



Inverter

i510 protec frequency inverter NEMA 1 (IP20)

0.37 kW ... 5.5 kW

0.5 hp ... 7.5 hp

Single-phase mains connection 120 V

Single-phase mains connection 230/240 V

Three-phase mains connection 230/240 V

Three-phase mains connection 400 V

Three-phase mains connection 480 V

Contents

About this document	6
Further documents.....	6
Notations and conventions.....	7
Safety instructions	8
Basic safety instructions.....	8
Application as directed.....	9
Foreseeable misuse.....	9
Residual hazards.....	10
Product information	12
Features.....	12
Identification of the products.....	13
Mechanical installation	14
Dimensions.....	14

Electrical installation	19
Important notes	19
EMC-compliant installation	21
Connection according to UL	22
Important notes	22
Fusing data	23
Branch Circuit Protection (BCP)	23
Mains connection	24
1-phase mains connection 120 V	25
Connection diagrams	25
Terminal data	26
Fusing data	26
1-phase mains connection 230/240 V	27
Connection diagrams	27
Terminal data	28
Fusing data	28
1-phase mains connection 230/240 V "Light Duty"	29
Connection diagrams	29
Terminal data	29
Fusing data	29
3-phase mains connection 230/240 V	30
Connection diagrams	30
Terminal data	31
Fusing data	31
3-phase mains connection 230/240 V "Light Duty"	32
Connection diagrams	32
Terminal data	32
Fusing data	32
3-phase mains connection 400 V	33
Connection diagrams	33
Terminal data	34
Fusing data	34
3-phase mains connection 400 V "Light Duty"	35
Connection diagrams	35
Terminal data	35
Fusing data	35
3-phase mains connection 480 V	36
Connection diagrams	36
Terminal data	37
Fusing data	37
3-phase mains connection 480 V "Light Duty"	38
Connection diagrams	38
Terminal data	38
Fusing data	38
Control connections	39

Networks	40
CANopen	40
Modbus RTU	41
Commissioning	42
Important notes	42
Initial switch-on and functional test	43
Using accessories	44
Keypad	44
Keypad operating mode	44
Function of keypad keys in operating mode	44
Keypad parameterisation mode	45
Function of the keypad keys in the parameterisation mode	45
Diagnostics and fault elimination	46
LED status display	46
Technical data	47
Standards and operating conditions	47
Conformities and approvals	47
Protection of persons and device protection	47
EMC data	47
Motor connection	48
Environmental conditions	48
Electrical supply conditions	48
1-phase mains connection 120 V	49
Rated data	49
1-phase mains connection 230/240 V	50
Rated data	50
1-phase mains connection 230/240 V "Light Duty"	51
Rated data	51
3-phase mains connection 230/240 V	52
Rated data	52
3-phase mains connection 230/240 V "Light Duty"	53
Rated data	53
3-phase mains connection 400 V	54
Rated data	54
3-phase mains connection 400 V "Light Duty"	55
Rated data	55
3-phase mains connection 480 V	56
Rated data	56
3-phase mains connection 480 V "Light Duty"	57
Rated data	57
Environmental notes and recycling	58

About this document



Read this documentation carefully before starting any work.

- ▶ Please observe the safety instructions!
-

Further documents

For certain tasks, information is available in additional documents.

Document	Contents/topics
Configuration document	Basic information on configuring and ordering the product
Commissioning document	Basic information on installing and commissioning 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

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: "Engineer", "EASY Starter"
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.

Safety instructions

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

Observe all specifications of the corresponding documentation supplied. This is the precondition for safe and trouble-free operation and for obtaining the product features specified.

Please observe the specific safety information in the other sections!

Basic safety instructions

DANGER!

Dangerous electrical voltage

Possible consequences: Death or severe injuries from electric shock

- ▶ Any work on the device must only be carried out in a deenergized state.
- ▶ After switching off the mains voltage, observe the signs on the product.

Product

- The product must only be used as directed.
- Never commission the product in the event of visible damage.
- The product must never be technically modified.
- Never commission the product before assembly has been completed.
- The product must never be operated without required covers.
- Connect/disconnect all pluggable terminals only in de-energized condition.
- Only remove the product from the installation in the de-energized state.

Personnel

Only qualified and skilled personnel are allowed to work with the product. IEC 60364 and/or CENELEC HD 384 define the qualifications of these persons as follows:

- They are familiar with the installation, mounting, commissioning, and operation of the product.
- They possess the appropriate qualifications for their tasks.
- They are familiar with all regulations for the prevention of accidents, directives, and laws applicable at the location and are able to apply them.

Process engineering

The procedural notes and circuit details described are only proposals. It is up to the user to check whether they can be adapted to the particular applications. Lenze does not take any responsibility for the suitability of the procedures and circuit proposals described.

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).

Application as directed

- The product serves to control three-phase AC motors and servo motors.
- The product must only be actuated with motors that are suitable for the operation with inverters.
- The product is not a household appliance, but is only designed as a component for commercial or professional use in terms of EN 61000-3-2.
- Depending on the degree of protection, the product can be mounted inside and outside control cabinets.
- The product must only be actuated under the operating conditions and power limits specified in this documentation.
- The product meets the protection requirements of 2014/35/EU: Low-Voltage Directive.
- The product is not a machine in terms of 2006/42/EU: Machinery Directive.
- Commissioning or starting the operation as directed of a machine with the product is not permitted until it has been ensured that the machine meets the regulations of the EC Directive 2006/42/EU: Machinery Directive; observe EN 60204-1.
- Commissioning or starting operation as directed is only permissible if the EMC Directive 2014/30/EU is complied with.
- In residential areas, the product may cause EMC interferences. The operator is responsible for taking interference suppression measures.

Foreseeable misuse

Inverters are not to be operated with DC motors.

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!

DANGER!

Danger to life due to electrical voltage!

The product's power connections can still be carrying voltage when the mains supply has been switched off.

Possible consequences: Death, severe injury, or burns

- ▶ Do not touch the power connections immediately.
- ▶ Take note of the corresponding warning plates on the product.
- ▶ Check power terminals for isolation from supply.

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.

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.

Switch contactors in the motor cable only if the controller is inhibited.

- Switching while the inverter is enabled is only permissible if no monitoring functions are activated.

Motor

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

Product information

Features

0.37 kW ... 5.5 kW

Network status LEDs

Memory module

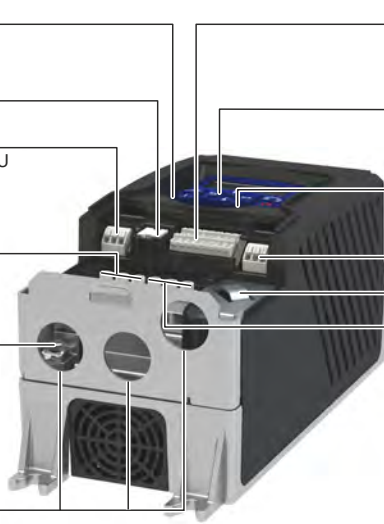
X2xx Network, Option
CANopen or Modbus RTU

X100 Mains connection

PE connection

Cable inlet

Cable gland shield connection for motor cable



X3 Control terminals
Standard I/O

Diagnostic module
Keypad, WLAN module or
USB module

Inverter status LEDs

X9 Relay output

Shield connection control cable

X105 Motor connection

Meaning of the status LEDs for the different networks

Network	LED left	LED right	
CANopen	CAN-RUN	CAN-ERR	
Modbus	COMM	ERR	

Identification of the products

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

Product code

			I	5	1	A	P	□□□	□	□	□	□	□	□	□	□□□	
Product type	Inverter		I														
Product family	i500			5													
Product	i510				1												
Product generation	Generation 1					A											
Mounting type	Wall mounting						P										
Rated power [kW] (Examples)	0.25 kW	0.5 HP						137									
	0.55 kW	1.0 HP						155									
	2.2 kW	3.0 HP						222									
Mains voltage and connection type	1/N/PE AC 120 V													A			
	1/N/PE AC 230/240 V													B			
	3/PE AC 230/240 V													C			
	1/N/PE AC 230/240 V																
	3/PE AC 230/240 V													D			
	3/PE AC 400 V																
	3/PE AC 480 V													F			
Product variant	Standard														0		
Integrated functional safety	Without safety function														0		
Degree of protection	NEMA 1 (IP20), uncoated														0		
Interference suppression	Without														0		
Application	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	
	WLAN module with Standard I/O ...															W	
	... without network																00S
	... with CANopen																02S
... with Modbus RTU																03S	

Mechanical installation

Dimensions

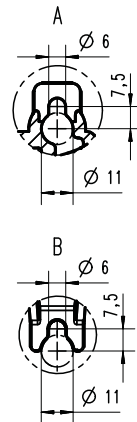
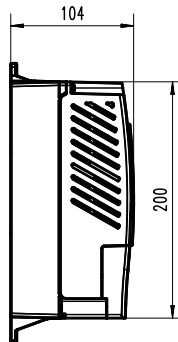
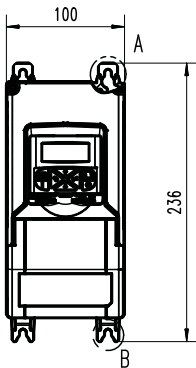
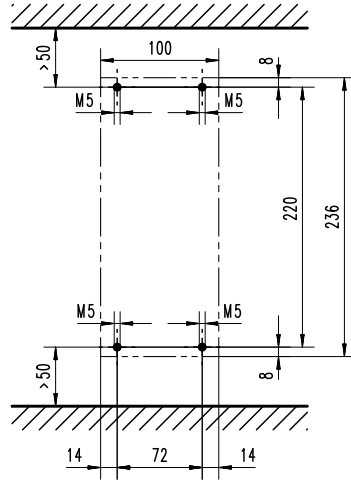
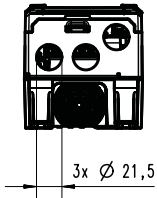


The specified installation clearances are minimum dimensions to ensure a sufficient air circulation for cooling purposes. They do not consider the bend radiuses of the connecting cables.

0.37 kW ... 2.2 kW

The dimensions in mm apply to:

0.37 kW	I51AP137A..3	I51AP137D..3			
0.75 kW	I51AP175A..3	I51AP175D..3		I51AP175F..3	
1.1 kW			I51AP211D..3		I51AP211F..3
1.5 kW			I51AP215D..3		I51AP215F..3
2.2 kW					I51AP222F..3
Weight	1.4 kg	1.4 kg	1.5 kg	1.4 kg	1.5 kg



8800784

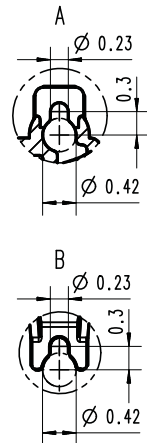
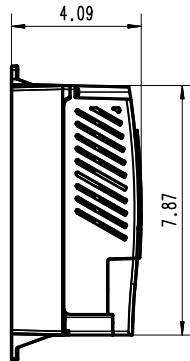
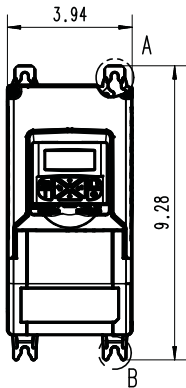
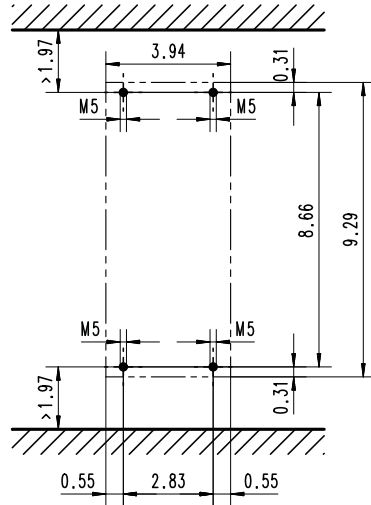
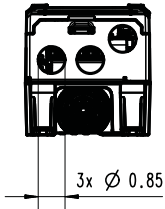
Mechanical installation

Dimensions

0.5 HP ... 3 HP

The dimensions in inch apply to:

0.5 HP	I51AP137A..3	I51AP137D..3			
1 HP	I51AP175A..3	I51AP175D..3		I51AP175F..3	
1.5 HP			I51AP211D..3		I51AP211F..3
2 HP			I51AP215D..3		I51AP215F..3
3 HP					I51AP222F..3
Weight	3.1 lb	3.1 lb	3.3 lb	3.1 lb	3.3 lb

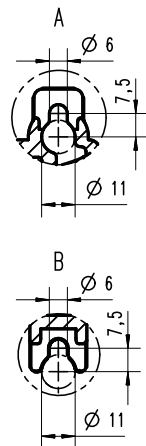
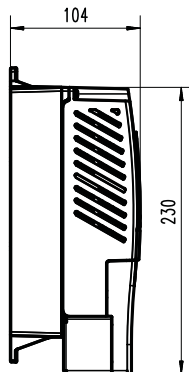
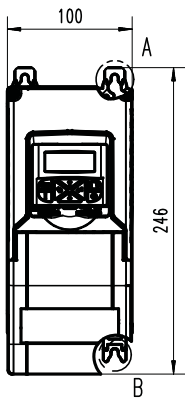
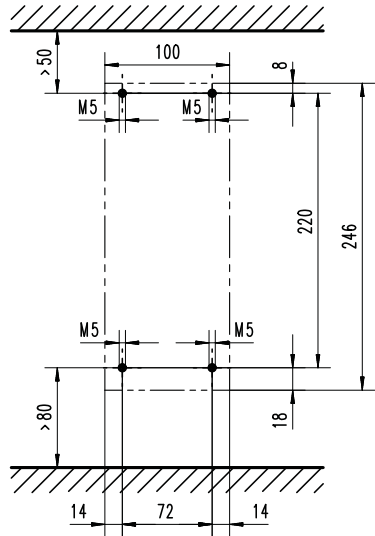
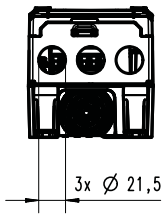


8800785

2.2 kW ... 5.5 kW

The dimensions in mm apply to:

2.2 kW	I51AP222D..3		
3 kW		I51AP230C..3	I51AP230F..3
4 kW		I51AP240C..3	I51AP240F..3
5.5 kW			I51AP255F..3
Weight	1.5 kg	1.6 kg	1.6 kg



8800786

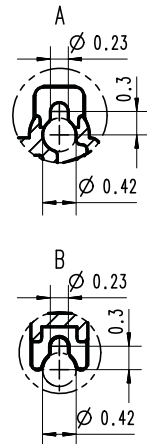
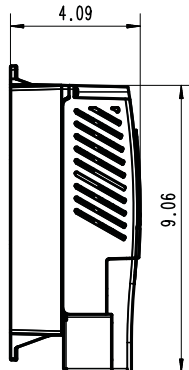
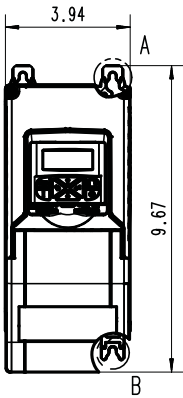
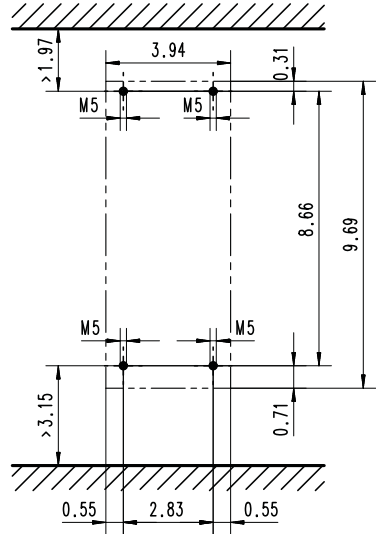
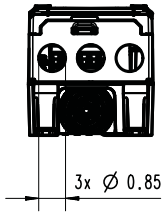
Mechanical installation

Dimensions

3 HP ... 7.5 HP

The dimensions in inch apply to:

3 HP	I51AP222D..3		
4 HP		I51AP230C..3	I51AP230F..3
5 HP		I51AP240C..3	I51AP240F..3
7.5 HP			I51AP255F..3
Weight	3.3 lb	3.5 lb	3.5 lb



8800787

Electrical installation

Important notes

DANGER!

Electrical voltage

Possible consequences: Death or severe injuries

- ▶ Any work on the inverter must only be carried out in the de-energized state.
 - ▶ After switching off the mains voltage, wait for at least 3 min before you start working.
-

DANGER!

Dangerous electrical voltage

The leakage current against earth (PE) is > 3.5 mA AC or > 10 mA DC.

Possible consequences: Death or severe injuries when touching the device in the event of an error.

- ▶ Implement the measures requested in EN 61800-5-1 or EN 60204-1. Especially:
 - ▶ Fixed installation
 - ▶ The PE connection must comply with the standards (PE conductor diameter ≥ 10 mm² or use a double PE conductor)
-

WARNING!

Dangerous electrical voltage

Device error causes an overvoltage in the system.

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

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.
-

Remove housing cover and remount



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



Remove cover

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

The terminals are exposed for wiring.

Mount cover

1. Mount the housing cover by carefully pressing it down until it engages.

The cover is mounted.

EMC-compliant installation

The drive system (inverter and drive) only complies with the EMC Directive 2014/30/EU 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.



These inverters do not have an integrated RFI filter in the AC mains supply.

In order to meet the EMC requirements according to EN 61800–3, an external EMC filter according to IEC EN 60939 must be used.

The user must verify that the conformity with EN 61800–3 is fulfilled.

The following example shows the effective wiring:



- A Shield connection for control connections
B Control line
C EMC cable gland

- D Motor cable with low capacity
E Power line

EMC-compliant installation must be implemented with shielded motor cables of low capacitance. Capacitance per unit length:

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

Connection according to UL

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.
-

NOTICE

- ▶ **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.

Fusing data

Branch Circuit Protection (BCP)

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

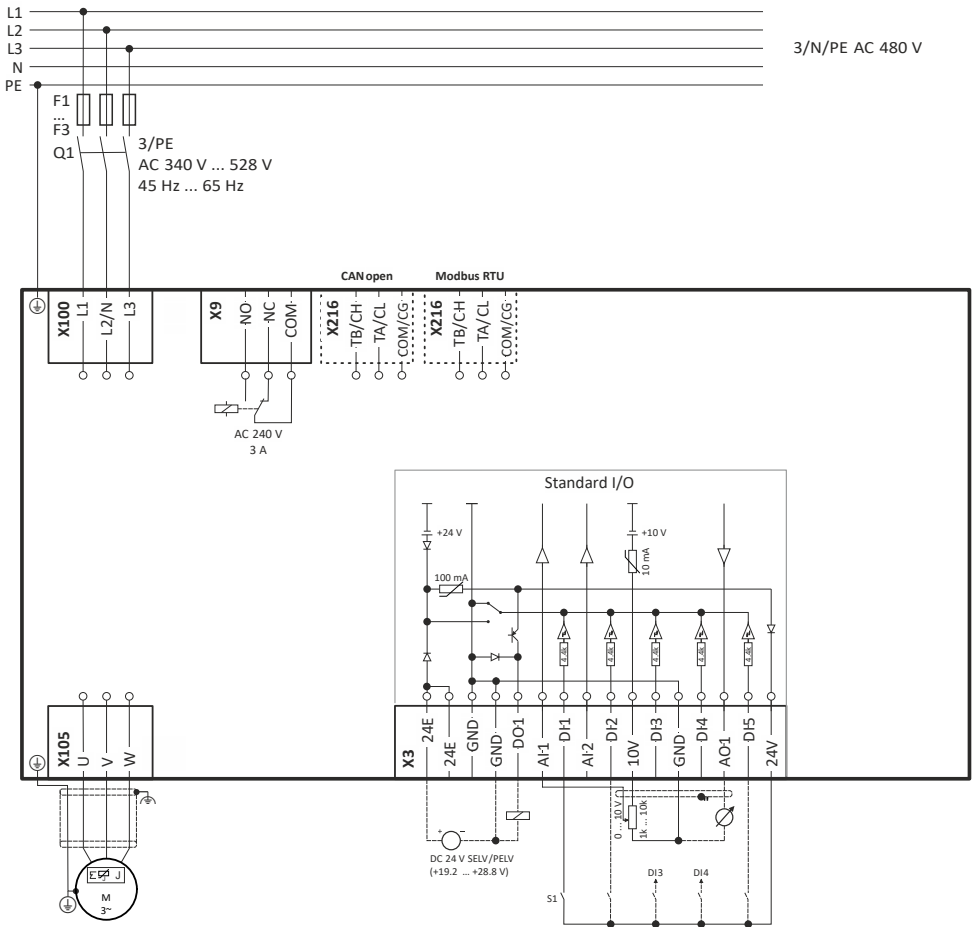
(Tested per UL61800-5-1, reference UL file E132659)

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
120 V, 1-ph	0.37	0.5	5	30	CC, CF, J, T	5	30
120 V, 1-ph	0.75	1	5	30	CC, CF, J, T	5	30
230 V, 1/3-ph	0.37	0.5	42	25	CC, CF, J, T	5	
230 V, 1/3-ph	0.75	1	42	25	CF, J, T	5	
230 V, 1/3-ph	1.1	1.5	42	25	CF, J, T	5	
230 V, 1/3-ph	1.5	2	42	25	CF, J, T	5	
230 V, 1/3-ph	2.2	3	42	50	CF, J, T	5	30
230 V, 3-ph	3	4	42	60	CF, J, T	5	30
230 V, 3-ph	4	5	42	60	CF, J, T	5	30
480 V, 3-ph	0.75	1	65	50	CF, J, T	5	30
480 V, 3-ph	1.1	1.5	65	50	CF, J, T	5	30
480 V, 3-ph	1.5	2	65	50	CF, J, T	5	30
480 V, 3-ph	2.2	3	65	50	CF, J, T	5	30
480 V, 3-ph	3	4	5	40	CF, J, T	5	30
480 V, 3-ph	4	5	5	40	CF, J, T	5	30
480 V, 3-ph	5.5	7.5	5	40	CF, J, T	5	30

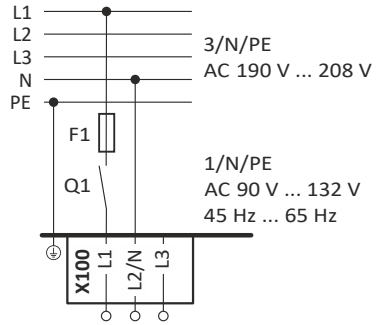
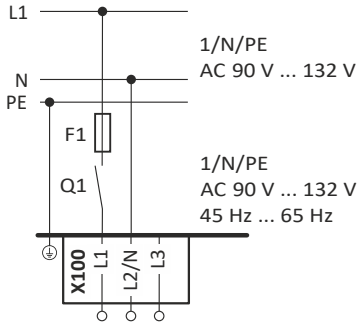
Mains connection

The connection diagram is considered exemplary for all voltage and power classes. Deviating mains connection diagrams can be found in the corresponding chapters.



1-phase mains connection 120 V

Connection diagrams



Terminal data

Rated power	P _{rated}	kW	0.37 ... 0.75
Connection description			Mains connection
Connection			X100
Connection type			Pluggable
Max. cable cross-section		mm ²	4
Max. cable cross-section		AWG	10
Stripping length		mm	8
Stripping length		in	0.3
Tightening torque		Nm	0.6
Tightening torque		lb-in	5.3
Required tool			Screwdriver 0.5 x 3.0

Rated power	P _{rated}	kW	0.37 ... 0.75
Connection description			PE connection
Connection			PE
Connection type			Pluggable
Max. cable cross-section		mm ²	6
Max. cable cross-section		AWG	10
Stripping length		mm	10
Stripping length		in	0.4
Tightening torque		Nm	2
Tightening torque		lb-in	18
Required tool			Torx key 20

Rated power	P _{rated}	kW	0.37 ... 0.75
Connection description			Motor connection
Connection			X105
Connection type			Pluggable
Max. cable cross-section		mm ²	4
Max. cable cross-section		AWG	10
Stripping length		mm	8
Stripping length		in	0.3
Tightening torque		Nm	0.6
Tightening torque		lb-in	5.3
Required tool			Screwdriver 0.5 x 3.0

Fusing data



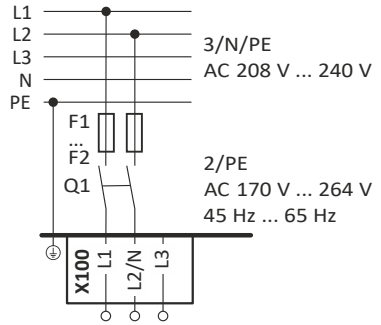
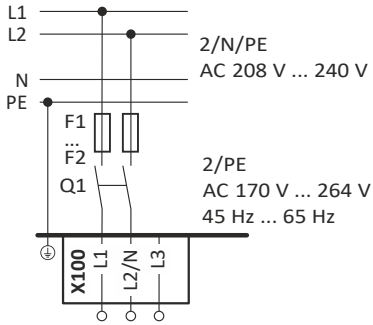
A residual current device (RCD) is optional.

Fusing data for UL/NEC compliant installations: [▶ Fusing data](#) 23

Inverter	Fuse		Circuit breaker		RCD	
	Characteristic	Max. rated current	Characteristic	Max. rated current		Type
		A		A	mA	
I51AP137A	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP175A	gG/gL, gRL	32	B	32	≥30	Typ B

1-phase mains connection 230/240 V

Connection diagrams



Electrical installation

Mains connection

1-phase mains connection 230/240 V

Terminal data

Rated power	P _{rated}	kW	0.37 ... 1.5	2.2
Connection description			Mains connection	
Connection			X100	
Connection type			Pluggable	
Max. cable cross-section		mm ²	4	6
Max. cable cross-section		AWG	10	10
Stripping length		mm	8	8
Stripping length		in	0.3	0.3
Tightening torque		Nm	0.6	0.7
Tightening torque		lb-in	5.3	6.2
Required tool			Screwdriver 0.5 x 3.0	Screwdriver 0.6 x 3.5

Rated power	P _{rated}	kW	0.37 ... 2.2	
Connection description			PE connection	
Connection			PE	
Max. cable cross-section		mm ²	6	
Max. cable cross-section		AWG	10	
Stripping length		mm	10	
Stripping length		in	0.4	
Tightening torque		Nm	2	
Tightening torque		lb-in	18	
Required tool			Torx key 20	

Rated power	P _{rated}	kW	0.37 ... 1.5	2.2
Connection description			Motor connection	
Connection			X105	
Connection type			Pluggable	
Max. cable cross-section		mm ²	4	6
Max. cable cross-section		AWG	10	10
Stripping length		mm	8	8
Stripping length		in	0.3	0.3
Tightening torque		Nm	0.6	0.7
Tightening torque		lb-in	5.3	6.2
Required tool			Screwdriver 0.5 x 3.0	Screwdriver 0.6 x 3.5

Fusing data




A residual current device (RCD) is optional.

Fusing data for UL/NEC compliant installations: [▶ Fusing data](#)  23

Inverter	Fuse		Circuit breaker		RCD	
	Characteristic	Max. rated current	Characteristic	Max. rated current		Type
		A		A	mA	
I51AP137D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP175D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP211D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP215D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP222D	gG/gL, gRL	40	B	32	≥30	Typ B

1-phase mains connection 230/240 V "Light Duty"**Connection diagrams**[▶ Connection diagrams](#)  27**Terminal data**[▶ Terminal data](#)  28**Fusing data**

A residual current device (RCD) is optional.

Fusing data for UL/NEC compliant installations: [▶ Fusing data](#)  23

Inverter	Fuse		Circuit breaker		RCD	
	Characteristic	Max. rated current	Characteristic	Max. rated current		Type
		A		A	mA	
I51AP137D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP175D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP211D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP215D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP222D	gG/gL, gRL	40	B	32	≥30	Typ B

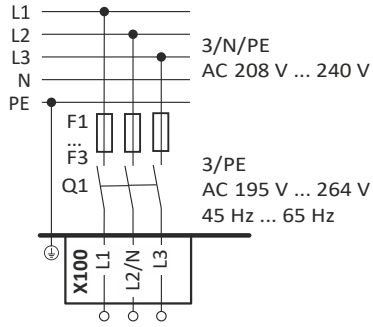
Electrical installation

Mains connection

3-phase mains connection 230/240 V

3-phase mains connection 230/240 V

Connection diagrams



Terminal data

Rated power	P _{rated}	kW	0.37 ... 1.5	2.2 ... 4
Connection description			Mains connection	
Connection			X100	
Connection type			Pluggable	
Max. cable cross-section		mm ²	4	6
Max. cable cross-section		AWG	10	10
Stripping length		mm	8	8
Stripping length		in	0.3	0.3
Tightening torque		Nm	0.6	0.7
Tightening torque		lb-in	5.3	6.2
Required tool			Screwdriver 0.5 x 3.0	Screwdriver 0.6 x 3.5

Rated power	P _{rated}	kW	0.37 ... 4	
Connection description			PE connection	
Connection			PE	
Max. cable cross-section		mm ²	6	
Max. cable cross-section		AWG	10	
Stripping length		mm	10	
Stripping length		in	0.4	
Tightening torque		Nm	2	
Tightening torque		lb-in	18	
Required tool			Torx key 20	

Rated power	P _{rated}	kW	0.37 ... 1.5	2.2 ... 4
Connection description			Motor connection	
Connection			X105	
Connection type			Pluggable	
Max. cable cross-section		mm ²	4	6
Max. cable cross-section		AWG	10	10
Stripping length		mm	8	8
Stripping length		in	0.3	0.3
Tightening torque		Nm	0.6	0.7
Tightening torque		lb-in	5.3	6.2
Required tool			Screwdriver 0.5 x 3.0	Screwdriver 0.6 x 3.5

Fusing data



A residual current device (RCD) is optional.

Fusing data for UL/NEC compliant installations: [▶ Fusing data](#) 23

Inverter	Fuse		Circuit breaker		RCD	
	Characteristic	Max. rated current	Characteristic	Max. rated current		Type
		A		A	mA	
I51AP137D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP175D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP211D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP215D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP222D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP230C	gG/gL, gRL	80	B	32	≥30	Typ B
I51AP240C	gG/gL, gRL	80	B	32	≥30	Typ B

Electrical installation

Mains connection

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

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

Connection diagrams

▶ [Connection diagrams](#)  30


Terminal data

▶ [Terminal data](#)  31

Fusing data



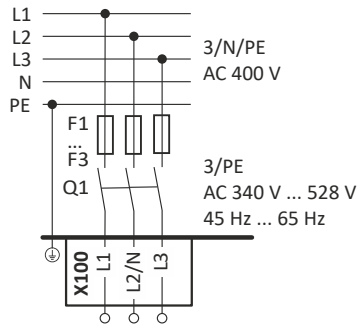
A residual current device (RCD) is optional.

Fusing data for UL/NEC compliant installations: ▶ [Fusing data](#)  23

Inverter	Fuse		Circuit breaker		RCD	
	Characteristic	Max. rated current	Characteristic	Max. rated current		Type
		A		A	mA	
I51AP137D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP175D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP211D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP215D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP222D	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP230C	gG/gL, gRL	80	B	32	≥30	Typ B
I51AP240C	gG/gL, gRL	80	B	32	≥30	Typ B

3-phase mains connection 400 V

Connection diagrams



Terminal data

Rated power	P _{rated}	kW	0.75 ... 2.2	3 ... 5.5
Connection description			Mains connection	
Connection			X100	
Connection type			Pluggable	
Max. cable cross-section		mm ²	4	6
Max. cable cross-section		AWG	10	10
Stripping length		mm	8	8
Stripping length		in	0.3	0.3
Tightening torque		Nm	0.6	0.7
Tightening torque		lb-in	5.3	6.2
Required tool			Screwdriver 0.5 x 3.0	Screwdriver 0.6 x 3.5

Rated power	P _{rated}	kW	0.75 ... 5.5	
Connection description			PE connection	
Connection			PE	
Max. cable cross-section		mm ²	6	
Max. cable cross-section		AWG	10	
Stripping length		mm	10	
Stripping length		in	0.4	
Tightening torque		Nm	2	
Tightening torque		lb-in	18	
Required tool			Torx key 20	

Rated power	P _{rated}	kW	0.75 ... 2.2	3 ... 5.5
Connection description			Motor connection	
Connection			X105	
Connection type			Pluggable	
Max. cable cross-section		mm ²	4	6
Max. cable cross-section		AWG	10	10
Stripping length		mm	8	8
Stripping length		in	0.3	0.3
Tightening torque		Nm	0.6	0.7
Tightening torque		lb-in	5.3	6.2
Required tool			Screwdriver 0.5 x 3.0	Screwdriver 0.6 x 3.5

Fusing data



A residual current device (RCD) is optional.

Fusing data for UL/NEC compliant installations: [▶ Fusing data](#) 23

Inverter	Fuse		Circuit breaker		RCD	
	Characteristic	Max. rated current	Characteristic	Max. rated current		Type
		A		A	mA	
I51AP175F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP211F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP215F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP222F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP230F	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP240F	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP255F	gG/gL, gRL	40	B	32	≥30	Typ B

3-phase mains connection 400 V "Light Duty"

Connection diagrams

▶ [Connection diagrams](#) □ 33

Terminal data

▶ [Terminal data](#) □ 34

Fusing data



A residual current device (RCD) is optional.

Fusing data for UL/NEC compliant installations: ▶ [Fusing data](#) □ 23

Inverter	Fuse		Circuit breaker		RCD	
	Characteristic	Max. rated current	Characteristic	Max. rated current		Type
		A		A	mA	
I51AP175F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP211F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP215F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP222F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP230F	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP240F	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP255F	gG/gL, gRL	40	B	32	≥30	Typ B

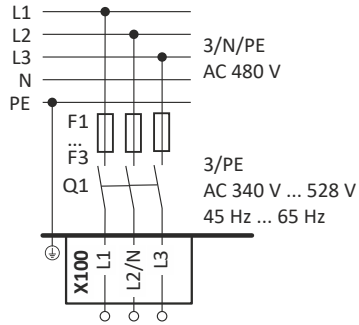
Electrical installation

Mains connection

3-phase mains connection 480 V

3-phase mains connection 480 V

Connection diagrams



Terminal data

Rated power	P _{rated}	kW	0.75 ... 2.2	3 ... 5.5
Connection description			Mains connection	
Connection			X100	
Connection type			Pluggable	
Max. cable cross-section		mm ²	4	6
Max. cable cross-section		AWG	10	10
Stripping length		mm	8	8
Stripping length		in	0.3	0.3
Tightening torque		Nm	0.6	0.7
Tightening torque		lb-in	5.3	6.2
Required tool			Screwdriver 0.5 x 3.0	Screwdriver 0.6 x 3.5

Rated power	P _{rated}	kW	0.75 ... 5.5	
Connection description			PE connection	
Connection			PE	
Max. cable cross-section		mm ²	6	
Max. cable cross-section		AWG	10	
Stripping length		mm	10	
Stripping length		in	0.4	
Tightening torque		Nm	2	
Tightening torque		lb-in	18	
Required tool			Torx key 20	

Rated power	P _{rated}	kW	0.75 ... 2.2	3 ... 5.5
Connection description			Motor connection	
Connection			X105	
Connection type			Pluggable	
Max. cable cross-section		mm ²	4	6
Max. cable cross-section		AWG	10	10
Stripping length		mm	8	8
Stripping length		in	0.3	0.3
Tightening torque		Nm	0.6	0.7
Tightening torque		lb-in	5.3	6.2
Required tool			Screwdriver 0.5 x 3.0	Screwdriver 0.6 x 3.5

Fusing data



A residual current device (RCD) is optional.

Fusing data for UL/NEC compliant installations: [▶ Fusing data](#) 23

Inverter	Fuse		Circuit breaker		RCD	
	Characteristic	Max. rated current	Characteristic	Max. rated current		Type
		A		A	mA	
I51AP175F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP211F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP215F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP222F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP230F	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP240F	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP255F	gG/gL, gRL	40	B	32	≥30	Typ B

Electrical installation

Mains connection

3-phase mains connection 480 V "Light Duty"

3-phase mains connection 480 V "Light Duty"

Connection diagrams

▶ [Connection diagrams](#)  36


Terminal data

▶ [Terminal data](#)  37

Fusing data

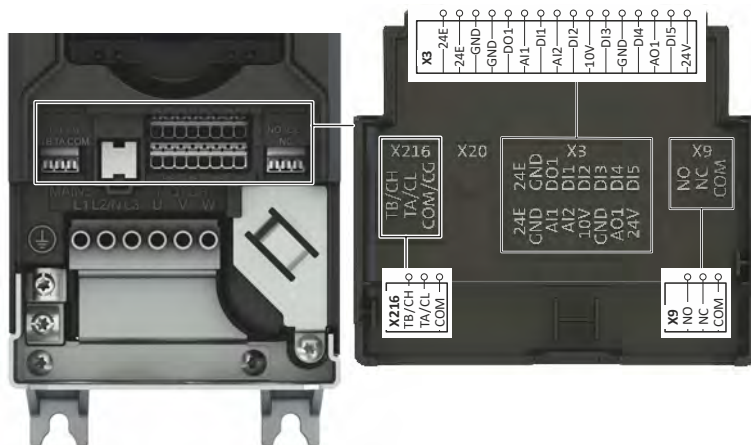


A residual current device (RCD) is optional.

Fusing data for UL/NEC compliant installations: ▶ [Fusing data](#)  23

Inverter	Fuse		Circuit breaker		RCD	
	Characteristic	Max. rated current	Characteristic	Max. rated current		Type
		A		A	mA	
I51AP175F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP211F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP215F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP222F	gG/gL, gRL	32	B	32	≥30	Typ B
I51AP230F	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP240F	gG/gL, gRL	40	B	32	≥30	Typ B
I51AP255F	gG/gL, gRL	40	B	32	≥30	Typ B

Control connections



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

Connection description		Control terminals		Relay output	
Connection		X3		X9	
Connection type		Non-pluggable		Non-pluggable	
Max. cable cross-section	mm ²	1.5		1.5	
Max. cable cross-section	AWG	16		16	
Stripping length	mm	9		9	
Stripping length	in	0.35		0.35	
Required tool		Screwdriver 0.4 x 2.5			

Electrical installation

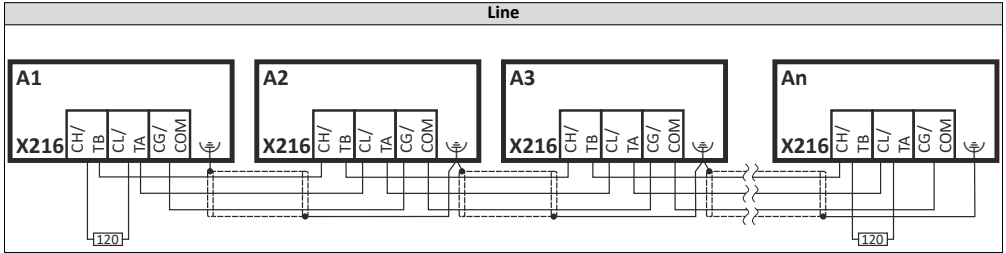
Networks

CANopen



The network must be terminated with a 120 Ω resistor at the physically first and last node. Connect resistor to terminals TB/CH and TA/CL.

Typical topologies



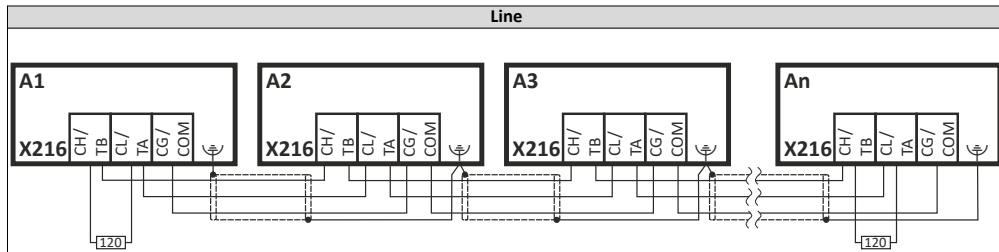
Connection description		CANopen	
Connection		X216	
Connection type		Non-pluggable	
Max. cable cross-section	mm ²	1.5	
Max. cable cross-section	AWG	16	
Stripping length	mm	9	
Stripping length	in	0.35	
Required tool		Screwdriver 0.4 x 2.5	

Modbus RTU



The network must be terminated with a 120 Ω resistor at the physically first and last node.
 Connect resistor to terminals TB/CH and TA/CL.

Typical topologies



Connection description		Modbus RTU	
Connection		X216	
Connection type		Non-pluggable	
Max. cable cross-section	mm ²	1.5	
Max. cable cross-section	AWG	16	
Stripping length	mm	9	
Stripping length	in	0.35	
Required tool		Screwdriver 0.4 x 2.5	

Commissioning

Important notes

DANGER!

Incorrect wiring can cause unexpected states during the commissioning phase.

Possible consequences: death, severe injuries or damage to property

Ensure the following before switching on the mains voltage:

- ▶ Wiring must be complete and correct.
 - ▶ Wiring must be free of short circuits and earth faults.
 - ▶ The motor circuit configuration (star/delta) must be adapted to the inverter output voltage.
 - ▶ The motor must be connected in-phase (direction of rotation).
 - ▶ The "emergency off" function of the overall system must operate correctly.
-

DANGER!

Incorrect settings during commissioning may cause unexpected and dangerous motor and system movements.

Possible consequences: death, severe injuries or damage to property

- ▶ Clear hazardous area.
 - ▶ Observe safety instructions and safety clearances.
-

Initial switch-on and functional test

Target: Get the motor connected to the inverter to rotate in best time.

Necessary conditions:

- The power rating of the motor connected is appropriate for the inverter.
- The parameter settings correspond to the delivery status (Lenze setting).

1. Preparation

1. Wire the power connections. ▶ [Electrical installation](#) [□ 19](#)
2. Wire digital inputs X3/DI1 (start/stop), X3/DI3 (reversal) and X3/DI4 (frequency preset 20 Hz).
3. Do not wire terminal X3/AI1 (analog setpoint selection) or set to GND.

2. Switch on mains and check readiness for operation

1. Switch on mains voltage.
2. Observe LED status displays "RDY" and "ERR" on the front of the inverter:
 - a) When the blue LED "RDY" blinks and the red LED "ERR" is off, the inverter is ready for operation. The controller is inhibited.
You can start the drive.
 - b) If the red LED "ERR" remains lit, a fault is active.
Eliminate the fault before you carry on with the functional test.

Carry out functional test

1. Start drive

1. Start inverter: X3/DI1 = HIGH.
2. Activate frequency preset 1 (20 Hz) as speed setpoint: X3/DI4 = HIGH.
The drive rotates with 20 Hz.
3. Optional: Activate reversal
 - a) X3/DI3 = HIGH.
The drive rotates at 20 Hz in the opposite direction.
 - b) Deactivate reversal again: X3/DI3 = LOW.
Speed characteristic (example)

2. Stop drive



1. Deactivate frequency preset 1 again: X3/DI4 = LOW.
2. Stop inverter again: X3/DI1 = LOW.

The functional test has been completed.

Control with Keypad

The "Keypad Full Control" control mode can be activated with the keypad key "CTRL". Both the control and the setpoint selection are then made via the keypad. This special control mode can be, for instance, used during the commissioning phase if external control and setpoint sources are not ready to use yet.

If the local keypad control is active, "LOC" is displayed in the lower status row of the keypad and the red LED flashed.

- After the "CTRL" key has been pressed, the activation of the control mode must be confirmed with the  key. (The  key serves to cancel the action.)
- When the control mode is changed over, the motor is first stopped and the "Forward" direction of rotation is set. Then, the motor can be started and stopped via the keypad.











Using accessories

Keypad

Keypad operating mode

Function of keypad keys in operating mode








In the operating mode, the keypad can be used for local control and for manual setpoint selection.

Function of keypad keys in operating mode			
Key	Actuation	Condition	Action
	Shortly	Local keypad control active. Display "LOC"	Run motor.
		Remote control active Display "REM" Display "KSTOP"	Deactivate keypad triggered stop. The motor remains at standstill. Display changes from "KSTOP" to "STOP".
	Shortly	No Jog operation	Stop motor. Display "KSTOP"
	Shortly	Operating mode	Change to parameterisation mode.
	More than 3 s	None (anytime possible)	Save parameter settings in the user memory of the memory module.
	Shortly	During operation	Scroll through information in the above status line.
	Shortly	Manual setpoint selection via keypad active. Display "MAN"	Change frequency setpoint.
	Shortly	Operating mode	Activate full keypad control Display "ON?" → Confirm with  Control and setpoint selection can now only be carried out via keypad. Renewed clicking: Exit full keypad control. Display "OFF?" → Confirm with 
	Shortly	Local keypad control active. Display "LOC"	Reversal of rotation direction. Display "REV?" → Confirm with 

Keypad parameterisation mode

Function of the keypad keys in the parameterisation mode

In the parameterisation mode of the keypad you can have actual values of the inverter displayed for purposes of diagnostics and change settings of the inverter.

Function of the keypad keys in the parameterisation mode			
Key	Actuation	Condition	Action
	Shortly	Local keypad control active. Display "LOC"	Run motor.
		Remote control active Display "REM" Display "KSTOP"	Deactivate keypad triggered stop. The motor remains at standstill. Display changes from "KSTOP" to "STOP".
	Shortly	No Jog operation	Stop motor. Display "KSTOP"
	Longer than 3 s	Parameterisation mode	Navigate to one level below. Group level → Parameter level → [SUB parameter level] → Editing mode
Editing mode		Exit editing mode and accept new setting.	
	Shortly	Parameterisation mode	Navigate to one level above. [SUB parameter level] → Parameter level → Group level → Operating mode
	Editing mode	Abort: Exit editing mode without accepting new setting.	
	Shortly	Group level/Parameter level	Navigate: Select group/parameter.
		Editing mode	Change parameter setting.
			Without function
			Without function
			Without function

Diagnostics and fault elimination

Diagnostic interfaces

Depending on the purchase order, the inverter will include one of the following modules:

- No module
- Keypad
- WLAN module
- USB module

Further information on the diagnostic modules can be found here: [Download](#)

Keypad





▶ Keypad  44

WLAN module

A connection to the WLAN module is established using the connection data.

Connection data (default settings)	
IP address	192.168.178.1
SSID	«Product type» «10-character identification code»
Password	password

LED status display

"RDY" LED (blue)	"ERR" LED (red)	Status/meaning
Off	Off	Supply voltage not available.
On	On	Initialisation in progress (inverter is being started.)
 Blinks (1 Hz)	Off	Safe torque off (STO) active. The inverter has been inhibited by the integrated safety system.
 Blinks (1 Hz)	On	Inverter inhibited, error active.
On	Off	Inverter enabled. Motor rotates according to the specified setpoint or quick stop is active.
 Both LEDs are blinking in a rapidly alternating mode		Firmware update active.
 Both LEDs are blinking in a very rapidly synchronous mode		"Visual tracking" function is active.

Technical data

Standards and operating conditions

Conformities and approvals

Conformities			
CE	2014/30/EU		EMC Directive (reference: CE-typical drive system)
	2014/35/EU		Low-Voltage Directive
EAC	TP TC 020/2011		Eurasian conformity: Electromagnetic compatibility of technical means
	TP TR 004/2011		Eurasian conformity: Safety of low voltage equipment
RoHS	2011/65/EU		Restrictions on the use of certain hazardous substances in electrical and electronic devices
Approvals			
UL	UL 61800-5-1		File No. E132659 for USA and Canada (requirements of the CSA 22.2 No. 274)

Protection of persons and device protection

Degree of protection			Information applies to the mounted and ready-for-use state
EN	EN 60529	IP20	
NEMA	NEMA 250	Type 1	
UL	UL 50		
Insulation resistance			
Overvoltage category	EN 61800-5-1	II	> 2000 m ü. NN
		III	0 ... 2000 m ü. NN
Insulation of control circuits			
	EN 61800-5-1	Safe mains isolation	double/reinforced insulation
Leakage current			
AC	EN 61800-5-1	> 3.5 mA	Please observe regulations and safety instructions!
DC		> 10 mA	
Starting current			
		≤ 3 x rated mains current	
Protective measures			
Earth fault resistance			Earth-fault protected depending on operating status
Motor stall protection			
Short-circuit strength			
Overvoltage resistance			
Overtemperature of motor			I ² xt monitoring

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, mains current ≤ 16 A	EN 61000-3-2	no additional measures	
< 1kW		with mains choke	
Mains current > 16 A	EN 61000-3-12	With mains choke or mains filter	When designed for rated power.
Noise emission			
Category C1	EN 61800-3		See rated data
Category C2			
Category C3			
Noise immunity			
	EN 61800-3	Requirements fulfilled	

Technical data

Standards and operating conditions

Electrical supply conditions

Motor connection

Requirements for the shielded motor cable			
Capacitance per unit length		< 150/300 pF/m	C core-core/C core-shield $\leq 4 \text{ mm}^2$ / AWG 12
		< 75/150 pF/m	C core-core/C core-shield $\leq 2.5 \text{ mm}^2$ / 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 $\geq 600 \text{ V}$ U = r.m.s. value from external conductor to external conductor

Environmental conditions

Energy efficiency			
High Efficiency	EN 50598-2	Class IE2	
Climate			
Storage	EN 60721-3-1	1K3 (-30 ... +60 °C)	
Transport	EN 60721-3-2	2K3 (-30 ... +70 °C)	
Operation	EN 60721-3-3	3K3 (-30 ... +55 °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
Site altitude			
0 ... 1000 m ü. NN			
1000 ... 4000 m ü. NN			Reduce rated output current by 5 %/1000 m
Pollution			
	EN 61800-5-1 UL 61800-5-1	Degree of pollution 2	
Vibration resistance			
Transport	EN 60721-3-2	2M2 (sine, shock)	in original packaging
Operation	EN 61800-5-1	Amplitude 0.075 mm	10 ... 57 Hz
		acceleration resistant up to 1 g	57 ... 150 Hz
	German Lloyd	Amplitude 1 mm acceleration resistant up to 0.7 g	5 ... 13.2 Hz 13.2 ... 100 Hz

Electrical supply conditions

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

1-phase mains connection 120 V

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).

Inverter			I51AP	
			137A	175A
Rated power	P _{rated}	kW	0.37	0.75
Rated power	P _{rated}	HP	0.5	1
Mains voltage range			1/PE AC 90 V ... 132 V, 45 Hz ... 65 Hz	
Output voltage			3 AC 0 - 230/240 V	
Rated mains current				
without mains choke		A	9.6	16.8
with mains choke		A	-	-
Apparent output power		kVA	0.9	1.6
Rated output current				
2 kHz		A	2.4	4.2
4 kHz		A	2.4	4.2
8 kHz		A	2.4	4.2
12 kHz		A	2.2	3.8
16 kHz		A	1.6	2.8
Power loss				
2 kHz		W	19	30
4 kHz		W	20	32
8 kHz		W	24	40
12 kHz		W	23	38
16 kHz		W	22	35
Cyclic mains switching			3 times per minute	
Brake chopper				
Max. output current			-	-
Min. Brake resistor			-	-
Max. shielded motor cable length				
without EMC category		m	30	-
Category C1 (2 kHz, 4 kHz, 8kHz)		m	-	-
Category C2 (2 kHz, 4 kHz, 8 kHz)		m	-	-
Category C3 (2 kHz, 4 kHz, 8 kHz)		m	-	-
Max. Unshielded motor cable length				
without EMC category		m	60	-

Technical data

1-phase mains connection 230/240 V

Rated data

1-phase mains connection 230/240 V

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).

Inverter			I51AP				
			137D	175D	211D	215D	222D
Rated power	P _{rated}	kW	0.37	0.75	1.1	1.5	2.2
Rated power	P _{rated}	HP	0.5	1	1.5	2	3
Mains voltage range			1/PE AC 170 V ... 264 V, 45 Hz ... 65 Hz				
Output voltage			3 AC 0 - 230/240 V				
Rated mains current							
without mains choke		A	5.7	10	14.3	16.7	22.5
with mains choke		A	-				
Apparent output power		kVA	0.9	1.6	2.3	2.6	3.6
Rated output current							
2 kHz		A	2.4	4.2	6	7	9.6
4 kHz		A	2.4	4.2	6	7	9.6
8 kHz		A	2.4	4.2	6	7	9.6
12 kHz		A	2.2	3.8	5.4	6.3	8.6
16 kHz		A	1.6	2.8	4	4.7	6.4
Power loss							
2 kHz		W	19	30	38	45	62
4 kHz		W	20	32	40	48	66
8 kHz		W	24	40	51	61	85
12 kHz		W	23	38	54	65	91
16 kHz		W	22	35	49	58	81
Cyclic mains switching			3 times per minute				
Brake chopper							
Max. output current			-				
Min. Brake resistor			-				
Max. shielded motor cable length							
without EMC category		m	30				
Category C1 (2 kHz, 4 kHz, 8kHz)		m	-				
Category C2 (2 kHz, 4 kHz, 8 kHz)		m	-				
Category C3 (2 kHz, 4 kHz, 8 kHz)		m	-				
Max. Unshielded motor cable length							
without EMC category		m	60		80		

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

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).

Inverter			I51AP				
			137D	175D	211D	215D	222D
Rated power	P _{rated}	kW	0.55	1.1	1.5	2.2	3
Rated power	P _{rated}	HP	0.75	1.5	2	3	4
Mains voltage range			1/PE AC 170 V ... 264 V, 45 Hz ... 65 Hz				
Output voltage			3 AC 0 - 230/240 V				
Rated mains current							
without mains choke		A	6.9	12	17.1	20	27.4
with mains choke		A	-				
Apparent output power		kVA	1.2	2.2	2.6	3.6	4.9
Rated output current							
2 kHz		A	2.9	5	7.2	8.4	11.5
4 kHz		A	2.9	5	7.2	8.4	11.5
Power loss							
2 kHz		W	30	38	45	62	79
4 kHz		W	32	40	48	66	84
Cyclic mains switching			3 times per minute				
Brake chopper							
Max. output current			-				
Min. Brake resistor			-				
Max. shielded motor cable length							
without EMC category		m	30				
Category C1 (2 kHz, 4 kHz, 8kHz)		m	-				
Category C2 (2 kHz, 4 kHz, 8 kHz)		m	-				
Category C3 (2 kHz, 4 kHz, 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

3-phase mains connection 230/240 V

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).

Inverter			I51AP							
			137D	175D	211D	215D	222D	230C	240C	
Rated power	P _{rated}	kW	0.37	0.75	1.1	1.5	2.2	3	4	
Rated power	P _{rated}	HP	0.5	1	1.5	2	3	4	5	
Mains voltage range			3/PE AC 195 V ... 264 V, 45 Hz ... 65 Hz							
Output voltage			3 AC 0 - 230/240 V							
Rated mains current										
without mains choke		A	3.9	6.4	7.8	9.5	13.6	15	20.6	
with mains choke		A	-							
Apparent output power		kVA	0.9	1.6	2.3	2.6	3.6	4.5	6.2	
Rated output current										
2 kHz		A	2.4	4.2	6	7	9.6	12	16.5	
4 kHz		A	2.4	4.2	6	7	9.6	12	16.5	
8 kHz		A	2.4	4.2	6	7	9.6	12	16.5	
12 kHz		A	2.2	3.8	5.4	6.3	8.6	10.8	14.9	
16 kHz		A	1.6	2.8	4	4.7	6.4	8	11	
Power loss										
2 kHz		W	19	30	38	45	62	79	102	
4 kHz		W	20	32	40	48	66	84	108	
8 kHz		W	24	40	51	61	85	109	140	
12 kHz		W	23	38	54	65	91	104	133	
16 kHz		W	22	35	49	58	81	104	133	
Cyclic mains switching			3 times per minute							
Brake chopper										
Max. output current			-							
Min. Brake resistor			-							
Max. shielded motor cable length										
without EMC category		m	30				50			
Category C1 (2 kHz, 4 kHz, 8kHz)		m	-							
Category C2 (2 kHz, 4 kHz, 8 kHz)		m	-							
Category C3 (2 kHz, 4 kHz, 8 kHz)		m	-							
Max. Unshielded motor cable length										
without EMC category		m	60			80		100		

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

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).

Inverter			I51AP						
			137D	175D	211D	215D	222D	230C	240C
Rated power	P _{rated}	kW	0.55	1.1	1.5	2.2	3	4	5.5
Rated power	P _{rated}	HP	0.75	1.5	2	3	4	5	7.5
Mains voltage range			3/PE AC 195 V ... 264 V, 45 Hz ... 65 Hz						
Output voltage			3 AC 0 - 230/240 V						
Rated mains current									
without mains choke		A	4.7	7.7	9.4	11.4	16.4	17.3	23.8
with mains choke		A	-						
Apparent output power		kVA	1.2	2.2	2.6	3.6	4.9	6.2	8.7
Rated output current									
2 kHz		A	2.9	5	7.2	8.4	11.5	14.4	19.8
4 kHz		A	2.9	5	7.2	8.4	11.5	14.4	19.8
Power loss									
2 kHz		W	30	38	45	62	79	102	137
4 kHz		W	32	40	48	66	84	108	145
Cyclic mains switching			3 times per minute						
Brake chopper									
Max. output current			-						
Min. Brake resistor			-						
Max. shielded motor cable length									
without EMC category		m	30				50		
Category C1 (2 kHz, 4 kHz, 8kHz)		m	-						
Category C2 (2 kHz, 4 kHz, 8 kHz)		m	-						
Category C3 (2 kHz, 4 kHz, 8 kHz)		m	-						
Max. Unshielded motor cable length									
without EMC category		m	60		80			100	

Technical data

3-phase mains connection 400 V

Rated data

3-phase mains connection 400 V

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).

Inverter			I51AP							
			175F	211F	215F	222F	230F	240F	255F	
Rated power	P _{rated}	kW	0.75	1.1	1.5	2.2	3	4	5.5	
Rated power	P _{rated}	HP	1	1.5	2	3	4	5	7.5	
Mains voltage range			3/PE AC 340 V ... 528 V, 45 Hz ... 65 Hz							
Output voltage			3 AC 0 - 400/480 V							
Rated mains current										
without mains choke		A	3.3	4.4	5.4	7.8	9.6	12.5	17.2	
with mains choke		A	-							
Apparent output power		kVA	1.6	2.1	2.6	3.8	4.9	6.4	8.7	
Rated output current										
2 kHz		A	2.4	3.2	3.9	5.6	7.3	9.5	13	
4 kHz		A	2.4	3.2	3.9	5.6	7.3	9.5	13	
8 kHz		A	2.4	3.2	3.9	5.6	7.3	9.5	13	
12 kHz		A	1.9	2.9	3.5	5	5.8	7.6	10.4	
16 kHz		A	1.4	2.1	2.6	3.7	4.9	6.3	8.7	
Power loss										
2 kHz		W	30	38	45	62	79	102	137	
4 kHz		W	32	40	48	66	84	108	145	
8 kHz		W	40	51	61	85	109	140	189	
12 kHz		W	38	54	65	91	104	133	180	
16 kHz		W	35	49	58	81	104	133	180	
Cyclic mains switching			3 times per minute							
Brake chopper										
Max. output current			-							
Min. Brake resistor			-							
Max. shielded motor cable length										
without EMC category		m	30				50			
Category C1 (2 kHz, 4 kHz, 8kHz)		m	-							
Category C2 (2 kHz, 4 kHz, 8 kHz)		m	-							
Category C3 (2 kHz, 4 kHz, 8 kHz)		m	-							
Max. Unshielded motor cable length										
without EMC category		m	60	80			100			

3-phase mains connection 400 V "Light Duty"

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).

Inverter			I51AP						
			175F	211F	215F	222F	230F	240F	255F
Rated power	P _{rated}	kW	1.1	1.5	2.2	3	4	5.5	7.5
Rated power	P _{rated}	HP	1.5	2	3	4	5	7.5	10
Mains voltage range			3/PE AC 340 V ... 528 V, 45 Hz ... 65 Hz						
Output voltage			3 AC 0 - 400/480 V						
Rated mains current									
without mains choke		A	4.5	5	6.1	8.7	10.3	14	18.3
with mains choke		A	-						
Apparent output power		kVA	2.1	2.6	3.6	4.9	6.4	8.7	11
Rated output current									
2 kHz		A	2.9	3.8	4.7	6.7	8.8	11.9	15.6
4 kHz		A	2.9	3.8	4.7	6.7	8.8	11.9	15.6
Power loss									
2 kHz		W	38	45	62	79	102	137	172
4 kHz		W	40	48	66	84	108	145	183
Cyclic mains switching			3 times per minute						
Brake chopper									
Max. output current			-						
Min. Brake resistor			-						
Max. shielded motor cable length									
without EMC category		m	30				50		
Category C1 (2 kHz, 4 kHz, 8kHz)		m	-						
Category C2 (2 kHz, 4 kHz, 8 kHz)		m	-						
Category C3 (2 kHz, 4 kHz, 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

3-phase mains connection 480 V

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).

Inverter			I51AP							
			175F	211F	215F	222F	230F	240F	255F	
Rated power	P _{rated}	kW	0.75	1.1	1.5	2.2	3	4	5.5	
Rated power	P _{rated}	HP	1	1.5	2	3	4	5	7.5	
Mains voltage range			3/PE AC 340 V ... 528 V, 45 Hz ... 65 Hz							
Output voltage			3 AC 0 - 400/480 V							
Rated mains current										
without mains choke		A	2.8	3.7	4.5	6.5	8	10.5	14.3	
with mains choke		A	-							
Apparent output power		kVA	1.7	2.4	2.8	3.9	5.1	6.6	8.9	
Rated output current										
2 kHz		A	2.1	3	3.5	4.8	6.3	8.2	11	
4 kHz		A	2.1	3	3.5	4.8	6.3	8.2	11	
8 kHz		A	2.1	3	3.5	4.8	6.3	8.2	11	
12 kHz		A	1.7	2.7	3.2	4.3	5	6.6	8.8	
16 kHz		A	1.3	2	2.3	3.2	4.2	5.5	7.3	
Power loss										
2 kHz		W	30	38	45	62	79	102	137	
4 kHz		W	32	40	48	66	84	108	145	
8 kHz		W	40	51	61	85	109	140	189	
12 kHz		W	38	54	65	91	104	133	180	
16 kHz		W	35	49	58	81	104	133	180	
Cyclic mains switching			3 times per minute							
Brake chopper										
Max. output current			-							
Min. Brake resistor			-							
Max. shielded motor cable length										
without EMC category		m	30				50			
Category C1 (2 kHz, 4 kHz, 8kHz)		m	-							
Category C2 (2 kHz, 4 kHz, 8 kHz)		m	-							
Category C3 (2 kHz, 4 kHz, 8 kHz)		m	-							
Max. Unshielded motor cable length										
without EMC category		m	60	80			100			

3-phase mains connection 480 V "Light Duty"

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).

Inverter			I51AP							
			175F	211F	215F	222F	230F	240F	255F	
Rated power	P _{rated}	kW	1.1	1.5	2.2	3	4	5.5	7.5	
Rated power	P _{rated}	HP	1.5	2	3	4	5	7.5	10	
Mains voltage range			3/PE AC 340 V ... 528 V, 45 Hz ... 65 Hz							
Output voltage			3 AC 0 - 400/480 V							
Rated mains current										
without mains choke		A	3.9	4.2	5.1	7.3	8.6	11.2	15.3	
with mains choke		A	-							
Apparent output power		kVA	2.4	2.8	3.9	5.1	6.6	8.9	11.3	
Rated output current										
2 kHz		A	2.5	3.6	4.2	5.8	7.6	9.8	13.2	
4 kHz		A	2.5	3.6	4.2	5.8	7.6	9.8	13.2	
Power loss										
2 kHz		W	38	45	62	79	102	137	172	
4 kHz		W	40	48	66	84	108	145	183	
Cyclic mains switching			3 times per minute							
Brake chopper										
Max. output current			-							
Min. Brake resistor			-							
Max. shielded motor cable length										
without EMC category		m	30				50			
Category C1 (2 kHz, 4 kHz, 8kHz)		m	-							
Category C2 (2 kHz, 4 kHz, 8 kHz)		m	-							
Category C3 (2 kHz, 4 kHz, 8 kHz)		m	-							
Max. Unshielded motor cable length										
without EMC category		m	60	80			100			

Environmental notes and recycling

Lenze has been certified according to the global environmental management standard (DIN EN) ISO 14001 for many years. As part of our environmental policy and the associated climate responsibility, please observe the following information on hazardous substances and the recycling of Lenze products and their packaging:



Lenze products are subject in part to EU Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic devices (RoHS). This is documented accordingly in the EU Declaration of Conformity and with the CE mark.



Lenze products are not subject to EU Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), but do sometimes contain batteries/rechargeable batteries in accordance with EU Directive 2006/66/EC (Battery Directive). The separate from domestic waste disposal route is shown by the corresponding labeling with the "crossed-out garbage can".

Any batteries/rechargeable batteries included are designed for the service life of the product and do not have to be replaced or otherwise removed by the end user.



Lenze products are usually sold with cardboard or plastic packaging. This packaging corresponds to EU Directive 94/62/EC on packaging and packaging waste (Packaging Directive). The required waste disposal route is shown by material-specific labeling with the "recycling triangle".
Example: "21 - Miscellaneous cardboard"

REACH

Lenze products are subject to the European Regulation EC No. 1907/2006 (REACH chemical regulation). When used as intended, exposure of substances to humans, animals and the environment is excluded.

Lenze products are industrial electrical and electronic products and are to be disposed of professionally. Both the mechanical and electrical components, such as electric motors, gearboxes, or inverters, contain valuable raw materials that can be recycled and reused. Proper recycling and thus maintaining the highest possible reusable materials cycle is therefore important and sensible from an economic and ecological point of view.

- Always coordinate professional waste disposal with your local waste disposal company.
- Separate mechanical and electrical components, packaging, hazardous waste (e.g. gearbox oils), and batteries/rechargeable batteries wherever possible.
- Dispose of the separated waste in an environmentally friendly and proper way (not with household waste or municipal bulky waste).



More information on Lenze's environmental and climate responsibility, as well as on the topic of energy efficiency, can be found on the Internet:

www.Lenze.com → search word: "Sustainability"

Lenze SE
Postfach 101352 · 31763 Hameln
Hans-Lenze-Straße 1 · 31855 Aerzen
GERMANY
Hannover HRB 204803
Phone +49 5154 82-0
Fax +49 5154 82-2800
sales.de@lenze.com
www.Lenze.com

Lenze Americas Repair
630 Douglas Street
Uxbridge, MA 01569
UNITED STATES
+1 508 278-9100
+1 800 217-9100 (toll free)
+1 508 278-6620
repair.us@lenze.com

