverter may be loaded for 3 s with up to 200 % of the rated current if afterwards a recovery time of 12 s with max. 75 % of the rated current is observed. A cycle corresponds to 15 s.

Cycle 180 s

During this operation, the inverter may be loaded for 60 s with up to 150 % of the rated current if afterwards a recovery time of 120 s with max. 75 % of the rated current is observed. A cycle corresponds to 180 s.

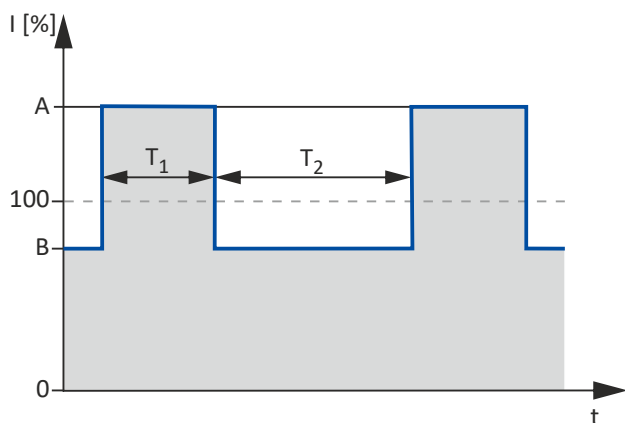
The monitoring of the device utilization (Ixt) triggers an error if the utilization value exceeds a threshold of 100 %.



The maximum output currents correspond to the switching frequencies and the overload behaviour of the inverters are given in the rated data.

In case of rotating frequencies < 10 Hz, the time-related overload behaviour may be reduced.

The graphics shows a cycle. The basic conditions given in the table (graphics field highlighted in grey) have to be complied with in order that the inverter will not be overloaded. Both cycles can be combined with each other.



Cycle	Max. output current	Max. overload time	Max. output current during the Recovery time	Min. recovery time
	A	T ₁	B	T ₂
s	%	s	%	s
15	200	3	75	12
180	150	60	75	120



4.2 Decentralized topologies

The i510 protec frequency inverters support decentralized concepts for machines and electrical installation in particular.

Advantages

- Saves installation costs
 - Less expensive shielded motor cables, no EMC collective filters
 - Fewer circuit breakers, protection devices and mains cables
 - Fewer I/O gateways and cabling thanks to decentralized I/Os
 - Smaller control cabinet
- New solutions when less space is available
- Combination of functionally independent machine modules
- Less cooling units, higher efficiency

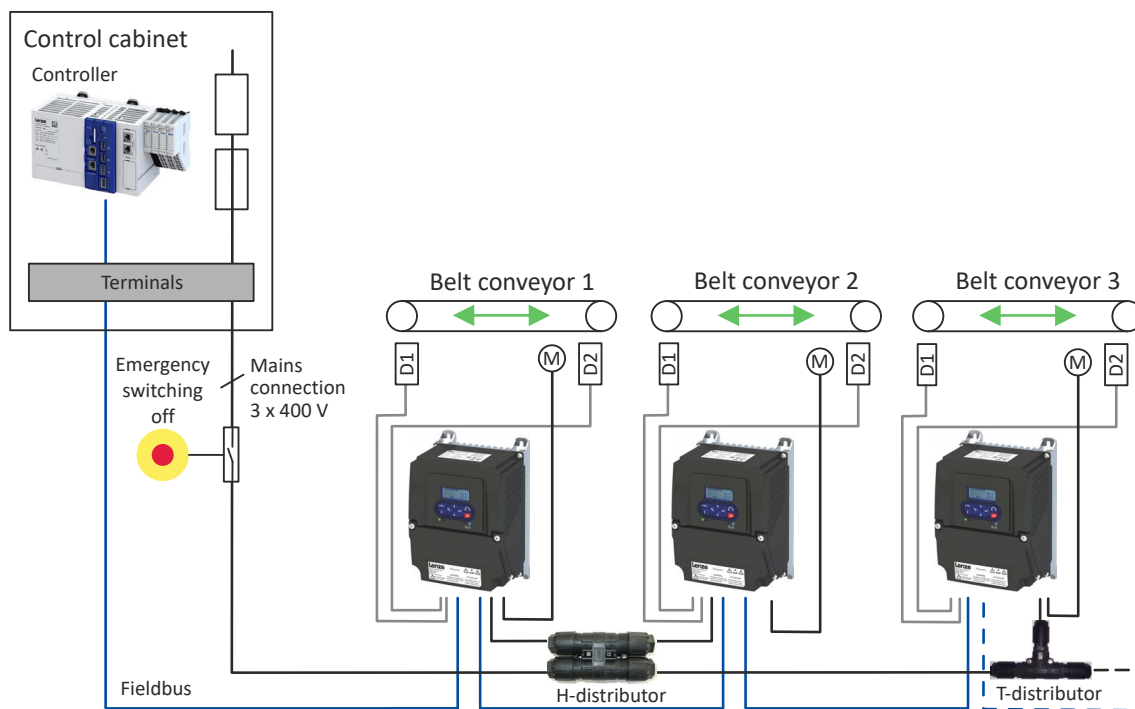


Fig. 1: Sample configuration

4.2.1 Cables

Requirements

- The cables used must correspond to the requirements at the location (e. g. EN 60204-1, UL).
- The cable cross-section must be dimensioned for the assigned fusing. Observe national and regional regulations.
- You must observe the regulations for minimum cross-sections of PE conductors. The cross-section of the PE conductor must be at least as large as the cross-section of the power connections.



5 Mechanical installation

5.1 Important notes

Measures for cooling during operation

- Ensure unimpeded ventilation of cooling air and outlet of exhaust air.



5.2 Preparation

Mounting position

- Vertical alignment - do not interfere with free air flow from bottom to top of heatsink fins.
Other mounting positions require a reduction of the rated output values by approx. 1/3.
Your Lenze contact will help you with a precise assessment.

Free spaces

- Maintain the specified free spaces above and below to the other installations.
- Several i5xx protec frequency inverters can be mounted directly next to each other, regardless of the device size. No installation clearance is required between the devices.

Mechanical fastening

- The mounting location and material must ensure a durable mechanical connection.
- Do not mount onto DIN rails!
- In case of continuous vibrations or shocks use vibration dampers.

How to mount the inverters at a mounting location.

Required:

- Tool for drilling and thread cutting
 - Screwdriver
 - Screw and washer assemblies or hexagon socket screws with washers.
1. Prepare mounting area with corresponding threaded holes.
 2. Fit screws and washers (if applicable).
 3. Do not yet tighten the screws.
 4. Mount the inverter on the prepared mounting area via keyhole suspension.
 5. Only tighten the screws hand-tight.
 6. Pre-assemble other devices if necessary.
 - a) Adjust the devices.
 - b) Screw the devices onto the mounting area.

The inverters are mounted on the mounting area. You can begin with the wiring.

Screw and washer assemblies or hexagon socket screws with washers are recommended..

M5 x ≥ 10 mm

Further data and information

- ▶ [Decentralized topologies](#) 31
- ▶ [Dimensions](#) 119



6 Electrical installation

6.1 Important notes

DANGER!

Dangerous electrical voltage

During operation and up to 20 minutes after power-off, hazardous electrical voltages may be present at the connections of the product.

The leakage current against earth (PE) is $> 3.5 \text{ mA AC}$ or $> 10 \text{ mA DC}$.

Possible consequences: Death or serious injury from electric shock

Protective measures

- ▶ Any work on the product must only be carried out in a deenergized state.
- ▶ Check that no voltage is present!
- ▶ After switching off the mains voltage, observe the signs on the product.
- ▶ After switching off, wait until the drive comes to a standstill.
- ▶ Implement the measures required by EN 61800-5-1 or EN 60204-1, i.e. fixed installation and standard-compliant PE connection.

WARNING!

Dangerous electrical voltage

Device error causes an overvoltage in the system.

- ▶ For a voltage supply with DC 24 V ($\pm 20 \%$), use only a safely separated power supply unit according to the valid SELV/PELV requirements.

NOTICE

No protection against excessively high mains voltage

The mains input is not fused internally.

Possible consequences: Destruction of the product in the event of excessively high mains voltage.

- ▶ Take note of the maximum permissible mains voltage.
- ▶ On the mains supply side, use fuses to adequately protect the product against mains fluctuations and voltage peaks.

NOTICE

Overvoltage at devices with 230-V mains connection and no. of phases = 1 or 1/3

An impermissible overvoltage may occur if the central supply of the N conductor is interrupted if the devices are connected to a TN three-phase system.

Possible consequences: Destruction of the device

- ▶ Provide for the use of isolating transformers.

NOTICE

The product contains electrostatic sensitive devices.

Possible consequences: Destruction of the device

- ▶ Before working in the connection area, the personnel must be free of electrostatic charge.



NOTICE

Mounting not according to protection class

Possible consequences: Material damage due to penetrating humidity and foreign bodies.

- ▶ All cable glands and mounting parts must at least correspond to the protection class of the inverter.
- ▶ All openings in the housing must be closed according to the protection class.
- ▶ The cover must be screwed on with the specified tightening torque.



When implementing machines and systems for the use in the UL/CSA scope, you have to observe the relevant special notes.

These notes are marked with "UL marking".

6.1.1 Automatic disconnection of the supply according to IEC/HD 60364-4-41

IEC/HD 60364-4-41 (DIN VDE 0100-410; VDE 0100-410) requires fault protection for the output circuits.

Preconditions

Installation in TN network and TT network

- The inverters are installed according to the specifications in the documentation.
- The system complies with the requirements of the applicable standards of the series IEC/HD 60364 (DIN VDE 0100; VDE 0100).
- The continuity of all associated PE conductors and equipotential bonding conductors is ensured including the bonding and connection points.
- Additional measures in the TT network:
 - Use of earth-leakage circuit breakers or the additional protective grounding according to IEC 60361-4-41, section 415.

Under these conditions, the inverters meet the protective measure "automatic disconnection of the supply" according to IEC/HD 60364-4-41

(DIN VDE 0100-410; VDE 0100-410):2007-06, section 411.3.2.5.

This means that in the event of a short circuit with negligible impedance to a protective conductor or to earth, the inverters reduce the output voltage within the time required in table 41.1 of IEC/HD 60364-4-41 (DIN VDE 0100-410; VDE 0100-410):2007-06.

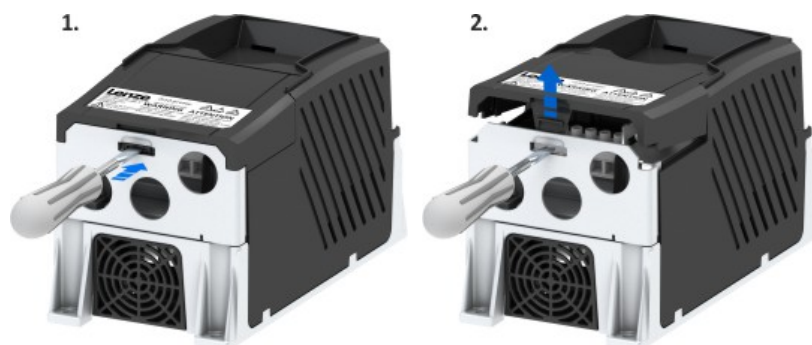


6.2 Preparation

Remove housing cover and remount



For wiring, the housing cover must be removed and then remounted.



Remove housing cover

1. Press a screwdriver into the housing slot on the bottom of the device.

2. Remove housing cover

The terminals are exposed for wiring.

Mount housing cover

1. Carefully press on the housing cover until it clicks into place.

The housing cover is mounted.

Cable glands and connection area

Bore holes are provided for mounting the cable glands for the mains cable and motor cable.

The cable gland of the motor cable must be EMC-compatible. The housing wall for the cable gland is reinforced and well conductive to avoid EMC interference.

Further data and information

► [EMC-compliant installation](#) 37

► [Standards and operating conditions](#) 54



6.3 EMC-compliant installation

The drive system (inverter and drive) only complies with the directive 2014/30/EU: EMC Directive [UKCA: S.I. 2016/1091 - The Electromagnetic Compatibility Regulations 2016] if it is installed according to the guidelines for CE-typical drive systems.

These guidelines should also be followed in installations requiring FCC Part 15 or ICES 001 compliance.

NOTICE

Electromagnetic interferences

Product and peripheral devices may be affected during operation.

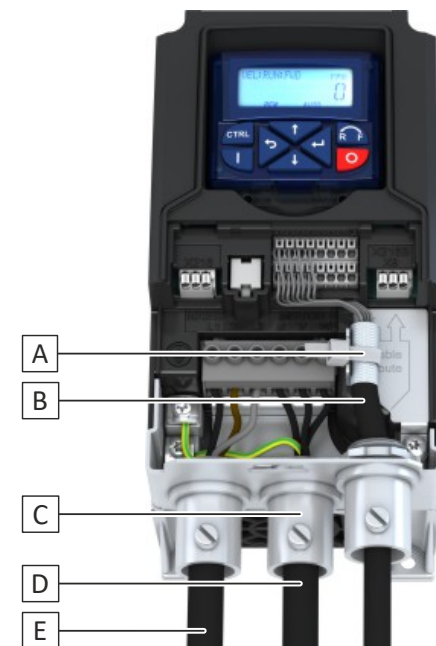
- Use integrated conductive shield connections for control lines and motor lines.
- Use central earthing points.



The inverters i510 protec do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
- Suitable EMC filters can be obtained directly from Lenze as accessories.
- The user must verify that the conformity with EN IEC 61800-3 is fulfilled.

The example below shows the effective wiring for an application without network:



- A Shield connection for control connections
B Control cable

- C EMC cable gland / Conduit hub
D Motor cable with low capacity
E Mains cable



EMC cable glands/conduit hubs

The information applies to:

0.37 kW	0.5 hp	i510-P0.37/120-1	i510-P0.37/230-2	
0.75 kW	1 hp	i510-P0.75/120-1	i510-P0.75/230-2	i510-P0.75/400-3
1.1 kW	1.5 hp		i510-P1.1/230-2	i510-P1.1/400-3
1.5 kW	2 hp			i510-P1.5/400-3
2.2 kW	3 hp			i510-P2.2/400-3



- ① ½" conduit hub for mains cable
- ② ½" conduit hub for motor cable
- ③ ½" conduit hub for shielded control cable or fieldbus cable

The information applies to:

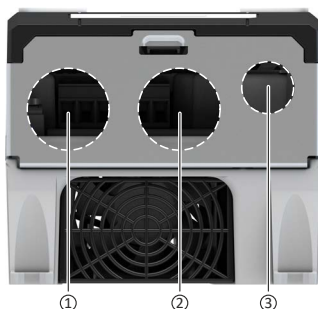
0.75 kW	1 hp			i510-P0.75/600-3
1.5 kW	2 hp	i510-P1.5/230-2		i510-P1.5/600-3
2.2 kW	3 hp	i510-P2.2/230-2		i510-P2.2/600-3
3 kW	4 hp	i510-P3.0/230-3	i510-P3.0/400-3	
4 kW	5 hp	i510-P4.0/230-3	i510-P4.0/400-3	i510-P4.0/600-3



- ① ½" conduit hub for mains cable
- ② ½" conduit hub for motor cable
- ③ ½" conduit hub for shielded control cable or fieldbus cable

The information applies to:

1.1 kW	1.5 hp	i510-P1.1/120-1			
3 kW	4 hp		i510-P3.0/230-2		
5.5 kW	7.5 hp		i510-P5.5/230-3	i510-P5.5/400-3	i510-P5.5/600-3
7.5 kW	10 hp			i510-P7.5/400-3	i510-P7.5/600-3



- ① 1" conduit hub for mains cable
- ② 1" conduit hub for motor cable
- ③ ½" conduit hub for shielded control cable or fieldbus cable



6.3.1 Mains connection

- Inverters, mains chokes, or mains filters may be connected to the mains via unshielded single cores or unshielded cables.
- Cable between line filter and inverter:

	Cable length	
	$\leq 300 \text{ mm}$	$> 300 \text{ mm}$
Type	unshielded twisted option	always shielded

- In DC-bus operation or DC supply, use shielded cables.

6.3.2 Motor cable

EMC-compliant installation must be carried out with shielded low-capacitance motor cables.

Suitable motor cables can be obtained directly from Lenze.

Capacitance per unit length

- Cable cross-section $\leq 2.5 \text{ mm}^2$ ($\geq \text{AWG } 14$): C-core-core/C-core-shield $< 75/150 \text{ pF/m}$
- Cable cross-section $\leq 4 \text{ mm}^2$ ($\geq \text{AWG } 12$): C-core-core/C-core-shield $< 150/300 \text{ pF/m}$

Conduits

When using electrically conductive conduits:

- Single unshielded conductors or multi-core unshielded cables installed in a metallic conduit are equivalent to a shielded motor cable for EMC compliance purposes.
- Permissible is a rigid or flexible metallic conduit.
- The conduit must be properly connected at both ends with metal glands to the inverter and motor to connect all devices.
- Non-metallic branches or glands that interrupt the electrical conductivity of the metallic conduit are not permitted.

Braid

- Only use motor cables with braids made of tinned or nickel-plated copper.
- Shields made of steel braids are not suitable.
- The overlap rate of the braid must be at least 70 % with an overlap angle of 90° .

Measures on the motor

- Connect the shield with PE over a large area at the terminal box of the motor, e.g. via a metallic EMC cable gland.
- For motors with plug connectors, the large-area shield connection is ensured via the plug connection.

Further supporting measures

- Route the motor cable separately from the mains cables and control cables.
- Lay the motor cable so that it only crosses mains cables and control cables at right angles.
- Do not disconnect the motor cable.
- If the motor cable must be disconnected (e.g. by chokes, contactors, or terminals):
 - Install the shield of the motor cable directly before and behind the point of separation to the mounting plate with a large surface.
 - The unshielded cable ends must not be longer than 100 mm.
 - Mount the separating component at least 100 mm away from other components.



6.4 Connection according to UL

6.4.1 Important notes

WARNING!

► **UL marking**

- The integral solid state short circuit protection included in the inverter does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code / Canadian Electrical Code and any additional local codes.

► **Marquage UL**

- La protection statique intégrée contre les courts-circuits n'offre pas la même protection que le dispositif de protection du circuit de dérivation. Un tel dispositif doit être fourni, conformément au National Electrical Code / Canadian Electrical Code et aux autres dispositions applicables au niveau local.
-

WARNING!

► **UL marking**

- Use 75 °C copper wire only, except for control circuits.

► **Marquage UL**

- Utiliser exclusivement des conducteurs en cuivre 75 °C, sauf pour la partie commande.
-

WARNING!

► **UL marking**

- Suitable for motor group installation or use on a circuit capable of delivering not more than the RMS symmetrical amperes (SCCR) of the drive at its rated voltage.
- Approved fusing is specified in SCCR tables below.

► **Marquage UL**

- Convient pour l'utilisation sur une installation avec un groupe de moteurs ou sur un circuit capable de fournir au maximum une valeur de courant efficace symétrique en ampères à la tension assignée de l'appareil.
 - Les dispositifs de protection adaptés sont spécifiés dans les SCCR tableaux suivants.
-

WARNING!

► **UL marking**

- The opening of the Branch Circuit Protective Device may be an indication that a fault has been interrupted. To reduce the risk of fire or electric shock, current carrying parts and other components of the controller should be examined and replaced if damaged. If burnout of the current element of an overload relay occurs, the complete overload relay must be replaced.

► **Marquage UL**

- Le déclenchement du dispositif de protection du circuit de dérivation peut être dû à une coupure qui résulte d'un courant de défaut. Pour limiter le risque d'incendie ou de choc électrique, examiner les pièces porteuses de courant et les autres éléments du contrôleur et les remplacer s'ils sont endommagés. En cas de grillage de l'élément traversé par le courant dans un relais de surcharge, le relais tout entier doit être remplacé.
-



NOTICE

► **UL marking**

► Internal overload protection rated for 125 % of the rated FLA.

► **Marquage UL**

► Protection contre les surcharges conçue pour se déclencher à 125 % de l'intensité assignée à pleine charge.

Electrical installation

Connection according to UL

Fusing data

Branch Circuit Protection (BCP) with Standard Fuses or Circuit Breaker



6.4.2 Fusing data

6.4.2.1 Branch Circuit Protection (BCP) with Standard Fuses or Circuit Breaker

Short Circuit Current Ratings (SCCR) with Standard Fuses or Circuit Breaker

(Tested per UL61800-5-1, reference UL file E132659)

These devices are suitable for motor group installation when used with Standard Fuses or Circuit Breaker. For single motor installation, if the fuse value indicated is higher than 400 % of the motor current (FLA), the fuse value has to be calculated. If the value of the fuse is below two standard ratings, the nearest standard ratings less than the calculated value shall apply.

Inverter				Standard fuses (UL248)			Circuit breaker (UL489)	
	Mains	Rated power		SCCR	Max. rated current	Class	SCCR	Max. rated current
		kW	hp	kA	A		kA	A
i510-P0.37/120-1	120 V, 1-ph	0.37	0.5	5	30	CC, CF, J, T	5	30
i510-P0.75/120-1	120 V, 1-ph	0.75	1	5	30	CC, CF, J, T	5	30
i510-P1.1/120-1	120 V, 1-ph	1.1	1.5	5	30	CC, CF, J, T	5	30
i510-P0.37/230-2	230 V, 1/3-ph	0.37	0.5	5	30	CC, CF, J, T	5	30
i510-P0.75/230-2	230 V, 1/3-ph	0.75	1	5	30	CC, CF, J, T	5	30
i510-P1.1/230-2	230 V, 1/3-ph	1.1	1.5	5	30	CC, CF, J, T	5	30
i510-P1.5/230-2	230 V, 1/3-ph	1.5	2	5	50	CF, J, T	5	30
i510-P2.2/230-2	230 V, 1/3-ph	2.2	3	5	50	CF, J, T	5	30
i510-P3.0/230-2	230 V, 1/3-ph	3	4	5	60	CF, J, T	5	50
i510-P3.0/230-3	230 V, 3-ph	3	4	5	80	CF, J, T	5	30
i510-P4.0/230-3	230 V, 3-ph	4	5	5	80	CF, J, T	5	30
i510-P5.5/230-3	230 V, 3-ph	5.5	7.5	5	60	CF, J, T	5	50
i510-P0.75/400-3	480 V, 3-ph	0.75	1	5	40	CF, J, T	5	15
i510-P1.1/400-3	480 V, 3-ph	1.1	1.5	5	40	CF, J, T	5	15
i510-P1.5/400-3	480 V, 3-ph	1.5	2	5	40	CF, J, T	5	15
i510-P2.2/400-3	480 V, 3-ph	2.2	3	5	40	CF, J, T	5	15
i510-P3.0/400-3	480 V, 3-ph	3	4	5	40	CF, J, T	5	20
i510-P4.0/400-3	480 V, 3-ph	4	5	5	40	CF, J, T	5	20
i510-P5.5/400-3	480 V, 3-ph	5.5	7.5	5	40	CF, J, T	5	30
i510-P7.5/400-3	480 V, 3-ph	7.5	10	5	40	CF, J, T	5	30
i510-P0.75/600-3	600 V, 3-ph	0.75	1	5	40	CF, J, T	-	-
i510-P1.5/600-3	600 V, 3-ph	1.5	2	5	40	CF, J, T	-	-
i510-P2.2/600-3	600 V, 3-ph	2.2	3	5	40	CF, J, T	-	-
i510-P4.0/600-3	600 V, 3-ph	4	5	5	40	CF, J, T	-	-
i510-P5.5/600-3	600 V, 3-ph	5.5	7.5	5	40	CF, J, T	-	-
i510-P7.5/600-3	600 V, 3-ph	7.5	10	5	40	CF, J, T	-	-

Circuit Breaker (UL489)

Operation with circuit breakers, only permitted in a cabinet as UL Open Type

(I51xPxxxGxxTxxxxxx)

Inverter				Circuit breaker (UL489)	
	Mains	Rated power		SCCR	Max. rated current
		kW	hp	kA	A
i510-P0.75/600-3	600 V, 3-ph	0.75	1	5	15
i510-P1.5/600-3	600 V, 3-ph	1.5	2	5	15
i510-P2.2/600-3	600 V, 3-ph	2.2	3	5	15
i510-P4.0/600-3	600 V, 3-ph	4	5	5	15
i510-P5.5/600-3	600 V, 3-ph	5.5	7.5	5	30
i510-P7.5/600-3	600 V, 3-ph	7.5	10	5	30



Electrical installation

Connection according to UL

Fusing data

Branch Circuit Protection (BCP) with Standard Fuses or Circuit Breaker

Standard fuses "High Fault"

Inverter				Standard fuses (UL248)		
	Mains	Rated power		SCCR	Max. rated current	Class
		kW	hp			
i510-P0.37/120-1	120 V, 1-ph	0.37	0.5	-	-	-
i510-P0.75/120-1	120 V, 1-ph	0.75	1	-	-	-
i510-P1.1/120-1	120 V, 1-ph	1.1	1.5	-	-	-
i510-P0.37/230-2	230 V, 1/3-ph	0.37	0.5	42	30	CC, CF, J, T
i510-P0.75/230-2	230 V, 1/3-ph	0.75	1	42	30	CC, CF, J, T
i510-P1.1/230-2	230 V, 1/3-ph	1.1	1.5	42	30	CC, CF, J, T
i510-P1.5/230-2	230 V, 1/3-ph	1.5	2	42	30	CC, CF, J, T
i510-P2.2/230-2	230 V, 1/3-ph	2.2	3	42	30	CC, CF, J, T
i510-P3.0/230-2	230 V, 1/3-ph	3	4	42	60	CF, J, T
i510-P3.0/230-3	230 V, 3-ph	3	4	42	60	CF, J, T
i510-P4.0/230-3	230 V, 3-ph	4	5	42	60	CF, J, T
i510-P5.5/230-3	230 V, 3-ph	5.5	7.5	42	60	CF, J, T
i510-P0.75/400-3	480 V, 3-ph	0.75	1	42	30	CC, CF, J, T
i510-P1.1/400-3	480 V, 3-ph	1.1	1.5	42	30	CC, CF, J, T
i510-P1.5/400-3	480 V, 3-ph	1.5	2	42	30	CC, CF, J, T
i510-P2.2/400-3	480 V, 3-ph	2.2	3	42	30	CC, CF, J, T
i510-P3.0/400-3	480 V, 3-ph	3	4	42	30	CC, CF, J, T
i510-P4.0/400-3	480 V, 3-ph	4	5	42	30	CC, CF, J, T
i510-P5.5/400-3	480 V, 3-ph	5.5	7.5	42	40	CF, J, T
i510-P7.5/400-3	480 V, 3-ph	7.5	10	42	40	CF, J, T
i510-P0.75/600-3	600 V, 3-ph	0.75	1	42	30	CC, CF, J, T
i510-P1.5/600-3	600 V, 3-ph	1.5	2	42	30	CC, CF, J, T
i510-P2.2/600-3	600 V, 3-ph	2.2	3	42	30	CC, CF, J, T
i510-P4.0/600-3	600 V, 3-ph	4	5	42	30	CC, CF, J, T
i510-P5.5/600-3	600 V, 3-ph	5.5	7.5	42	40	CF, J, T
i510-P7.5/600-3	600 V, 3-ph	7.5	10	42	40	CF, J, T



6.5 Mains connection

Single inverters are connected directly to the **AC system** or via upstream filters/mains chokes.

6.5.1 1-phase mains connection 120 V

The connection plan is valid for the inverters i510-Pxxx/120-1.



The inverters i510-Pxxx/120-1 do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
- Suitable EMC filters can be obtained directly from Lenze as accessories.
- The user must verify that the conformity with EN IEC 61800-3 is fulfilled.

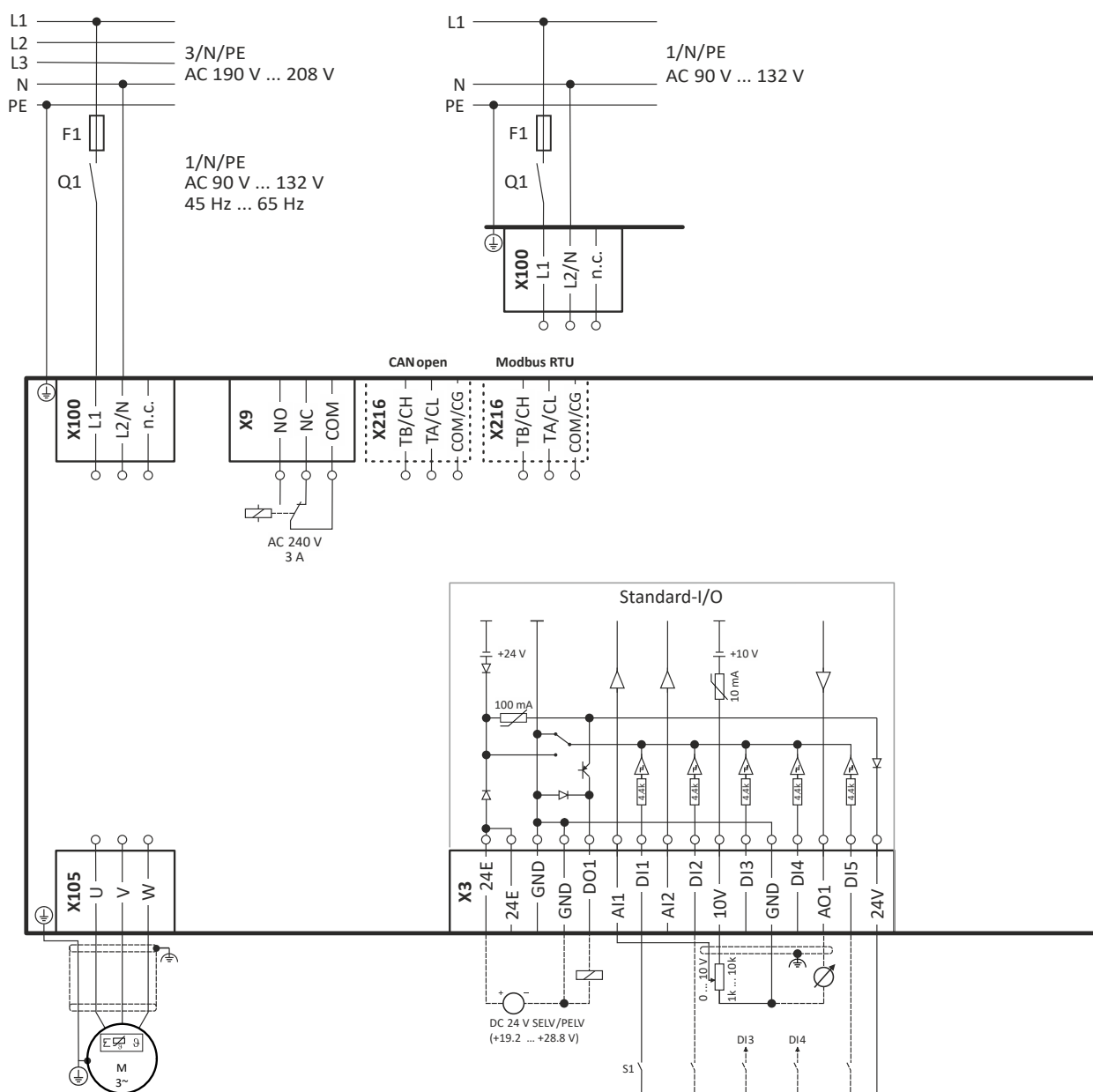


Fig. 2: Wiring example

S1 Start/Stop
Fx Fuses

Q1 Mains contactor
--- Dashed line = options



6.5.2 1-phase mains connection 230/240 V

The connection plan is valid for the inverters i510-Pxxx/230-2.



The inverters i510-Pxxx/230-2 do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
- Suitable EMC filters can be obtained directly from Lenze as accessories.
- The user must verify that the conformity with EN IEC 61800-3 is fulfilled.

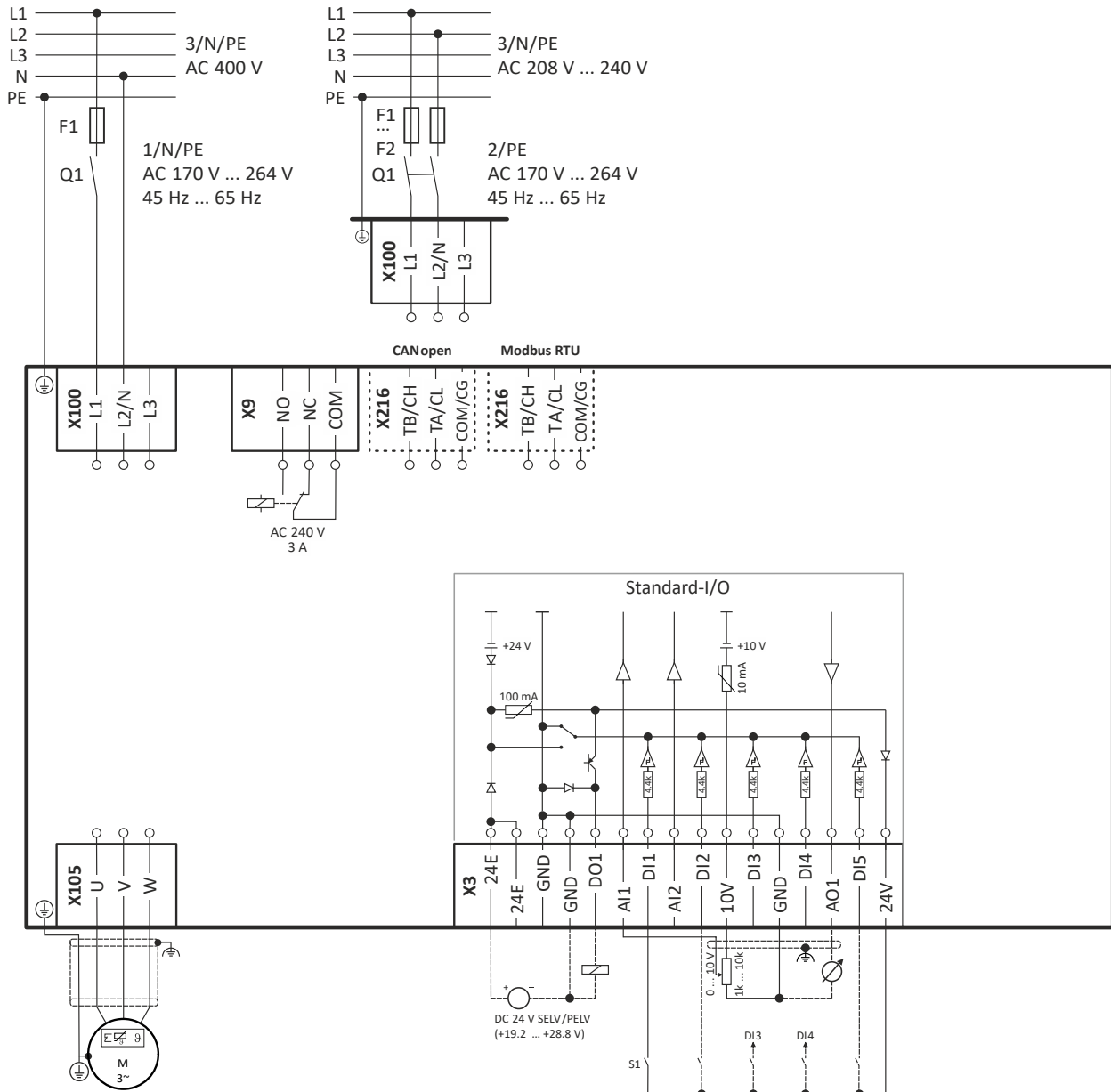


Fig. 3: Wiring example

S1 Start/Stop
Fx Fuses

Q1 Mains contactor
--- Dashed line = options



6.5.3 3-phase mains connection 230/240 V

The connection plan is valid for the inverters i510-Pxxx/**230-2** and i510-Pxxx/**230-3**.



The inverters i550-Pxxx/**230-2** and i550-Pxxx/**230-3** do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
- Suitable EMC filters can be obtained directly from Lenze as accessories.
- The user must verify that the conformity with EN IEC 61800-3 is fulfilled.

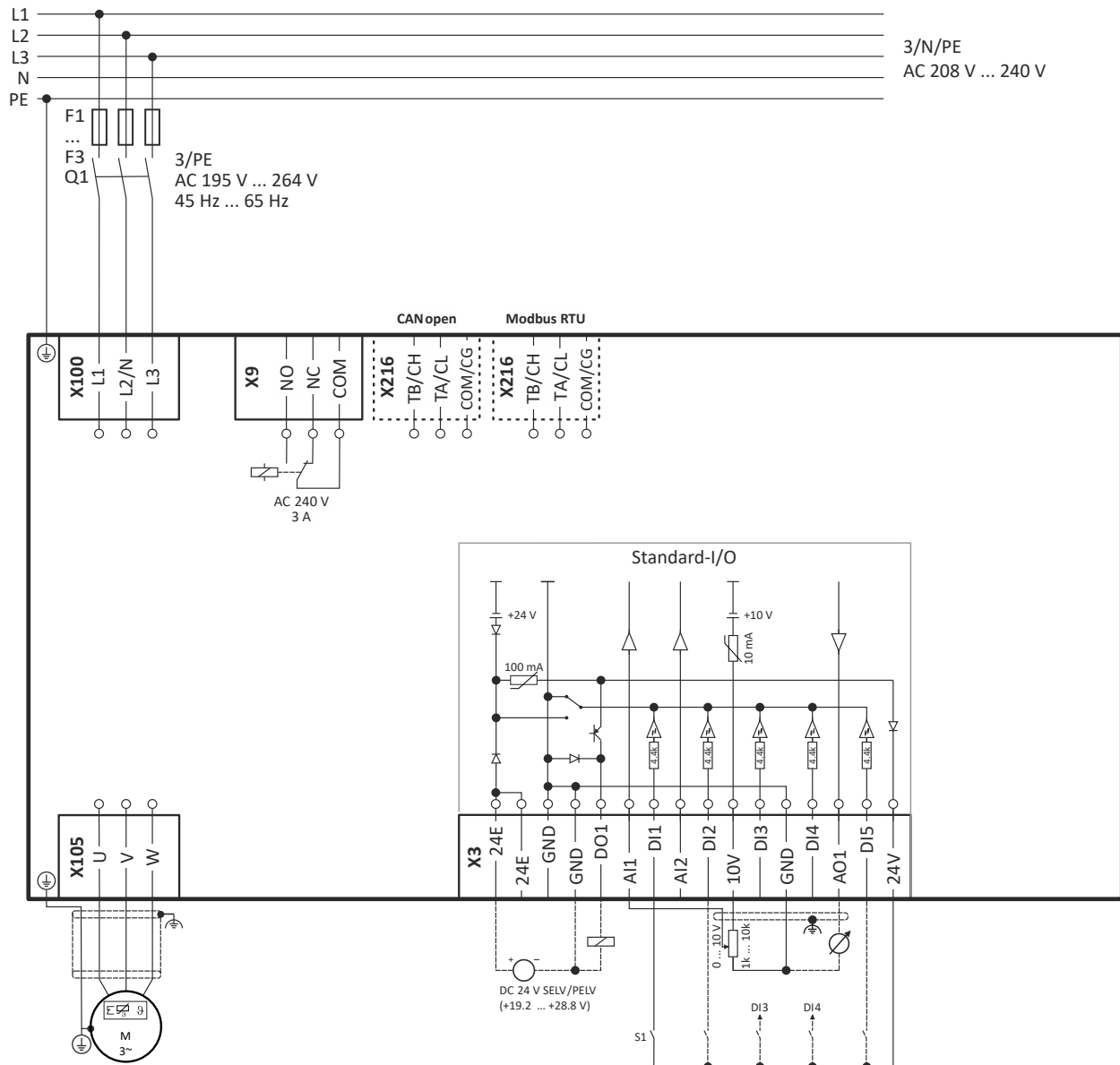


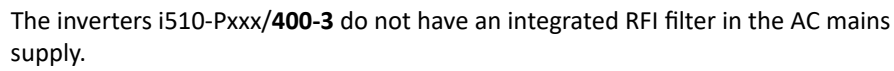
Fig. 4: Wiring example

S1 Start/Stop
Fx Fuses

Q1 Mains contactor
--- Dashed line = options



The connection plan is valid for the inverters i510-Pxxx/**400-3**.



- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
- Suitable EMC filters can be obtained directly from Lenze as accessories.
- The user must verify that the conformity with EN IEC 61800-3 is fulfilled.



Q1 Mains contactor
--- Dashed line = options





6.5.6 3-phase mains connection 600 V

The connection plan is valid for the inverters i510-Pxxx/600-3.



The inverters i510-Pxxx/600-3 do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
- Suitable EMC filters can be obtained directly from Lenze as accessories.
- The user must verify that the conformity with EN IEC 61800-3 is fulfilled.

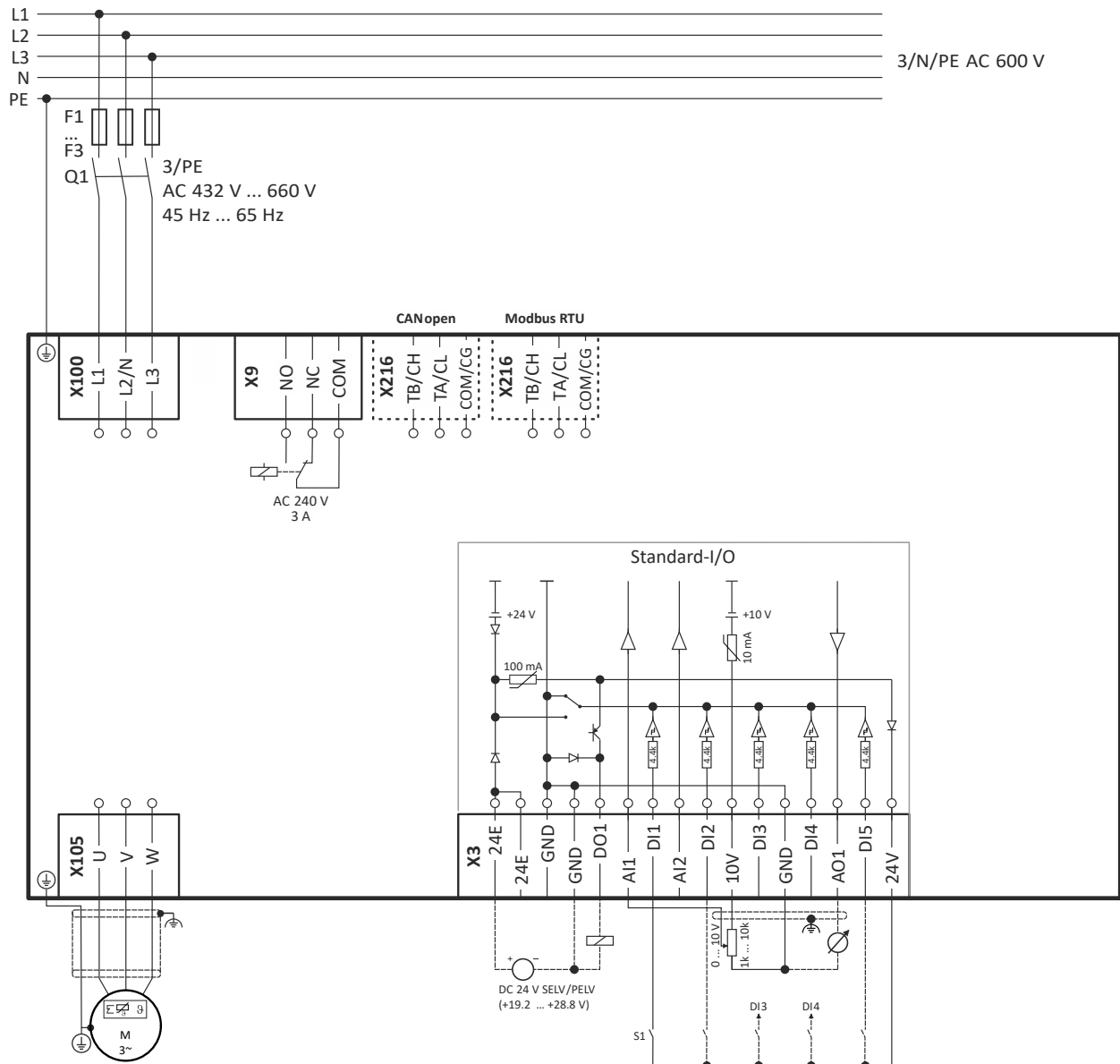


Fig. 7: Wiring example

S1 Start/Stop
Fx Fuses

Q1 Mains contactor
--- Dashed line = options



6.6 Motor connection

Only use motors suitable for the inverter operation.

Insulation resistance (EN 60034): max. $\hat{u} \geq 1.5 \text{ kV}$, max. $du/dt \geq 5 \text{ kV}/\mu\text{s}$



When using electrically conductive conduits, the conduit is considered a cable shield, so unshielded cables or single cores together with the conduit are also considered shielded cables.

Switching in the motor cable

Some applications require switching on the motor side of the inverter. Switching on the motor side of the inverter is permitted if you observe the following basic conditions.

Preconditions:

- The switching elements on the motor side must be dimensioned for with the maximum occurring loads.
- Connect the shield of the motor cable to the mounting plate immediately before and after the switching element in an EMC-compliant manner.

Possible applications:

- Galvanic isolation of the motor from the inverter
 - A controller must ensure that the switching element in the motor cable does not switch until the inverter is inhibited.
- Operation of several motors on one inverter in V/f characteristic control mode
 - Monitoring functions of the inverter for motor protection (e.g. i^2xt) cannot be used.
 - Ensure temperature monitoring of all motors by external measures.
 - Disable the inverter when overload protection and cable protection in the individual motor cables respond. Do not disconnect the motor circuit.

Please note the following:

- If switching is performed on the motor side when the inverter is enabled, error messages can be triggered.
- It is not possible to predict whether an error message will be triggered or not. This can only be determined by testing under real operating conditions.
- Error messages to be expected:
 - Overcurrent
 - Motor phase failure



6.7 Control connections



In case of long cables and/or high interference the effect of the shielding can be improved. To do this, connect the shield of cables for the analog inputs and outputs at one end of the cable via a capacitor with PE potential (e. g. 10 nF/250 V).



The designations of the terminals X216, X3 and X9 are located on the inside of the cover.

Connection			Control signals (I/O)	Control signals (relay)
Connection designation			X3	X9
Connection system			Spring terminal	-
Connection type			Non-pluggable	Non-pluggable
Double (Daisy Chain)			No	
Max. Cable cross-section		mm ²	1.5	1.5
Max. Cable cross-section		AWG	16	16
Min. Cable cross-section		mm ²	0.25	0.25
Min. Cable cross-section		AWG	22	22
Stripping length		mm	9	9
Stripping length		in	0.35	0.35
Required tools			Screwdriver 0.4 x 2.5	



6.8 Networks

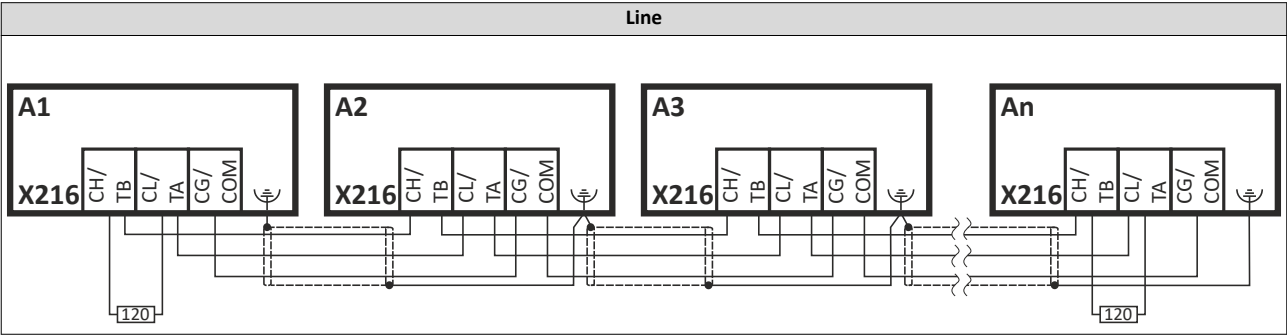
6.8.1 CANopen



The network must be terminated with a 120 Ω resistor at the physically first and last node.

Connect the resistor to terminals TB/CH and TA/CL.

Typical topologies



Connection			CANopen
Connection designation			X216
Connection system			Spring terminal
Connection type			Non-pluggable
Double (Daisy Chain)			No
Max. Cable cross-section		mm ²	1.5
Max. Cable cross-section		AWG	16
Min. Cable cross-section		mm ²	0.25
Min. Cable cross-section		AWG	22
Stripping length		mm	9
Stripping length		in	0.35
Required tools			Screwdriver 0.4 x 2.5



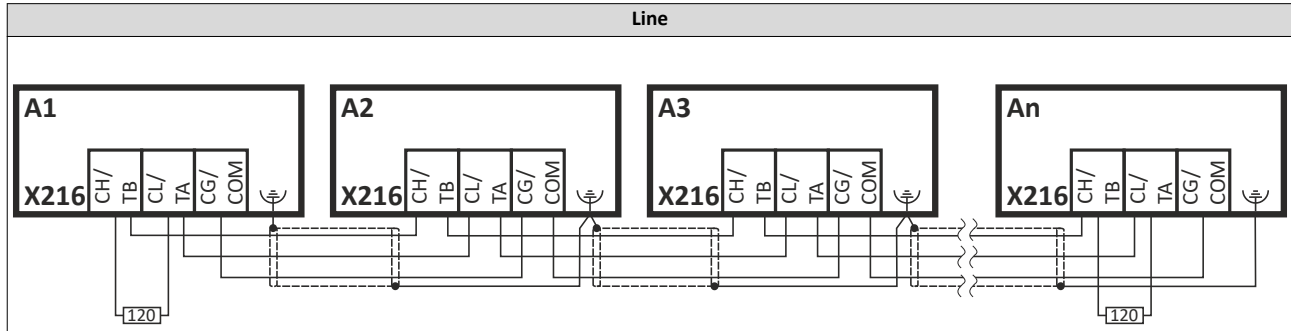
6.8.2 Modbus RTU



The network must be terminated with a 120 Ω resistor at the physically first and last node.

Connect the resistor to terminals TB/CH and TA/CL.

Typical topologies



Connection			Modbus RTU
Connection designation			X216
Connection system			Spring terminal
Connection type			Non-pluggable
Double (Daisy Chain)			No
Max. Cable cross-section		mm ²	1.5
Max. Cable cross-section		AWG	16
Min. Cable cross-section		mm ²	0.25
Min. Cable cross-section		AWG	22
Stripping length		mm	9
Stripping length		in	0.35
Required tools			Screwdriver 0.4 x 2.5



7 Technical data

7.1 Standards and operating conditions

7.1.1 Conformities and approvals

Conformities			
CE	2009/125/EC		Ecodesign Directive
	2011/65/EU		RoHS Directive
	2014/30/EU		EMC Directive
	2014/35/EU		Low-Voltage Directive
UKCA	S.I. 2008/1597		The Supply of Machinery (Safety) Regulations 2008
	S.I. 2012/3032		The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
	S.I. 2016/1091		The Electromagnetic Compatibility Regulations 2016
	S.I. 2021/745		The Ecodesign for Energy-Related Products and Energy Information Regulations 2021
Approvals			
cULus	UL 61800-5-1		Requirements of CSA 22.2 No. 274
			Ed. 2-2022
			File No. E132659



Declarations of conformity, certificates and approvals can be found on the Internet:

www.Lenze.com → Products → Inverters → Frequency inverters

→ [i510 protec frequency inverter](#)

(Section "Product support")

7.1.2 Protection of persons and device protection

Degree of protection			Information applies to the mounted and ready-for-use state.
EN	EN IEC 60529	IP20	
UL	UL 50E	Type 1	UL 50E Type 1 comparable to NEMA 1
	UL 61800-5-1	Open type	Attention! Installation only in the control cabinet.
Protection against electric shock			
Isolation of control circuits	EN IEC 61800-5-1	Safe mains isolation	Double/reinforced insulation
Overvoltage category		II	>2000 m amsl
		III	0 ... 2000 m amsl
Degree of pollution		2	
Leakage current			
AC	EN IEC 61800-5-1	> 3.5 mA	Observe regulations and safety instructions!
DC		> 10 mA	
Starting current			
		≤ 3 x rated mains current	
Protective measures			
Earth fault strength			Earth-fault protected depending on operating status
Motor stalling protection			
Short-circuit strength			
Overvoltage resistance			
Motor overtemperature			I²xt monitoring



7.1.3 EMC data

Operation on public supply systems			The machine or system manufacturer is responsible for compliance with the requirements for the machine/system!
< 1 kW	EN IEC 61000-3-2	With mains choke	The use of an active filter is recommended for single-phase inverters in order to comply with the limit values!
> 1 kW, mains current ≤ 16 A		No additional measures	
Mains current > 16 A ... ≤ 75 A	EN IEC 61000-3-12	With mains choke	The use of an active filter is recommended for single-phase inverters in order to comply with the limit values!
Noise emission			
Category C1	EN IEC 61800-3		see rated data
Category C2			
Category C3			
Noise immunity			
	EN IEC 61800-3	Requirements fulfilled	

7.1.4 Motor connection

Requirements for the shielded motor cable			
Capacitance per unit length		< 150/300 pF/m	≥ 4 mm ² / AWG 12
		< 75/150 pF/m	≤ 2.5 mm ² / AWG 14
Electric strength		U ₀ /U = 0.6/1.0 kV	U = r.m.s. value from external conductor to external conductor U ₀ = r.m.s. value external conductor to PE
	UL	U ≥ 600 V	U = r.m.s. value from external conductor to external conductor

7.1.5 Environmental conditions

Energy efficiency			
Efficiency level	EN IEC 61800-9-2	Energy efficiency class IE2	according to REGULATION (EU) 2019/1781
Climate			
Storage	EN 60721-3-1:1997	1K3 (-30 ... +60°C)	
Transport	EN 60721-3-2:1997	2K3 (-30 ... +70 °C)	
Operation	EN 60721-3-3:1995 + A2:1997	3K3 (-30 ... +60 °C)	Operation at a switching frequency of 2 or 4 kHz: Above +45°C: reduce rated output current by 2.5 %/°C
			Operation at a switching frequency of 8, 12 or 16 kHz: Above +40°C: reduce rated output current by 2.5 %/°C
			Relative humidity < 95 %, condensation not permissible
		3C2	For chemically active substances
		3S2	For mechanically active substances
Site altitude			
0 ... 1000 m amsl			Without current derating
1000 ... 4000 m amsl			Reduce rated output current by 5 %/1000 m
Vibration resistance			
Transport	EN 60721-3-2:1997	2M2 (sine, shock)	In original packaging
Operation	DNV-CG-0339	Amplitude 1 mm	5 ... 13.2 Hz
		Acceleration resistant up to 0.7 g	13.2 ... 100 Hz
	EN IEC 61800-5-1	Amplitude 0.075 mm	10 ... 57 Hz
		Acceleration resistant up to 1 g	57 ... 150 Hz



7.1.6 Electrical supply conditions

Power systems			
TN			Voltage against earth: max. 300 V
TT			

The connection to different supply forms enables a worldwide application of the inverters.

The following is supported:

- [1-phase mains connection 120 V](#) 57
- [1-phase mains connection 230/240 V](#) 61
- [1-phase mains connection 230/240 V "Light Duty"](#) 66
- [3-phase mains connection 230/240 V](#) 70
- [3-phase mains connection 230/240 V "Light Duty"](#) 77
- [3-phase mains connection 400 V](#) 81
- [3-phase mains connection 400 V "Light Duty"](#) 87
- [3-phase mains connection 480 V](#) 91
- [3-phase mains connection 480 V "Light Duty"](#) 99



7.2 1-phase mains connection 120 V



The inverters i510-Pxxx/**120-1** do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
- Suitable EMC filters can be obtained directly from Lenze as accessories.
- The user must verify that the conformity with EN IEC 61800-3 is fulfilled.

7.2.1 Rated data

The output currents apply to these operating conditions:

- At switching frequency 2 kHz or 4 kHz: Ambient temperature max. 45 °C (113 °F).
- At switching frequency 8 kHz, 12 kHz or 16 kHz: Ambient temperature max. 40 °C (104 °F).

Technical data

1-phase mains connection 120 V

Rated data



Product name			i510-P0.37/120-1	i510-P0.75/120-1	i510-P1.1/120-1
Rated power	P _{rated}	kW	0.37	0.75	1.1
Rated power	P _{rated}	hp	0.5	1	1.5
Mains voltage range			1 AC 90 V ... 132 V, 45 Hz ... 65 Hz		
Output voltage		V	3 AC 0 ... 230/240		
Rated mains current					
without mains choke		A	9.6	16.8	22.9
with mains choke		A	-		
Apparent output power		kVA	0.9	1.6	2.3
Rated output current					
2 kHz		A	2.4	4.2	6
4 kHz		A	2.4	4.2	6
8 kHz		A	2.4	4.2	6
12 kHz		A	2.2	3.8	5.4
16 kHz		A	1.6	2.8	4
Power loss					
2 kHz		W	20	30	40
4 kHz		W	20	31	42
8 kHz		W	25	39	53
12 kHz		W	26	42	57
16 kHz		W	24	38	51
Overcurrent cycle 180 s					
Max. output current (≤ 8 kHz)		A	3.6	6.3	9
Overload time	T ₁	s	60	60	60
Recovery time	T ₂	s	120	120	120
Max. Output current during the recovery time		A	1.8	3.2	4.5
Overcurrent cycle 15 s					
Max. output current (≤ 8 kHz)		A	4.8	8.4	12
Overload time	T ₁	s	3	3	3
Recovery time	T ₂	s	12	12	12
Max. Output current during the recovery time		A	1.8	3.2	4.5
Cyclic mains switching			3-mal pro Minute		
Brake chopper					
Max. output current			-		
Min. Brake resistor			-		
Max. shielded motor cable length					
without EMC category		m	30		50
Category C1 (≤ 8 kHz)		m	-		
Category C2 (≤ 8 kHz)		m	-		
Category C3 (≤ 8 kHz)		m	-		
Max. unshielded motor cable length					
without EMC category		m	60		80



7.2.2 Fusing data (EN 60204-1)

► [Fusing data](#) for UL/NEC-compliant installations [42](#)



- A residual current device (**RCD**) is optional.
- **I_{cc}** = Rated conditional short-circuit current
- Fusing data for UL/NEC compliant installations:
► [Connection according to UL, Fusing data](#) [42](#)

Inverter	Fuse			Circuit breaker			RCD	
	I _{cc}	Characteristic	Max. rated current	I _{cc}	Characteristic	Max. rated current		Type
	kA		A	kA		A	mA	
i510-P0.37/120-1	5	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P0.75/120-1								
i510-P1.1/120-1								



7.2.3 Connection data

Rated power	P _{rated}	kW	0.37 ... 1.1
Connection			Netz
Connection designation			X100
Connection system			Screw terminal
Connection type			Pluggable
Max. Cable cross-section		mm ²	4
Max. Cable cross-section		AWG	10
Min. Cable cross-section		mm ²	1.0
Min. Cable cross-section		AWG	18
Stripping length		mm	8
Stripping length		in	0.32
Tightening torque		Nm	0.6
Tightening torque		lb-in	5.3
Required tools			Screwdriver 0.5 x 3.0

Rated power	P _{rated}	kW	0.37 ... 0.75	1.1
Connection			Schutzerde (PE)	
Connection designation			Symbol for protective earth (PE)	
Connection system			Schraube	
Max. Cable cross-section		mm ²	6	16
Max. Cable cross-section		AWG	10	6
Min. Cable cross-section		mm ²	1.5	2.5
Min. Cable cross-section		AWG	16	14
Stripping length		mm	10	12
Stripping length		in	0.4	0.47
Tightening torque		Nm	2	3.4
Tightening torque		lb-in	18	30
Required tools			Torx key 20	Torx key 25

Rated power	P _{rated}	kW	0.37 ... 1.1
Connection			Motor
Connection designation			X105
Connection system			Screw terminal
Connection type			Pluggable
Max. Cable cross-section		mm ²	4
Max. Cable cross-section		AWG	10
Min. Cable cross-section		mm ²	1.0
Min. Cable cross-section		AWG	18
Stripping length		mm	8
Stripping length		in	0.32
Tightening torque		Nm	0.6
Tightening torque		lb-in	5.3
Required tools			Screwdriver 0.5 x 3.0



7.3 1-phase mains connection 230/240 V



The inverters i510-Pxxx/**230-2** do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
 - Suitable EMC filters can be obtained directly from Lenze as accessories.
 - The user must verify that the conformity with EN IEC 61800-3 is fulfilled.
-

7.3.1 Rated data

The output currents apply to these operating conditions:

- At switching frequency 2 kHz or 4 kHz: Ambient temperature max. 45 °C (113 °F).
- At switching frequency 8 kHz, 12 kHz or 16 kHz: Ambient temperature max. 40 °C (104 °F).

Technical data

1-phase mains connection 230/240 V

Rated data



Product name			i510-P0.37/230-2	i510-P0.75/230-2	i510-P1.1/230-2	i510-P1.5/230-2
Rated power	P _{rated}	kW	0.37	0.75	1.1	1.5
Rated power	P _{rated}	hp	0.5	1	1.5	2
Mains voltage range			1 AC 170 V ... 264 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 230/240			
Rated mains current						
without mains choke		A	6.3	11	14.3	16.7
with mains choke		A	-			
Apparent output power		kVA	0.9	1.6	2.3	2.6
Rated output current						
2 kHz		A	2.4	4.2	6	7
4 kHz		A	2.4	4.2	6	7
8 kHz		A	2.4	4.2	6	7
12 kHz		A	2.2	3.8	5.4	6.3
16 kHz		A	1.6	2.8	4	4.7
Power loss						
2 kHz		W	20	30	40	46
4 kHz		W	20	31	42	48
8 kHz		W	25	39	53	61
12 kHz		W	26	42	57	65
16 kHz		W	24	38	51	59
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	3.6	6.3	9	10.5
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	1.8	3.2	4.5	5.3
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	4.8	8.4	12	14
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	1.8	3.2	4.5	5.3
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	30			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	60		80	



Technical data

1-phase mains connection 230/240 V
Rated data

Product name			i510-P2.2/230-2	i510-P3.0/230-2
Rated power	P _{rated}	kW	2.2	3
Rated power	P _{rated}	hp	3	4
Mains voltage range			1 AC 170 V ... 264 V, 45 Hz ... 65 Hz	
Output voltage		V	3 AC 0 ... 230/240	
Rated mains current				
without mains choke		A	22.5	30
with mains choke		A	-	
Apparent output power		kVA	3.6	4.7
Rated output current				
2 kHz		A	9.6	12.4
4 kHz		A	9.6	12.4
8 kHz		A	9.6	12.4
12 kHz		A	8.6	11.2
16 kHz		A	6.4	8.3
Power loss				
2 kHz		W	60	76
4 kHz		W	64	81
8 kHz		W	82	104
12 kHz		W	87	111
16 kHz		W	78	99
Overcurrent cycle 180 s				
Max. output current (≤ 8 kHz)		A	14.4	18.6
Overload time	T ₁	s	60	60
Recovery time	T ₂	s	120	120
Max. Output current during the recovery time		A	7.2	9.3
Overcurrent cycle 15 s				
Max. output current (≤ 8 kHz)		A	19.2	24.8
Overload time	T ₁	s	3	3
Recovery time	T ₂	s	12	12
Max. Output current during the recovery time		A	7.2	9.3
Cyclic mains switching			3-mal pro Minute	
Brake chopper				
Max. output current			-	
Min. Brake resistor			-	
Max. shielded motor cable length				
without EMC category		m	30	50
Category C1 (≤ 8 kHz)		m	-	
Category C2 (≤ 8 kHz)		m	-	
Category C3 (≤ 8 kHz)		m	-	
Max. unshielded motor cable length				
without EMC category		m	80	100



7.3.2 Fusing data (EN 60204-1)

► [Fusing data](#) for UL/NEC-compliant installations [42](#)



- A residual current device (**RCD**) is optional.
- **I_{cc}** = Rated conditional short-circuit current
- Fusing data for UL/NEC compliant installations:
 - [Connection according to UL, Fusing data](#) [42](#)



The RCD type "F" is only permitted in 1-phase operation (L/N)!

Inverter	Fuse			Circuit breaker			RCD	
	I _{cc}	Characteristic	Max. rated current	I _{cc}	Characteristic	Max. rated current		Type
	kA		A	kA		A	mA	
i510-P0.37/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P0.37/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ F
i510-P0.75/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P0.75/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ F
i510-P1.1/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P1.1/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ F
i510-P1.5/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P1.5/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ F
i510-P2.2/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P2.2/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ F
i510-P3.0/230-2	42	gG/gL, gRL	63	5	B	50	≥ 30	Typ B
i510-P3.0/230-2	42	gG/gL, gRL	63	5	B	50	≥ 30	Typ F



7.3.3 Connection data

Rated power	P _{rated}	kW	0.37 ... 3
Connection			Netz
Connection designation			X100
Connection system			Screw terminal
Connection type			Pluggable
Max. Cable cross-section		mm ²	4
Max. Cable cross-section		AWG	10
Min. Cable cross-section		mm ²	1.0
Min. Cable cross-section		AWG	18
Stripping length		mm	8
Stripping length		in	0.32
Tightening torque		Nm	0.6
Tightening torque		lb-in	5.3
Required tools			Screwdriver 0.5 x 3.0

Rated power	P _{rated}	kW	0.37 ... 2.2	3
Connection			Schutzerde (PE)	
Connection designation			Symbol for protective earth (PE)	
Connection system			Schraube	
Max. Cable cross-section		mm ²	6	16
Max. Cable cross-section		AWG	10	6
Min. Cable cross-section		mm ²	1.5	2.5
Min. Cable cross-section		AWG	16	14
Stripping length		mm	10	12
Stripping length		in	0.4	0.47
Tightening torque		Nm	2	3.4
Tightening torque		lb-in	18	30
Required tools			Torx key 20	Torx key 25

Rated power	P _{rated}	kW	0.37 ... 3
Connection			Motor
Connection designation			X105
Connection system			Screw terminal
Connection type			Pluggable
Max. Cable cross-section		mm ²	4
Max. Cable cross-section		AWG	10
Min. Cable cross-section		mm ²	1.0
Min. Cable cross-section		AWG	18
Stripping length		mm	8
Stripping length		in	0.32
Tightening torque		Nm	0.6
Tightening torque		lb-in	5.3
Required tools			Screwdriver 0.5 x 3.0



7.4 1-phase mains connection 230/240 V "Light Duty"



The inverters i510-Pxxx/**230-2** do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
- Suitable EMC filters can be obtained directly from Lenze as accessories.
- The user must verify that the conformity with EN IEC 61800-3 is fulfilled.

7.4.1 Rated data

The output currents apply to these operating conditions:

- At switching frequency 2 kHz or 4 kHz: Ambient temperature max. 40 °C (104 °F).



Technical data

1-phase mains connection 230/240 V "Light Duty"
Rated data

Product name			i510-P0.37/230-2	i510-P0.75/230-2	i510-P1.1/230-2	i510-P1.5/230-2
Rated power	P _{rated}	kW	0.55	1.1	1.5	2.2
Rated power	P _{rated}	hp	0.75	1.5	2	3
Mains voltage range			1 AC 170 V ... 264 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 230/240			
Rated mains current						
without mains choke		A	8.4	15.7	17.1	22.8
with mains choke		A	-			
Apparent output power		kVA	1.2	2.3	2.7	3.6
Rated output current						
2 kHz		A	3.2	6	7.2	9.6
4 kHz		A	3.2	6	7.2	9.6
Power loss						
2 kHz		W	24	40	47	60
4 kHz		W	25	42	49	64
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	3.6	6.3	9	10.5
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	1.8	3.2	4.5	5.3
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	4.8	8.4	12	14
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	1.8	3.2	4.5	5.3
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	30			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	60		80	

Technical data

1-phase mains connection 230/240 V "Light Duty"

Rated data



Product name			i510-P3.0/230-2
Rated power	P _{rated}	kW	4
Rated power	P _{rated}	hp	5
Mains voltage range			1 AC 170 V ... 264 V, 45 Hz ... 65 Hz
Output voltage		V	3 AC 0 ... 230/240
Rated mains current			
without mains choke		A	35
with mains choke		A	-
Apparent output power		kVA	5.7
Rated output current			
2 kHz		A	15.2
4 kHz		A	15.2
Power loss			
2 kHz		W	92
4 kHz		W	97
Overcurrent cycle 180 s			
Max. output current (≤ 8 kHz)		A	18.6
Overload time	T ₁	s	60
Recovery time	T ₂	s	120
Max. Output current during the recovery time		A	9.3
Overcurrent cycle 15 s			
Max. output current (≤ 8 kHz)		A	24.8
Overload time	T ₁	s	3
Recovery time	T ₂	s	12
Max. Output current during the recovery time		A	9.3
Cyclic mains switching			3-mal pro Minute
Brake chopper			
Max. output current			-
Min. Brake resistor			-
Max. shielded motor cable length			
without EMC category		m	50
Category C1 (≤ 8 kHz)		m	-
Category C2 (≤ 8 kHz)		m	-
Category C3 (≤ 8 kHz)		m	-
Max. unshielded motor cable length			
without EMC category		m	100



7.4.2 Fusing data (EN 60204-1)

► Fusing data for UL/NEC-compliant installations [42](#)



- A residual current device (**RCD**) is optional.
- **I_{cc}** = Rated conditional short-circuit current
- Fusing data for UL/NEC compliant installations:
► [Connection according to UL, Fusing data](#) [42](#)



The RCD type "F" is only permitted in 1-phase operation (L/N)!

Inverter	Fuse			Circuit breaker			RCD	
	I _{cc}	Characteristic	Max. rated current	I _{cc}	Characteristic	Max. rated current		Type
	kA		A	kA		A	mA	
i510-P0.37/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P0.37/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ F
i510-P0.75/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P0.75/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ F
i510-P1.1/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P1.1/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ F
i510-P1.5/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P1.5/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ F
i510-P3.0/230-2	42	gG/gL, gRL	63	5	B	50	≥ 30	Typ B
i510-P3.0/230-2	42	gG/gL, gRL	63	5	B	50	≥ 30	Typ F

7.4.3 Connection data

► [Connection data](#) [65](#)



7.5 3-phase mains connection 230/240 V



The inverters i550-Pxxx/**230-2** and i550-Pxxx/**230-3** do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
- Suitable EMC filters can be obtained directly from Lenze as accessories.
- The user must verify that the conformity with EN IEC 61800-3 is fulfilled.

7.5.1 Rated data

The output currents apply to these operating conditions:

- At switching frequency 2 kHz or 4 kHz: Ambient temperature max. 45 °C (113 °F).
- At switching frequency 8 kHz, 12 kHz or 16 kHz: Ambient temperature max. 40 °C (104 °F).



Technical data

3-phase mains connection 230/240 V
Rated data

Product name			i510-P0.37/230-2	i510-P0.75/230-2	i510-P1.1/230-2	i510-P1.5/230-2
Rated power	P _{rated}	kW	0.37	0.75	1.1	1.5
Rated power	P _{rated}	hp	0.5	1	1.5	2
Mains voltage range			3 AC 170 V ... 264 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 230/240			
Rated mains current						
without mains choke		A	3.9	6.4	7.8	9.5
with mains choke		A	-			
Apparent output power		kVA	0.9	1.6	2.3	2.6
Rated output current						
2 kHz		A	2.4	4.2	6	7
4 kHz		A	2.4	4.2	6	7
8 kHz		A	2.4	4.2	6	7
12 kHz		A	2.2	3.8	5.4	6.3
16 kHz		A	1.6	2.8	4	4.7
Power loss						
2 kHz		W	20	30	40	46
4 kHz		W	20	31	42	48
8 kHz		W	25	39	53	61
12 kHz		W	26	42	57	65
16 kHz		W	24	38	51	59
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	3.6	6.3	9	10.5
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	1.8	3.2	4.5	5.3
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	4.8	8.4	12	14
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	1.8	3.2	4.5	5.3
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	30			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	60		80	

Technical data

3-phase mains connection 230/240 V

Rated data



Product name			i510-P2.2/230-2	i510-P3.0/230-2	i510-P3.0/230-3	i510-P4.0/230-3
Rated power	P _{rated}	kW	2.2	3		4
Rated power	P _{rated}	hp	3	4		5
Mains voltage range			3 AC 170 V ... 264 V, 45 Hz ... 65 Hz	3 AC 195 V ... 264 V, 45 Hz ... 65 Hz		
Output voltage		V	3 AC 0 ... 230/240			
Rated mains current						
without mains choke		A	13.6	15.5	15	20.6
with mains choke		A	-			
Apparent output power		kVA	3.6	4.7	4.5	6.2
Rated output current						
2 kHz		A	9.6	12.4	12	16.5
4 kHz		A	9.6	12.4	12	16.5
8 kHz		A	9.6	12.4	12	16.5
12 kHz		A	8.6	11.2	10.8	14.9
16 kHz		A	6.4	8.3	8	11
Power loss						
2 kHz		W	60	76	79	102
4 kHz		W	64	81	84	108
8 kHz		W	82	104	109	140
12 kHz		W	87	111	104	133
16 kHz		W	78	99	104	133
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	14.4	18.6	18	24.8
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	7.2	9.3	9	12.4
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	19.2	24.8	24	33
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	7.2	9.3	9	12.4
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	30	50		
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	80	100		



Technical data

3-phase mains connection 230/240 V
Rated data

Product name			i510-P5.5/230-3
Rated power	P _{rated}	kW	5.5
Rated power	P _{rated}	hp	7.5
Mains voltage range			3 AC 195 V ... 264 V, 45 Hz ... 65 Hz
Output voltage		V	3 AC 0 ... 230/240
Rated mains current			
without mains choke		A	28.8
with mains choke		A	-
Apparent output power		kVA	8.7
Rated output current			
2 kHz		A	23
4 kHz		A	23
8 kHz		A	23
12 kHz		A	20.7
16 kHz		A	15.3
Power loss			
2 kHz		W	136
4 kHz		W	144
8 kHz		W	188
12 kHz		W	201
16 kHz		W	179
Overcurrent cycle 180 s			
Max. output current (≤ 8 kHz)		A	34.5
Overload time	T ₁	s	60
Recovery time	T ₂	s	120
Max. Output current during the recovery time		A	17.3
Overcurrent cycle 15 s			
Max. output current (≤ 8 kHz)		A	46
Overload time	T ₁	s	3
Recovery time	T ₂	s	12
Max. Output current during the recovery time		A	17.3
Cyclic mains switching			3-mal pro Minute
Brake chopper			
Max. output current			-
Min. Brake resistor			-
Max. shielded motor cable length			
without EMC category		m	50
Category C1 (≤ 8 kHz)		m	-
Category C2 (≤ 8 kHz)		m	-
Category C3 (≤ 8 kHz)		m	-
Max. unshielded motor cable length			
without EMC category		m	100



7.5.2 Fusing data (EN 60204-1)

► [Fusing data](#) for UL/NEC-compliant installations [42](#)



- A residual current device (**RCD**) is optional.
- **I_{cc}** = Rated conditional short-circuit current
- Fusing data for UL/NEC compliant installations:
 - [Connection according to UL, Fusing data](#) [42](#)

Inverter	Fuse			Circuit breaker			RCD	
	I _{cc}	Characteristic	Max. rated current	I _{cc}	Characteristic	Max. rated current		Type
	kA		A	kA		A	mA	
i510-P0.37/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P0.75/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P1.1/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P1.5/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P2.2/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P3.0/230-2	42	gG/gL, gRL	63	5	B	50	≥ 30	Typ B
i510-P3.0/230-3	42	gG/gL, gRL	80	5	B	32	≥ 30	Typ B
i510-P4.0/230-3	42	gG/gL, gRL	80	5	B	32	≥ 30	Typ B
i510-P5.5/230-3	42	gG/gL, gRL	63	5	B	50	≥ 30	Typ B



7.5.3 Connection data

Rated power	P _{rated}	kW	0.37 ... 5.5
Connection			Netz
Connection designation			X100
Connection system			Screw terminal
Connection type			Pluggable
Max. Cable cross-section		mm ²	4
Max. Cable cross-section		AWG	10
Min. Cable cross-section		mm ²	1.0
Min. Cable cross-section		AWG	18
Stripping length		mm	8
Stripping length		in	0.32
Tightening torque		Nm	0.6
Tightening torque		lb-in	5.3
Required tools			Screwdriver 0.5 x 3.0

Rated power	P _{rated}	kW	0.37 ... 4	3 ... 5.5
Connection			Schutzerde (PE)	
Connection designation			Symbol for protective earth (PE)	
Connection system			Schraube	
Max. Cable cross-section		mm ²	6	16
Max. Cable cross-section		AWG	10	6
Min. Cable cross-section		mm ²	1.5	2.5
Min. Cable cross-section		AWG	16	14
Stripping length		mm	10	12
Stripping length		in	0.4	0.47
Tightening torque		Nm	2	3.4
Tightening torque		lb-in	18	30
Required tools			Torx key 20	Torx key 25

Rated power	P _{rated}	kW	0.37 ... 2.2	3 ... 5.5
Connection			Schutzerde (PE)	
Connection designation			Symbol for protective earth (PE)	
Connection system			Schraube	
Max. Cable cross-section		mm ²	6	16
Max. Cable cross-section		AWG	10	6
Min. Cable cross-section		mm ²	1.5	2.5
Min. Cable cross-section		AWG	16	14
Stripping length		mm	10	12
Stripping length		in	0.4	0.47
Tightening torque		Nm	2	3.4
Tightening torque		lb-in	18	30
Required tools			Torx key 20	Torx key 25

Technical data

3-phase mains connection 230/240 V
Connection data



Rated power	P _{rated}	kW	0.37 ... 5.5	3 ... 4
Connection			Motor	
Connection designation			X105	
Connection system			Screw terminal	
Connection type			Pluggable	
Max. Cable cross-section		mm ²	4	6
Max. Cable cross-section		AWG	10	10
Min. Cable cross-section		mm ²	1.0	1.0
Min. Cable cross-section		AWG	18	18
Stripping length		mm	8	8
Stripping length		in	0.32	0.32
Tightening torque		Nm	0.6	0.7
Tightening torque		lb-in	5.3	6.2
Required tools			Screwdriver 0.5 x 3.0	Screwdriver 0.6 x 3.5

Rated power	P _{rated}	kW	0.37 ... 5.5
Connection			Motor
Connection designation			X105
Connection system			Screw terminal
Connection type			Pluggable
Max. Cable cross-section		mm ²	4
Max. Cable cross-section		AWG	10
Min. Cable cross-section		mm ²	1.0
Min. Cable cross-section		AWG	18
Stripping length		mm	8
Stripping length		in	0.32
Tightening torque		Nm	0.6
Tightening torque		lb-in	5.3
Required tools			Screwdriver 0.5 x 3.0

Connection data for inverter i510-P3.0/230-3 and i510-P4.0/230-3

Inverter			I51AP230C	I51AP240C	I51AP230C	I51AP240C	I51AP230C	I51AP240C
Rated power	P _{rated}	kW	3	4	3	4	3	4
Connection			Motor		Netz		Schutzerde (PE)	
Connection designation			X105		X100		Symbol for protective earth (PE)	
Connection system			Screw terminal				Screw	
Connection type			Pluggable				-	
Max. Cable cross-section		mm ²	6	6	6	6	6	6
Max. Cable cross-section		AWG	10	10	10	10	10	10
Min. Cable cross-section		mm ²	1.0	1.0	1.0	1.0	1.5	1.5
Min. Cable cross-section		AWG	18	18	18	18	16	16
Stripping length		mm	8	8	8	8	10	10
Stripping length		in	0.32	0.32	0.32	0.32	0.4	0.4
Tightening torque		Nm	0.7	0.7	0.7	0.7	2	2
Tightening torque		lb-in	6.2	6.2	6.2	6.2	18	18
Required tools			Screwdriver 0.6 x 3.5				Torx key 20	



7.6 3-phase mains connection 230/240 V "Light Duty"



The inverters i550-Pxxx/**230-2** and i550-Pxxx/**230-3** do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
- Suitable EMC filters can be obtained directly from Lenze as accessories.
- The user must verify that the conformity with EN IEC 61800-3 is fulfilled.

7.6.1 Rated data

The output currents apply to these operating conditions:

- At switching frequency 2 kHz or 4 kHz: Ambient temperature max. 40 °C (104 °F).

Technical data

3-phase mains connection 230/240 V "Light Duty"

Rated data



Product name			i510-P0.37/230-2	i510-P0.75/230-2	i510-P1.1/230-2	i510-P1.5/230-2
Rated power	P _{rated}	kW	0.55	1.1	1.5	2.2
Rated power	P _{rated}	hp	0.75	1.5	2	3
Mains voltage range			3 AC 170 V ... 264 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 230/240			
Rated mains current						
without mains choke		A	5.2	9.1	9.4	13
with mains choke		A	-			
Apparent output power		kVA	1.2	2.3	2.7	3.6
Rated output current						
2 kHz		A	3.2	6	7.2	9.6
4 kHz		A	3.2	6	7.2	9.6
8 kHz		A	-			
12 kHz		A	-			
16 kHz		A	-			
Power loss						
2 kHz		W	24	40	47	60
4 kHz		W	25	42	49	64
8 kHz		W	-			
12 kHz		W	-			
16 kHz		W	-			
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	3.6	6.3	9	10.5
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	1.8	3.2	4.5	5.3
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	4.8	8.4	12	14
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	1.8	3.2	4.5	5.3
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	30			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	60		80	



Technical data

3-phase mains connection 230/240 V "Light Duty"
Rated data

Product name			i510-P3.0/230-2	i510-P3.0/230-3	i510-P4.0/230-3	i510-P5.5/230-3
Rated power	P _{rated}	kW	4		5.5	7.5
Rated power	P _{rated}	hp	5		7.5	10
Mains voltage range			3 AC 195 V ... 264 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 230/240			
Rated mains current						
without mains choke		A	19	17.3	23.8	35
with mains choke		A	-			
Apparent output power		kVA	5.7	6.2	8.7	10.5
Rated output current						
2 kHz		A	15.2	14.4	19.8	28
4 kHz		A	15.2	14.4	19.8	28
8 kHz		A	-			
12 kHz		A	-			
16 kHz		A	-			
Power loss						
2 kHz		W	92	102	137	164
4 kHz		W	97	108	145	175
8 kHz		W	-			
12 kHz		W	-			
16 kHz		W	-			
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	18.6	18	24.8	34.5
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	9.3	9	12.4	17.3
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	24.8	24	33	46
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	9.3	9	12.4	17.3
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	50			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	100			

Technical data

3-phase mains connection 230/240 V "Light Duty"

Fusing data (EN 60204-1)



7.6.2 Fusing data (EN 60204-1)

► [Fusing data](#) for UL/NEC-compliant installations [42](#)



- A residual current device (**RCD**) is optional.
- **I_{cc}** = Rated conditional short-circuit current
- Fusing data for UL/NEC compliant installations:
 - [Connection according to UL](#), [Fusing data](#) [42](#)

Inverter	Fuse			Circuit breaker			RCD	
	I _{cc}	Characteristic	Max. rated current	I _{cc}	Characteristic	Max. rated current		Type
	kA		A	kA		A	mA	
i510-P0.37/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P0.75/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P1.1/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P1.5/230-2	42	gG/gL, gRL	32	5	B	32	≥ 30	Typ B
i510-P3.0/230-2	42	gG/gL, gRL	63	5	B	50	≥ 30	Typ B
i510-P3.0/230-3	42	gG/gL, gRL	80	5	B	32	≥ 30	Typ B
i510-P4.0/230-3	42	gG/gL, gRL	80	5	B	32	≥ 30	Typ B
i510-P5.5/230-3	42	gG/gL, gRL	63	5	B	50	≥ 30	Typ B

7.6.3 Connection data

► [Connection data](#) [75](#)



7.7 3-phase mains connection 400 V



The inverters i510-Pxxx/**400-3** do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
 - Suitable EMC filters can be obtained directly from Lenze as accessories.
 - The user must verify that the conformity with EN IEC 61800-3 is fulfilled.
-

Technical data

3-phase mains connection 400 V

Rated data



7.7.1 Rated data

The output currents apply to these operating conditions:

- At switching frequency 2 kHz or 4 kHz: Ambient temperature max. 45 °C (113 °F).
- At switching frequency 8 kHz, 12 kHz or 16 kHz: Ambient temperature max. 40 °C (104 °F).



Technical data

3-phase mains connection 400 V
Rated data

Product name			i510-P0.75/400-3	i510-P1.1/400-3	i510-P1.5/400-3	i510-P2.2/400-3
Rated power	P _{rated}	kW	0.75	1.1	1.5	2.2
Rated power	P _{rated}	hp	1	1.5	2	3
Mains voltage range			3 AC 340 V ... 440 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 400			
Rated mains current						
without mains choke		A	3.3	4.4	5.4	7.8
with mains choke		A	-			
Apparent output power		kVA	1.6	2.1	2.6	3.8
Rated output current						
2 kHz		A	2.4	3.2	3.9	5.6
4 kHz		A	2.4	3.2	3.9	5.6
8 kHz		A	2.4	3.2	3.9	5.6
12 kHz		A	1.9	2.6	3.5	5
16 kHz		A	1.4	1.6	2.6	3.7
Power loss						
2 kHz		W	30	38	45	62
4 kHz		W	32	40	48	66
8 kHz		W	40	51	61	85
12 kHz		W	38	49	65	91
16 kHz		W	35	38	58	81
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	3.6	4.8	5.9	8.4
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	1.8	2.4	2.9	4.2
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	4.8	6.4	7.8	11.2
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	1.8	2.4	2.9	4.2
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	30			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	60	80		

Technical data

3-phase mains connection 400 V

Rated data



Product name			i510-P3.0/400-3	i510-P4.0/400-3	i510-P5.5/400-3	i510-P7.5/400-3
Rated power	P _{rated}	kW	3	4	5.5	7.5
Rated power	P _{rated}	hp	4	5	7.5	10
Mains voltage range			3 AC 340 V ... 440 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 400			
Rated mains current						
without mains choke		A	9.6	12.5	17.2	20
with mains choke		A	-			
Apparent output power		kVA	4.9	6.4	8.7	11.1
Rated output current						
2 kHz		A	7.3	9.5	13	16.5
4 kHz		A	7.3	9.5	13	16.5
8 kHz		A	7.3	9.5	13	16.5
12 kHz		A	5.8	7.6	10.4	13.2
16 kHz		A	4.9	6.3	8.7	11
Power loss						
2 kHz		W	79	102	137	172
4 kHz		W	84	108	145	183
8 kHz		W	109	140	189	238
12 kHz		W	104	133	180	227
16 kHz		W	104	133	180	227
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	11	14.3	19.5	24.8
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	5.5	7.1	9.8	12.4
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	14.6	19	26	33
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	5.5	7.1	9.8	12.4
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	50			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	100			200



7.7.2 Fusing data (EN 60204-1)

► [Fusing data](#) for UL/NEC-compliant installations [42](#)



- A residual current device (**RCD**) is optional.
- **I_{cc}** = Rated conditional short-circuit current
- Fusing data for UL/NEC compliant installations:
► [Connection according to UL, Fusing data](#) [42](#)

Inverter	Fuse			Circuit breaker			RCD	
	I _{cc}	Characteristic	Max. rated current	I _{cc}	Characteristic	Max. rated current		Type
	kA		A	kA		A	mA	
i510-P0.75/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P1.1/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P1.5/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P2.2/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P3.0/400-3	42	gG/gL, gRL	32	5	B	20	≥ 30	Typ B
i510-P4.0/400-3	42	gG/gL, gRL	32	5	B	20	≥ 30	Typ B
i510-P5.5/400-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B
i510-P7.5/400-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B



7.7.3 Connection data

Rated power	P _{rated}	kW	0.75 ... 7.5
Connection			Mains connection
Connection designation			X100
Connection system			Screw terminal
Connection type			Pluggable
Max. Cable cross-section		mm ²	4
Max. Cable cross-section		AWG	10
Min. Cable cross-section		mm ²	1.0
Min. Cable cross-section		AWG	18
Stripping length		mm	8
Stripping length		in	0.32
Tightening torque		Nm	0.6
Tightening torque		lb-in	5.3
Required tools			Screwdriver 0.5 x 3.0

Rated power	P _{rated}	kW	0.75 ... 4	5.5 ... 7.5
Connection			Schutzerde (PE)	
Connection designation			Symbol for protective earth (PE)	
Connection system			Schraube	
Max. Cable cross-section		mm ²	6	16
Max. Cable cross-section		AWG	10	6
Min. Cable cross-section		mm ²	1.5	2.5
Min. Cable cross-section		AWG	16	14
Stripping length		mm	10	12
Stripping length		in	0.4	0.47
Tightening torque		Nm	2	3.4
Tightening torque		lb-in	18	30
Required tools			Torx key 20	Torx key 25

Rated power	P _{rated}	kW	0.75 ... 7.5
Connection			Motor
Connection designation			X105
Connection system			Screw terminal
Connection type			Pluggable
Max. Cable cross-section		mm ²	4
Max. Cable cross-section		AWG	10
Min. Cable cross-section		mm ²	1.0
Min. Cable cross-section		AWG	18
Stripping length		mm	8
Stripping length		in	0.32
Tightening torque		Nm	0.6
Tightening torque		lb-in	5.3
Required tools			Screwdriver 0.5 x 3.0



7.8 3-phase mains connection 400 V "Light Duty"



The inverters i510-Pxxx/**400-3** do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
 - Suitable EMC filters can be obtained directly from Lenze as accessories.
 - The user must verify that the conformity with EN IEC 61800-3 is fulfilled.
-

Technical data

3-phase mains connection 400 V "Light Duty"
Rated data



7.8.1 Rated data

The output currents apply to these operating conditions:

- At switching frequency 2 kHz or 4 kHz: Ambient temperature max. 40 °C (104 °F).

Product name			i510-P0.75/400-3	i510-P1.1/400-3	i510-P1.5/400-3	i510-P2.2/400-3
Rated power	P _{rated}	kW	1.1	1.5	2.2	3
Rated power	P _{rated}	hp	1.5	2	3	4
Mains voltage range			3 AC 340 V ... 440 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 400			
Rated mains current						
without mains choke		A	4.8	5	7.4	10
with mains choke		A	-			
Apparent output power		kVA	2.3	2.4	3.6	4.8
Rated output current						
2 kHz		A	3.4	3.6	5.3	7.2
4 kHz		A	3.4	3.6	5.3	7.2
8 kHz		A	-			
12 kHz		A	-			
16 kHz		A	-			
Power loss						
2 kHz		W	40	42	60	78
4 kHz		W	43	45	63	83
8 kHz		W	-			
12 kHz		W	-			
16 kHz		W	-			
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	3.6	4.8	5.9	8.4
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	1.8	2.4	2.9	4.2
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	4.8	6.4	7.8	11.2
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	1.8	2.4	2.9	4.2
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	30			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	60	80		



Technical data

3-phase mains connection 400 V "Light Duty"
Rated data

Product name			i510-P3.0/400-3	i510-P4.0/400-3	i510-P5.5/400-3	i510-P7.5/400-3
Rated power	P _{rated}	kW	4	5.5	7.5	11
Rated power	P _{rated}	hp	5	7.5	10	15
Mains voltage range			3 AC 340 V ... 440 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 400			
Rated mains current						
without mains choke		A	11.6	16.8	21.8	29.6
with mains choke		A	-			
Apparent output power		kVA	5.9	8.5	11.1	16.4
Rated output current						
2 kHz		A	8.8	12.7	16.5	24.5
4 kHz		A	8.8	12.7	16.5	24.5
8 kHz		A	-			
12 kHz		A	-			
16 kHz		A	-			
Power loss						
2 kHz		W	95	134	172	252
4 kHz		W	100	143	184	269
8 kHz		W	-			
12 kHz		W	-			
16 kHz		W	-			
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	11	14.3	19.5	24.8
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	5.5	7.1	9.8	12.4
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	14.6	19	26	33
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	5.5	7.1	9.8	12.4
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	50			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	100			200

Technical data

3-phase mains connection 400 V "Light Duty"
Fusing data (EN 60204-1)



7.8.2 Fusing data (EN 60204-1)

► [Fusing data](#) for UL/NEC-compliant installations [42](#)



- A residual current device (**RCD**) is optional.
- **I_{cc}** = Rated conditional short-circuit current
- Fusing data for UL/NEC compliant installations:
► [Connection according to UL, Fusing data](#) [42](#)

Inverter	Fuse			Circuit breaker			RCD	
	I _{cc}	Characteristic	Max. rated current	I _{cc}	Characteristic	Max. rated current		Type
	kA		A	kA		A	mA	
i510-P0.75/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P1.1/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P1.5/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P2.2/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P3.0/400-3	42	gG/gL, gRL	32	5	B	20	≥ 30	Typ B
i510-P4.0/400-3	42	gG/gL, gRL	32	5	B	20	≥ 30	Typ B
i510-P5.5/400-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B
i510-P7.5/400-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B

7.8.3 Connection data

► [Connection data](#) [86](#)



7.9 3-phase mains connection 480 V



The inverters i510-Pxxx/**400-3** and i510-Pxxx/**600-3** do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
 - Suitable EMC filters can be obtained directly from Lenze as accessories.
 - The user must verify that the conformity with EN IEC 61800-3 is fulfilled.
-

Technical data

3-phase mains connection 480 V

Rated data



7.9.1 Rated data

The output currents apply to these operating conditions:

- At switching frequency 2 kHz or 4 kHz: Ambient temperature max. 45 °C (113 °F).
- At switching frequency 8 kHz, 12 kHz or 16 kHz: Ambient temperature max. 40 °C (104 °F).



Technical data

3-phase mains connection 480 V
Rated data

Product name			i510-P0.75/400-3	i510-P1.1/400-3	i510-P1.5/400-3	i510-P2.2/400-3
Rated power	P _{rated}	kW	0.75	1.1	1.5	2.2
Rated power	P _{rated}	hp	1	1.5	2	3
Mains voltage range			3 AC 432 V ... 528 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 480			
Rated mains current						
without mains choke		A	2.8	3.7	4.5	6.5
with mains choke		A	-			
Apparent output power		kVA	1.7	2.4	2.8	3.9
Rated output current						
2 kHz		A	2.1	3	3.5	4.8
4 kHz		A	2.1	3	3.5	4.8
8 kHz		A	2.1	3	3.5	4.8
12 kHz		A	1.7	2.4	3.2	4.3
16 kHz		A	1.3	1.5	2.3	3.2
Power loss						
2 kHz		W	31	42	48	64
4 kHz		W	33	45	51	68
8 kHz		W	41	57	65	87
12 kHz		W	40	54	69	93
16 kHz		W	36	42	62	83
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	3.2	4.5	5.3	7.2
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	1.6	2.3	2.6	3.6
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	4.2	6	7	9.6
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	1.6	2.3	2.6	3.6
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	30			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	60	80		

Technical data

3-phase mains connection 480 V

Rated data



Product name			i510-P3.0/400-3	i510-P4.0/400-3	i510-P5.5/400-3	i510-P7.5/400-3
Rated power	P _{rated}	kW	3	4	5.5	7.5
Rated power	P _{rated}	hp	4	5	7.5	10
Mains voltage range			3 AC 432 V ... 528 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 480			
Rated mains current						
without mains choke		A	8	10.5	14.3	16.6
with mains choke		A	-			
Apparent output power		kVA	5.1	6.6	8.9	11.3
Rated output current						
2 kHz		A	6.3	8.2	11	14
4 kHz		A	6.3	8.2	11	14
8 kHz		A	6.3	8.2	11	14
12 kHz		A	5	6.6	8.8	11.2
16 kHz		A	4.2	5.5	7.3	9.3
Power loss						
2 kHz		W	82	105	139	175
4 kHz		W	87	112	148	186
8 kHz		W	112	145	192	243
12 kHz		W	107	138	183	231
16 kHz		W	107	138	183	231
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	9.5	12.3	16.5	21
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	4.7	6.2	8.3	10.5
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	12.6	16.4	22	28
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	4.7	6.2	8.3	10.5
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	50			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	100			200



Technical data

3-phase mains connection 480 V
Rated data

Product name			i510-P0.75/600-3	i510-P1.5/600-3	i510-P2.2/600-3	i510-P4.0/600-3
Rated power	P _{rated}	kW	0.75	1.5	2.2	4
Rated power	P _{rated}	hp	1	2	3	5
Mains voltage range			3 AC 432 V ... 528 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 480			
Rated mains current						
without mains choke		A	2.3	3.6	5.3	8.2
with mains choke		A	-			
Apparent output power		kVA	1.4	2.2	3.1	4.9
Rated output current						
2 kHz		A	1.7	2.7	3.9	6.1
4 kHz		A	1.7	2.7	3.9	6.1
8 kHz		A	1.7	2.7	3.9	6.1
12 kHz		A	1.3	2.1	3	4.6
16 kHz		A	1.1	1.8	2.6	4.1
Power loss						
2 kHz		W	27	39	53	80
4 kHz		W	28	41	56	85
8 kHz		W	35	52	72	109
12 kHz		W	32	47	66	99
16 kHz		W	33	49	69	104
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	2.6	4.1	5.9	9.2
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	1.3	2	2.9	4.6
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	3.4	5.4	7.8	12.2
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	1.3	2	2.9	4.6
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	50			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	60	80	100	

Technical data

3-phase mains connection 480 V
Rated data



Product name			i510-P5.5/600-3	i510-P7.5/600-3
Rated power	P _{rated}	kW	5.5	7.5
Rated power	P _{rated}	hp	7.5	10
Mains voltage range			3 AC 432 V ... 528 V, 45 Hz ... 65 Hz	
Output voltage		V	3 AC 0 ... 480	
Rated mains current				
without mains choke		A	12.2	14.9
with mains choke		A	-	
Apparent output power		kVA	7.2	8.9
Rated output current				
2 kHz		A	9	11
4 kHz		A	9	11
8 kHz		A	9	11
12 kHz		A	6.8	8.4
16 kHz		A	6	7.3
Power loss				
2 kHz		W	115	139
4 kHz		W	122	148
8 kHz		W	158	192
12 kHz		W	144	174
16 kHz		W	151	183
Overcurrent cycle 180 s				
Max. output current (≤ 8 kHz)		A	13.5	16.5
Overload time	T ₁	s	60	60
Recovery time	T ₂	s	120	120
Max. Output current during the recovery time		A	6.8	8.3
Overcurrent cycle 15 s				
Max. output current (≤ 8 kHz)		A	18	22
Overload time	T ₁	s	3	3
Recovery time	T ₂	s	12	12
Max. Output current during the recovery time		A	6.8	8.3
Cyclic mains switching			3-mal pro Minute	
Brake chopper				
Max. output current			-	
Min. Brake resistor			-	
Max. shielded motor cable length				
without EMC category		m	50	
Category C1 (≤ 8 kHz)		m	-	
Category C2 (≤ 8 kHz)		m	-	
Category C3 (≤ 8 kHz)		m	-	
Max. unshielded motor cable length				
without EMC category		m	100	



7.9.2 Fusing data (EN 60204-1)

► Fusing data for UL/NEC-compliant installations [42](#)



- A residual current device (**RCD**) is optional.
- **I_{cc}** = Rated conditional short-circuit current
- Fusing data for UL/NEC compliant installations:
► [Connection according to UL, Fusing data 42](#)

Inverter	Fuse			Circuit breaker			RCD	
	I _{cc}	Characteristic	Max. rated current	I _{cc}	Characteristic	Max. rated current		Type
	kA		A	kA		A	mA	
i510-P0.75/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P1.1/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P1.5/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P2.2/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P3.0/400-3	42	gG/gL, gRL	32	5	B	20	≥ 30	Typ B
i510-P4.0/400-3	42	gG/gL, gRL	32	5	B	20	≥ 30	Typ B
i510-P5.5/400-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B
i510-P7.5/400-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B
i510-P0.75/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P1.5/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P2.2/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P4.0/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P5.5/600-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B
i510-P7.5/600-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B



7.9.3 Connection data

Rated power	P _{rated}	kW	0.75 ... 7.5
Connection			Mains connection
Connection designation			X100
Connection system			Screw terminal
Connection type			Pluggable
Max. Cable cross-section		mm ²	4
Max. Cable cross-section		AWG	10
Min. Cable cross-section		mm ²	1.0
Min. Cable cross-section		AWG	18
Stripping length		mm	8
Stripping length		in	0.32
Tightening torque		Nm	0.6
Tightening torque		lb-in	5.3
Required tools			Screwdriver 0.5 x 3.0

Rated power	P _{rated}	kW	0.75 ... 4	5.5 ... 7.5
Connection			Schutzerde (PE)	
Connection designation			Symbol for protective earth (PE)	
Connection system			Schraube	
Max. Cable cross-section		mm ²	6	16
Max. Cable cross-section		AWG	10	6
Min. Cable cross-section		mm ²	1.5	2.5
Min. Cable cross-section		AWG	16	14
Stripping length		mm	10	12
Stripping length		in	0.4	0.47
Tightening torque		Nm	2	3.4
Tightening torque		lb-in	18	30
Required tools			Torx key 20	Torx key 25

Rated power	P _{rated}	kW	0.75 ... 7.5
Connection			Motor
Connection designation			X105
Connection system			Screw terminal
Connection type			Pluggable
Max. Cable cross-section		mm ²	4
Max. Cable cross-section		AWG	10
Min. Cable cross-section		mm ²	1.0
Min. Cable cross-section		AWG	18
Stripping length		mm	8
Stripping length		in	0.32
Tightening torque		Nm	0.6
Tightening torque		lb-in	5.3
Required tools			Screwdriver 0.5 x 3.0



7.10 3-phase mains connection 480 V "Light Duty"



The inverters i510-Pxxx/**400-3** and i510-Pxxx/**600-3** do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
 - Suitable EMC filters can be obtained directly from Lenze as accessories.
 - The user must verify that the conformity with EN IEC 61800-3 is fulfilled.
-

Technical data

3-phase mains connection 480 V "Light Duty"
Rated data



7.10.1 Rated data

The output currents apply to these operating conditions:

- At switching frequency 2 kHz or 4 kHz: Ambient temperature max. 40 °C (104 °F).

Product name			i510-P0.75/400-3	i510-P1.1/400-3	i510-P1.5/400-3	i510-P2.2/400-3
Rated power	P _{rated}	kW	1.1	1.5	2.2	3
Rated power	P _{rated}	hp	1.5	2	3	4
Mains voltage range			3 AC 432 V ... 528 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 480			
Rated mains current						
without mains choke		A	4	4.2	6.2	8.4
with mains choke		A	-			
Apparent output power		kVA	2.4	2.7	3.9	5
Rated output current						
2 kHz		A	3	3.4	4.8	6.2
4 kHz		A	3	3.4	4.8	6.2
8 kHz		A	-			
12 kHz		A	-			
16 kHz		A	-			
Power loss						
2 kHz		W	42	47	64	81
4 kHz		W	45	50	68	86
8 kHz		W	-			
12 kHz		W	-			
16 kHz		W	-			
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	3.2	4.5	5.3	7.2
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	1.6	2.3	2.6	3.6
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	4.2	6	7	9.6
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	1.6	2.3	2.6	3.6
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	30			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	60	80		



Technical data

3-phase mains connection 480 V "Light Duty"
Rated data

Product name			i510-P3.0/400-3	i510-P4.0/400-3	i510-P5.5/400-3	i510-P7.5/400-3
Rated power	P _{rated}	kW	4	5.5	7.5	11
Rated power	P _{rated}	hp	5	7.5	10	15
Mains voltage range			3 AC 432 V ... 528 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 480			
Rated mains current						
without mains choke		A	9.7	14	18.2	25
with mains choke		A	-			
Apparent output power		kVA	6.1	8.9	11.3	16.9
Rated output current						
2 kHz		A	7.6	11	14	21
4 kHz		A	7.6	11	14	21
8 kHz		A	-			
12 kHz		A	-			
16 kHz		A	-			
Power loss						
2 kHz		W	98	139	175	260
4 kHz		W	104	148	186	276
8 kHz		W	-			
12 kHz		W	-			
16 kHz		W	-			
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	9.5	12.3	16.5	21
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	4.7	6.2	8.3	10.5
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	12.6	16.4	22	28
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	4.7	6.2	8.3	10.5
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	50			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	100			200

Technical data

3-phase mains connection 480 V "Light Duty"

Rated data



Product name			i510-P0.75/600-3	i510-P1.5/600-3	i510-P2.2/600-3	i510-P4.0/600-3
Rated power	P _{rated}	kW	1.1	2.2	3	5.5
Rated power	P _{rated}	hp	1.5	3	4	7.5
Mains voltage range			3 AC 432 V ... 528 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 480			
Rated mains current						
without mains choke		A	3.2	5.3	6.8	12.2
with mains choke		A	-			
Apparent output power		kVA	1.9	3.1	4	7.2
Rated output current						
2 kHz		A	2.4	3.9	5	9
4 kHz		A	2.4	3.9	5	9
8 kHz		A	-			
12 kHz		A	-			
16 kHz		A	-			
Power loss						
2 kHz		W	35	53	66	115
4 kHz		W	37	56	70	122
8 kHz		W	-			
12 kHz		W	-			
16 kHz		W	-			
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	2.6	4.1	5.9	9.2
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	1.3	2	2.9	4.6
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	3.4	5.4	7.8	12.2
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	1.3	2	2.9	4.6
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	50			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	60	80	100	



Technical data

3-phase mains connection 480 V "Light Duty"
Rated data

Product name			i510-P5.5/600-3	i510-P7.5/600-3
Rated power	P _{rated}	kW	7.5	11
Rated power	P _{rated}	hp	10	15
Mains voltage range			3 AC 432 V ... 528 V, 45 Hz ... 65 Hz	
Output voltage		V	3 AC 0 ... 480	
Rated mains current				
without mains choke		A	14.9	23
with mains choke		A	-	
Apparent output power		kVA	8.9	13.7
Rated output current				
2 kHz		A	11	17
4 kHz		A	11	17
8 kHz		A	-	
12 kHz		A	-	
16 kHz		A	-	
Power loss				
2 kHz		W	139	211
4 kHz		W	148	225
8 kHz		W	-	
12 kHz		W	-	
16 kHz		W	-	
Overcurrent cycle 180 s				
Max. output current (≤ 8 kHz)		A	13.5	16.5
Overload time	T ₁	s	60	60
Recovery time	T ₂	s	120	120
Max. Output current during the recovery time		A	6.8	8.3
Overcurrent cycle 15 s				
Max. output current (≤ 8 kHz)		A	18	22
Overload time	T ₁	s	3	3
Recovery time	T ₂	s	12	12
Max. Output current during the recovery time		A	6.8	8.3
Cyclic mains switching			3-mal pro Minute	
Brake chopper				
Max. output current			-	
Min. Brake resistor			-	
Max. shielded motor cable length				
without EMC category		m	50	
Category C1 (≤ 8 kHz)		m	-	
Category C2 (≤ 8 kHz)		m	-	
Category C3 (≤ 8 kHz)		m	-	
Max. unshielded motor cable length				
without EMC category		m	100	

Technical data

3-phase mains connection 480 V "Light Duty"

Fusing data (EN 60204-1)



7.10.2 Fusing data (EN 60204-1)

► [Fusing data](#) for UL/NEC-compliant installations [42](#)



- A residual current device (**RCD**) is optional.
- **I_{cc}** = Rated conditional short-circuit current
- Fusing data for UL/NEC compliant installations:
 - [Connection according to UL](#), [Fusing data](#) [42](#)

Inverter	Fuse			Circuit breaker			RCD	
	I _{cc}	Characteristic	Max. rated current	I _{cc}	Characteristic	Max. rated current		Type
	kA		A	kA		A	mA	
i510-P0.75/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P1.1/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P1.5/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P2.2/400-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P3.0/400-3	42	gG/gL, gRL	32	5	B	20	≥ 30	Typ B
i510-P4.0/400-3	42	gG/gL, gRL	32	5	B	20	≥ 30	Typ B
i510-P5.5/400-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B
i510-P7.5/400-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B
i510-P0.75/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P1.5/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P2.2/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P4.0/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P5.5/600-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B
i510-P7.5/600-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B

7.10.3 Connection data

► [Connection data](#) [98](#)



7.11 3-phase mains connection 600 V



The inverters i510-Pxxx/**600-3** do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
 - Suitable EMC filters can be obtained directly from Lenze as accessories.
 - The user must verify that the conformity with EN IEC 61800-3 is fulfilled.
-

Technical data

3-phase mains connection 600 V
Rated data



7.11.1 Rated data

The output currents apply to these operating conditions:

- At switching frequency 2 kHz or 4 kHz: Ambient temperature max. 45 °C (113 °F).
- At switching frequency 8 kHz, 12 kHz or 16 kHz: Ambient temperature max. 40 °C (104 °F).



Technical data

3-phase mains connection 600 V
Rated data

Product name			i510-P0.75/600-3	i510-P1.5/600-3	i510-P2.2/600-3	i510-P4.0/600-3
Rated power	P _{rated}	kW	0.75	1.5	2.2	4
Rated power	P _{rated}	hp	1	2	3	5
Mains voltage range			3 AC 540 V ... 660 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 600			
Rated mains current						
without mains choke		A	2.3	3.6	5.3	8.2
with mains choke		A	-			
Apparent output power		kVA	1.7	2.7	3.9	6.1
Rated output current						
2 kHz		A	1.7	2.7	3.9	6.1
4 kHz		A	1.7	2.7	3.9	6.1
8 kHz		A	1.7	2.7	3.9	6.1
12 kHz		A	1.3	2.1	3	4.6
16 kHz		A	1.1	1.8	2.6	4.1
Power loss						
2 kHz		W	32	47	65	98
4 kHz		W	33	49	69	104
8 kHz		W	42	63	88	135
12 kHz		W	38	58	81	123
16 kHz		W	40	60	84	129
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	2.6	4.1	5.9	9.2
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	1.3	2	2.9	4.6
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	3.4	5.4	7.8	12.2
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	1.3	2	2.9	4.6
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	50			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	60	80	100	

Technical data

3-phase mains connection 600 V
Rated data



Product name			i510-P5.5/600-3	i510-P7.5/600-3
Rated power	P _{rated}	kW	5.5	7.5
Rated power	P _{rated}	hp	7.5	10
Mains voltage range			3 AC 540 V ... 660 V, 45 Hz ... 65 Hz	
Output voltage		V	3 AC 0 ... 600	
Rated mains current				
without mains choke		A	12.2	14.9
with mains choke		A	-	
Apparent output power		kVA	9.1	11.1
Rated output current				
2 kHz		A	9	11
4 kHz		A	9	11
8 kHz		A	9	11
12 kHz		A	6.8	8.4
16 kHz		A	6	7.3
Power loss				
2 kHz		W	142	172
4 kHz		W	151	183
8 kHz		W	196	238
12 kHz		W	178	216
16 kHz		W	187	227
Overcurrent cycle 180 s				
Max. output current (≤ 8 kHz)		A	13.5	16.5
Overload time	T ₁	s	60	60
Recovery time	T ₂	s	120	120
Max. Output current during the recovery time		A	6.8	8.3
Overcurrent cycle 15 s				
Max. output current (≤ 8 kHz)		A	18	22
Overload time	T ₁	s	3	3
Recovery time	T ₂	s	12	12
Max. Output current during the recovery time		A	6.8	8.3
Cyclic mains switching			3-mal pro Minute	
Brake chopper				
Max. output current			-	
Min. Brake resistor			-	
Max. shielded motor cable length				
without EMC category		m	50	
Category C1 (≤ 8 kHz)		m	-	
Category C2 (≤ 8 kHz)		m	-	
Category C3 (≤ 8 kHz)		m	-	
Max. unshielded motor cable length				
without EMC category		m	100	



7.11.2 Fusing data (EN 60204-1)

► [Fusing data](#) for UL/NEC-compliant installations [42](#)



- A residual current device (**RCD**) is optional.
- **I_{cc}** = Rated conditional short-circuit current
- Fusing data for UL/NEC compliant installations:
► [Connection according to UL, Fusing data](#) [42](#)

Inverter	Fuse			Circuit breaker			RCD	
	I _{cc}	Characteristic	Max. rated current	I _{cc}	Characteristic	Max. rated current		Type
	kA		A	kA		A	mA	
i510-P0.75/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P1.5/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P2.2/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P4.0/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P5.5/600-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B
i510-P7.5/600-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B



7.11.3 Connection data

Rated power	P _{rated}	kW	0.75 ... 7.5
Connection			Netz
Connection designation			X100
Connection system			Screw terminal
Connection type			Pluggable
Max. Cable cross-section		mm ²	4
Max. Cable cross-section		AWG	10
Min. Cable cross-section		mm ²	1.0
Min. Cable cross-section		AWG	18
Stripping length		mm	8
Stripping length		in	0.32
Tightening torque		Nm	0.6
Tightening torque		lb-in	5.3
Required tools			Screwdriver 0.5 x 3.0

Rated power	P _{rated}	kW	0.75 ... 4	5.5 ... 7.5
Connection			Schutzerde (PE)	
Connection system			Schraube	
Max. Cable cross-section		mm ²	6	16
Max. Cable cross-section		AWG	10	6
Min. Cable cross-section		mm ²	1.5	2.5
Min. Cable cross-section		AWG	16	14
Stripping length		mm	10	12
Stripping length		in	0.4	0.47
Tightening torque		Nm	2	3.4
Tightening torque		lb-in	18	30
Required tools			Torx key 20	Torx key 25

Rated power	P _{rated}	kW	0.75 ... 7.5
Connection			Motor
Connection designation			X105
Connection system			Screw terminal
Connection type			Pluggable
Max. Cable cross-section		mm ²	4
Max. Cable cross-section		AWG	10
Min. Cable cross-section		mm ²	1.0
Min. Cable cross-section		AWG	18
Stripping length		mm	8
Stripping length		in	0.32
Tightening torque		Nm	0.6
Tightening torque		lb-in	5.3
Required tools			Screwdriver 0.5 x 3.0



7.12 3-phase mains connection 600 V "Light Duty"



The inverters i510-Pxxx/**600-3** do not have an integrated RFI filter in the AC mains supply.

- In order to meet the EMC requirements according to EN IEC 61800-3, an external EMC filter according to IEC EN 60939 must be used.
 - Suitable EMC filters can be obtained directly from Lenze as accessories.
 - The user must verify that the conformity with EN IEC 61800-3 is fulfilled.
-

Technical data

3-phase mains connection 600 V "Light Duty"
Rated data



7.12.1 Rated data

The output currents apply to these operating conditions:

- At switching frequency 2 kHz or 4 kHz: Ambient temperature max. 40 °C (104 °F).

Product name			i510-P0.75/600-3	i510-P1.5/600-3	i510-P2.2/600-3	i510-P4.0/600-3
Rated power	P _{rated}	kW	1.1	2.2	3	5.5
Rated power	P _{rated}	hp	1.5	3	4	7.5
Mains voltage range			3 AC 540 V ... 660 V, 45 Hz ... 65 Hz			
Output voltage		V	3 AC 0 ... 600			
Rated mains current						
without mains choke		A	3.2	5.3	6.8	12.2
with mains choke		A	-			
Apparent output power		kVA	2.4	3.9	5	9.1
Rated output current						
2 kHz		A	2.4	3.9	5	9
4 kHz		A	2.4	3.9	5	9
8 kHz		A	-			
12 kHz		A	-			
16 kHz		A	-			
Power loss						
2 kHz		W	42	65	81	142
4 kHz		W	45	69	86	151
8 kHz		W	-			
12 kHz		W	-			
16 kHz		W	-			
Overcurrent cycle 180 s						
Max. output current (≤ 8 kHz)		A	2.6	4.1	5.9	9.2
Overload time	T ₁	s	60	60	60	60
Recovery time	T ₂	s	120	120	120	120
Max. Output current during the recovery time		A	1.3	2	2.9	4.6
Overcurrent cycle 15 s						
Max. output current (≤ 8 kHz)		A	3.4	5.4	7.8	12.2
Overload time	T ₁	s	3	3	3	3
Recovery time	T ₂	s	12	12	12	12
Max. Output current during the recovery time		A	1.3	2	2.9	4.6
Cyclic mains switching			3-mal pro Minute			
Brake chopper						
Max. output current			-			
Min. Brake resistor			-			
Max. shielded motor cable length						
without EMC category		m	50			
Category C1 (≤ 8 kHz)		m	-			
Category C2 (≤ 8 kHz)		m	-			
Category C3 (≤ 8 kHz)		m	-			
Max. unshielded motor cable length						
without EMC category		m	60	80	100	



Technical data

3-phase mains connection 600 V "Light Duty"
Rated data

Product name			i510-P5.5/600-3	i510-P7.5/600-3
Rated power	P _{rated}	kW	7.5	11
Rated power	P _{rated}	hp	10	15
Mains voltage range			3 AC 540 V ... 660 V, 45 Hz ... 65 Hz	
Output voltage		V	3 AC 0 ... 600	
Rated mains current				
without mains choke		A	14.9	23
with mains choke		A	-	
Apparent output power		kVA	11.1	17.1
Rated output current				
2 kHz		A	11	17
4 kHz		A	11	17
8 kHz		A	-	
12 kHz		A	-	
16 kHz		A	-	
Power loss				
2 kHz		W	172	263
4 kHz		W	183	280
8 kHz		W	-	
12 kHz		W	-	
16 kHz		W	-	
Overcurrent cycle 180 s				
Max. output current (≤ 8 kHz)		A	13.5	16.5
Overload time	T ₁	s	60	60
Recovery time	T ₂	s	120	120
Max. Output current during the recovery time		A	6.8	8.3
Overcurrent cycle 15 s				
Max. output current (≤ 8 kHz)		A	18	22
Overload time	T ₁	s	3	3
Recovery time	T ₂	s	12	12
Max. Output current during the recovery time		A	6.8	8.3
Cyclic mains switching			3-mal pro Minute	
Brake chopper				
Max. output current			-	
Min. Brake resistor			-	
Max. shielded motor cable length				
without EMC category		m	50	
Category C1 (≤ 8 kHz)		m	-	
Category C2 (≤ 8 kHz)		m	-	
Category C3 (≤ 8 kHz)		m	-	
Max. unshielded motor cable length				
without EMC category		m	100	

Technical data

3-phase mains connection 600 V "Light Duty"
Fusing data (EN 60204-1)



7.12.2 Fusing data (EN 60204-1)

► [Fusing data](#) for UL/NEC-compliant installations 42



- A residual current device (**RCD**) is optional.
- **I_{cc}** = Rated conditional short-circuit current
- Fusing data for UL/NEC compliant installations:
 - [Connection according to UL](#), [Fusing data](#) 42

Inverter	Fuse			Circuit breaker			RCD	
	I _{cc}	Characteristic	Max. rated current	I _{cc}	Characteristic	Max. rated current		Type
	kA		A	kA		A	mA	
i510-P0.75/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P1.5/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P2.2/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P4.0/600-3	42	gG/gL, gRL	32	5	B	16	≥ 30	Typ B
i510-P5.5/600-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B
i510-P7.5/600-3	42	gG/gL, gRL	40	5	B	32	≥ 30	Typ B

7.12.3 Connection data

► [Connection data](#) 110



7.13 Ecodesign Directive

Product information acc. to REGULATION (EU) 2019/1781 (ANNEX I, Section 4)

Legend

Operating point (f; I) f = relative motor stator frequency; I = relative torque-producing current

Power losses The power losses at the operating points (f; I) and in the standby state refer to the rated apparent output power.
The power losses for options (e.g. for diagnostics) and for accessories can be found in the additional product documentation on the Internet.

Performance losses										
0; 25	f; I	%	2.0	1.3	1.1	2.0	1.3	1.1	0.9	0.9
0; 50	f; I	%	2.0	1.4	1.3	2.0	1.4	1.3	1.1	1.0
0; 100	f; I	%	2.2	1.8	1.7	2.2	1.8	1.7	1.4	1.4
50; 25	f; I	%	2.1	1.3	1.2	2.1	1.3	1.2	1.0	0.9
50; 50	f; I	%	2.1	1.6	1.5	2.1	1.5	1.4	1.1	1.1
50; 100	f; I	%	2.5	2.2	2.2	2.4	2.1	2.0	1.6	1.7
90; 50	f; I	%	2.3	1.8	1.8	2.2	1.7	1.6	1.3	1.3
90; 100	f; I	%	2.7	2.7	3.0	2.5	2.4	2.5	2.0	2.2
In standby mode		%	0.6	0.4	0.3	0.6	0.4	0.3	0.2	0.1
Efficiency level			IE2	IE2	IE2	IE2	IE2	IE2	IE2	IE2
Manufacturer			Lenze Americas · 630 Douglas Street · Uxbridge, MA 01569 · USA							
Commercial register number			-							
Model identifier of the product			I51BP137A	I51BP175A	I55BP211A	I51BP137D	I51BP175D	I51BP211D	I51BP215D	I51BP222D
Apparent output power		kVA	0.9	1.6	2.3	0.9	1.6	2.3	2.6	3.6
Indicative rated output power of the motor		kW	0.37	0.75	1.1	0.37	0.75	1.1	1.5	2.2
Rated output current		A	2.4	4.2	6	2.4	4.2	6	7	9.6
Maximum operating temperature		°C	45							
Rated input frequency		Hz	50							
Rated input voltage		V	120			230				
Switching frequency		kHz	4							
Rated apparent output power		kVA	0.977	1.71	2.29	0.977	1.71	2.29	3.3	4.44



Performance losses										
0; 25	f; l	%	0.9	1.0	0.9	0.7	2.1	1.6	1.2	1.0
0; 50	f; l	%	1.1	1.1	1.0	0.9	2.2	1.7	1.3	1.2
0; 100	f; l	%	1.4	1.5	1.4	1.4	2.5	2.0	1.6	1.5
50; 25	f; l	%	1.0	1.0	0.9	0.7	2.1	1.6	1.2	1.1
50; 50	f; l	%	1.2	1.2	1.1	1.0	2.3	1.7	1.3	1.2
50; 100	f; l	%	1.7	1.8	1.7	1.7	2.6	2.1	1.7	1.6
90; 50	f; l	%	1.3	1.4	1.3	1.1	2.3	1.8	1.4	1.3
90; 100	f; l	%	1.8	2.2	1.9	2.0	2.5	2.1	1.6	1.6
In standby mode		%	0.1	0.1	0.1	0.1	0.4	0.3	0.2	0.1
Efficiency level			IE2	IE2	IE2	IE2	IE2	IE2	IE2	IE2
Manufacturer			Lenze Americas · 630 Douglas Street · Uxbridge, MA 01569 · USA							
Commercial register number			-							
Model identifier of the product			I51AP230C	I51BP230D	I51AP240C	I51BP255C	I51BP175F	I51BP211F	I51BP215F	I51BP222F
Apparent output power		kVA	4.5	4.7	6.2	8.7	1.6	2.1	2.6	3.8
Indicative rated output power of the motor		kW	3	3	4	5.5	0.75	1.1	1.5	2.2
Rated output current		A	12	12.4	16.5	23	2.4	3.2	3.9	5.6
Maximum operating temperature		°C	45							
Rated input frequency		Hz	50							
Rated input voltage		V	230				400			
Switching frequency		kHz	4							
Rated apparent output power		kVA	5.85	5.85	7.38	9.95	1.71	2.29	3.3	4.44



Performance losses										
0; 25	f; l	%	1.0	1.0	0.7	0.6	2.5	1.2	0.9	0.7
0; 50	f; l	%	1.1	1.1	0.8	0.7	2.6	1.3	1.0	0.8
0; 100	f; l	%	1.5	1.5	1.2	1.1	2.9	1.5	1.2	1.0
50; 25	f; l	%	1.0	1.0	0.7	0.6	2.6	1.2	0.9	0.7
50; 50	f; l	%	1.2	1.2	0.9	0.7	2.7	1.3	1.0	0.8
50; 100	f; l	%	1.5	1.6	1.3	1.2	2.9	1.5	1.3	1.1
90; 50	f; l	%	1.2	1.2	0.9	0.8	2.7	1.3	1.0	0.9
90; 100	f; l	%	1.6	1.6	1.4	1.3	2.8	1.5	1.2	1.1
In standby mode		%	0.1	0.1	0.1	0.0	0.4	0.2	0.1	0.1
Efficiency level			IE2	IE2	IE2	IE2	IE2	IE2	IE2	IE2
Manufacturer			Lenze Americas · 630 Douglas Street · Uxbridge, MA 01569 · USA							
Commercial register number			-							
Model identifier of the product			I51BP230F	I51BP240F	I51BP255F	I51BP275F	I51BP175G	I51BP215G	I51BP222G	I51BP240G
Apparent output power		kVA	4.9	6.4	8.7	11.1	1.7	2.7	3.9	6.1
Indicative rated output power of the motor		kW	3	4	5.5	7.5	0.75	1.5	2.2	4
Rated output current		A	7.3	9.5	13	16.5	1.7	2.7	3.9	6.1
Maximum operating temperature		°C	45							
Rated input frequency		Hz	50							
Rated input voltage		V	400				600			
Switching frequency		kHz	4							
Rated apparent output power		kVA	5.85	7.38	9.95	14.4	1.71	3.3	4.44	7.38



Performance losses				
0; 25	f; I	%	0.5	0.5
0; 50	f; I	%	0.6	0.6
0; 100	f; I	%	0.9	0.8
50; 25	f; I	%	0.5	0.5
50; 50	f; I	%	0.6	0.6
50; 100	f; I	%	0.9	0.9
90; 50	f; I	%	0.7	0.6
90; 100	f; I	%	1.0	0.9
In standby mode		%	0.1	0.0
Efficiency level			IE2	IE2
Manufacturer			Lenze Americas · 630 Douglas Street · Uxbridge, MA 01569 · USA	
Commercial register number			-	
Model identifier of the product			I51BP255G	I51BP275G
Apparent output power		kVA	9.1	11.1
Indicative rated output power of the motor		kW	5.5	7.5
Rated output current		A	9	11
Maximum operating temperature		°C	45	
Rated input frequency		Hz	50	
Rated input voltage		V	600	
Switching frequency		kHz	4	
Rated apparent output power		kVA	9.95	14.4



7.14 Dimensions



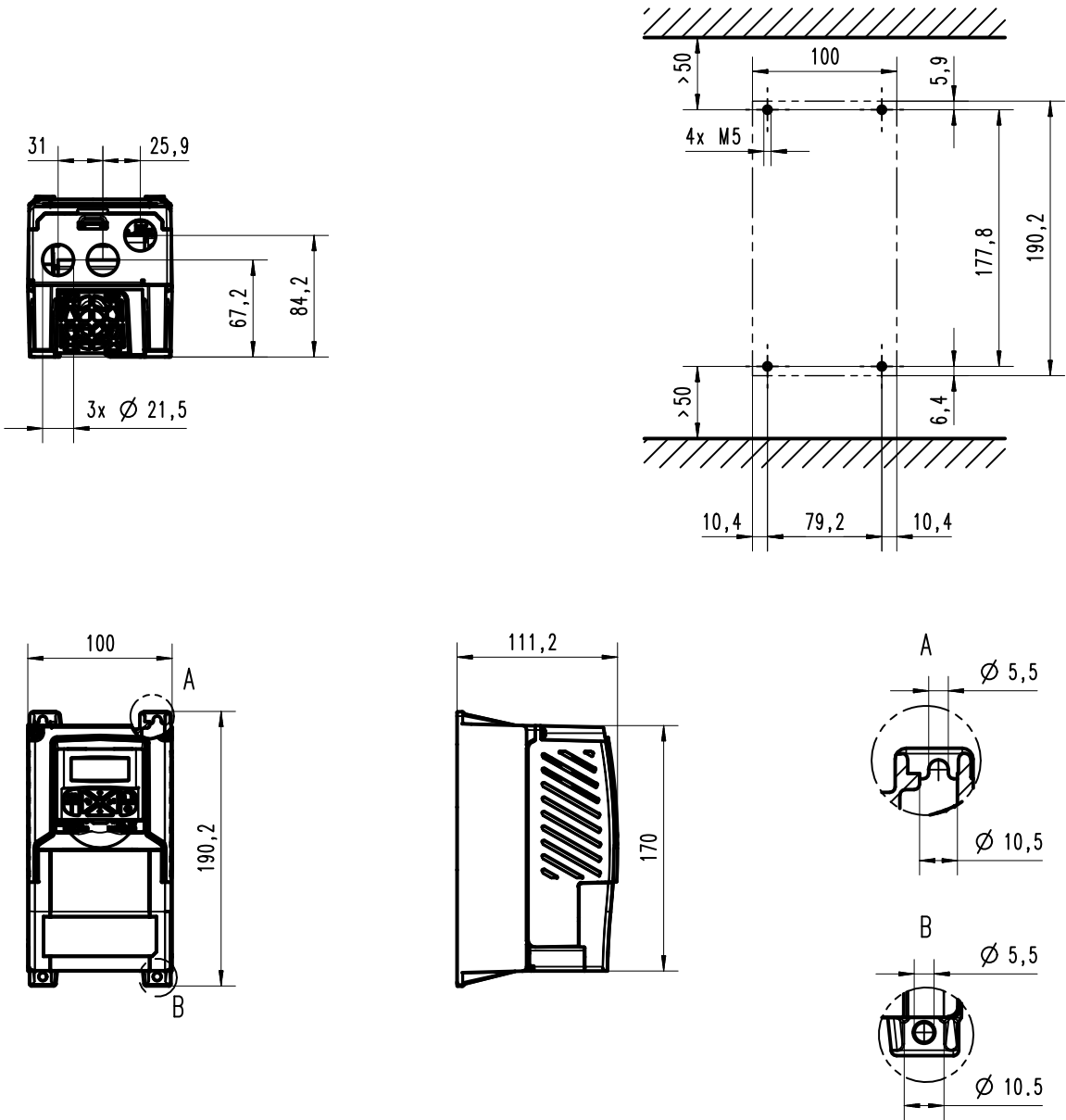
The specified installation clearances are minimum dimensions to ensure a sufficient air circulation for cooling purposes. They do not consider the bend radiuses of the connecting cables.



0.37 kW ... 2.2 kW

The dimensions in mm apply to:

0.37 kW	i510-P0.37/120-1	i510-P0.37/230-2	
0.75 kW	i510-P0.75/120-1	i510-P0.75/230-2	i510-P0.75/400-3
1.1 kW		i510-P1.1/230-2	i510-P1.1/400-3
1.5 kW			i510-P1.5/400-3
2.2 kW			i510-P2.2/400-3
Weight	1.29 kg	1.29 kg	1.29 kg



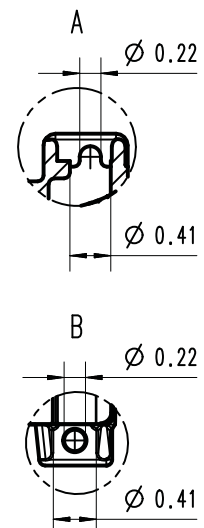
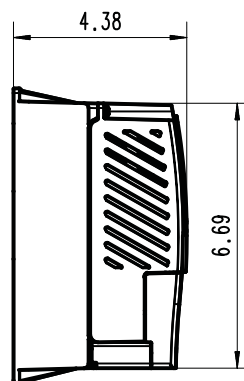
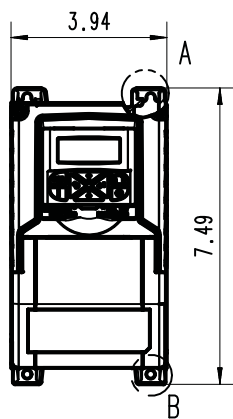
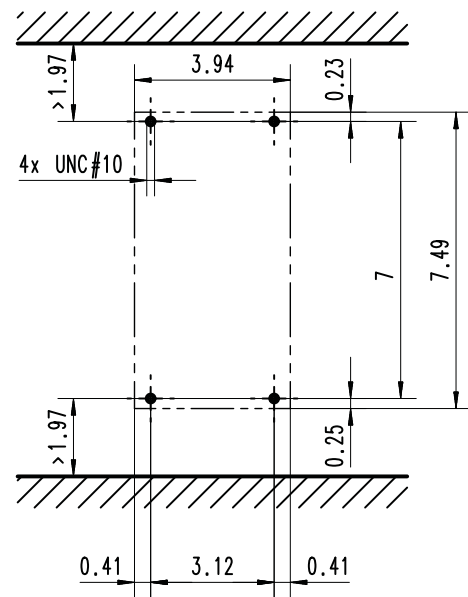
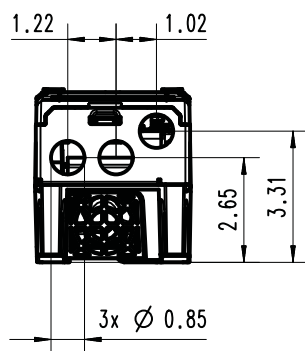
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0.5 hp ... 3 hp

The dimensions in inch apply to:

0.5 hp	i510-P0.37/120-1	i510-P0.37/230-2	
1 hp	i510-P0.75/120-1	i510-P0.75/230-2	i510-P0.75/400-3
1.5 hp		i510-P1.1/230-2	i510-P1.1/400-3
2 hp			i510-P1.5/400-3
3 hp			i510-P2.2/400-3
Weight	2.8 lb	2.8 lb	2.8 lb



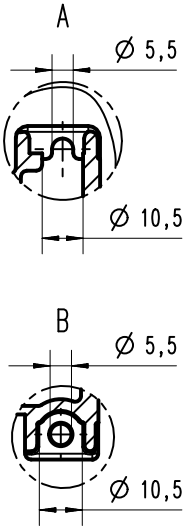
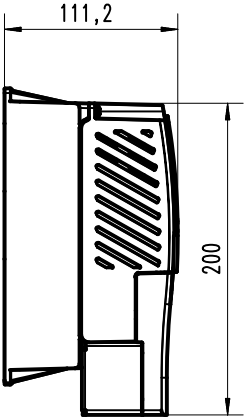
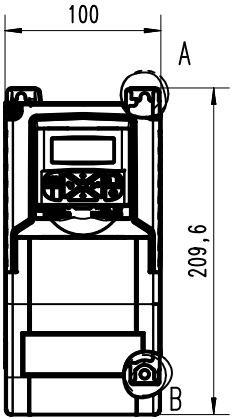
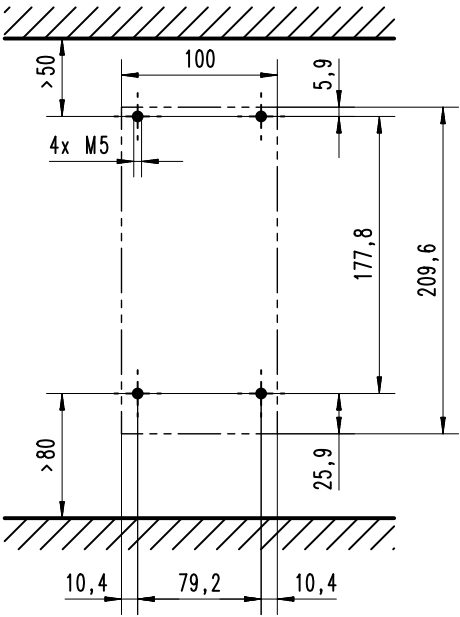
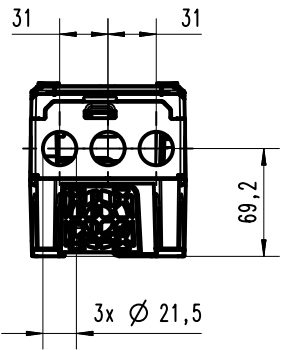
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0.75 kW ... 4 kW

The dimensions in mm apply to:

0.75 kW			i510-P0.75/600-3
1.5 kW	i510-P1.5/230-2		i510-P1.5/600-3
2.2 kW	i510-P2.2/230-2		i510-P2.2/600-3
3 kW		i510-P3.0/400-3	
4 kW		i510-P4.0/400-3	i510-P4.0/600-3
Weight	1.33 kg	1.33 kg	1.33 kg



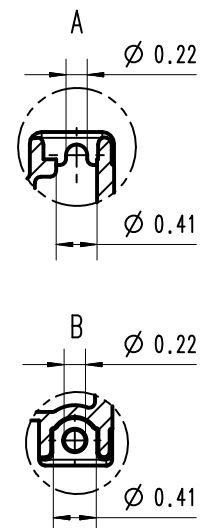
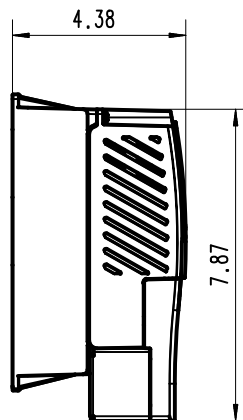
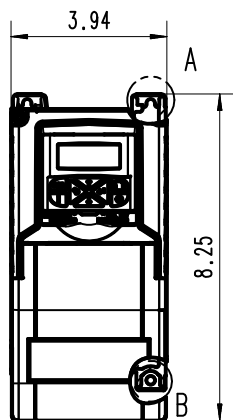
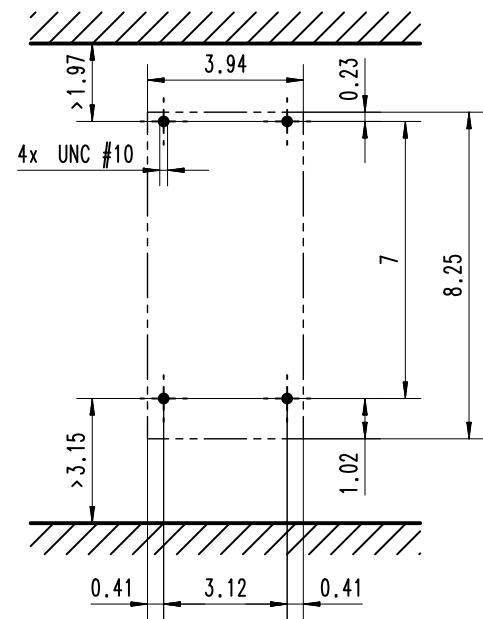
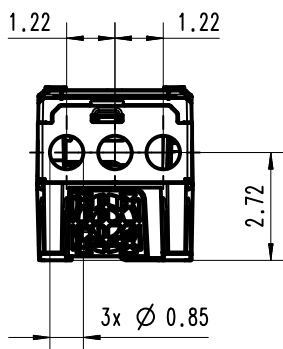
8801751



1 hp ... 5 hp

The dimensions in inch apply to:

1 hp			i510-P0.75/600-3
2 hp	i510-P1.5/230-2		i510-P1.5/600-3
3 hp	i510-P2.2/230-2		i510-P2.2/600-3
4 hp		i510-P3.0/400-3	
5 hp		i510-P4.0/400-3	i510-P4.0/600-3
Weight	2.9 lb	2.9 lb	2.9 lb



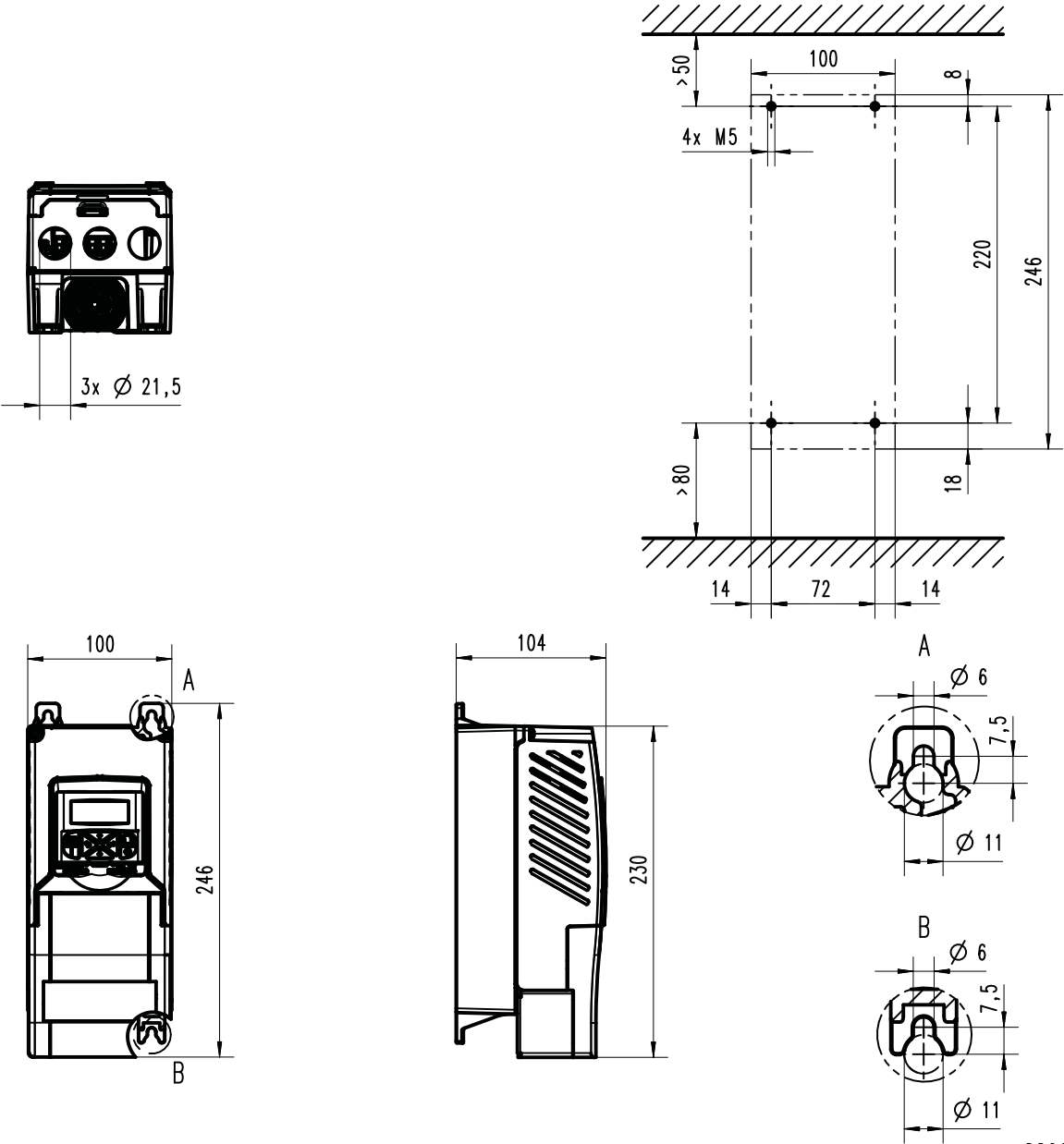
8801752



3 kW ... 4 kW

The dimensions in mm apply to:

3 kW	i510-P3.0/230-3
4 kW	i510-P4.0/230-3
Weight	1.6 kg



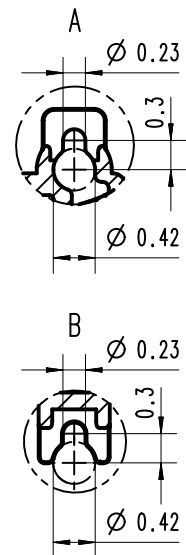
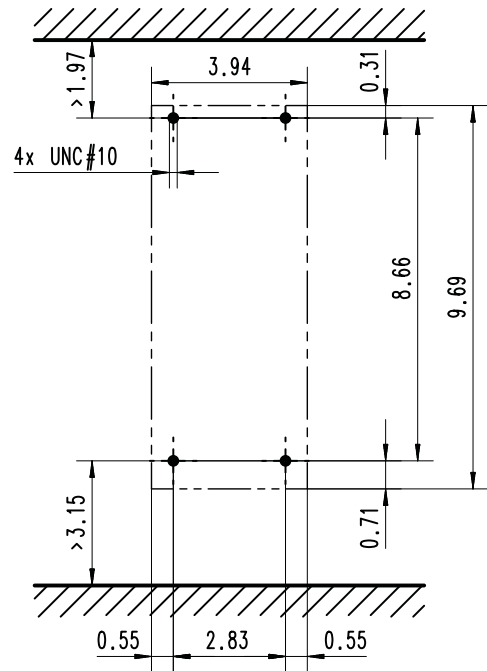
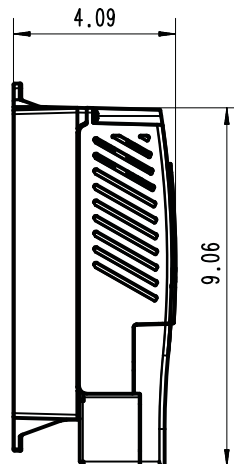
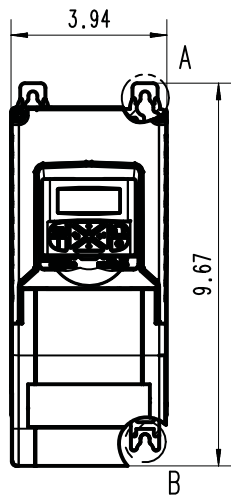
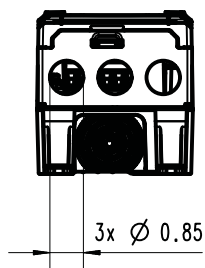
8800786



4 hp ... 5 hp

The dimensions in inch apply to:

4 hp	i510-P3.0/230-3
5 hp	i510-P4.0/230-3
Weight	3.5 lb



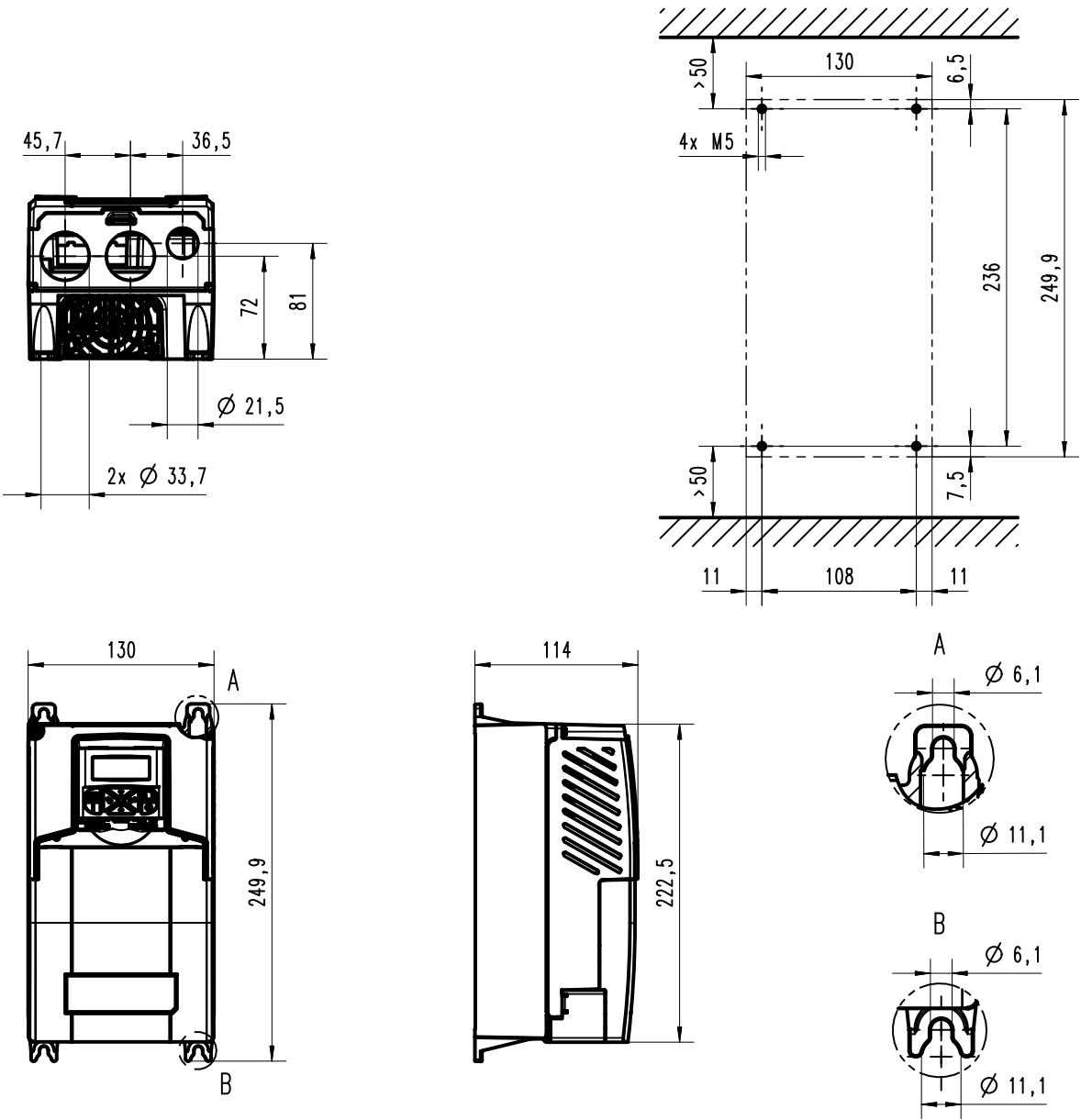
8800787



1.1 kW ... 7.5 kW

The dimensions in mm apply to:

1.1 kW	i510-P1.1/120-1				
3 kW		i510-P3.0/230-2			
5.5 kW			i510-P5.5/230-3	i510-P5.5/400-3	i510-P5.5/600-3
7.5 kW				i510-P7.5/400-3	i510-P7.5/600-3
Weight	2 kg	2 kg	2 kg	2 kg	2 kg



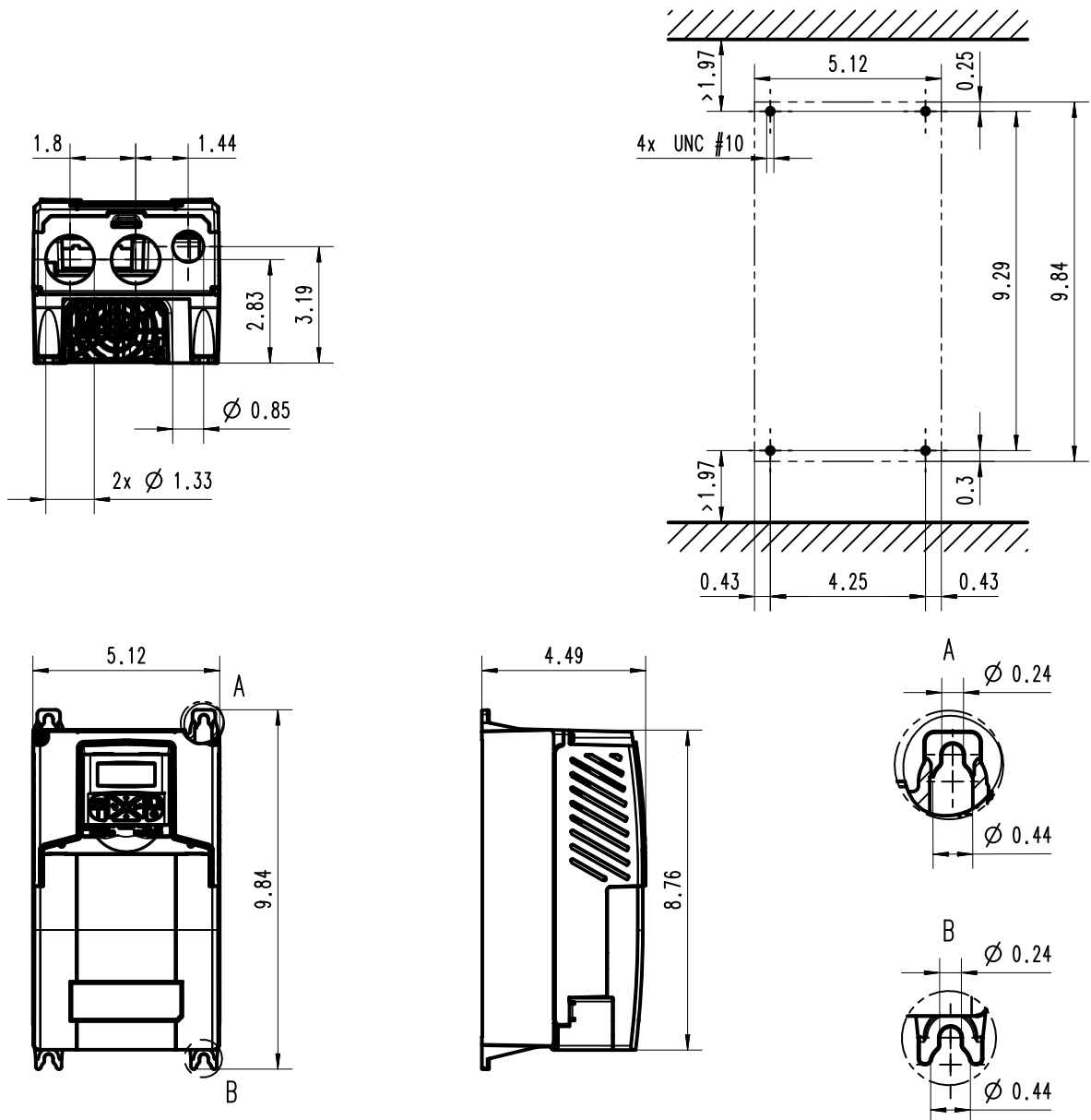
8801753



1.5 hp ... 10 hp

The dimensions in inch apply to:

1.5 hp	i510-P1.1/120-1				
4 hp		i510-P3.0/230-2			
7.5 hp			i510-P5.5/230-3	i510-P5.5/400-3	i510-P5.5/600-3
10 hp				i510-P7.5/400-3	i510-P7.5/600-3
Weight	4.4 lb	4.4 lb	4.4 lb	4.4 lb	4.4 lb



8801754



8 Product extensions

8.1 Overview

Integrated standard interfaces:

- Standard I/O (analog and digital inputs and outputs)
- Relay output

These **optional** product extensions provide further interfaces for the functions required for your application:

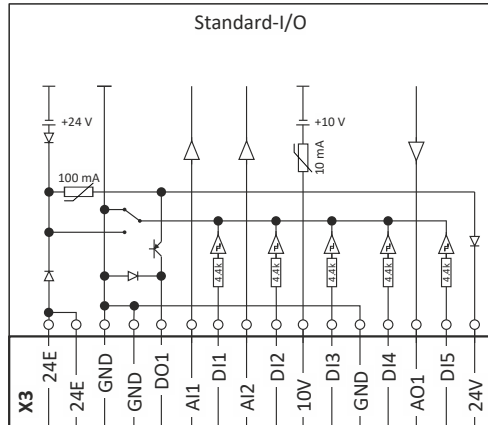
- Networks:
 - CANopen
 - Modbus RTU



8.2 I/O extensions

8.2.1 Standard I/O

The Standard-I/O provides the inverter with analog and digital inputs and outputs and is designed for standard applications. The Standard-I/O is available with different network options. ▶ [Networks](#) 134



Control terminal X3		
Inputs/outputs	Terminal	Description
Digital inputs	DI1, DI2, DI3, DI4, DI5	DI3/DI4 can be optionally used as frequency or encoder input. HIGH active/LOW active switchable.
Digital outputs	DO1	
Analog inputs	AI1, AI2	Can be optionally used as voltage or current input.
Analog outputs	AO1	Can be optionally used as voltage or current output.
24-V input	24E	Mains-independent DC supply of the control electronics (incl. communication)
10-V output	10 V	Reference voltage or setpoint potentiometer
24-V output	24V	Primarily for supplying digital inputs or Basic Safety - STO; SELV/PELV
Reference potential	GND	
Connection system		Spring terminals, not pluggable



8.2.2 Data of control connections

Digital inputs

Switching type		PNP, NPN	Parameterisable
PNP switching level			
LOW	V	< +5	IEC 61131-2, type 1
HIGH	V	> +15	
NPN switching level			
LOW	V	> +15	
HIGH	V	< +5	
Input resistance	kΩ	4.6	
Cycle time	ms	1	
Electric strength of external voltage	V	± 30	

Frequency input			
Connection		X3/DI3, X3/DI4	
Frequency range	kHz	0 ... 100	

Encoder input			
Type		Incremental HTL encoder	
Two-track connection		X3/DI3 X3/DI4	Track A Track B
Frequency range	kHz	0 ... 100	

Digital outputs

Switching level			
LOW	V	< +5	IEC 61131-2, type 1
HIGH	V	> +15	
max. output current	mA	100	Total current for DO1 and 24V
Cycle time	ms	1	
Short-circuit strength		Unlimited period	
Electric strength of external voltage	V	± 30	
Polarity reversal protection		Integrated freewheeling diode for switching the inductive load	
Overload behaviour		Reduced voltage or periodic switch-off/on	
Reset or switch-on behaviour		Output is switched off	LOW



Analog inputs

Cycle time	ms	1	
Resolution of A/D converter	Bit	12	
Operation as voltage input			
Connection designation		X3/AI1, X3/AI2	
Input voltage DC	V	-10 ... 10	
Input resistance	kΩ	70	
Accuracy	mV	± 50	Typical
Input voltage in case of open circuit	V	- 0.2 ... 0.2	Display "0"
Electric strength of external voltage	V	± 30	
Operation as current input			
Connection designation		X3/AI1, X3/AI2	
Input current	mA	0 ... 20	
		4 ... 20	open-circuit monitored
Accuracy	mA	± 0.1	Typical
Input current in case of open circuit	mA	< 0.1	Display "0"
Input resistance	Ω	< 250	
Electric strength of external voltage	V	± 30	

Analog outputs

Short-circuit strength		Unlimited period	
Electric strength of external voltage	V	+ 30	
Operation as voltage output			
Resolution of D/A converter	Bit	12	
Output voltage DC	V	0 ... 10	
max. output current	mA	5	
min. load resistance	kΩ	≥ 2.2	
max. capacitive load	μF	1	
Accuracy	mV	± 100	Typical
Operation as current output			
Output current	mA	0 ... 20	
		4 ... 20	open-circuit monitored
Accuracy	mA	± 0.3	Typical

10-V output

Use		Primarily for the supply of a potentiometer (1 ... 10 kΩ)	
Output voltage DC			
Typical	V	10	
Accuracy	mV	± 100	
Max. output current	mA	10	
Max. capacitive load	μF	1	
Short-circuit strength		Unlimited period	
Electric strength of external voltage	V	+ 30	

Product extensions

I/O extensions
Data of control connections



24-V input

Use		Input for mains-independent DC supply of the control electronics (incl. communication)	
Input voltage DC			
Typical	V	24	IEC 61131-2
Area	V	19.2 ... 28.8	
Input power			
Typical	W	3.6	
Max.	W	6	Depending on the use and state of inputs and outputs.
Input current			
Typical	A	0.150	
Max.	A	1.0	When switching on for 50 ms
Capacity to be charged	μF	440	
Polarity reversal protection		When polarity is reversed: No function and no destruction	
Suppression of voltage pulses		Suppressor diode 30 V, bidirectional	
Power supply unit		SELV/PELV	Externally to create a mains-independent DC supply
Max. current	A	8.0	While looping-through

24-V output

Use		Primarily for the supply of digital inputs	SELV/PELV
Output voltage DC			
Typical	V	24	
Area	V	16 ... 28	
max. output current	mA	100	Total current for DO... and 24V
Short-circuit strength		Unlimited period	
Electric strength of external voltage	V	+ 30	
Excess current release		Automatically resettable	



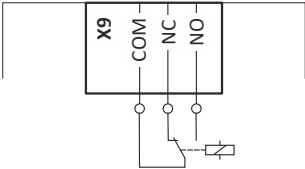
8.3 Further control connections

8.3.1 Relay output



Use a corresponding suppressor circuit in case of an inductive or capacitive load!

Connection			Terminal X9: COM	Common contact (Common)
			Terminal X9: NC	Normally closed contact
			Terminal X9: NO	Normally open contact
Minimum DC contact load				
	Voltage	V	10	A correct switching of the relay contacts needs both values to be exceeded simultaneously.
	Current	mA	10	
Switching voltage/switching current				
Maximum	AC 240 V	A	3	According to UL: General Purpose
	24 V DC	A	2	According to UL: Resistive
	240 V DC	A	0.16	





8.4 Networks

8.4.1 CANopen

CANopen is an internationally approved communication protocol which is designed for commercial and industrial automation applications.

Bus-related information			
Name		CANopen CiA 301 V4.2.0	
Communication medium		CAN cable in accordance with ISO 11898-2	
Use		Connection of inverter to a CANopen network	
Connection system		Pluggable double spring terminal	
Status display		2 LEDs	
Connection designation		X216: CH, CL, CG	
Technical data			
Bus terminating resistor	Ω	120	Terminated on both sides
Integrated bus terminating resistor		No	
Network topology			
Without repeater		Line	
With repeater		Line or tree	
Device			
Type		Responder	
Max. number without repeater		127	Per bus segment, incl. host system
Address		1 ... 127	Adjustable via code
Baud rate	kbps	20, 50, 125, 250, 500, 800 or 1000	Adjustable via code
Max. bus length	m	2500, 1000, 500, 250, 100, 50 or 25	Total cable length depends on the baud rate
Max. cable length between two devices		Not limited	The max. bus length is decisive
Process data			
Transmit PDOs		3 TPDOs with 1 ... 8 Byte (adjustable)	
Receive PDOs		3 RPDOs with 1 ... 8 bytes (adjustable)	
Transmission mode for TPDOs			
With change of data		Yes	
Time-controlled, multiple of	ms	10	
After reception		1 ... 240 sync telegrams	
Parameter data			
SDO channels		Max. 2 servers	
Processing time of process data			
Update cycle	ms	10	In inverter
Processing time	ms	0 ... 1	
Application task runtime of the technology application used (tolerance)	ms	1 ... x	



8.4.2 Modbus RTU

Modbus is an internationally approved, asynchronous, serial communication protocol, designed for commercial and industrial automation applications.

Bus-related information			
Name		Modbus RTU	
Communication medium		RS485 (EIA)	
Use		Connection as Modbus server	
Connection system		Pluggable double spring terminal	
Status display		2 LEDs	
Connection designation		X216: TA, TB, COM	

Technical data			
Communication profile		Modbus RTU	
Bus terminating resistor	Ω	120	Terminated on both sides
Integrated bus terminating resistor		No	
Network topology			
Without repeater		Line	
Device			
Type		Server	
Max. number without repeater		32	Per bus segment, incl. host system
Max. number with repeater		90	
Address		1 ... 247	Adjustable via code
Baud rate	kbps	4.8 ... 115	Adjustable via code
Max. cable length	m	12 ... 600	Per bus segment, depending on the baud rate and the used cable type
Max. cable length between two devices		Not limited	The max. bus length is decisive
Data channel			
SDO channels		Max. 2 servers, with 1 ... 8 bytes	Supported functions: • Read Holding Registers • Preset Single Register • Preset Multiple Registers • Read/Write 4 x registers



9 Accessories

9.1 Operation and diagnostics



The inverter can be configured and ordered with keypad module, USB module or WLAN module. The inverter is then delivered with the module mounted.

9.1.1 Keypad

Parameter setting and diagnostics

Thanks to the intuitive operating structure, the navigation keys allow a quick and easy access to the most important parameters, either to configure functions or to query current values. Parameters and actual values are indicated on the easy-to-read display.



Keypad	
Type designation	Design
I5MADK0000000S	LCD display Display in German/English

9.1.2 USB module

Interface to the PC

Connect the inverter via a USB 2.0 connection cable to a PC on which the Lenze "EASY Starter" engineering tool is installed. Configure the inverter with the "EASY Starter" using graphical user interfaces. You can create diagnostics with trend functions or observe parameter values.

Parameterising without supplying the inverter with voltage: in many cases, the USB interface of the PC is sufficient for the voltage supply if you connect the inverter directly to the PC without a hub.



USB module	
Type designation	Design
I5MADU0000000S	Parameterization without voltage supply of the inverter is possible. USB 2.0 connecting cable required

Connecting cable		
Type designation	Length	Design
EWL0085/S	3 m	USB 2.0-connecting cable (A-plug to micro B-plug)
EWL0086/S	5 m	



9.1.3 WLAN module

Communicate wirelessly with the inverter, via a PC using the Lenze Engineering Tool "EASY Starter" or the Lenze "SMART Keypad App" for Android and iOS smartphones.



⚠ WARNING!

- ▶ This product contains FCC ID: Z64-CC3235MOD / IC: 451I-CC3235MOD
- ▶ To comply with FCC and Industry Canada RF radiation exposure limits for general population, the transmitter with its antenna must be installed such that a minimum separation distance of 20 cm is maintained between the radiator (antenna) and all persons at all times.
- ▶ This product must not be collocated or operated in conjunction with any other antenna or transmitter.
- ▶ -----
- ▶ Le produit contient un module transmetteur certifié FCC ID: Z64-CC3235MOD / IC: 451I-CC3235MOD
- ▶ Afin de se conformer aux réglementations de la FCC et d'Industry Canada relatives aux limites d'exposition aux rayonnements RF pour le grand public, le transmetteur et son antenne doivent être installés de sorte qu'une distance minimale de 20 cm soit constamment maintenue entre le radiateur (antenne) et toute personne.
- ▶ Le produit ne doit pas être utilisé en combinaison avec d'autres antennes ou transmetteurs.

The module can be used if the certification is recognized in a country according to one of these standards.

Conformity and approvals		
CE	2014/53/EU	Radio equipment directive
FCC	Part 15.107/15.109 ICES-003	

Additional conformities and approvals:

- IC

LED status displays			
LED 1	LED 2	LED 3	Meaning
Power (green)	TX/RX (yellow)	WLAN (green)	
Supply voltage status	Communication status	WLAN status	
OFF	OFF	OFF	No voltage
ON	ON	ON	Self-test (approx. 1 s)
ON	OFF	OFF	Ready for operation No active WLAN connection
ON	Flashing	ON	Communication active
ON	OFF	Blinking	Client Mode Waiting for connection
Blinking	OFF	OFF	Trouble

Connection data (default setting)	
IP address	192.168.178.1
SSID	<Product type>_<10-digit identifier>
Password	password



WLAN module	
Type designation	Design
I5MBDW0000000S	i500 WLAN module



9.2 Memory modules

For standard set-up, Lenze offers its customers multipacked, unwritten memory modules (EPM). In combination with the EPM copier, the EPMs can be duplicated at any location.

A memory module is included in the scope of supply of the inverter.



Memory module		
Type designation	Design	VPE
		Piece
IOMAPA0000000M	Easily pluggable Duplicate data set with memory module copier	12



9.3 Memory module copier

For duplicating data on memory modules for a faster standard set-up.

The memory module copier is a copying system for all memory modules from Lenze. With the help of simple optical user guidance, the data of a module is copied quickly and reliably to another memory module.



Memory module copiers	
Type designation	Type
EZAEDE1001	Data set copier for memory modules



9.4 QUICKON connector

With the QUICKONconnectors, the mains connection is available in a pluggable version with a commonly used standard.

QUICKON V2 components for cable cross-section 1 ... 2.5 mm ²		
Type designation	Design	
QUICKON V2 set for rated power ≤ 4 kW (16 A)		
EZAMBHXX027		1 x M25 QUICKON V2 plug (wall bushing), 3 + PE, 1 ... 2.5 mm ² 1 x QUICKON V2 nut 1 x connecting cable 0.5 m with connection cross-section 2.5 mm ² 1 x adapter M20/M25 1 x adapter M25/M32
QUICKON V2 nut		
EWS0103/M		• Cable diameter: 6 ... 10 mm • Connection frequency: max. 10 • 5 pieces
EWS0104/M		• Cable diameter: 9 ... 14 mm • Connection frequency: max. 10 • 5 pieces
QUICKON V2 connector with nut		
EWS0105/M		• Cable diameter: 6 ... 10 mm • Connection frequency: ≥ 50 • 5 pieces
EWS0106/M		• Cable diameter: 9 ... 14 mm • Connection frequency: ≥ 50 • 5 pieces
QUICKON V2 H-distributor		
EWS0110		• Number of poles: 4 • Connection cross-section: 2.5 mm ² • Cable diameter: 6 ... 14 mm • Connection frequency: ≥ 50 • The scope of supply does not include QUICKON V2 nuts. These must be ordered additionally (EWS0103/M, EWS0104/M).
QUICKON V2 T distributor		
EWS0111		• Number of poles: 4 • Connection cross-section: 2.5 mm ² • Cable diameter: 9 ... 14 mm • Connection frequency: ≥ 50 • Two QUICKON V2 nuts are included in the scope of supply. Others must be ordered additionally (EWS0103/M, EWS0104/M).
QUICKON V2 socket wrench		
EWS0112		• Suitable for QUICKON V2 nuts EWS0103/M ... EWS0106/M • Wrench size: 22 mm
QUICKON V2 protection cover		
EWS0113		Suitable for QUICKON V2 distributor EWS0110, EWS0111 • Protection class: IP68 • Eyelet for fastening



QUICKON V2 components for cable cross-section 2.5 ... 6 mm²		
Type designation	Design	
QUICKON V2 H-distributor		
EWS0114		• Number of poles: 5 • Connection cross-section: 6 mm² • Cable diameter: 9 ... 20 mm • Connection frequency: ≥ 50 • No V2 nuts are included QUICKON in the scope of supply. These need to be ordered separately (EWS0116, EWS0117).
QUICKON V2 T-distributor		
EWS0115		• Number of poles: 5 • Connection cross-section: 6 mm² • Cable diameter: 12 ... 20 mm • Connection frequency: ≥ 50 • Two V2 nuts are included QUICKON in the scope of supply. Any additional nuts will need to be ordered separately (EWS0116, EWS0117).
QUICKON V2 nut		
EWS0116		• Cable diameter: 12 ... 20 mm • Connection cross-section: 6 mm² • Connection frequency: max. 10 • 5 pieces
EWS0117		• Cable diameter: 9 ... 14 mm • Connection cross-section: 6 mm² • Connection frequency: max. 10 • 5 pieces
QUICKON V2 protection cap		
EWS0118		Fits QUICKON V2 distributor EWS0114, EWS0115 • Degree of protection: IP68 • Fastening eyelet



10 Purchase order

10.1 Notes on ordering

You can order the frequency inverter i510 protec in the protection class NEMA 1 (IP20).

Additional feature options can be optionally configured during order placement.

- Rated power
- Mains voltage
- Application area (default parameter setting)
- Product extension (keypad module, WLAN module, fieldbus network CANopen or Modbus RTU)

The inverters are supplied as a complete device in the selected configuration.

Subsequent modification of the configured inverter is not possible. Only in this way can the compact design and the protection class be achieved and assured.

The selection can be made with the "EASY Product Finder" on the Lenze homepage.

»EASY Product Finder«

The »EASY Product Finder« helps you to configure your required product in next to no time. In addition, you can retrieve all important technical details such as data sheets, CAD data, and EPLAN data.

The link and the QR code lead directly to the "EASY Product Finder": [EASY Product Finder](#)





10.2 Order details

The following is a list of the information required to order an i510 protec frequency inverter.

Order example

Description of the component	Order code
Complete inverter	I51B P 222 F 0 0 0 0 1 002S
Rated power: 2.2 kW / 3 hp	
Three-phase mains connection 400 V	
Product version: Standard	
Safety technology: Without safety function	
Degree of protection: IP20 / UL Type 1	
Interference suppression: Without interference suppression	
Default parameter setting: Region US (60-Hz networks)	
Product extension: Standard I/O with CANopen	

Assignment of product name and order code

When listing the technical data of the various variants, the easily legible product name is used.

The product name contains the power in kW, mains voltage class and the number of phases.

This information results in the first 9 characters of the order code:

Complete inverter			
Power		Product name	Order code
kW	hp		
Single-phase mains connection 120 V			
0.37	0.5	i510-P0.37/120-1	I51BP137A
0.75	1	i510-P0.75/120-1	I51BP175A
1.1	1.5	i510-P1.1/120-1	I51BP211A
Single/three-phase mains connection 230/240 V			
0.37	0.5	i510-P0.37/230-2	I51BP137D
0.75	1	i510-P0.75/230-2	I51BP175D
1.1	1.5	i510-P1.1/230-2	I51BP211D
1.5	2	i510-P1.5/230-2	I51BP215D
2.2	3	i510-P2.2/230-2	I51BP222D
3	4	i510-P3.0/230-2	I51BP230D
Three-phase mains connection 230/240 V			
3	4	i510-P3.0/230-3	I51AP230C
4	5	i510-P4.0/230-3	I51AP240C
5.5	7.5	i510-P5.5/230-3	I51BP255C
Three-phase mains connection 400/480 V			
0.75	1	i510-P0.75/400-3	I51BP175F
1.1	1.5	i510-P1.1/400-3	I51BP211F
1.5	2	i510-P1.5/400-3	I51BP215F
2.2	3	i510-P2.2/400-3	I51BP222F
3	4	i510-P3.0/400-3	I51BP230F
4	5	i510-P4.0/400-3	I51BP240F
5.5	7.5	i510-P5.5/400-3	I51BP255F
7.5	10	i510-P7.5/400-3	I51BP275F
Three-phase mains connection 480/600 V			
0.75	1	i510-P0.75/600-3	I51BP175G
1.5	2	i510-P1.5/600-3	I51BP215G
2.2	3	i510-P2.2/600-3	I51BP222G
4	5	i510-P4.0/600-3	I51BP240G
5.5	7.5	i510-P5.5/600-3	I51BP255G
7.5	10	i510-P7.5/600-3	I51BP275G

The other positions of the order code indicate options and design variants. The following table shows the structure of the complete order code.



Type code structure

		I	5	1		P					0	0	0	0				
Product type	Inverter	I																
Product family	i500		5															
Product	i510			1														
Product generation	Generation 1				A													
	Generation 2				B													
Mounting type	Wall mounting					P												
Rated power	0.37 kW																	
	0.75 kW																	
	1.1 kW																	
	1.5 kW																	
	2.2 kW																	
	3 kW																	
	4 kW																	
	5.5 kW																	
	7.5 kW																	
Mains voltage and connection type	1/N/PE AC 120 V																	
	3/PE AC 230/240 V																	
	1/N/PE AC 230/240 V																	
	3/PE AC 230/240 V																	
	3/PE AC 400 V																	
	3/PE AC 480 V																	
	3/PE AC 480 V																	
	3/PE AC 600 V																	
Product variant	Standard																	
Integrated functional safety	Without safety function																	
Degree of protection	IP20, uncoated																	
	IP20, uncoated																	
Interference suppression	Without																	
Application area	Default parameter setting: Region EU (50-Hz networks)																	
	Default parameter setting: Region US (60-Hz networks)																	
Product extension	Standard I/O ...																	
	Keypad module with Standard I/O ...																	
	USB module with Standard I/O ...																	
	WLAN module with Standard I/O ...																	
	... without network																	00S
	... with CANopen																	02S
	... with Modbus RTU																	03S



11 Environmental notes and recycling

Lenze products are intended for use by companies in industrial environments. This means that they are also subject to requirements regarding recycling and disposal. Both mechanical and electrical components such as electric motors, gearboxes, and inverters contain valuable raw materials that can be recycled and reused. Proper recycling is important and sensible from both an economic and ecological perspective.

For information on the proper disposal and legal requirements of our products, please refer to the information on the respective product page on the Internet:

<https://www.lenze.com/en-de/products>

If you require support, please contact your local branch:

<https://www.lenze.com/en-de/company/global-presence>

Note: By disposing of devices and packaging properly, you are helping us to protect the environment and conserve resources.



Further information on Lenze's environmental and climate responsibility and on the topic of energy efficiency can be found on the Internet:

<https://www.lenze.com/en-de/company/sustainability>



12 Appendix

12.1 Good to know

12.1.1 Operating modes of the motor

Operating modes S1 ... S10 as specified by EN 60034-1 describe the basic stress of an electrical machine.

In continuous operation a motor reaches its permissible temperature limit if it outputs the rated power dimensioned for continuous operation. However, if the motor is only subjected to load for a short time, the power output by the motor may be greater without the motor reaching its permissible temperature limit. This behaviour is referred to as overload capacity.

Depending on the duration of the load and the resulting temperature rise, the required motor can be selected reduced by the overload capacity.

The most important operating modes

Continuous operation S1	Short-time operation S2
Operation with a constant load until the motor reaches the thermal steady state. The motor may be actuated continuously with its rated power.	Operation with constant load; however, the motor does not reach the thermal steady state. During the following standstill, the motor winding cools down to the ambient temperature again. The increase in power depends on the load duration.



Intermittent operation S3	Non-intermittent periodic operation S6
Sequence of identical duty cycles comprising operation with a constant load and subsequent standstill. Start-up and braking processes do not have an impact on the winding temperature. The steady-state is not reached. The guide values apply to a cycle duration of 10 minutes. The power increase depends on the cycle duration and on the load period/downtime ratio.	Sequence of identical duty cycles comprising operation with a constant load and subsequent no-load operation. The motor cools down during the no-load phase. Start-up and braking processes do not have an impact on the winding temperature. The steady-state is not reached. The guide values apply to a cycle duration of 10 minutes. The power increase depends on the cycle duration and on the load period/idle time ratio.
P Power t Time t_L Idle time ϑ Temperature	P_v Power loss t_B Load period t_s Cycle duration



12.1.2 Motor control types

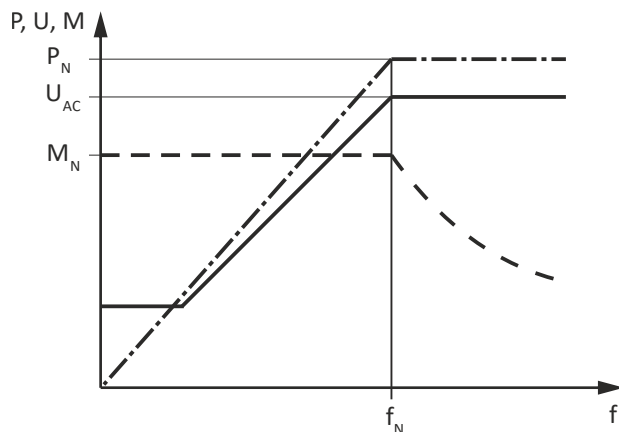
The inverter provides various motor control types.

Linear V/f characteristic control

The output voltage is increased proportionately to the output frequency.

In case of low output frequencies, the motor voltage can be increased to ensure a minimum current for the breakaway torque. In the field weakening range, the output voltage of the inverter is constant (mains voltage) and the frequency can be further increased depending on the load. The maximum torque of the motor is reduced proportionately to the square of the frequency increase, the maximum output power of the motor being constant.

Application areas are for instance: Single drives with constant load.



P Power
V Voltage
M Torque
f Frequency

P_N Rated power
 U_{AC} Mains voltage
 M_N Rated torque
 f_N Rated frequency



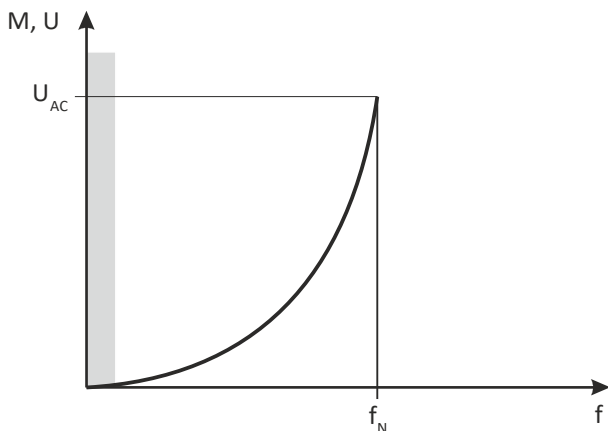
Square-law V/f characteristic control

The output voltage is increased squaredly to the output frequency.

In case of low output frequencies, the motor voltage can be increased to ensure a minimum current for the breakaway torque. In the field weakening range, the output voltage of the inverter is constant (mains voltage) and the frequency can be further increased depending on the load. The maximum torque of the motor is reduced squaredly to the frequency increase, the maximum output power of the motor being constant.

Application areas are for instance:

- Pumps
- Fans
- Ventilators

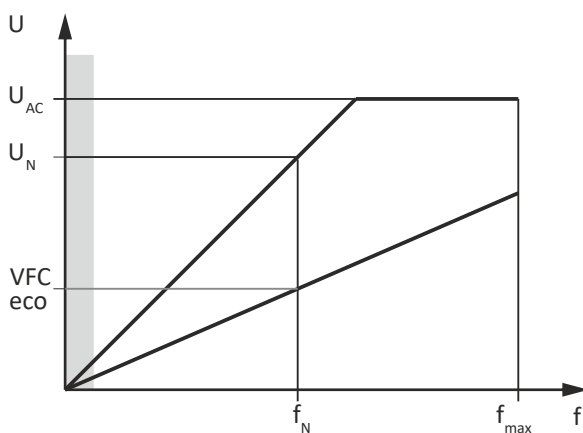


V Voltage
f Frequency
M Torque

U_{AC} Mains voltage
 f_N Rated frequency

VFCeco

The VFCeco mode has a special effect in the partial load operational range. Usually, three-phase AC motors are supplied there with a higher magnetising current than required by the operating conditions. The VFCeco mode reduces the losses in the partial load operational range so that savings up to 30 % are possible.



V Voltage
 U_{AC} Mains voltage
 U_N Rated voltage

f Frequency
 f_N Rated frequency
 f_{max} Max. frequency

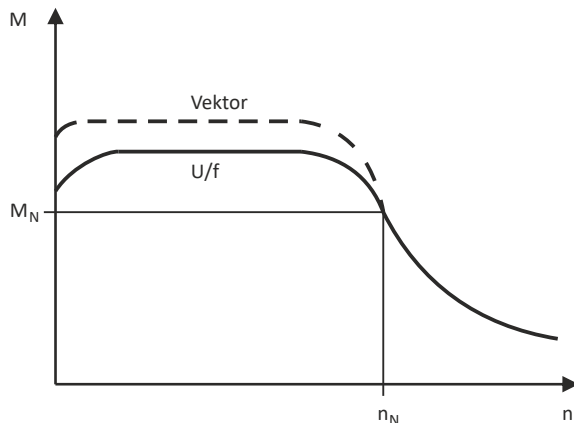


Sensorless vector control (SLVC)

In vector control, an inverted voltage model is used for calculation. The parameters are detected via a parameter identification. The inverter determines the angle between current and voltage. This imposes a current on the motor".

Compared to the V/f characteristic control, the vector control serves to achieve improved drive characteristics thanks to:

- higher torque throughout the entire speed range
- higher speed accuracy and higher concentricity factor
- higher efficiency



M Torque
n Speed

M_N Rated torque
 n_N Rated speed

Application areas are for instance:

- Single drives with changing loads
- Single drives with high starting duty
- Sensorless speed control of three-phase AC motors

12.1.3 Switching frequencies

On an inverter, the term "switching frequency" is understood to mean the frequency with which the input and outputs of the output module (inverter) are switched. On an inverter, the switching frequency can generally be set to values between 2 and 16 kHz, whereby the selection is based on the respective power output.

As switching the modules cause heat losses, the inverter can provide higher output currents at low switching frequencies than at high frequencies. Additionally, it is distinguished between the operation at a permanently set switching frequency and a variably set switching frequency. Here, the switching frequency is automatically reduced as a function of the device utilization.

At a higher switching frequency, the noise generation is less.

Options for the switching frequency:

- 2 kHz
- 4 kHz
- 8 kHz
- 12 kHz
- 16 kHz
- variable (automatic adaptation)



12.1.4 Enclosures

The protection class indicates the suitability of a product for specific ambient conditions with regard to humidity as well as the protection against contact and the ingress of foreign particles. The protection classes are classified in the EN 60034-5/ EN IEC 60529.

The first code number after the code letters IP indicates the protection against the ingress of foreign particles and dust. The second code number refers to the protection against the ingress of humidity.

Code number 1	Degree of protection	Code number 2	Degree of protection
0	No protection	0	No protection
1	Protection against the ingress of foreign particles $d > 50$ mm. No protection in case of deliberate access.	1	Protection against vertically dripping water (dripping water).
2	Protection against medium-sized foreign particles, $d > 12$ mm, keeping away fingers or the like.	2	Protection against diagonally falling water (dripping water), 15° compared to normal service position.
3	Protection against small foreign particles $d > 2.5$ mm. Keeping away tools, wires or the like.	3	Protection against spraying water, up to 60° from vertical.
4	Protection against granular foreign particles, $d > 1$ mm, keeping away tools, wire or the like.	4	Protection against spraying water from all directions.
5	Protection against dust deposits (dust-protected), complete protection against contact.	5	Protection against water jets from all directions.
6	Protection against the ingress of dust (dust-proof), complete protection against contact.	6	Protection against choppy seas or heavy water jets (flood protection).



12.2 Glossary

Definitions in functional safety

Abbreviation	Meaning
AIE	Acknowledge In Error, error acknowledgement
AIS	Acknowledge In Stop, restart acknowledgement
OFF state	Triggered signal status of the safety sensors
CCF	Common Cause Error (also β -value)
EC_FS	Error Class Fail Safe
EC_SS1	Error Class Safe Stop 1
EC_SS2	Error Class Safe Stop 2
EC_STO	Error Class Safe Torque Off Stop 0
ON state	Signal status of the safety sensors in normal operation
FIT	Failure In Time, 1 FIT = 10^{-9} Error/h
FMEA	Failure Mode and Effect Analysis
FSoE	FailSafe over EtherCAT
GSDML	Device description file with PROFINET-specific data to integrate the configuring software of a PROFINET controller.
HFT	Hardware Failure Tolerance
Cat.	Category according to EN ISO 13849-1
nBD	Speed value Base-Drive, internally determined actual speed from standard application
nSD	Safe-Drive speed value, internally determined actual speed from the safety application
n_safe	Actual speed determined from validation of nBD and nSD. Enters the further processing of the speed-dependent safety functions.
OSSD	Output Signal Switching Device, tested signal output
pBD	Base-Drive position value, internally determined actual position from standard application
pSD	Safe-Drive position value, internally determined actual position from the safety application
p_safe	Actual position determined from validation of pBD and pSD. Enters the further processing of the position-dependent safety functions.
PELV	Protective Extra Low Voltage
PL	Performance Level according to EN ISO 13849-1
PM	Plus-Minus – switched signal paths
PP	Plus-Plus – switched signal paths
PS	PROFIsafe
PWM	Pulse Width Modulation
SCS	Safe Creeping Speed
SD-In	Safe Digital Input
SD-Out	Safe Digital Output
SELV	Safety Extra Low Voltage
SFF	Safe Failure Fraction
SIL	Safety Integrity Level according to EN IEC 61508

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