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Lenze

9300 vector frequency inverter 110 … 400 kW

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Whatever drive system you require - we will turn your plans into reality

Our “one-stop shop” enables us to offer you a complete range of reliable, high-performance electronic and mechanical drive products.
Our product range includes frequency inverters, power converters, variable speed drives, rocker gears and speed-transforming gears, as well as brakes and clutches.
This makes Lenze the ideal supplier for your applications - not only for individual components, but also for complete drive systems, from project planning to setup and commissioning.

In addition, our global service and distribution network provides local customer service as well as fast and comprehensive after sales service.
Our quality assurance system for development, production, sales and service is certified to DIN ISO 9001 : 2000.
Our environmental management system is also certified to DIN ISO 14001.
Our customers measure the quality of our products. It is our responsibility to meet their requirements. Our company policy, which places the customer at the centre of our focus, means that quality is always our top priority.

Why not find out for yourself?

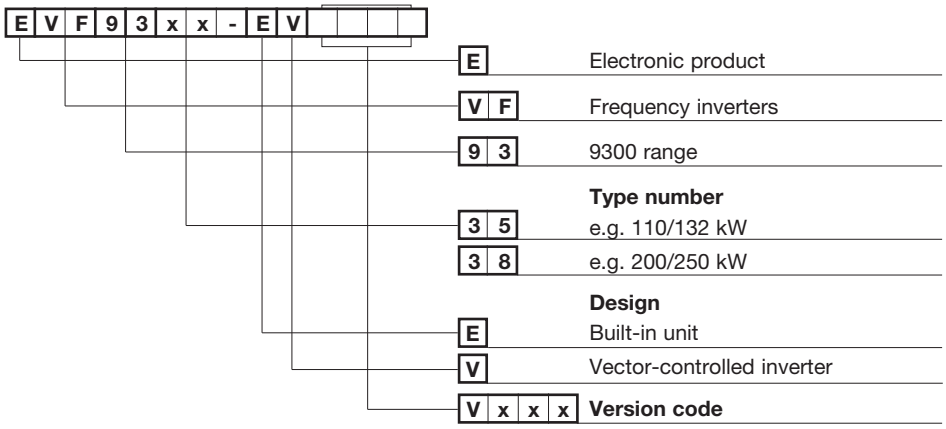
List of abbreviations/Type key

Abbreviations used in this catalog

U_{mains}	[V]	Mains voltage
I_{mains}	[A]	Mains current
I_r	[A]	Output current rating
I_{max}	[A]	Maximum output current
P_r	[kW]	Rated motor power
P_{loss}	[W]	Inverter power loss
M_r	[Nm]	Rated motor torque
L	[mH]	Inductance
R	[Ω]	Resistance

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

Type key



Lenze

Contents

Product information - 9300 vector

Lenze frequency inverters are used for the electronic speed control of three-phase asynchronous motors in numerous industries and applications. We offer seamless standard products with flexible application options,
quick and easy start-up, reliability
and of course a high level of quality. The 9300 vector is a vector-controlled frequency inverter which is ideally equipped even for complex applications. An excellent drive response - even without the use of speed feedback - and previously unimaginable options for open and closed-loop control tasks are just some of the features which make this frequency inverter so impressive.
Typical application options for the 9300 vector include extruders, winders, pumps, compressors, fans, blowers, sawing/cutting drives, textile machines or conveyors.

The range
- Frequency inverter for three-phase mains connection
- Power ranges
  400 V, 110 ... 400 kW
  400 V / 500 V, 110/132...400 / 500 kW

The 9300 vector frequency inverter is available
– With or without integrated RFI filter (threshold class A)
– With or without integrated brake transistor
A complementary range of accessories completes the offer.

Stable, safe and precise processes due to excellent drive response
- Can be overloaded with 150% torque
- 100% holding torque at speed 0 (with feedback)
- Speed control range 1 : 100 (1 : 1000 with feedback)
- High speed stability
- Rapid adjustment of the speed on load changes
- Torque setting range up to 1 : 10 (1 : 20 with feedback)
- Rapid reactions - scan time for digital inputs 1 ms

Adaptability
The selectable form of the U/f characteristic enables the frequency inverter to be adapted to loads with constant or square-law torque. The integrated flying restart circuit enables the machine to be restarted even if the shaft is still rotating.

Operational reliability
An adjustable slip compensation function compensates load-dependent speed deviations without complex speed feedback. The maximum speed limit ensures stable operation at all times with static and dynamic loads.

Energy-saving
The power is adapted to the drive requirements, i.e. the momentary torque and current requirements.

Ease of device connection
Screw-type terminal blocks for digital/analog inputs and outputs (pull-out terminal blocks) and SUB-D sockets for feedback and master frequency signals ensure that control signals can be connected quickly, easily and with protection against polarity reversal. All connections can be accessed easily from outside the unit.

Ready for immediate operation
The frequency inverters are preset for standard operation.
The following parameters are also preset:
- Controlled acceleration and deceleration due to preset ramp times
- Assignment of standard functions to inputs and outputs

For complex applications, predefined basic configurations are available (e.g. for dancer positioning control, torque control, laying control, master frequency connection).

User-friendly
A wide variety of topic-related and application-specific menus are sure to help you solve your drive task and find the parameters required for it. Example: All the basic settings for standard applications can be made using the 32 parameters in the “User” menu. However, the “User” menu can also be customised by modifying and configuring parameters.

Easy operation
The 9300 vector frequency inverter can be adapted quickly and easily to individual requirements using the PC and the “Global Drive Control” parameter setting/operating software. Simple dialogue boxes (e.g. for quick start-up) facilitate the process. Alternatively, a plug-on operating module is available.

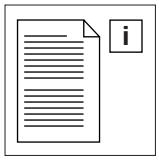
The correct setpoint source for every application
- Via setpoint potentiometer on the control current on the control terminals
- Via master reference voltage or master reference current on the control terminals
- Via digital frequency input
- Via the operating module
- Via a communication module directly from a host system.

Communication
The frequency inverters communicate with a higher-level host system via plug-on communication modules.

- LECOM-A/B (RS232/485)
- LECOM-LI (optical fibres)
- INTERBUS
- INTERBUS Loop
- PROFIBUS-DP
- DeviceNet/CANopen
- LON

A system bus interface (CAN) is provided on the frequency inverter as standard. This enables for example bus connections to be made between several Lenze inverters and automation components, with little cabling required.

Open and closed-loop control free of charge
More than 100 freely connectable function blocks such as PID controllers, flipflops, counters, comparators, delay elements, logic and mathematical functions are available. This enables the 9300 vector to perform other open and closed-loop control functions in addition to the actual drive task in the same way as a PLC. This reduces the load on - or even eliminates the need for - higher-level control systems, free of charge! Furthermore, the freely assignable function blocks mean that the 9300 vector can be integrated in machine, system and control concepts easily and without compromise.



Ordering data - 9300 vector

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

- Your address and ordering data
- Our order numbers/designations for each catalogue product
- Your delivery data, i.e. delivery date and delivery address

How to order

Ordering a frequency inverter is extremely easy:

- Make a photocopy of the fax order form which you will find on the last page of this catalogue. (⇨ page 61 ff).
- Enter the order data.

  Use the following pages to help you:

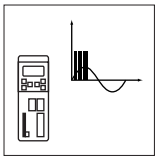
  Selection of frequency inverters
  – For 400 V mains ⇨ pages 14 to 17
  – For 500 V mains ⇨ pages 18 and 19
  – For DC supply or DC bus connection ⇨ pages 16 to 19

  Selection of accessories
  – Motor chokes e.g. on
    • Long motor cable ⇨ page 48 ff.
    • Parallel connection of EVF9381/9382/9383 ⇨ page 25
  – Air lock for direct heat dissipation from the control cabinet ⇨ page 50
  – Communication modules for networking and operation ⇨ pages 34 ff.
  – Overview of accessories ⇨ page 58 ff.

- Post or fax the form to your Lenze sales office. A list of Lenze sales offices can be found on the last two pages or on the Internet (www.lenze.com).

Delivery

- All products are individually packed and checked prior to delivery.
- Orders are subject to the general terms of sale and delivery of Lenze Drive Systems GmbH:
  – Terms of delivery: Ex works according to the delivery method specified, excluding packaging.
  – Discount: If invoice is settled within 10 days 2%, 30 days net.



Design - 9300 vector

Product features

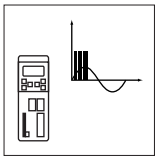
A versatile frequency inverter for three-phase mains connection available in two designs:

- 3 ~ 400 V, 110…400 kW
- 3 ~ 400 V / 500 V, 110 / 132… 400 / 500 kW

Product features (selection)

Incremental encoder input (connection of a feedback system)
Master frequency input/output (e.g. precise, speed synchronous control of multiple motor systems)
System bus interface (CAN)
7 digital inputs (6 can be freely assigned)
4 digital outputs (can be freely assigned)
2 bipolar analog inputs
2 bipolar analog outputs (can be freely assigned)
Level inversion of digital inputs/outputs
Optional inverse setpoint processing
Input for PTC or thermal contact
Integrated DC bus choke (mains choke not required)
Optional integrated brake transistor
Optional integrated RFI filter (threshold class A)
U/f characteristic control (linear or quadratic) can be selected
Sensorless speed control
Slip compensation
150 % rated torque for 60 s
Adjustable current limitation
Torque control
Predefined basic configurations (e.g. for dancer positioning control, torque control, laying control, step control)
Freely assignable function blocks (logic, arithmetic, flipflop, counter, etc.)
Automatic detection of motor parameters (at standstill)
2 PID controllers
Smooth start/stop along S ramps
Flying restart with coasting motor
3 skip frequencies (elimination of mechanical resonances)
4 parameter sets
Up to 15 fixed speeds per parameter set
Password protection

Note:
More frequency inverter types such as the 8200 vector range are available for the power range 0.25…90 kW.

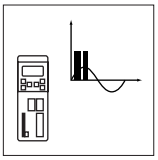


Product features (selection)

Electronic motor potentiometer
DC braking
Error log memory
Motor phase failure monitoring
Mains failure control
Chopper frequency of 1, 2 or 4 kHz
Output frequency up to 300 Hz
TRIP set and TRIP reset functions
Connection for DC supply or DC bus operation (only types EVF93xx-EV**V210**, EVF93xx-EV**V240**, EVF93xx-EV**V270**, EVF93xx-EV**V300**)

Communication modules
Keypad XT operating module for control and parameter setting with memory for parameter transfer (copy function)
LECOM-A/B (RS232/485)
LECOM-LI (optical fibres)
INTERBUS
INTERBUS Loop
PROFIBUS-DP
DeviceNet/CANopen
LON

Note:
More frequency inverter types such as the 8200 vector range are available for the power range 0.25…90 kW.



Standards and operating conditions

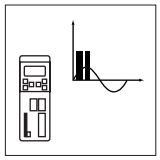
Conformity	CE	Low voltage directive (73/23/EEC)	
Max. permissible motor cable length [1] (without additional output wiring)	Shielded: Unshielded	100 m 200 m	
Max. permissible motor cable length (with motor choke)	Shielded: Unshielded	200 m 400 m	Observe the operating conditions of the motor choke (see page 48)
Vibrational stability	EN 50178		
Climatic conditions	Class 3K3 to EN 50178 (without condensation, average relative humidity 85%)		
Pollution degree	VDE 0110 Part 2 pollution degree 2		
Packaging (DIN 4180)	Shipping container		
Permissible temperature ranges	Transport	-25 °C…+70 °C	
	Storage	-20 °C…+60 °C	
	Operation	0°C…+50°C at over +40°C the rated output current should be reduced by 2.5%/°C (With EVF9335-EV types, current derating is not required)	
Permissible installation height	0... 4000 m above sea level at over 1000 m above sea level the rated output current should be reduced by 5%/1000 m		
Mounting position	Vertical		
Mounting clearances	Above and below: see page 20		
	To the side: see page 20		
DC bus connection	Supported by: EVF93xx-EV**V210**, EVF93xx-EV**V240**, EVF93xx-EV**V270**, EVF93xx-EV**V300**		
Protection of the connected motor	In order to avoid shaft currents, we recommend the use of motors with isolated output shaft. Motor chokes are an alternative method of reducing shaft currents (see page 48).		

[1] Permissible cable lengths may be affected by other EMC conditions that have to be met.

General electrical data

EMC	Compliance with requirements to EN 61800-3/A11		
Noise emissions	Compliance with threshold class A to EN 55011		
	• Only with integrated RFI filter (optional) • Max. permissible motor cable length: 50 m, shielded		
Noise immunity	Requirements to EN 61800-3 incl. A11		
	Requirements	**Standard**	**Intensity of tests**
	ESD	EN 61000-4-2	3, i.e. 8 kV with air discharge 6 kV with contact discharge
	Line-bound HF interference	EN 61000-4-6	150 kHz...80 MHz, 10 V/m 80% AM (1 kHz)
	HF irradiated interference (housing)	EN 61000-4-3	80 MHz...1000 MHz, 10 V/m 80% AM (1 kHz)
	Burst	EN 61000-4-4	3/4, i.e. 2 kV/5 kHz
	Surge (voltage surge on mains cable)	EN 61000-4-5	3, i.e. 1.2/50 µs, 1 kV phase-phase, 2 kV phase-PE
Insulation strength	Overvoltage category III to VDE 0110		
Leakage current to PE (to EN 50178)	> 3.5 mA		
Degree of protection	IP 20		
Protective measures against	Short circuit, short to earth (protected against short to earth during operation, limited protection against short to earth short to earth when switching on the mains supply), overvoltage, overcurrent, motor stalling, motor overtemperature (input for PTC or thermal contact, I^2t monitoring)		
Total insulation of control circuits	Mains isolation: Double/reinforced insulation to EN 50178 for digital inputs and outputs		
Cooling	Internal fan (volume flow: 975 m^3/hr per unit), Flow direction from bottom to top [1]		

[1] We recommend the use of air locks for dissipating heat loss from the control cabinet (see page 50).



Open and closed-loop control

Control methods		U/f characteristic control (linear/square), vector control
Chopper frequency		1 kHz, 2 kHz or 4 kHz
Torque characteristics	Holding torque	1.0 x M_r (with feedback)
	Maximum torque	1.5 x M_r for 60 s, if rated motor power = rated power of 9300 vector
	Setting range	up to 1 : 10 (1 : 20 with feedback) in speed control range 3…50 Hz
Sensorless speed control	min. motor speed	1% rated motor speed (0... M_r)
	Setting range	1 : 100 (related to 50 Hz and M_N)
	Accuracy	± 0.5 % in speed range 3... 50 Hz
Speed control with feedback	Min. motor speed	0 % rated motor speed (0... M_r)
	Setting range	1 : 1,000 (related to 50 Hz and M_N)
	Accuracy	± 0.1 % in speed range 3... 50 Hz
Output frequency	Range	-300 Hz... +300 Hz
	Absolute resolution	0.06 Hz
	Normalised resolution	Parameter data: 0.01 %, Process data: 0,006 % (= 2^{14})
Digital setpoint preselection	Accuracy	± 0.005 Hz (= ± 100 ppm)
Analog setpoint preselection	Linearity	± 0.15% Signal level: 5 V or 10 V
	Temperature sensitivity	+ 0.1 % 0 … 50°C
	Offset	± 0 %

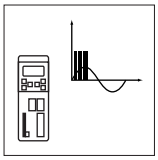
Inputs and outputs

Analog inputs/outputs		• 2 inputs (bipolar) • 2 outputs (bipolar)
Digital inputs/outputs		• 6 inputs (can be freely assigned) • 1 input for controller inhibit • 4 outputs (can be freely assigned) • 1 incremental encoder input (500 kHz, TTL level); version: 9-pin SUB-D connector • 1 master frequency input (500 kHz, TTL level or 200 kHz, HTL level); version: 9-pin SUB-D connector; can alternatively be used as an incremental encoder input (200 kHz, HTL level) • 1 master frequency output (500 kHz, TTL level); version: 9-pin SUB-D socket
Scan time	Digital inputs	1 ms
	Digital outputs	1 ms
	Analog inputs	1 ms
	Analog outputs	1 ms (filter time: τ = 10 ms)
Generator mode		Integrated brake transistor (optional)

Design - 9300 vector

Ratings at 400 V mains voltage

Typical motor power		**P_r [kW]**	**110**	**132**	**160**	**200**
		P_r [hp]	148	177	215	268
9300 vector		**Type/ Order ref.**	**EVF9335-EV**	**EVF9336-EV**	**EVF9337-EV**	**EVF9338-EV**
9300 vector with integrated RFI filter A		**Type/ Order ref.**	**EVF9335-EVV030**	**EVF9336-EVV030**	**EVF9337-EVV030**	**EVF9338-EVV030**
9300 vector with integrated brake transistor		**Type/ Order ref.**	**EVF9335-EVV060**	**EVF9336-EVV060**	**EVF9337-EVV060**	**EVF9338-EVV060**
9300 vector with integrated RFI filter A with integrated brake transistor		**Type/ Order ref.**	**EVF9335-EVV110**	**EVF9336-EVV110**	**EVF9337-EVV110**	**EVF9338-EVV110**
Mains voltage range		U_{mains} [V]	3/PE 340 V AC 0%... 456 V + 0% (45 Hz - 0%... 65 Hz + 0%)			
Alternative DC supply		U_{DC} [V]	Not possible (see page 16)			
			Data for operation on 3/PE 400 V AC			
Rated mains current		I_{mains} [A]	200	238	285	356
Rated output current at a chopper frequency of...	1 kHz	I_{r1} [A]	210	250	300	375
	2 kHz	**I_{r2} [A]**	**210**	**250**	**300**	**375**
	4 kHz	I_{r4} [A]	210	250	270	330
Max. permissible output current for 60 s at a chopper frequency of…	1 kHz	I_{max1} [A]	315	375	450	560
	2 kHz	**I_{max2} [A]**	**315**	**375**	**450**	**560**
	4 kHz	I_{max4} [A]	315	375	405	495
Power loss		P_{loss} [kW]	2.8	3.3	4	5
Dimensions H x W x D		[mm]	1145 x 500 x 436			
Weight		m [kg]	160			200
Weight with integrated RFI filter A		m [kg]	175			215



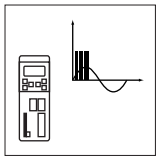
Typical motor power		P_r [kW]	250	315	400
		P_r [hp]	335	422	536
9300 vector		**Type/ Order ref.**	**EVF9381-EV**	**EVF9382-EV**	**EVF9383-EV**
9300 vector with integrated RFI filter A		**Type/ Order ref.**	**EVF9381-EVV030**	**EVF9382-EVV030**	**EVF9383-EVV030**
9300 vector with integrated brake transistor		**Type/ Order ref.**	**EVF9381-EVV060**	**EVF9382-EVV060**	**EVF9383-EVV060**
9300 vector with integrated RFI filter A with integrated brake transistor		**Type/ Order ref.**	**EVF9381-EVV110**	**EVF9382-EVV110**	**EVF9383-EVV110**
Mains voltage range		U_{mains} [V]	3/PE 340 V AC 0%... 456 V + 0% (45 Hz - 0%... 65 Hz + 0%)		
Alternative DC supply		U_{DC} [V]	Not possible (see page 17)		
			Data for operation on 3/PE 400 V AC		
Rated mains current		I_{mains} [A]	475	570	713
Rated output current at a chopper requency of...	1 kHz	I_{r1} [A]	500	600	750
	2 kHz	**I_{r2} [A]**	**500**	**600**	**750**
	4 kHz	I_{r4} [A]	500	540	660
Max. permissible output current for 60 s at a chopper frequency of…	1 kHz	I_{max1} [A]	750	900	1125
	2 kHz	**I_{max2} [A]**	**750**	**900**	**1125**
	4 kHz	I_{max4} [A]	750	810	990
Power loss		P_{loss} [kW]	6.6	8	10
Dimensions H x W x D		[mm]	1145 x 1050 x 436 [1]		
Weight		m [kg]	320		400
Weight with integrated RFI filter A		m [kg]	350		430

[1] Device consists of two units (master and slave) connected in parallel. The components required for parallel connection (DC connection kit) are included in the scope of supply. The device should be mounted with a clearance of 50 mm at the side.

Note:

- The currents listed are total currents for master **and** slave.

Master Slave

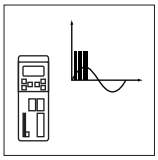


Design - 9300 vector

Ratings at 400 V mains voltage

Typical motor power		**P_r [kW]**	**110**	**132**	**160**	**200**
		P_r [hp]	148	177	215	268
9300 vector		**Type/ Order ref.**	**EVF9335-EVV210**	**EVF9336-EVV210**	**EVF9337-EVV210**	**EVF9338-EVV210**
9300 vector with integrated RFI filter A		**Type/ Order ref.**	**EVF9335-EVV240**	**EVF9336-EVV240**	**EVF9337-EVV240**	**EVF9338-EVV240**
9300 vector with integrated brake transistor		**Type/ Order ref.**	**EVF9335-EVV270**	**EVF9336-EVV270**	**EVF9337-EVV270**	**EVF9338-EVV270**
9300 vector with integrated RFI filter A with integrated brake transistor		**Type/ Order ref.**	**EVF9335-EVV300**	**EVF9336-EVV300**	**EVF9337-EVV300**	**EVF9338-EVV300**
Mains voltage range		U_{mains} [V]	3/PE 340 V AC 0%... 577 V + 0% (45 Hz - 0%... 65 Hz + 0%)			
Alternative DC supply		U_{DC} [V]	480 V DC 0%... 800 V +0%			
			Data for operation at 3/PE 400 V AC or 565 V DC			
Rated mains current		I_{mains} [A]	200	238	285	356
Rated output current at a chopper frequency of...	1 kHz	I_{r1} [A]	210	250	300	375
	2 kHz	**I_{r2} [A]**	**210**	**250**	**300**	**375**
	4 kHz	I_{r4} [A]	210	250	270	330
Max. permissible output current for 60 s at a chopper frequency of…	1 kHz	I_{max1} [A]	315	375	450	560
	2 kHz	**I_{max2} [A]**	**315**	**375**	**450**	**560**
	4 kHz	I_{max4} [A]	315	375	405	495
Power loss		P_{loss} [kW]	2.8	3.3	4	5
Dimensions H x W x D		[mm]	1145 x 500 x 436			
Weight		m [kg]	160			200
Weight with integrated RFI filter A		m [kg]	175			215

Note:
Other inverters in the 9300 range (servo or vector) can also be used for the DC supply or DC bus connection in the models shown on these pages.



Typical motor power		**P_r [kW]**	**250**	**315**	**400**
		P_r [hp]	335	422	536
9300 vector		**Type/ Order ref.**	**EVF9381-EVV210**	**EVF9382-EVV210**	**EVF9383-EVV210**
9300 vector with integrated RFI filter A		**Type/ Order ref.**	**EVF9381-EVV240**	**EVF9382-EVV240**	**EVF9383-EVV240**
9300 vector with integrated brake transistor		**Type/ Order ref.**	**EVF9381-EVV270**	**EVF9382-EVV270**	**EVF9383-EVV270**
9300 vector with integrated RFI filter A with integrated brake transistor		**Type/ Order ref.**	**EVF9381-EVV300**	**EVF9382-EVV300**	**EVF9383-EVV300**
Mains voltage range		U_{mains} [V]	3/PE 340 V AC 0%... 577 V + 0% (45 Hz - 0%... 65 Hz + 0%)		
Alternative DC supply		U_{DC} [V]	480 V DC 0%... 800 V +0%		
			Data for operation at 3/PE 400 V AC or 565 V DC		
Rated mains current		I_{mains} [A]	475	570	713
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	4 kHz	I_{max4} [A]	750	810	990
Power loss		P_{loss} [kW]	6.6	8	10
Dimensions H x W x D		[mm]	1145 x 1050 x 436 [1]		
Weight		m [kg]	320		400
Weight with integrated RFI filter A		m [kg]	350		430

[1] Device consists of two units (master and slave) connected in parallel. The components required for parallel connection (DC connection kit) are included in the scope of supply. The device should be mounted with a clearance of 50 mm at the side.

Master Slave

Note:

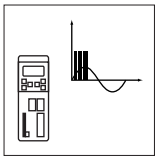
- The currents listed are total currents for master **and** slave.
- Other inverters in the 9300 range (servo or vector) can also be used for the DC supply or DC bus connection in the models shown on these pages.

Design - 9300 vector

Ratings at 500 V mains voltage

Typical motor power		P_r [kW]	132	160	200	250
		P_r [hp]	177	215	268	335
9300 vector		**Type/ Order ref.**	**EVF9335-EVV210**	**EVF9336-EVV210**	**EVF9337-EVV210**	**EVF9338-EVV210**
9300 vector with integrated RFI filter A		**Type/ Order ref.**	**EVF9335-EVV240**	**EVF9336-EVV240**	**EVF9337-EVV240**	**EVF9338-EVV240**
9300 vector with integrated brake transistor		**Type/ Order ref.**	**EVF9335-EVV270**	**EVF9336-EVV270**	**EVF9337-EVV270**	**EVF9338-EVV270**
9300 vector with integrated RFI filter A with integrated brake transistor		**Type/ Order ref.**	**EVF9335-EVV300**	**EVF9336-EVV300**	**EVF9337-EVV300**	**EVF9338-EVV300**
Mains voltage range		U_{mains} [V]	3/PE 340 V AC 0%... 577 V + 0% (45 Hz - 0%... 65 Hz + 0%)			
Alternative DC supply		U_{DC} [V]	480 V DC 0%... 800 V +0%			
			Data for operation at 3/PE 500 V AC or 705 V DC			
Rated mains current		I_{mains} [A]	200	238	285	356
Rated output current at a chopper frequency of...	1 kHz	I_{r1} [A]	210	250	300	375
	2 kHz	**I_{r2} [A]**	**210**	**250**	**300**	**375**
	4 kHz	I_{r4} [A]	210	250	270	330
Max. permissible output current for 60 s at a chopper frequency of…	1 kHz	I_{max1} [A]	315	375	450	560
	2 kHz	**I_{max2} [A]**	**315**	**375**	**450**	**560**
	4 kHz	I_{max4} [A]	315	375	405	495
Power loss		P_{loss} [kW]	3	3.5	4.3	5.3
Dimensions H x W x D		[mm]	1145 x 500 x 436			
Weight		m [kg]	160			200
Weight with integrated RFI filter A		m [kg]	175			215

Note:
Other inverters in the 9300 range (servo or vector) can also be used for the DC supply or DC bus connection in the models shown on these pages.



Typical motor power		P_r [kW]	315	400	500
		P_r [hp]	422	536	671
9300 vector		**Type/ Order ref.**	**EVF9381-EVV210**	**EVF9382-EVV210**	**EVF9383-EVV210**
9300 vector with integrated RFI filter A		**Type/ Order ref.**	**EVF9381-EVV240**	**EVF9382-EVV240**	**EVF9383-EVV240**
9300 vector with integrated brake transistor		**Type/ Order ref.**	**EVF9381-EVV270**	**EVF9382-EVV270**	**EVF9383-EVV270**
9300 vector with integrated RFI filter A with integrated brake transistor		**Type/ Order ref.**	**EVF9381-EVV300**	**EVF9382-EVV300**	**EVF9383-EVV300**
Mains voltage range		U_{mains} [V]	3/PE 340 V AC 0%... 577 V + 0% (45 Hz - 0%... 65 Hz + 0%)		
Alternative DC supply		U_{DC} [V]	480 V DC 0%... 800 V +0%		
			Data for operation at 3/PE 500 V AC or 705 V DC		
Rated mains current		I_{mains} [A]	475	570	713
Rated output current at a chopper frequency of...	1 kHz	I_{r1} [A]	500	600	750
	2 kHz	**I_{r2} [A]**	**500**	**600**	**750**
	4 kHz	I_{r4} [A]	500	540	660
Max. permissible output current for 60 s at a chopper frequency of…	1 kHz	I_{max1} [A]	750	900	1125
	2 kHz	**I_{max2} [A]**	**750**	**900**	**1125**
	4 kHz	I_{max4} [A]	750	810	990
Power loss		P_{loss} [kW]	7	8.6	10.6
Dimensions H x W x D		[mm]	1145 x 1050 x 436 [1]		
Weight		m [kg]	320		400
Weight with integrated RFI filter A		m [kg]	350		430

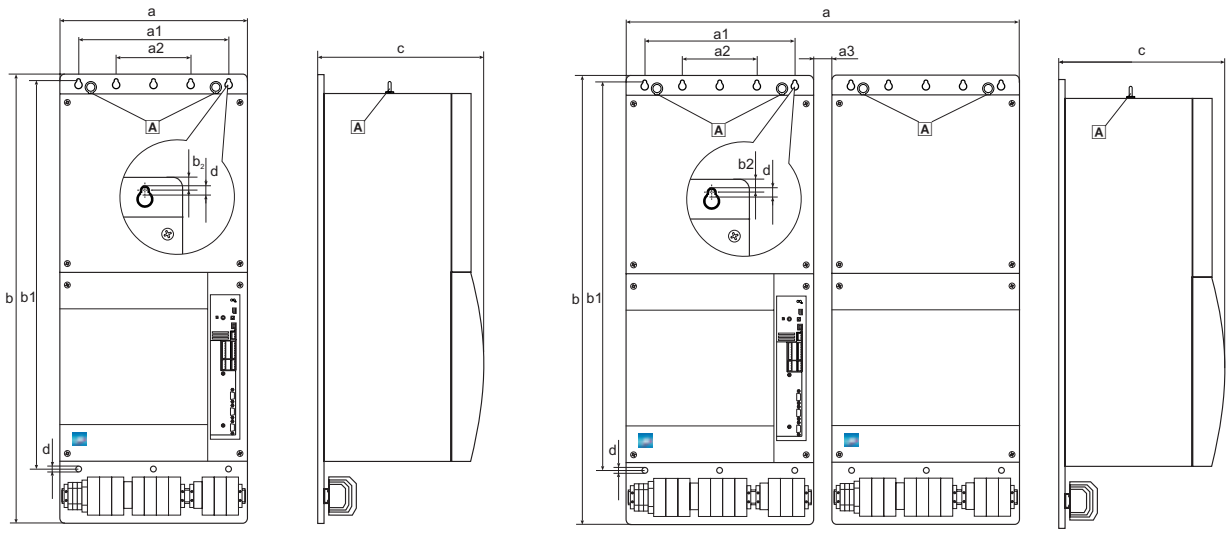
[1] Device consists of two units (master and slave) connected in parallel. The components required for parallel connection (DC connection kit) are included in the scope of supply. The device should be mounted with a clearance of 50 mm at the side.

Master Slave

Note:

- The currents listed are total currents for master **and** slave.
- Other inverters in the 9300 range (servo or vector) can also be used for the DC supply or DC bus connection in the models shown on these pages.

Fastening



A Lifting rings for the frequency inverter

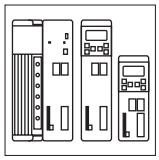
9300 vector	Dimensions [mm]								
Type	a	a_1	a_2	a_3	b	b_1	b_2	c	d
EVF9335-EV	500	450	225	–	1145	1005	15	436	9 (8x)
EVF9336-EV									
EVF9337-EV									
EVF9338-EV									
EVF9381-EV	1050	450	225	50	1145	1005	15	436	9 (16x)
EVF9382-EV									
EVF9383-EV									

Mounting clearances

Observe the specified clearances to ensure sufficient cooling for the frequency inverter.

Clearance	Minimum distance
On the left/right to another inverter	30 mm
On the left/right to a wall that does not dissipate heat	100 mm
Above/below 1)	200 mm

1) If you are using an air lock (accessories, see page 50), you must allow specific clearance between the device and the control cabinet (see air lock installation guidelines).



Fuses and cable cross-sections for the mains supply

The following fuses (utilisation category gG/gL) can be used with the appropriate cable cross sections to protect the mains cable:

9300 vector Type	**Fuse** VDE		**Cable cross-section** [mm²] [1] L1, L2, L3		PE	
EVF9335-EV	250 A		150		95	
EVF9336-EV	315 A		150		95	
EVF9337-EV	315 A		150		95	
EVF9338-EV	400 A		240		150	
	Master [2]	Slave [2]	Master [2]	Slave [2]	Master [2]	Slave [2]
EVF9381-EV	315 A	315 A	150	150	95	95
EVF9382-EV	315 A	315 A	150	150	95	95
EVF9383-EV	400 A	400 A	240	240	150	150

Please observe national and regional regulations

[1] The cable cross-sections listed are recommendations based on installation in accordance with EN 60204-1
- The clearance between the cables and the control cabinet must equate to at least one cable cross-section
- Max. ambient temperature 40°C

[2] Separate power supplies must be used for both the master and the slave

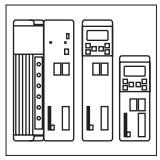
Note:
The frequency inverter can only be protected using semiconductor fuses (utilisation class gRL).

Standard fuses and suitable holders (e.g. isolators or holders) may be used if they have suitable features.

We recommend the following LV fuses and LVHRC fuses manufactured by Siba (www.siba.de) in accordance with DIN 43 620:

LV fuse [1]			**LVHRC fuse**	**Size**
Current rating [A]	Voltage [V]	Siba order ref.	Siba order ref.	LV
250	690	20 211 34.250	21 003 21	1
315		20 212 34.315	21 004 21	2
400		20 213 34.400	21 005 21	3

[1] Semiconductor fuse (utilisation class gRL, rated breaking capacity 100 kA)



Fuses and cable cross-sections for the DC supply

Other inverters from Lenze's 9300 device range (servo or vector) can be used for the DC supply or DC bus connection on EVF93xx-EV**V210**, EVF93xx-EV**V240**, EVF93xx-EV**V270** and EVF93xx-EV**V300** 9300 frequency inverters.

Semiconductor fuses (utilisation category gRL) are required to protect the DC cables and the frequency inverter.
We recommend the following fuses with appropriate cable cross-sections.

9300 vector Type	**Fuse** VDE		**Cable cross-section** [mm²] 1) $+U_G$, $-U_G$		PE	
EVF9335-EV	315 A		150		95	
EVF9336-EV	350 A		150		95	
EVF9337-EV	400 A		240		95	
EVF9338-EV	500 A		240		150	
	Master 2)	Slave 2)	Master 2)	Slave 2)	Master 2)	Slave 2)
EVF9381-EV	350 A	350 A	150	150	95	95
EVF9382-EV	400 A	400 A	240	240	95	95
EVF9383-EV	500 A	500 A	240	240	150	150

Please observe national and regional regulations

1) The cable cross-sections listed are based on installation in accordance with EN 60204-1
- The cables should be located at least one cable cross-section away from the control cabinet
- Max. ambient temperature 40°C

2) Separate power supplies must be used for both the master and the slave

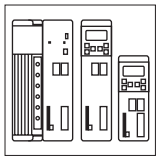
Note: Use a bipolar fuse for the DC cable ($+U_G$, $-U_G$).

Standard fuses and suitable holders (e.g. isolators or holders) may be used if they have suitable features.

We recommend the following LV fuses and LVHRC fuses manufactured by Siba (www.siba.de) in accordance with DIN 43 620:

LV fuse 1)			**LVHRC fuse**	**Size**
Current rating [A]	Voltage [V]	Siba order ref.	Siba order ref. [V]	LV
315	690	20 212 34.315	21 004 21	2
350		20 213 34.350	21 005 21	3
400		20 213 34.400	21 005 21	3
500		20 213 34.500	21 005 21	3

1) Semiconductor fuse (utilisation class gRL, rated breaking capacity 100 kA)



Electrical installation - 9300 vector

Notes for laying out the mains cable and motor cable

General

- Both multi-wire cables and single-cores can be used.
- If the cable comprises a number of wires per phase, it may be necessary to use standard cable junctions for the frequency inverter connection.

Cable cross-sections

- Maximum connectable cable cross-section for power terminals (screw terminals)

9300 vector Type	Maximum connectable cable cross-section [mm²]					
	L1, L2, L3, BR1, BR2, U, V, W		$+U_G$, $-U_G$		PE	
EVF9335-EV	150 (2 x 50) [1]		150 (2 x 50) [1]		95	
EVF9336-EV	150 (2 x 50) [1]		150 (2 x 50) [1]		95	
EVF9337-EV	150 (2 x 50) [1]		240 (2 x 95) [1]		95	
EVF9338-EV	240 (2 x 95) [1]		240 (2 x 95) [1]		150	
	Master	Slave	Master	Slave	Master	Slave
EVF9381-EV	150 (2 x 50) [1]	150 (2 x 50) [1]	150 (2 x 50) [1]	150 (2 x 50) [1]	95	95
EVF9382-EV	150 (2 x 50) [1]	150 (2 x 50) [1]	240 (2 x 95) [1]	240 (2 x 95) [1]	95	95
EVF9383-EV	240 (2 x 95) [1]	240 (2 x 95) [1]	240 (2 x 95) [1]	240 (2 x 95) [1]	150	150

[1] Multi-conductor connection (two conductors with the same cross-section)

- The actual cable cross-section required can be determined e.g. by the application, the ambient and operating conditions or the type of cable used.

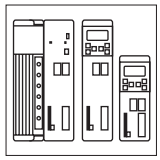
The same cable cross-sections do not have to be used for the input and output.
Important: When laying out cables, ensure adherence to national and local regulations.

Mains cable/DC cable

- The mains cable does not have to be shielded.
- We recommend the use of shielded DC cables for DC bus connections and DC supplies.

Motor cable

- A fuse is not required for the motor cable.
- For reasons of EMC, we recommend the use of shielded motor cables.
- Bruns Spezialkabel (www.brunskabel.de) are among the suppliers of shielded cables.
- Use standard metal clips to connect the motor cable shield.



EVF93**81**-EV, EVF93**82**-EV and EVF93**83**-EV frequency inverters comprise two units (master and slave).

Following mechanical installation, the master and slave are connected electrically (parallel connection):

Connecting the DC bus voltage

The DC bus voltage is connected via two DC connecting bars. The bars and corresponding screws are part of the scope of supply (DC connection kit).

Important:
You must ensure the correct mounting distance between the master and the slave (50 mm) in order that the DC connecting bars can be installed without problems.

Connecting the control signals

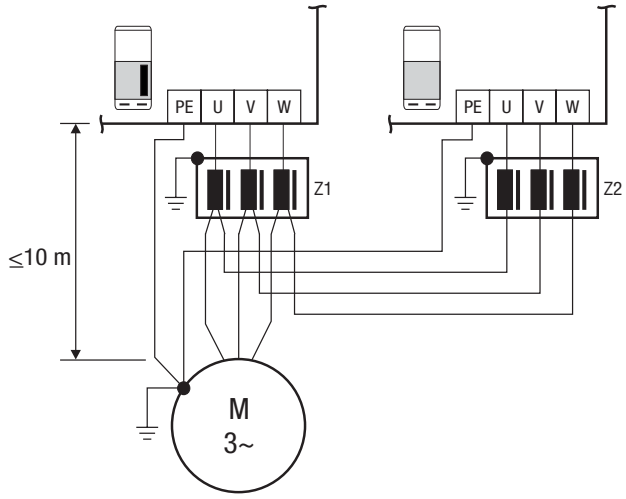
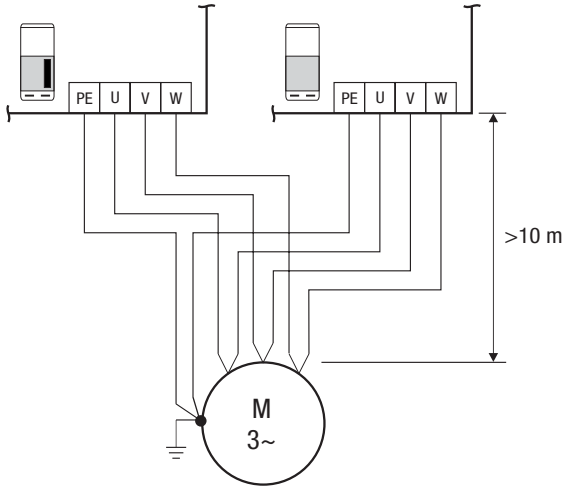
The frequency inverter control electronics are located in the master.

The control signals are connected to the slave via polarised plug connections.

Motor-side connection

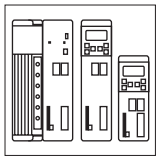
The motor-side parallel connection can only be made via an inductance at the outputs of the master and slave.

The length of the motor cable determines whether the cable inductance is sufficient or if additional motor chokes are required:

Connection if motor cable length ≤ 10 m	**Connection if motor cable length > 10 m**
	
If the length of the motor cable ≤ 10 m, you must connect the master and slave in parallel on the motor side using motor chokes (Z1, Z2). **Important:** Observe the operating conditions of the motor chokes (see page 49).	If the length of the motor cable > 10 m you may connect the master and slave motor cables to the motor in parallel.

Important

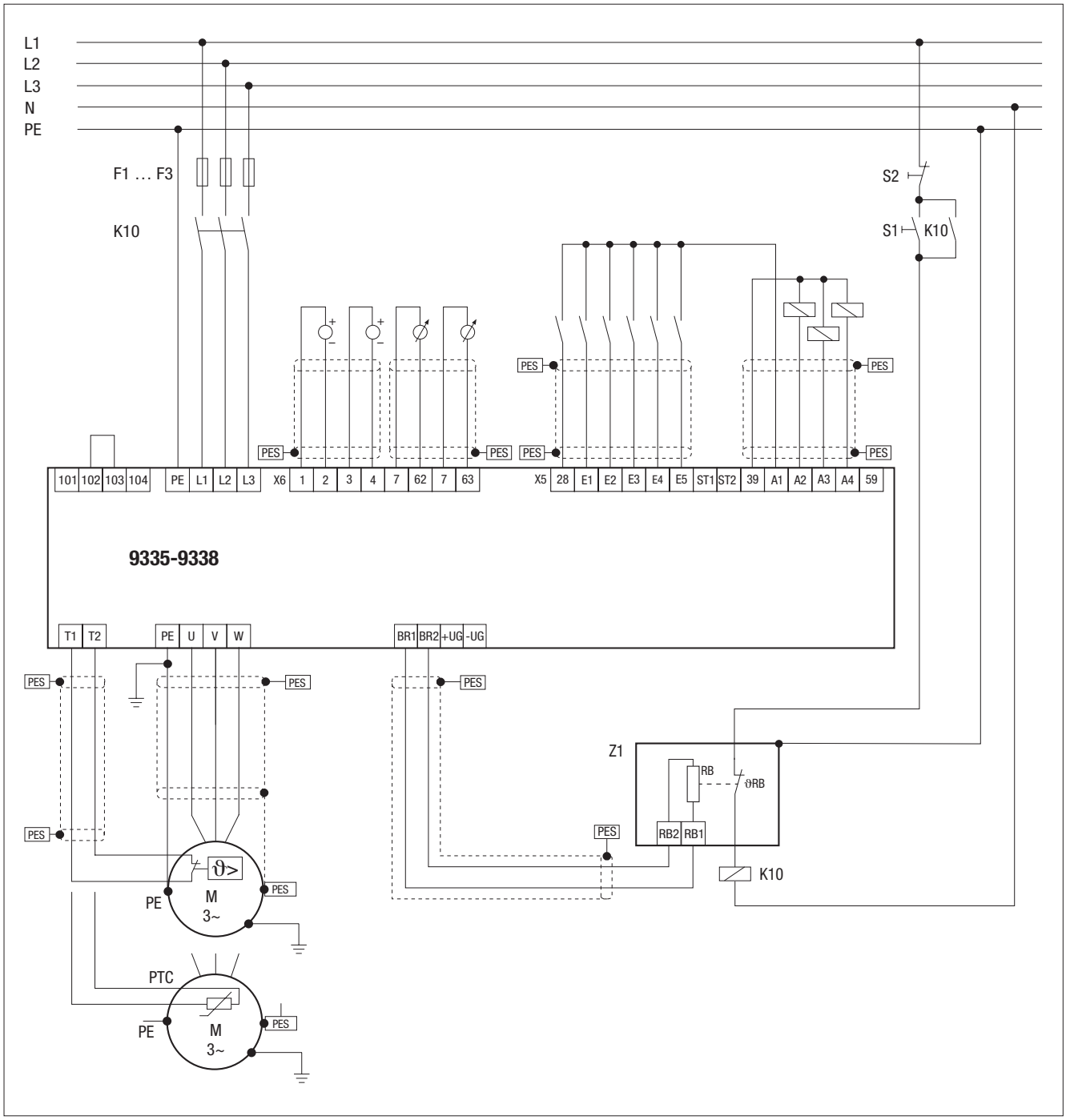
- **Separate** mains supplies must be used for both the master and the slave. This also applies if a DC supply or DC bus connection is being used.
- If a brake resistor is used for braking, the braking energy is usually dissipated equally via the master and the slave (**no** connection).



Electrical installation - 9300 vector

Example connection

The example below illustrates a maximum size view of the 9300 vector connection

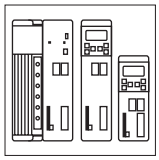


F1…F3	Fuse
K10	Mains contactor
Z1	Brake resistor
S1	Switch on mains contactor
S2	Switch off mains contactor
PES	HF screen termination by means of wide contact with PE

Lenze

The 9300 vector frequency inverter is controlled and integrated in automation and control concepts using analog/digital inputs and outputs, an incremental encoder input, one master frequency input and output and a system bus interface (CAN). In addition, depending on the application, it may also be possible to establish communication with a higher-level host system using plug-on communication modules. This provides a high level of flexibility for various drive and automation tasks.

Overview: Options for control of the 9300 vector

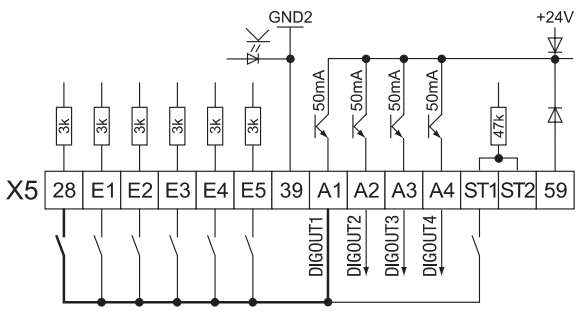
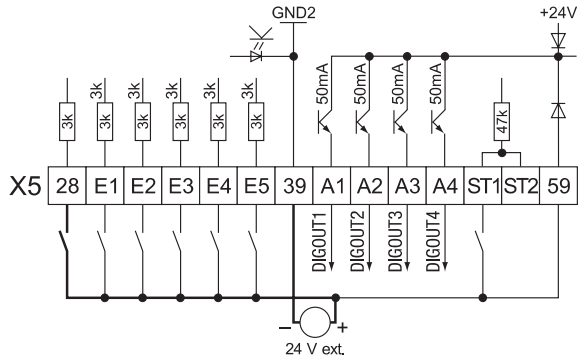


Control - 9300 vector

Digital inputs and outputs

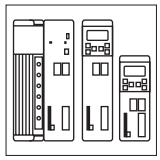
The 9300 vector frequency inverter has 7 digital inputs (e.g. to activate functions in the frequency inverter) and 4 digital outputs (e.g. to output messages).

Terminal assignment

Supply via internal voltage supply	Supply via external voltage supply
	
—— Minimum wiring required for operation	—— Minimum wiring required for operation

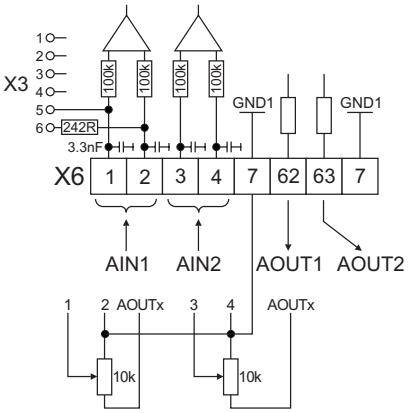
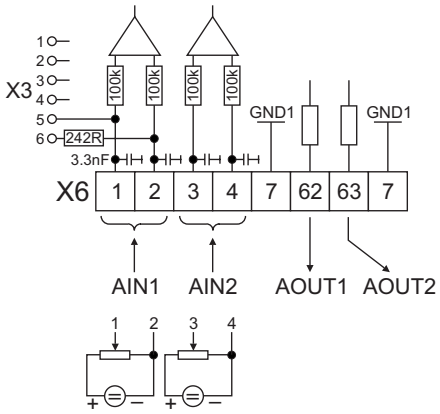
X5/	Signal type	Function (bold print = Lenze setting)	Level	Technical data
28	Digital inputs	Controller inhibit	HIGH = start	LOW: 0…+3 V HIGH: +12 … +30 V Input current at +24 V: 8 mA per input Read and process inputs: once per ms (mean value)
E1		Can be freely assigned **CW rotation**	HIGH	
E2		Can be freely assigned **CCW rotation**	HIGH	
E3		Can be freely assigned **Activate JOG setpoint 1**	HIGH	
E4		Can be freely assigned **Set fault indication**	LOW	
E5		Can be freely assigned **Reset fault indications**	LOW/HIGH edge	
ST1 ST2		Can be freely assigned Additional digital input (E6)	–	
A1	Digital outputs	Can be freely assigned **Fault indication pending**	LOW	LOW: 0…+3 V HIGH: +12 … +30 V Load capacity: max. 50 mA per output (external resistance at least 480 Ω at 24 V) Update outputs: once per ms (mean value)
A2		Can be freely assigned **Threshold** **Actual speed < setpoint**	LOW	
A3		Can be freely assigned **Ready for operation**	HIGH	
A4		Can be freely assigned **Maximum current reached**	HIGH	
39	–	GND2, reference potential for digital signals	–	Isolated to GND1
59	–	DC supply for back-up operation of the 9300 vector on mains failure	+24 V external	Current requirement: min. 1A

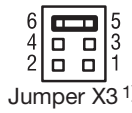
Electrical connection	Screw-type terminals	
Connection options	Rigid: 2.5 mm² (AWG 14)	
	Flexible:	
	2.5 mm² (AWG 14)	without ferrules
	2.5 mm² (AWG 14)	with ferrules without plastic sleeve
	2.5 mm² (AWG 14)	with ferrules with plastic sleeve
Tightening torques	0.5...0.6 Nm (4.4...5.3 lb in)	



The 9300 vector frequency inverter has 2 bipolar analog inputs (e.g. for selecting setpoints) and 2 bipolar analog outputs (e.g. to output actual values).

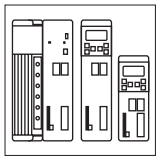
Terminal assignment

Supply via internal voltage supply	Supply via external voltage supply
	

X6/	Signal type	Function (bold print = Lenze setting)		Level	Technical data
1 2	Analog input 1	Differential input Master reference voltage **Master setpoint**	 Jumper X3 [1]	-10 V to +10 V	Resolution: 5 mV (11 bits + sign)
		Differential input Master reference current	 Jumper X3 [1]	-20 mA to +20 mA	Resolution: 20 µA (10 bits + sign)
3 4	Analog input 2	Differential input Master reference voltage **Not active**	Jumper X3 has no effect	-10 V to +10 V	Resolution: 5 mV (11 bits + sign)
62	Analog output 1	**Actual speed value**		-10 V to +10 V; max. 2 mA	Resolution: 20 mV (9 bits + sign)
63	Analog output 2	**Actual motor current value**		-10 V to +10 V; max. 2 mA	Resolution: 20 mV (9 bits + sign)
7	–	GND1, reference potential for analog signals		–	–

[1] Jumper X3 is located on the front panel of the control electronics

Electrical connection	Screw-type terminals		
Connection options		Rigid: 2.5 mm² (AWG 14)	
		Flexible:	
		2.5 mm² (AWG 14)	without ferrules
		2.5 mm² (AWG 14)	with ferrules without plastic sleeve
		2.5 mm² (AWG 14)	with ferrules with plastic sleeve
Tightening torques	0.5...0.6 Nm (4.4...5.3 lb in)		



Control - 9300 vector

Incremental encoder input

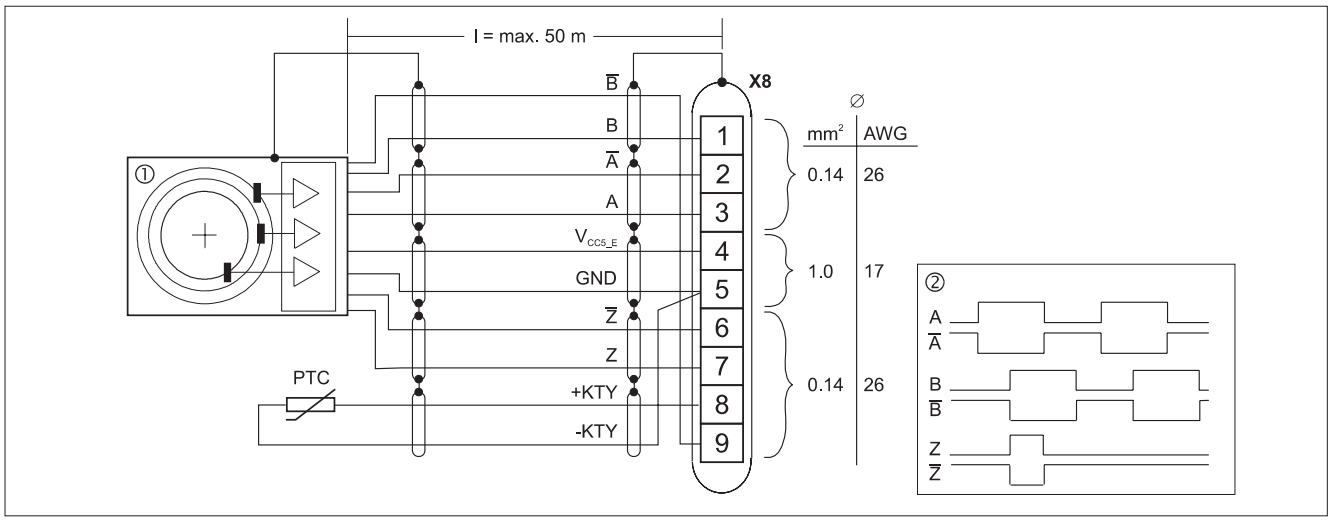
The 9300 vector frequency inverter has an incremental encoder input for control feedback. Feedback is required for applications, which require a high level of accuracy, wide setting ranges or holding torques at speed 0. The incremental encoder signal can be output again at the master frequency output for slave drives.

Technical data

Connection to 9300 vector	9-pin SUB-D connector
Incremental encoder level	TTL (5 V) [1]
Input frequency	0…500 kHz
Current requirement per channel	6 mA

[1] Incremental encoders with HTL level can be connected to the master frequency input

Connection of an incremental encoder to the incremental encoder input (X8)



① Incremental encoder with TTL level ② Signals on clockwise rotation

Connecting an incremental encoder with HTL level at the digital frequency input (X9):

• External supply voltage for the incremental encoder, GND and V_{CC5_E} (do not use X9/4) • Do not use X9/8

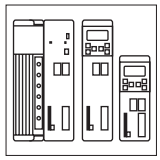
Tip:
When connecting the incremental encoder, use a pre-assembled encoder cable from Lenze (EWLExxxGX-T). The cables have a connector on one end for connection to the 9300 vector.

Encoder cables

Type/order ref.	Length [m]	No. of wires/ cross-section [mm²]	Cable diameter [mm]	Bend radius Fixed installation	Bend radius Flex. installation [1]	Weight [kg]
EWLE002GX-T	2.5	1x(2x1.0) + 4x(2x0.14)	10.7	7.5 x d	15 x d	0.3
EWLE005GX-T	5.0	1x(2x1.0) + 4x(2x0.14)	10.7	7.5 x d	15 x d	0.6
EWLE010GX-T	10.0	1x(2x1.0) + 4x(2x0.14)	10.7	7.5 x d	15 x d	1.3
EWLE015GX-T	15.0	1x(2x1.0) + 4x(2x0.14)	10.7	7.5 x d	15 x d	2.0
EWLE020GX-T	20.0	1x(2x1.0) + 4x(2x0.14)	10.7	7.5 x d	15 x d	2.7
EWLE025GX-T	25.0	1x(2x1.0) + 4x(2x0.14)	10.7	7.5 x d	15 x d	3.3
EWLE030GX-T	30.0	1x(2x1.0) + 4x(2x0.14)	10.7	7.5 x d	15 x d	4.0
EWLE035GX-T	35.0	1x(2x1.0) + 4x(2x0.14)	10.7	7.5 x d	15 x d	4.7
EWLE040GX-T	40.0	1x(2x1.0) + 4x(2x0.14)	10.7	7.5 x d	15 x d	5.4
EWLE045GX-T	45.0	1x(2x1.0) + 4x(2x0.14)	10.7	7.5 x d	15 x d	6,1
EWLE050GX-T	50.0	1x(2x1.0) + 4x(2x0.14)	10.7	7.5 x d	15 x d	6.8

[1] Continuous alternating bending not permitted

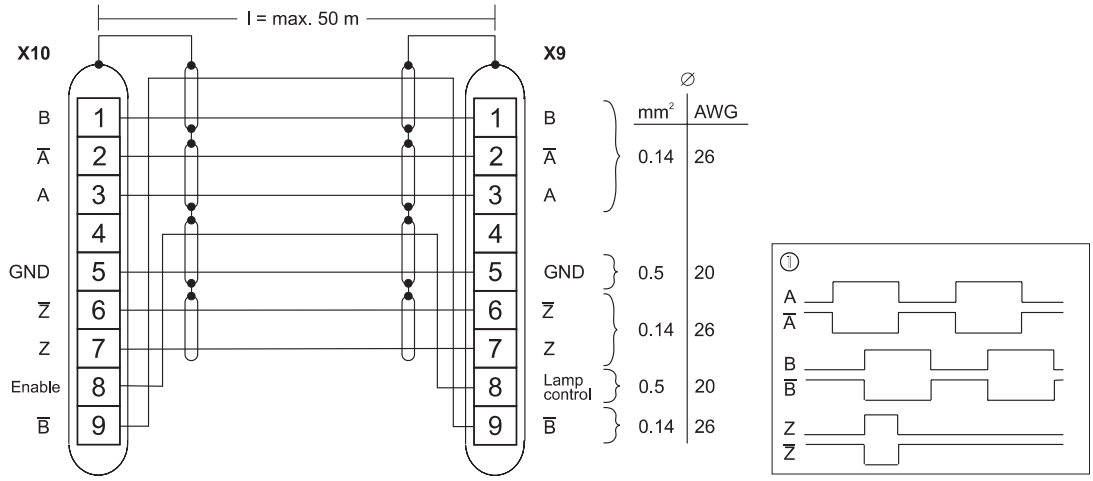
Lenze



The 9300 vector frequency inverter has one master frequency input and one master frequency output. This enables, for example, the precise and speed synchronous control of multiple motor systems.

Technical data/product features

Master frequency output (X10)	Master frequency input (X9)
• 9-pin SUB-D socket • Output frequency: 0…500 kHz • Current capacity per channel: max. 20 mA • Two-track with inverse 5 V signals and zero track • Load capacity: – For parallel connection, max. 3 slave drives can be connected	• 9-pin SUB-D connector • Can also be used as an incremental encoder input • Input frequency: – 0…500 kHz at TTL level – 0…200 kHz at HTL level • Current requirement max. 5 mA • Two-track with inverse signals and zero track

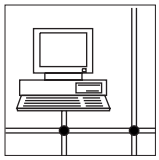


X10 Master drive
X9 Slave drive
① Signals on clockwise rotation

Tip:
Use Lenze's prefabricated cable when setting up a master frequency connection.
The cable has connectors on both ends for connection to two frequency inverters.

Connection cable for a master frequency connection

Type/order ref.	Length [m]	No. of wires/cross-section [mm²]	Cable diameter [mm]	Bend radius		Weight [kg]
				Fixed installation	Flex. installation	
EWLD002GGBS93	2.5	1 x (2 x 0.5) + 3 x (2 x 0.14)	9.3	7.5 x d	15 x d	0.4



Control - 9300 vector

System bus interface (CAN)

As standard, the 9300 vector frequency inverter has a system bus interface which can be used to connect the vector to the CAN (Controller Area Network) serial communication system.

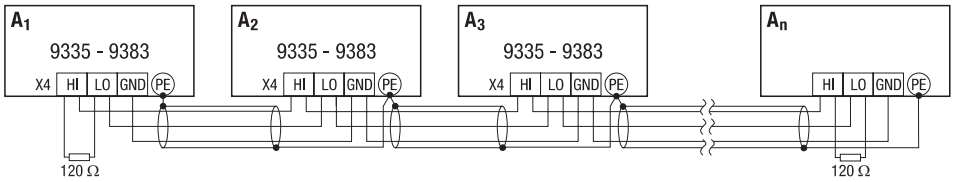
The system bus (CAN) enables the following functions:
- Parameter preselection / remote parameter setting
- Data transfer between inverters
- Connection to external controllers and host systems
- Optional connection to
  – distributed I/O systems
  – operating/display units

General data

Communication medium	DIN ISO 11898				
Communication profile	Similar to CANopen (CiA DS301)				
Network topology	Line (terminated at both ends with 120 Ω)				
System bus device	Master or slave				
Max. number of devices	63				
Max. distance between two devices	No restriction, max. bus length is decisive				
Baud rate [kBit/s]	50	125	250	500	1000
Max. bus length [m]	1000	550	250	120	25
Number of logical process data channels	3				
Number of logical parameter data channels	2				
Electrical connection	Screw-type terminals				
Connection options	Rigid: 2.5 mm² (AWG 14)				
	Flexible:				
	2.5 mm² (AWG 14) without ferrules				
	2.5 mm² (AWG 14) with ferrules without plastic sleeve				
	2.5 mm² (AWG 14) with ferrules with plastic sleeve				
Tightening torques	0.5...0.6 Nm (4.4...5.3 lb in)				

Terminal assignment

Basic structure



A_1 Bus device 1 A_2 Bus device 2 A_3 Bus device 3 A_n Bus device n (e.g. PLC), n = max. 63

Terminal	Designation	Explanation
X4/GND	CAN-GND	System bus reference potential
X4/LO	CAN-LOW	System bus LOW (data cable)
X4/HI	CAN-HIGH	System bus HIGH (data cable)

Wiring notes

We recommend the following signal cable:

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

Lenze

9300 vector communication modules

Operation overview

Possible applications

The default factory settings (Lenze standard configuration) of the 9300 vector meet the requirements of many common applications. Therefore, the drive can be put into operation directly after installation. The Keypad XT, LECOM-A/B and LECOM-LI communication modules, which can be connected to the frequency inverter, can be used to adapt the 9300 vector to your own specific requirements.

A wide variety of topic-related and application-specific menus are sure to help you solve your drive task and find the parameters required for it. Predefined basic configurations are available for complex applications.

	Keypad XT operating module	**LECOM-A/B (RS232/485) or LECOM-LI (optical fibres)**
Description	Used to operate the 9300 vector via keyboard	Connects the 9300 vector to a higher-level host (e.g. PC)
Function	Use these communication modules to • Set parameters for and configure your 9300 vector • Control the 9300 vector (e.g. inhibit and enable) • Display operating data • Preselect setpoint values • Transfer parameters to other 9300 vector units	

Note:
With a PC and the LECOM-A/B or LECOM-LI communication modules, it is also possible to set parameters using “Global Drive Control” parameterisation/operating software. Alternatively, the system can be operated with a PC and “Global Drive Control” via the system bus interface (CAN). For this option, a PC system bus converter is required instead of a LECOM module.

PC system bus converter

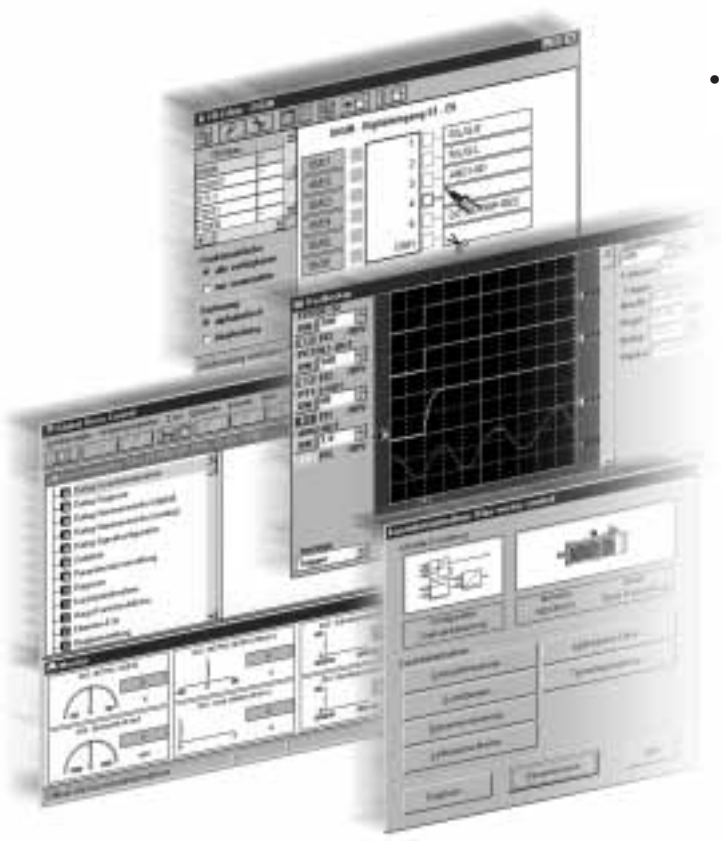
Alternatively, parameter setting/operation/configuration can be carried out with the PC and “Global Drive Control” parameter setting/operating software via the system bus interface (CAN) of the 9300 vector. For this option, a PC system bus converter is required instead of a LECOM-A/B or LI module. This adapter is plugged into the PC parallel port. The relevant drivers are installed automatically. Depending on the version, the adapter power supply is provided via the DIN or PS2 connection on the PC.

Advantage:
– Operation/diagnostics even if a communication module is connected
– In networked systems, up to 63 inverters can be addressed.

PC system bus converter	**Type ref./Order ref.**
Voltage supply via PC DIN connection	**EMF2173IB**
Voltage supply via PS2 PC connection	**EMF2173IB-V002**
Voltage supply via PS2 PC connection electrically isolated from system bus	**EMF2173IB-V003**

Global Drive Control – GDC (type/order ref. ESP-GDC2)

The PC program “Global Drive Control” is an easy to understand and convenient tool for operation, parameter setting, configuration and diagnostics of variable speed drives.



GDC features:

- Quick and easy set-up of the drive by means of the quick set-up function
- Intuitive operation even for inexperienced users
- Extensive help functions
- User-friendly diagnostics options via several monitor windows and oscilloscope functions mean that external measuring instruments are no longer required
- Connection of function blocks without programming knowledge using the function block editor.

The quick set-up function enables the entire drive to be set up quickly and easily, supported by self-explanatory dialogs. For complex applications, the links between function blocks are stored in predefined basic configurations (e.g. for dancer positioning control, torque control, laying control, master frequency connection).

System requirements for GDC

Hardware:
- IBM-AT or compatible PC
- CPU: Pentium 90 or higher
- RAM: 64 MB
- 120 MB free hard drive space
- Super VGA screen
- CD-ROM drive
- A free serial interface for RS232 or a free parallel interface for the system bus adapter (CAN)

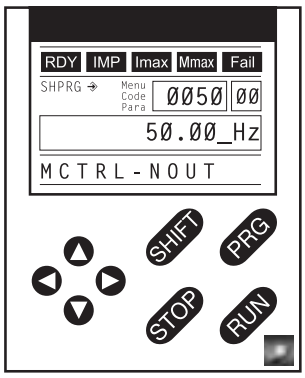
Software:
- Windows 95/98/Me/NT 4.0/2000/XP

Keypad XT

The Keypad XT operating module is available as an alternative to PC-based operation. 8 keys and display in plain text provide quick and easy access to the inverter parameters via the transparent menu structure. The Keypad XT is also used for the purposes of status display and error diagnostics. In addition, its built-in memory can be used to transfer parameters to other inverters.

Customised level-specific password protection prevents illegal access.

The Keypad XT can also be used on devices from the 9300 vector, 9300 servo and DrivePLC ranges, as well as on distributed 8200 motec motor inverters (via diagnosis terminal).



To facilitate handling, a connection cable can be used to plug the Keypad XT into a hand-held device so that it can be used as a diagnosis terminal.

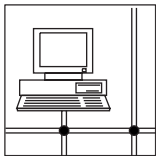
Selection	Order ref.
Keypad XT	EMZ9371BC
Diagnosis terminal (hand-held Keypad XT, IP20)	E82ZBBXC
2.5 m connection cable[1)]	E82ZWL025
5 m connection cable[1)]	E82ZWL050
10 m connection cable[1)]	E82ZWL100

[1)] The connection cable is required to connect the diagnosis terminal to the 9300 vector.

Diagnostics terminal for system bus (type/order ref. EMZ9372BB)

As an alternative to the Keypad XT, this diagnostics terminal can be connected to the system bus interface (CAN) of the 9300 vector via a connection cable.

Advantage:
- Operation/diagnostics even if a communication module is connected (e.g. PROFIBUS-DP)
- In networked systems, up to 63 inverters can be addressed from a single location (remote parameter setting)



9300 vector communication modules

Networking overview

9300 vector frequency inverters can be networked with a host system (PLC or PC) via plug-on communication modules.

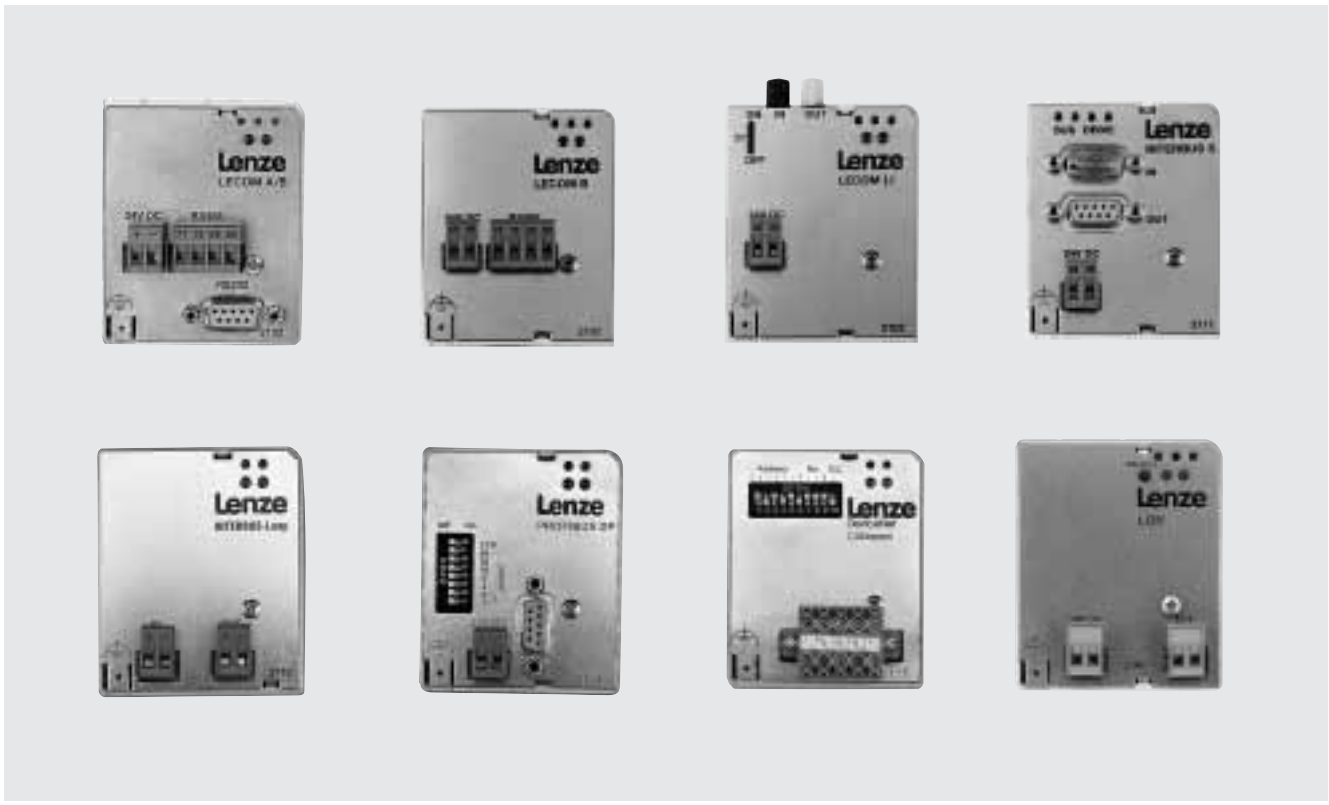
Networking via the RS232/485 interface
Three versions are available:
– RS232/485 (LECOM-A/B)
  The RS232 and RS485 interfaces are designed as 9-pin SUB-D sockets. For the RS485 interface there is an additional screw terminal for connecting through to the next frequency inverter.
– RS485 (LECOM-B)
– Optical fibres (LECOM-LI)
  Networking via optical fibres (using a plastic core) is noise-free and very economical. The optical fibre can be easily adapted through an optical fibre socket at the module. For the host system we offer optical fibre adapters which can be plugged into the interface of the host computer.

All three interfaces communicate using the Lenze LECOM protocol. The LECOM protocol is completely open for your applications. Components which support this protocol are available for various systems (e.g. Simatic S5) in order to facilitate integration into a control system.

Networking via LON
– The LON module is used in building automation and environment management.

Networking via CANopen or DeviceNet
– With the DeviceNet/CANopen module, the data transfer speed and the address can be specified via DIP switches. This module is particularly useful for servicing applications. It is possible to switch between DeviceNet and CANopen via a DIP switch. The DeviceNet fieldbus has been particularly successful in the American and Asian markets.

Networking via host systems with high processing speeds
– INTERBUS
  INTERBUS is connected directly to the remote bus. The DRIVECOM profile 21 is supported for this connection. 9-pin SUB-D connectors are provided for easy networking.
– INTERBUS Loop
– PROFIBUS
  Slave interface module with the PROFIBUS-DP communication profile.



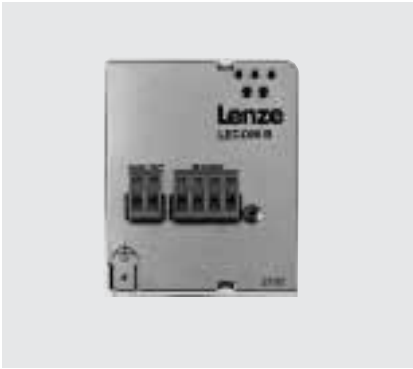
Communication modules

LECOM-B (RS485) (type no./order ref. EMF2102IB-V002)

General data and operating conditions

Communication medium	RS485 (LECOM-B)
Communication protocol	LECOM A/B V2.0
Transfer character format	7E1: 7-bit ASCII, 1 stop bit, 1 start bit, 1 parity bit (even)
Baud rate [Bit/s]	1200, 2400, 4800, 9600, 19200
LECOM-B device	Slave
Network topology	Without repeater: line With repeaters: line or tree
Max. number of devices	32 (= 1 bus segment) including host system With repeaters: 90 slaves
Max. cable length per bus segment	1,000 m (depending on baud rate and cable type used)
Electrical connection	Screw-type terminals
DC supply	• Internal • External, required if – Bus devices are to be disconnected from the mains but communication with the master must be maintained – Power is being provided via a separate power supply – +24 V DC ± 10%, max. 60 mA per module (LECOM-A/B: max. 80 mA)
Insulation voltage to reference earth/PE	50 V AC
Ambient temperature	Operation: 0 ... +55°C Transport: –25 ... +70°C Storage: –25 ... +60°C
Climatic conditions	Class 3K3 to EN 50178 (without condensation, average relative humidity 85%)
Order ref.	EMF2102IB-V002

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



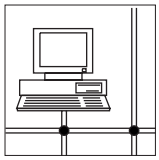
LECOM-A/B (RS232/485) (type no./order ref. EMF2102IB-V001)

In addition to the RS485 interface (see LECOM-B for data and operating conditions) the LECOM-A/B communication module also features an additional RS232 interface with the following features:

General data and operating conditions

Communication medium	RS232 (LECOM-A)
Network topology	Point-to-point
Max. number of devices	1
Max. cable length	15 m
Electrical connection	SUB-D socket (9-pin)
Order ref.	EMF2102IB-V001

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



9300 vector communication modules

LECOM-LI (optical fibres)

LECOM-LI (type no./order ref. EMF2102IB-V003)

General data and operating conditions

Communication medium	Optical fibres
Communication protocol	LECOM A/B V2.0
Transfer character format	7E1: 7-bit ASCII, 1 stop bit, 1 start bit, 1 parity bit (even)
Baud rate [Bit/s]	1200, 2400, 4800, 9600, 19200
LECOM-LI device	Slave
Network topology	Ring
Max. number of devices	52
Max. cable length per bus segment	0...40 m (normal transmission rating)/10...66 m (high transmission rating)
Electrical connection	Screw-type terminal and screw-type crimp connections
DC supply	• Internal • External, required if – Bus devices are to be disconnected from the mains but communication with the master must be maintained – Power is being provided via a separate power supply – +24 V DC ± 10%, max. 70 mA per module
Insulation voltage to reference earth/PE	50 V AC
Ambient temperature	Operation: 0 ... +55°C Transport: –25 ... +70°C Storage: –25 ... +60°C
Climatic conditions	Class 3K3 to EN 50178 (without condensation, average relative humidity 85%)
Order ref.	EMF2102IB-V003

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

Tip:
Use the optical fibre adapter (RS232/optical fibre converter) for adaptation to the host computer:
• Normal transmission rating (0... 40 m between two optical fibre devices): EMF2125IB
• High transmission rating (30... 66 m between two optical fibre devices): EMF2126IB
• Power supply for optical fibre adapter: EJ0013

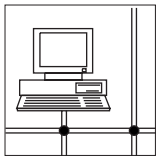
Optical fibre cable:
• 1-wire, black PE sleeve (simple protection),
sold by the metre: EWZ0007
• 1-wire, red PUR sleeve (reinforced protection for installation outside the control cabinet),
sold by the metre: EWZ0006

LON (type no./order ref. EMF2141IB)

General data and operating conditions

Communication medium	FTT - 10 A (Free Topology Transceiver)
Communication profile	LONMARK® Functional profile “Variable Speed Motor Drive”
Network topology	Free topology (line, tree/line, star, ring)
Possible number of nodes	64
Max. cable length	2700 m with bus topology (line) 500 m with mixed topology
Baud rate [kBit/s]	78
Electrical connection	Screw-type terminals
DC supply	• Internal • External, only required if – A bus device is switched off or fails but communication with it must be maintained – Power is being provided via a separate power supply – +24 V DC ± 10%, max. 120 mA per module
Insulation voltage to reference earth/PE	50 V AC
Ambient temperature	Operation: 0 ... +55°C Transport: –25 ... +70°C Storage: –25 ... +60°C
Climatic conditions	Class 3K3 to EN 50178 (without condensation, average relative humidity 85%)
Order ref.	EMF2141IB

Note:
- Two LEDs are located on the communication module to indicate the communication status.
- A configuration diskette for LON containing description files for the devices (EDS files) and the plug-in for the LONMaker software is included in the scope of supply.



9300 vector communication modules

CANopen

CANopen (type no./order ref. EMF2175IB)

General data and operating conditions

Communication medium	DIN ISO 11898						
Communication profile	CANopen (CiA DS301)						
Network topology	Line (terminated at both ends with 120 Ω)						
Device	Slave						
Max. number of devices	63						
Max. distance between 2 devices	No restriction, max. bus length is decisive						
Baud rate [kBit/s]	10	20	50	125	250	500	1000
Max. bus length [m]	5000	2500	1000	550	250	100	25
Number of logical process data channels	1						
Number of logical parameter data channels	2						
Electrical connection	Screw-type terminals						
DC supply	• Internal • External, required if - A bus device is switched off or fails but communication with it must be maintained - Power is being provided via a separate power supply - +24 V DC ± 10%, max. 60 mA per module (2175IB: max. 100 mA)						
Insulation voltage to reference earth/PE	50 V AC						
Ambient temperature	Operation: 0 ... +55°C Transport: –25 ... +70°C Storage: –25 ... +60°C						
Climatic conditions	Class 3K3 to EN 50178 (without condensation, average relative humidity 85%)						
Order ref.	EMF2175IB						

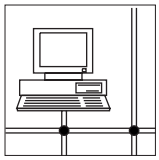
Note:
- The module can be switched over to DeviceNet via a DIP switch (see next page).
- The address and the baud rate can be adjusted via the DIP switch.
- Two LEDs are located on the communication module to indicate the communication status.
- A configuration diskette for CANopen containing description files for the devices (EDS files) is included in the scope of supply.

DeviceNet (type no./order ref. EMF2175IB)

General data and operating conditions

Communication medium	DIN ISO 11898		
Communication profile	DeviceNet		
DeviceNet device	Slave		
Network topology	Line (terminated at both ends with 120 Ω)		
Max. number of devices	63		
Baud rate [kBit/s]	125	250	500
Max. bus length (thin cable) [m]	100	100	100
Max. bus length (thick cable) [m]	500	250	100
Electrical connection	Screw-type terminals		
DC supply	• Internal • External, required if – A bus device is switched off or fails but communication with it must be maintained – Power is being provided via a separate power supply – + 24V DC ± 10%, max. 100 mA per module		
Insulation voltage to reference earth/PE	50 V AC		
Ambient temperature	Operation: 0 ... +55°C Transport: –25 ... +70°C Storage: –25 ... +60°C		
Climatic conditions	Class 3K3 to EN 50178 (without condensation, average relative humidity 85%)		
Order ref.	EMF2175IB		

Note:
- The module can be switched over to CANopen via a DIP switch.
- The address and the baud rate can be adjusted via the DIP switch.
- Two LEDs are located on the communication module to indicate the communication status.
- A configuration diskette for DeviceNet containing description files for the devices (EDS files) is included in the scope of supply.



9300 vector communication modules

INTERBUS

INTERBUS (type no./order ref. EMF2111IB/EMF2113IB)

General data and operating conditions

Communication medium	RS485
Selectable drive profile	• Lenze device control • DRIVECOM profile “Drive technology 21”
Baud rate	500 kBit/s (2113IB: 500 kBit/s or 2 MBit/s)
INTERBUS device	Slave
Network topology	Ring (go and return lines in the same bus cable)
Process data words (PCD) (16 bits)	2 ... 3 words (2113IB: 1…4 words)
Parameter data words (PCP) (16 bits)	1 word (2113IB: 4)
Max. PDU length	64 bytes
Supported PCP services	Initiate, Abort, Status, Identify, Get-OV-Long, Read, Write
Number of devices	Depends on the host system (I/O range), max. 63
Max. distance between 2 devices	400 m
Electrical connection	Screw-type terminal and SUB-D socket/connector (9-pin)
DC supply	• Internal • External, only required if – The communication ring must not be interrupted if a bus device is switched off or fails – Power is being provided via a separate power supply – +24 V DC ± 10%, max. 100 mA per module
Insulation voltage to reference earth/PE	50 V AC
Ambient temperature	Operation: 0 ... +55°C Transport: –25 ... +70°C Storage: –25 ... +60°C
Climatic conditions	Class 3K3 to EN 50178 (without condensation, average relative humidity 85%)
Order ref.	EMF2111IB/EMF2113IB

Note:
• Two LEDs are located on the communication module to indicate the communication status.
• EMF2113IB: The baud rate and process data words/parameter data words can be adjusted via the DIP switch.

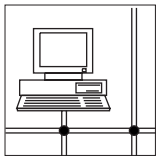
INTERBUS Loop (type no./order ref. EMF2112IB)

INTERBUS loops can be integrated within the INTERBUS network. Here, the DC supply to the communication modules is provided via the bus line of the INTERBUS Loop.

General data and operating conditions

Selectable drive profile	• Lenze device control • DRIVECOM profile “Drive technology 20”
Baud rate [kBit/s]	500
INTERBUS device	Slave
Network topology	Ring
Process data words (PCD) (16 bits)	2 words
Parameter data words (PCP) (16 bits)	Not supported
Max. PDU length	4 bytes
Supported PCP services	None
Max. number of devices	36 Lenze inverters
Max. loop length	200 m
Max. distance between 2 devices	20 m
Electrical connection	Screw-type terminals
DC supply	Via the bus
Insulation voltage to reference earth/PE	50 V AC
Ambient temperature	Operation: 0 ... +55°C Transport: –25 ... +70°C Storage: –25 ... +60°C
Climatic conditions	Class 3K3 to EN 50178 (without condensation, average relative humidity 85%)
Order ref.	EMF2112IB

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



9300 vector communication modules

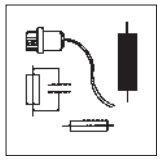
PROFIBUS-DP

PROFIBUS-DP (type no./order ref. EMF2133IB)

General data and operating conditions

Communication medium	RS485
Communication profile	PROFIBUS-DP (DIN 19245 Part 1 and Part 3)
Selectable drive profile	• DRIVECOM profile “Drive technology 20” • PROFIDRIVE • Lenze device control
Baud rate [kBit/s]	9.6... 12000 (automatic detection)
PROFIBUS-DP device	Slave
Network topology	Without repeater: line With repeaters: line or tree
Process data words (PCD) (16 bits)	1... 4 words
DP user data length	Parameter channel that can be deactivated (4 words) + process data words
Max. number of devices	Standard: 32 (= 1 bus segment) including host system With repeaters: 128 including host system and repeaters
Max. cable length per bus segment	1200 m (depending on baud rate and cable type used)
Electrical connection	Screw-type terminal and SUB-D socket (9-pin)
DC supply	• Internal • External, required if – Bus devices are to be disconnected from the mains but communication with the master must be maintained – Power is being provided via a separate power supply – +24 V DC ± 10%, max. 120 mA per module
Insulation voltage to reference earth/PE	50 V AC
Ambient temperature	Operation: 0 ... +55°C Transport: –25 ... +70°C Storage: –25 ... +60°C
Climatic conditions	Class 3K3 to EN 50178 (without condensation, average relative humidity 85%)
Order ref.	EMF2133IB

Note:
- Two LEDs are located on the communication module to indicate the communication status.
- A configuration diskette for PROFIBUS-DP containing description files for the devices (EDS files) is included in the scope of supply.
- The address can be adjusted via the DIP switch.
- Can be switched to the functionality of the 2131IB communication module via a DIP switch.



Setpoint potentiometer

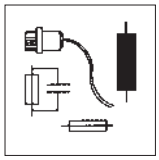
Speed can be preselected using an external potentiometer. For this purpose, the setpoint potentiometer can be connected to the analog control terminals of the 9300 vector. A scale and a rotary knob are also available.

Name	Order ref.	Data	Dimensions
Setpoint potentiometer	ERPD0010K0001W	10 kΩ /1 Watt	6 mm x 35 mm
Rotary knob	ERZ0001		36 mm diameter
Scale	ERZ0002	0...100 %	62 mm diameter

Digital display

A voltmeter can be connected to an analog output of the 9300 vector to display the output frequency or the motor speed.

Name	Order ref.	Measuring ranges	Mounting cut-out	Mounting depth
Voltmeter 3 1/2 digits	EPD203	0 - 6 V 0 - 20 V 0 - 200 V	91 mm x 22.5 mm	81.5 mm



Accessories - 9300 vector

Motor chokes

General information

A motor choke is an inductance which is connected to the motor cable at the frequency inverter output.

The principle of a frequency inverter is based on a clocked output voltage with fast voltage rise time (du/dt).

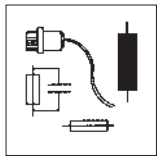
The cable capacitances of the motor cable cause leakage currents between the motor phases or to PE. These currents increase the load on the frequency inverter and this may lead to shut-down on faults.

The amount of current is determined by the voltage slope and the chopper frequency of the frequency inverter as well as by the effective capacitances of the motor cable. Motor chokes should therefore be used on long motor cables.

Motor chokes reduce the voltage slop at the frequency inverter output and therefore the capacitive leakage currents. This leads to a reduction in the frequency inverter load and parasitic currents and makes it possible to use a long motor cable.

Depending on the installation, it may also be necessary to use motor chokes for parallel connection of the master and slave on EVF93**81**-EV, EVF93**82**-EV and EVF93**81**-EV frequency inverters (see page 25).

Motor chokes can also be used to reduce currents in motor bearings.

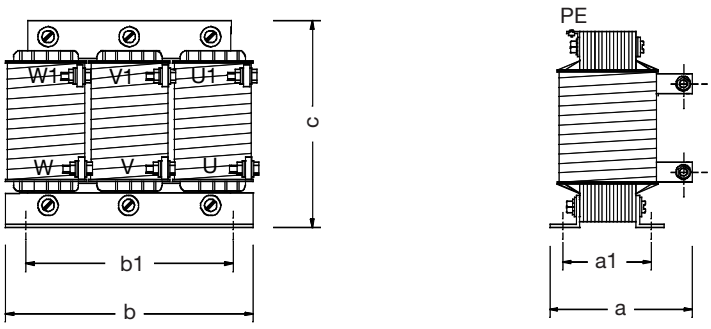


General data and operating conditions

Motor choke required for motor cable lengths of and above	• 100 m shielded • 200 m unshielded
Max. motor cable length	• 200 m shielded • 400 m unshielded
Max. mains voltage	577 V AC + 0%
Temperature range	0...40°C
Connection type	Screw connections
Degree of protection	IP 00
Operating conditions for the 9300 vector in conjunction with a motor filter	• Maximum output frequency: 100 Hz • Maximum chopper frequency: 2 kHz • Operating mode: V/f characteristic control (linear or quadratic)

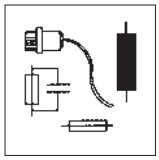
Selection and dimensions

9300 vector	Motor choke, dimensions [mm]									
Type	**Type ref./Order ref.**	**Number required**	**a**	**a_1**	**b**	**b_1**	**c**	**Fastening**	**Connection**	**Weight [kg]**
EVF9335-EV	ELM3-0003H275	1	170	95	230	180	200	M6	M10	18.4
EVF9336-EV										
EVF9337-EV	ELM3-0002H320									18.9
EVF9338-EV	ELM3-0002H410		180	96	240	185	210	M8	M12	22.6
EVF9381-EV	ELM3-0003H275	2	170	95	230	180	200	M6	M10	18.4
EVF9382-EV	ELM3-0002H320									18.9
EVF9383-EV	ELM3-0002H410		180	96	240	185	210	M8	M12	22.6



Input: U, V, W
Output: U1, V1, W1

Note:
Install the motor choke as close as possible to the frequency inverter.



Accessories - 9300 vector

Air lock

General information

We recommend the use of an air lock for dissipating heat loss directly from the control cabinet.
It comprises an air duct (Figure 1), which is assembled directly on the frequency inverter heat sink, and an air lock cover (Figure 2).

The frequency inverter has a heat sink fan which dissipates the heat outwards via the air lock.
The assembly kit is part of the scope of supply. Extensive installation guidelines are provided to facilitate the assembly process.

Figure 1

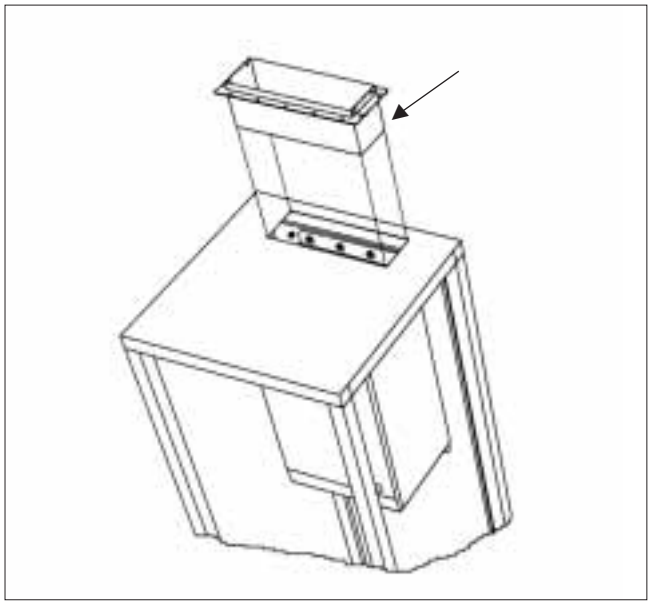
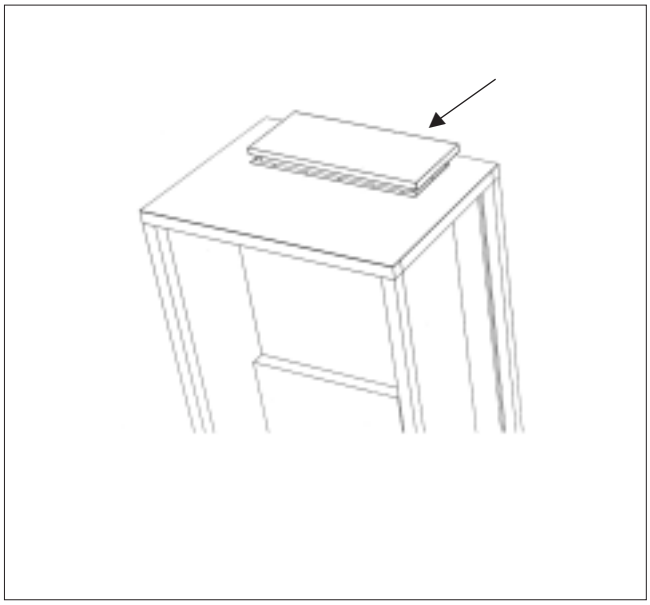


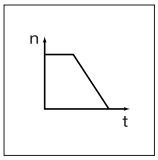
Figure 2



Note:
Provide air inlets in the control cabinet as appropriate for the volume flow of the fan in the frequency inverter (975 m^3/hr per unit).

Selection

9300 vector	Air lock
Type	**Type ref./Order ref.**
EVF9335-EV	E93ZWL
EVF9336-EV	
EVF9337-EV	
EVF9338-EV	
EVF9381-EV	E93ZWL02
EVF9382-EV	
EVF9383-EV	



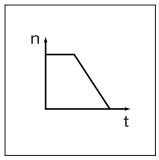
External brake resistors may be required to brake high moments of inertia or for extended generator mode operation. The brake resistor converts mechanical braking energy into heat.
The brake transistor integrated in the 9300 vector frequency inverter as an option connects the external brake resistor when the DC bus voltage exceeds a certain switching threshold. This prevents the frequency inverter from setting a pulse inhibit in the event of an overvoltage, which would cause the drive to coast to standstill. Braking is always controlled when using an external brake resistor.

Selection of brake resistors

The suitable brake resistor must meet the following requirements:

Brake resistor requirement	**Application**	
	with active load	**with passive load**
Permanent power [W]	$\geq P_{max} \cdot \eta_e \cdot \eta_m \cdot \frac{t_1}{t_{cycl}}$	$\geq \frac{P_{max} \cdot \eta_e \cdot \eta_m}{2} \cdot \frac{t_1}{t_{cycl}}$
Thermal capacity [Ws]	$\geq P_{max} \cdot \eta_e \cdot \eta_m \cdot t_1$	$\geq \frac{P_{max} \cdot \eta_e \cdot \eta_m}{2} \cdot t_1$
Resistance [Ω]	$R_{min} \leq R \leq \frac{U_{DC}^2}{P_{max} \cdot \eta_e \cdot \eta_m}$	

Active load	Can move by itself without any influence from the drive (e.g. materials handling systems, unwinders)
Passive load	Stops by itself without any influence from the drive (e.g. horizontal traversing drives, centrifuges, fans)
U_{DC} [V]	Threshold for brake transistor
P_{max} [W]	Maximum braking power defined by the application Important: Only use **P_{max}/2** for calculation purposes on EVF93**81**-EV/EVF93**82**-EV/EVF93**83**-EV frequency inverters, because the braking energy is usually dissipated equally via the master and the slave on these units. In the event of low braking power, if necessary, the braking energy may be dissipated either only via the master or only via the slave; in this case use P_{max} for the calculation.
η_e	Electrical efficiency (frequency inverter + motor) Guide value: 0.94
η_m	Mechanical efficiency (gearbox, machine)
t_1 [s]	Braking time
t_{scan} [s]	Scan time = time between two successive braking cycles (= t1 + break time)
R_{min}	Smallest permissible brake resistance (see rating for the integrated brake transistor)



Braking - 9300 vector

Braking with brake resistor

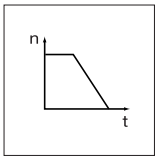
Rating data for the integrated brake transistor (optional)

The following data is valid for
- EVF93xx-EV**V060** and EVF93xx-EV**V110**

Brake transistor		**9300 vector**			
		EVF9335-EV	**EVF9336-EV**	**EVF9337-EV**	**EVF9338-EV**
Threshold U_{DC}	[V DC]	685			
Peak braking power	[A DC]	315	375	450	560
Max. continuous current	[A DC]	210	250	300	375
Smallest permissible brake resistance [1)]	[Ω]	2.2	1.8	1.5	1.2
Current derating		• Over 40°C, peak braking power reduced by 2.5%/°C • Over 1000 m above sea level, peak braking power reduced by 5%/1000 m			
Switch-on cycle [3)]		Max. 60 s peak braking power, then at least 30 s recovery time			

Brake transistor		**9300 vector**		
		EVF9381-EV [2)]	**EVF9382-EV** [2)]	**EVF9383-EV** [2)]
Threshold U_{DC}	[V DC]	685		
Peak braking power	[A DC]	2 x 375	2 x 450	2 x 560
Max. continuous current	[A DC]	2 x 250	2 x 300	2 x 375
Smallest permissible brake resistance per unit [1)]	[Ω]	1.8	1.5	1.2
Current derating		• Over 40°C, peak braking power reduced by 2.5%/°C • Over 1000 m above sea level, peak braking power reduced by 5%/1000 m		
Switch-on cycle [3)]		Max. 60 s peak braking power, then at least 30 s recovery time		

1) For longer connection cables, take the cable resistance into account. It is added to the value of the brake resistance and has a considerable effect on the total resistance.
2) Device consists of two units (master and slave) connected in parallel. The braking energy is usually dissipated equally via the master and the slave (see also “Selection of brake resistors” on page 51).
3) Take the switch-on cycle of the brake resistor used into account.



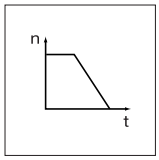
Rating data for the integrated brake transistor (optional)

The following data is valid for
- EVF93xx-EV**V270** and EVF93xx-EV**V300**
- Rated mains voltage 400 V or 460 V

Brake transistor		**9300 vector**			
		EVF9335-EV	**EVF9336-EV**	**EVF9337-EV**	**EVF9338-EV**
Threshold U_{DC}	[V DC]	755			
Peak braking power	[A DC]	315	375	450	560
Max. continuous current	[A DC]	210	250	300	375
Smallest permissible brake resistance [1)]	[Ω]	2.5	2.1	1.8	1.4
Current derating		• Over 40°C, peak braking power reduced by 2.5%/°C • Over 1000 m above sea level, peak braking power reduced by 5%/1000 m			
Switch-on cycle [3)]		Max. 60 s peak braking power, then at least 30 s recovery time			

Brake transistor		**9300 vector**		
		EVF9381-EV [2)]	**EVF9382-EV** [2)]	**EVF9383-EV** [2)]
Threshold U_{DC}	[V DC]	755		
Peak braking power	[A DC]	2 x 375	2 x 450	2 x 560
Max. continuous current	[A DC]	2 x 250	2 x 300	2 x 375
Smallest permissible brake resistance per unit [1)]	[Ω]	2.1	1.8	1.4
Current derating		• Over 40°C, peak braking power reduced by 2.5%/°C • Over 1000 m above sea level, peak braking power reduced by 5%/1000 m		
Switch-on cycle [3)]		Max. 60 s peak braking power, then at least 30 s recovery time		

1) For longer connection cables, take the cable resistance into account. It is added to the value of the brake resistance and has a considerable effect on the total resistance.
2) Device consists of two units (master and slave) connected in parallel. The braking energy is usually dissipated equally via the master and the slave (see also “Selection of brake resistors” on page 51).
3) Take the switch-on cycle of the brake resistor used into account.



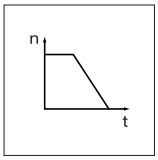
Rating data for the integrated brake transistor (optional)

The following data is valid for
- EVF93xx-EV**V270** and EVF93xx-EV**V300**
- Rated mains voltage 480 V

Brake transistor		**9300 vector**			
		EVF9335-EV	**EVF9336-EV**	**EVF9337-EV**	**EVF9338-EV**
Threshold U_{DC}	[V DC]	785			
Peak braking power	[A DC]	315	375	450	560
Max. continuous current	[A DC]	210	250	300	375
Smallest permissible brake resistance [1)]	[Ω]	2.5	2.1	1.8	1.4
Current derating		• Over 40°C, peak braking power reduced by 2.5%/°C • Over 1000 m above sea level, peak braking power reduced by 5%/1000 m			
Switch-on cycle [3)]		Max. 60 s peak braking power, then at least 30 s recovery time			

Brake transistor		**9300 vector**		
		EVF9381-EV [2)]	**EVF9382-EV** [2)]	**EVF9383-EV** [2)]
Threshold U_{DC}	[V DC]	785		
Peak braking power	[A DC]	2 x 375	2 x 450	2 x 560
Max. continuous current	[A DC]	2 x 250	2 x 300	2 x 375
Smallest permissible brake resistance per unit [1)]	[Ω]	2.1	1.8	1.4
Current derating		• Over 40°C, peak braking power reduced by 2.5%/°C • Over 1000 m above sea level, peak braking power reduced by 5%/1000 m		
Switch-on cycle [3)]		Max. 60 s peak braking power, then at least 30 s recovery time		

1) For longer connection cables, take the cable resistance into account. It is added to the value of the brake resistance and has a considerable effect on the total resistance.
2) Device consists of two units (master and slave) connected in parallel. The braking energy is usually dissipated equally via the master and the slave (see also “Selection of brake resistors” on page 51).
3) Take the switch-on cycle of the brake resistor used into account.



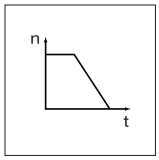
Rating data for the integrated brake transistor (optional)

The following data is valid for
- EVF93xx-EV**V270** and EVF93xx-EV**V300**
- Rated mains voltage 500 V

Brake transistor		**9300 vector**			
		EVF9335-EV	**EVF9336-EV**	**EVF9337-EV**	**EVF9338-EV**
Threshold U_{DC}	[V DC]	885			
Peak braking power	[A DC]	315	375	450	560
Max. continuous current	[A DC]	210	250	300	375
Smallest permissible brake resistance [1)]	[Ω]	2.8	2.3	1.9	1.6
Current derating		• Over 40°C, peak braking power reduced by 2.5%/°C • Over 1000 m above sea level, peak braking power reduced by 5%/1000 m			
Switch-on cycle [3)]		Max. 60 s peak braking power, then at least 30 s recovery time			

Brake transistor		**9300 vector**		
		EVF9381-EV [2)]	**EVF9382-EV** [2)]	**EVF9383-EV** [2)]
Threshold U_{DC}	[V DC]	885		
Peak braking power	[A DC]	2 x 375	2 x 450	2 x 560
Max. continuous current	[A DC]	2 x 250	2 x 300	2 x 375
Smallest permissible brake resistance per unit [1)]	[Ω]	2.3	1.9	1.6
Current derating		• Over 40°C, peak braking power reduced by 2.5%/°C • Over 1000 m above sea level, peak braking power reduced by 5%/1000 m		
Switch-on cycle [3)]		Max. 60 s peak braking power, then at least 30 s recovery time		

1) For longer connection cables, take the cable resistance into account. It is added to the value of the brake resistance and has a considerable effect on the total resistance.
2) Device consists of two units (master and slave) connected in parallel. The braking energy is usually dissipated equally via the master and the slave (see also “Selection of brake resistors” on page 51).
3) Take the switch-on cycle of the brake resistor used into account.



Braking - 9300 vector

Braking with brake resistor

Lenze brake resistor

Ratings

Lenze brake resistor (IP20)							
	R	Permanent power [1]	Thermal capacity	Switch-on cycle	Max. connectable cable cross-section		Weight
Order ref.	[Ω]	[kW]	[kWs]	Maximum 19/15/14/11 s braking, then at least 131/135/136/139 s recovery time [2]	[mm²]	AWG	[kg]
ERBD015R04K0	15	4.0	600		6	10	12.4

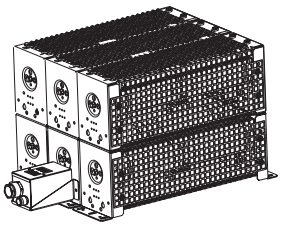
Please observe national and regional regulations

[1] The permanent power is a reference variable for selecting the brake resistor. Peak braking power is applied (U^2_{DC}/R)
[2] Data for threshold: Brake transistor U_{DC} = 685/755/785/885 V (see pages 52 to 55)

Note: The brake resistor is fitted with a temperature switch as standard (isolated NC contact, max. 250 V AC, 0.5 A).

Dimensions of ERBD015R04K0 brake resistor

- Dimensions:
  (length x width x height): 640 x 265 x 229 mm
- Fixing dimensions:
  536 x 240 mm
- Minimum free space:
  25 mm to the side, 100 mm to the front, 200 mm to the rear

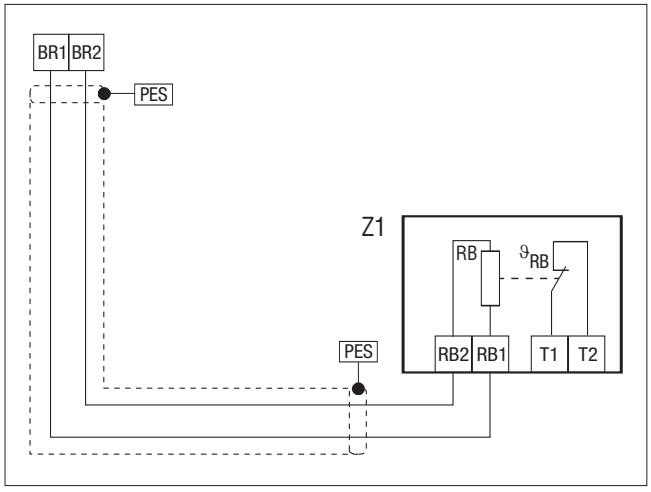


Layout

The appropriate brake resistance for each application is achieved by connecting a number of ERBD015R04K0 brake resistors in parallel.

The number of resistors to be connected in parallel is calculated by applying the formula 1/4 x permanent power (round the result up to a whole number). **Attention:** Do not undercut the minimum permissible value!

Connecting diagram



PES HF screen termination by means of PE connection via shield clamp

- The brake resistors are connected to terminals BR1 and BR2.
- Provide an emergency stop if the brake resistor overheats.
- Use the brake resistor temperature contacts (e.g. T1/T2) as control contacts in order to isolate the frequency inverter from the mains (see page 26).

Overview of accessories - 9300 vector

General accessories

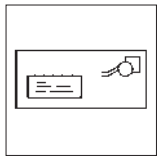
Accessories	Designation		Order ref.
Communication modules	LECOM-LI (optical fibres)		EMF2102IB-V003
	LECOM-B (RS485)		EMF2102IB-V002
	LECOM-A/B (RS232/485)		EMF2102IB-V001
	LON		EMF2141IB
	INTERBUS		EMF2113IB
	INTERBUS Loop		EMF2112IB
	PROFIBUS-DP		EMF2133IB
	DeviceNet/CANopen		EMF2175IB
	Keypad XT operating module		EMZ9371BC
	Diagnostics terminal (hand-held Keypad XT, IP20[1)]		E82ZBBXC
Miscellaneous	Connection cable	2.5 m	E82ZWL025
		5 m	E82ZWL050
		10 m	E82ZWL100
	Diagnostics terminal (for system bus) [2)]		EMZ9372BB
	“Global Drive Control” (GDC) parameter setting/operating software		ESP-GDC2
	PC system bus converter (voltage supply via DIN connection)		EMF2173IB
	PC system bus converter (voltage supply via PS2 connection)		EMF2173IB-V002
	PC system bus converter (voltage supply via PS2 connection; electrical isolation)		EMF2173IB-V003
	PC system cable RS232	5 m	EWL0020
		10 m	EWL0021
	Optical fibre adapter (normal transmission rating)		EMF2125IB
	Optical fibre adapter (high transmission rating)		EMF2126IB
	Power supply for optical fibre adapter		EJ0013
	Optical fibre, 1-wire, black PE sleeve (simple protection), sold by the metre		EWZ0007
	Optical fibre, 1-wire, red PUR sleeve (reinforced protection), sold by the metre		EWZ0006
	Setpoint potentiometer		ERPD0010K0001W
	Rotary knob for setpoint potentiometer		ERZ0001
	Scale for setpoint potentiometer		ERZ0002
	Digital display		EPD203
	Encoder cable	2.5 m	EWLE002GX-T
		5.0 m	EWLE005GX-T
		10.0 m	EWLE010GX-T
		15.0 m	EWLE015GX-T
		20.0 m	EWLE020GX-T
		25.0 m	EWLE025GX-T
		30.0 m	EWLE030GX-T
		35.0 m	EWLE035GX-T
		40.0 m	EWLE040GX-T
		45.0 m	EWLE045GX-T
		50.0 m	EWLE050GX-T
	Connection cable for a master frequency connection (2.5 m)		EWLD002GGBS93
Braking	Brake resistor		ERBD015R04K0

[1)] Additional connection cable required

[2)] You will find other system-bus-compatible accessories such as I/O systems and HMIs in Lenze’s “Automation” catalog.

Accessories	Designation	Order ref.
Communication Manual CAN [1] (for communication module DeviceNet/CANopen)	German	EDSCAN
	English	
	French	
Communication Manual INTERBUS [1]	German	EDSIBUS
	English	
	French	
Communication Manual PROFIBUS [1]	German	EDSPBUS
	English	
	French	
Communication Manual LECOM [1]	German	EDSLECOM
	English	
	French	

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



FAX ORDER FORM

To the Lenze sales office

Fax no. _____

From

_____
Company

_____
Street

_____
Town/postcode

_____
Date Signature

Customer no.

_____
Order ref.

_____
Name

_____
Department

_____
Tel.

Delivery address (if different)

_____
Street

_____
Town/postcode

Invoicing address (if different)

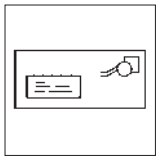
_____
Street

_____
Town/postcode

Requested delivery date _____

Despatch information _____

_____



Fax order form

The 9300 vector frequency inverter

Customer no.

Order no.

9300 vector frequency inverter, 110…400 kW, 400 V

EVF □ □ □ □-EV

Power				
9	3	3	5	= 110 kW
9	3	3	6	= 132 kW
9	3	3	7	= 160 kW
9	3	3	8	= 200 kW
9	3	8	1	= 250 kW
9	3	8	2	= 315 kW
9	3	8	3	= 400 kW

9300 vector frequency inverter
without RFI filter A, without brake transistor

Type ref./Order ref.	Quantity	Price €
EVF93 _ _ -EV		
EVF93 _ _ -EV		

9300 vector frequency inverter
with integrated RFI filter A

Type ref./Order ref.	Quantity	Price €
EVF93 _ _ -EVV030		
EVF93 _ _ -EVV030		

9300 vector frequency inverter
with integrated brake transistor

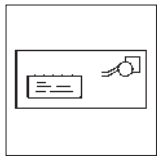
Type ref./Order ref.	Quantity	Price €
EVF93 _ _ -EVV060		
EVF93 _ _ -EVV060		

9300 vector frequency inverter
with integrated RFI filter A,
with integrated brake transistor

Type ref./Order ref.	Quantity	Price €
EVF93 _ _ -EVV110		
EVF93 _ _ -EVV110		

Fax order form

The 9300 vector frequency inverter



Customer no.

Order no.

9300 vector frequency inverter, 110/132 ... 400 / 500 kW, 400 V / 500 V

EVF □ □ □ □-EV

Power				
9	3	3	5	= 110/132 kW
9	3	3	6	= 132/160 kW
9	3	3	7	= 160/200 kW
9	3	3	8	= 200/250 kW
9	3	8	1	= 250/315 kW
9	3	8	2	= 315/400 kW
9	3	8	3	= 400/500 kW

9300 vector frequency inverter[1)]
without RFI filter A, without brake transistor

Type ref./Order ref.	Quantity	Price €
EVF93 _ _ -EVV210		
EVF93 _ _ -EVV210		

9300 vector frequency inverter[1)]
with integrated RFI filter A

Type ref./Order ref.	Quantity	Price €
EVF93 _ _ -EVV240		
EVF93 _ _ -EVV240		

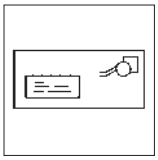
9300 vector frequency inverter[1)]
with integrated brake transistor

Type ref./Order ref.	Quantity	Price €
EVF93 _ _ -EVV270		
EVF93 _ _ -EVV270		

9300 vector frequency inverter[1)]
with integrated RFI filter A,
with integrated brake transistor

Type ref./Order ref.	Quantity	Price €
EVF93 _ _ -EVV300		
EVF93 _ _ -EVV300		

[1)] DC supply or DC bus connection possible



Fax order form

The 9300 vector frequency inverter

Customer no.

Order no.

Miscellaneous

Designation	Type ref./Order ref.	Quantity	Price €