BONFIGLIOLI VECTRON

Brief Manual

ACTIVE

230V single-three phase (2 sizes)
0.55 kW - 0.75 kW - 1.1 kW
1.5 kW - 2.2 kW - 3.0 kW

400V three phase (4 sizes)
0.55 kW - 0.75 kW - 1.1 kW
1.5 kW - 2.2 kW - 3.0 kW
4.0 kW - 5.5 kW - 7.5 kW
11.0 kW - 15.0 kW - 18.5 kW

BONFIGLIOLI
Power & Control Solutions

CE UL cUL N3878 *

MANUFACTORY FACILITIES

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General on the documentation

The present documentation is applicable to frequency inverters in the output range 0.55 kW to 18.5 kW. The factory settings of the entire range of units are suitable for a wide range of applications. The modular structure of the software and hardware makes it possible to set up the frequency inverters to suit the customer's particular requirements. Applications can be realized comfortable with a high level of functionality and dynamics

The user documentation has been structured according to the customer-specific requirements for the frequency inverter to ensure better clarity.

Brief instructions
The brief instructions describe the basic steps for mechanical and electrical installation of the frequency inverter. The commissioning helps you when selecting the required parameters and carrying out the software configuration of the frequency inverter.

Operating instructions
The operating instructions document the full functionality of the frequency inverter. The parameters required for special applications to adapt to the application and the comprehensive additional functions are fully described here.

User manual
The user manual supplements the documentation for specific installation and commissioning of the frequency inverter. Information on various topics in connection with the use of frequency inverters is given for specific applications.

The documentation and additional information can be obtained on request from the local representative of VECTRON Elektronik. The following pictograms and symbols have been used in this documentation:

Danger
indicates an immediate and direct hazard. There is a direct risk of death, severe injury and considerable damage to valuable assets if the precautionary measure is not taken.

Warning
indicates a possible hazard. There is a risk of death, severe injury and considerable damage to valuable assets if the precautionary information is not followed.

Caution
indicates an immediate and direct hazard. Injury or damage to assets could be the result.

Attention
indicates a possible form of operating behaviour or an undesirable state that can occur as described in the information text.

Note
indicates information to make handling of the unit easier for you and which supplements the corresponding part of the documentation.

Warning: Follow carefully the information given in the documentation during installation and commissioning. As a suitably qualified person, you must carefully read the documentation before starting the work and comply with the safety instructions. For the purposes of these instructions, a "qualified person" is someone who is familiar with the setting up, installation, commissioning and operation of frequency inverters and has the corresponding qualifications to carry out such work.

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1 General Information on Safety and Use

The present documentation was produced with great care and meticulously checked several times. It is not possible to give full detailed information on all types of products in view of the need for clarity, and it is also not possible to take into consideration the setting up, operation or servicing in every possible case. If you require further information or if particular problems crop up that are not covered in enough detail in the documentation, you can request the information that you require from the local representative of VECTRON Elektronik.
In addition, we would like to point out that the contents of this documentation are not part of an earlier or existing agreement, approval or legal relationship and are not intended to modify one. All the obligations of the manufacturer arise out of the relevant purchase contract, which alone includes the complete and solely valid stipulations concerning the warranty. These contractual stipulations concerning the warranty are neither increased nor restricted by the details given in this documentation.
The manufacturer reserves the right to correct or modify the contents and product details and also put right omissions without prior notice and shall have no liability whatsoever for damage, injuries or costs incurred that are due to the above-mentioned reasons.

1.1 General Information

Depending on the type of protection applicable for a particular VECTRON frequency inverter, there are moving or live parts and hot surfaces that could be touched.
There is a risk of severe personal injury or damage to valuable assets if the required covers are removed without permission, if the unit is used incorrectly, or as the result of incorrect installation or operation.
Avoid any risks of severe personal injury or damage to valuable assets by ensuring that only suitably qualified technicians are involving in transporting, installing, commissioning and servicing the unit. Standards IEC 60364 and CENELEC HD 384 or DIN VDE 0100 and IEC Report 664 or EN 50178 and BGV A2 (VBG 4) and the relevant national regulations are to be complied with. “Qualified persons” within the meaning of this basic safety information covers persons who are familiar with the setting up, installation, commissioning and operation of frequency inverters and have the corresponding qualifications to carry out such work.

1.2 Appropriate Use

Frequency inverters are electrical drive unit components that are intended for installation in industrial units or machines. Frequency inverters are only sold on a limited basis and as components that are solely intended for professional use within the meaning of standard EN 61000-3-2. Commissioning and the starting of appropriate operation are forbidden until it has been determined that the machine complies with the stipulations of EU Machine Guidelines 98/37/EWG and EN 60204. According to the CE marking regulations, frequency inverters must also comply with the requirements of Low Voltage Guideline 73/23/EWG and of standard EN 50178 / DIN VDE 0160.
The owner has the responsibility for ensuring compliance with EMC Guideline 89/336/EWG. The frequency inverters meet the requirements of Low Voltage Guideline 73/23/EWG and comply with standard EN 50178 / DIN VDE 0160. The requirements of CSA Standard C22.2-No. 14-95 were also complied with through the granting of the UL test mark as per UL508c.The technical data and the details on the connection and environmental conditions can be found on the rating plate and in the documentation and are to be complied with at all times.

1.3 Transport and Storage

Transport and storage are to be done in an appropriate manner and using the original packing materials. The units are to be stored in dry, dust-free rooms that are protected against wet and are subject to only minor temperature variations. Note the permissible climatic conditions as per EN 50178 and from the details given on the packing materials.
The period of storage may not exceed a year without the unit being connected to the relevant permitted rated voltage!

1.4 Handling and Setting Up

The frequency inverter concerned to be used in accordance with the documentation, regulations and standards. Ensure that it is handled with due care and avoid any mechanical overloading or stresses. Do not bend any structural parts in transport or handling, and nor should you change the insulation gaps. Do not touch any electronic components and contacts. The equipment has electrostatically-sensitive components that are easily damaged by incorrect handling. Damaged or destroyed components may not be used, since this could endanger your safety, and also compliance with the relevant standards cannot be guaranteed in such a case.

1.5 Electrical Connection

Ensure when working on or with the frequency inverter that the currently applicable standards BGV A2 (VBG 4), VDE 0100and other national standards are complied with. Comply with the information given in the documentation concerning electrical installation and the relevant regulations. The responsibility for compliance with and testing of the limit values for EMC - product standard EN 61800-3 for variable speed electric drive units lies with the manufacturer of the industrial unit or machine.
The documentation includes information concerning a proper installation in terms of EMC. The cables connected to the frequency inverter may not be subjected to insulation testing with a higher test voltage without having taken suitable switching precautions beforehand.

1.6 Operational Notes

Before commissioning starting up operation in an appropriate manner, all the safety covers are to be in place and the terminals must be checked. Check the additional monitoring and protective devices in accordance with EN 60204 and the relevant applicable safety stipulations (e.g., regulations concerning technical equipment or safety at work, etc.). The frequency inverter is to be completely free of any voltages before starting work, but in any case any connections that carry electric power may not be touched at once, since the capacitors could still be charged. Follow the notes and markings on the frequency inverter.

1.7 Maintenance and Servicing

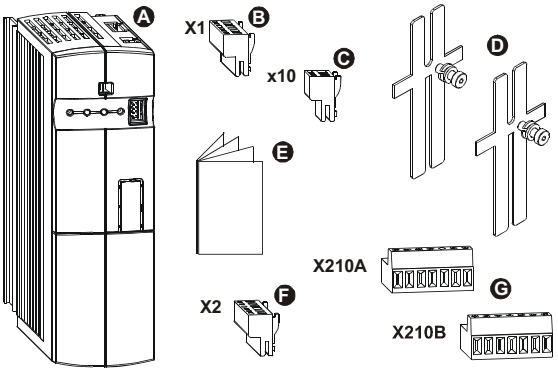
Unauthorized opening and inappropriate actions can lead to either injury or damage. Repairs to the frequency inverters may only be carried out by the manufacturer or by persons authorized by him.

2 Scope of Supply

These frequency inverters can easily be integrated into an automation concept due to the modular hardware components. The scope of supply described here can be supplemented by optional components and to suit specific customer requirements. The plug-in connections made possible functionally safe and economical installation.

2.1 Frequency Inverters (0.55 to 3.0 kW)

Output range 0.55 kW to 3.0 kW

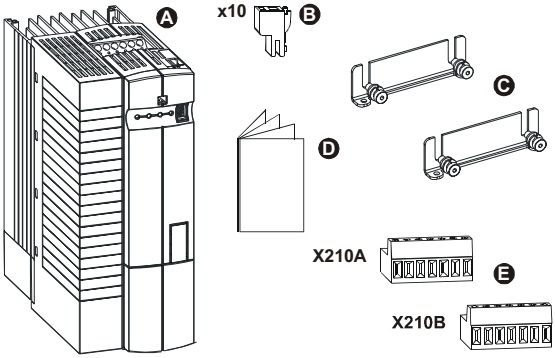


Scope of supply	
A	Frequency inverter
B	Terminal strip X1 (Phoenix ZEC 1.5/...ST7.5) Plug-in terminals for the mains connection and DC link
C	Terminal strip X10 (Phoenix ZEC 1.5/3ST5.0) Plug-in terminals for the relay output
D	Standard fasteners for three vertical installation variants
E	Brief instructions, present document
F	Terminal strip X2 (Phoenix ZEC 1.5/...ST7.5) Plug-in terminal for brake resistor and motor connection
G	Terminals X210A / X210B (Wieland DST 85 / RM3.5) Plug-in terminal to connect the control signals

Note: Please make a thorough check of the items that you have received in terms of quality, quantity and type. Any obvious problems such as external damage to the packing or to the equipment must be reported to the shipper within seven days for insurance reasons.

2.2 Frequency Inverters (4.0 to 18.5 kW)

Output range 4.0 kW to 18.5 kW



Scope of supply

A	Frequency inverter
B	Terminal strip X10 (Phoenix ZEC 1.5/3ST5.0) Plug-in terminals for the relay output
C	Standard fasteners for vertical installation
D	Brief instructions, present document
E	Terminals X210A / X210B (Wieland DST 85 / RM3.5) Plug-in terminal to connect the control signals

Note: Please make a thorough check of the items that you have received in terms of quality, quantity and type. Any obvious problems such as external damage to the packing or to the equipment must be reported to the shipper within seven days for insurance reasons.

3 Technical Data

3.1 Frequency Inverters 230 V (0.55 to 3.0 kW)

The following details relate to the nominal rated point of the frequency inverter.
The nominal rated point of the frequency inverter is defined for an approved mains voltage of 230 V and a switching frequency of 2 kHz.

Output at the motor								
ACT200			**003**	**004**	**005**	**007**	**009**	**012**
Recommended motor power	P	kW	0.4/0.55	0.55/0.75	0.75/1.1	1.1/1.5	1.5/2.2	2.2/3.0
Output current	I	A	2.4/3.0	3.0/4.0	4.0/5.5	5.5/7.0	7.0/9.5	9.5/12.5
Output voltage	U	V	3 x 0 ... mains voltage					
Overload capacity	-	-	1.5 for 60s; 2.0 for 1s/1.2 per 60s; 1.5 for 1s					
Protection	-	-	short-circuit / earth-fault					
Rotary field frequency	f	Hz	0 to 400 depending on the switching frequency					
Switching frequency	f	kHz	2 to 16					
Output brake resistor								
Min. brake resistor	R	Ω	230	160	115	75	55	37
Protection	-	-	short-circuit proof					
Input at the mains								
Mains current [3] 3ph/PE 1ph/N/PE; 2ph/PE	I	A	3 5.4	4 7.2	5.5 9.5 [2]	7 13.2	9.5 16.5 [2]	10.5 [1] 16.5 [2] [4]
Mains voltage	U	V	184 to 264					
Mains frequency	f	Hz	45 to 66					
Fuses 3ph/PE 1ph/N/PE; 2ph/PE	I	A	6 10		10 16		16 20	16 32
Mechanical								
Dimensions:	HxWxD	mm	190x60x175			250x60x175		
Weight (approx.)	m	kg	1.3			1.7		
Type of protection	-	-	IP20 (EN60529)					
Connection terminals	A	mm^2	0.2 to 1.5					
Type of installation	-	-	vertical					
Environmental conditions								
Energy dissipation	P	W	43	53	73	84	115	170
Coolant temperature	T_n	°C	0 to 40 (3K3 DIN IEC 721-3-3)					
Storage temperature	T_L	°C	-25 to 55					
Transport temperature	T_T	°C	-25 to 70					
Relative humidity	-	%	15 to 85; non-condensing					

It is permissible to increase the switching frequency while at the same time reducing the output current to suit customer-specific requirements. The relevant standards and regulations are to be noted for this operational point.

Output current					
Frequency inverter nominal rating	Switching frequency				
	2 kHz	4 kHz	8 kHz	12 kHz	16 kHz
0.55 kW	3.0 A	2.8 A	2.4 A	2.0 A	1.6 A
0.75 kW	4.0 A	3.7 A	3.0 A	2.5 A	2.0 A
1.1 kW	5.5 A [2]	5.0 A [2]	4.0 A	3.4 A	2.7 A
1.5 kW	7.0 A	6.5 A	5.5 A	4.6 A	3.7 A
2.2 kW	9.5 A [2]	8.7 A [2]	7.0 A	5.9 A	4.8 A
3.0 kW	12.5 A [1] [2]	11.5 A [1] [2]	9.5 A [2]	8.0 A [2]	6.5 A

[1] Three phase connection requires line choke
[2] One and two phase connection requires line choke
[3] Mains current with a relative mains impedance of 1%
[4] One and two phase connection requires the power limitation (derating)

3.2 Frequency Inverters 400 V (0.55 to 3.0 kW)

The following details relate to the nominal rated point of the frequency inverter.
The nominal rated point of the frequency inverter is defined for an approved mains voltage of 400 V and a switching frequency of 2 kHz.

Output at the motor								
ACT400			**001**	**002**	**003**	**004**	**005**	**007**
Recommended motor power	P	kW	0.4/0.55	0.55/0.75	0.75/1.1	1.1/1.5	1.5/2.2	2.2/3.0
Output current	I	A	1.3/1.8	1.8/2.4	2.4/3.2	3.2/4.2	4.2/5.8	5.8/7.8
Output voltage	U	V	3 x 0 ... mains voltage					
Overload capacity	-	-	1.5 for 60s; 2.0 for 1s/1.2 for 60s; 1.5 for 1s					
Protection	-	-	short-circuit proof / earth-fault proof					
Rotary field frequency	f	Hz	0 to 400 depending on the switching frequency					
Switching frequency	f	kHz	2 to 16					
Output brake resistor								
min. brake resistor	R	Ω	930	634	462	300	220	148
Protection	-	-	short-circuit proof					
Input at the mains								
Mains current [2] 3ph/PE	I	A	1.8	2.4	2.8 [1]	4.2	5.8	6.8 [1]
Mains voltage	U	V	320 to 528					
Mains frequency	f	Hz	45 to 66					
Fuses 3ph/PE	I	A	6				10	
Mechanical								
Dimensions:	HxWxD	mm	190x60x175			250x60x175		
Weight (approx.)	m	kg	1.3			1.7		
Type of protection	-	-	IP20 (EN60529)					
Connection terminals	A	mm^2	0.2 to 1.5					
Type of installation	-	-	vertical					
Environmental conditions								
Energy dissipation	P	W	40	46	58	68	87	115
Coolant temperature	T_n	°C	0 to 40 (3K3 DIN IEC 721-3-3)					
Storage temperature	T_L	°C	-25 to 55					
Transport temperature	T_T	°C	-25 to 70					
Relative humidity	-	%	15 to 85, non-condensing					

It is permissible to increase the switching frequency while at the same time reducing the output current to suit customer-specific requirements. The relevant standards and regulations are to be noted for this operational point.

Output current					
Frequency inverter nominal rating	Switching frequency				
	2 kHz	4 kHz	8 kHz	12 kHz	16 kHz
0.55 kW	1.8 A	1.6 A	1.3 A	1.1 A	0.9 A
0.75 kW	2.4 A	2.2 A	1.8 A	1.5 A	1.2 A
1.1 kW	3.2 A [1]	2.9 A [1]	2.4 A	2.0 A	1.6 A
1.5 kW	4.2 A	3.9 A	3.2 A	2.7 A	2.2 A
2.2 kW	5.8 A	5.3 A	4.2 A	3.5 A	2.9 A
3.0 kW	7.8 A [1]	7.1 A [1]	5.8 A	4.9 A	3.9 A

[1] Three phase connection requires line choke
[2] Mains current with a relative mains impedance of 1%

3.3 Frequency Inverters 400 V (4.0 to 18.5 kW)

The following details relate to the nominal rated point of the frequency inverter.
The nominal rated point of the frequency inverter is defined for an approved mains voltage of 400 V and a switching frequency of 2 kHz.

Output at the motor								
ACT400			**010**	**014**	**018**	**025**	**034**	**040**
Recommended motor power	P	kW	3.0/4.0	4.0/5.5	5.5/7.5	7.5/11	11/15	15/18.5
Output current	I	A	7.8/10	10/14	14/18	18/25	25/32	32/40
Output voltage	U	V	3 x 0 ... mains voltage					
Overload capacity	-	-	1.5 for 60s; 2.0 for 1s/1.2 for 60s; 1.5 for 1s					
Protection	-	-	short-circuit proof / earth-fault proof					
Rotary field frequency	f	Hz	0 to 400 depending on the switching frequency					
Switching frequency	f	kHz	2 to 16					
Output brake resistor								
Min. brake resistor	R	Ω	106	80	58	48	32	24
Input at the mains								
Mains current [2] 3ph/PE	I	A	10	14.2	15.8 [1]	26	28.2 [1]	35.6 [1]
Mains voltage	U	V	320 to 528					
Mains frequency	f	Hz	45 to 66					
Fuses 3ph/PE	I	A	16		25	35		50
Mechanical								
Dimensions:	HxWxD	mm	250x100x200			250x125x200		
Weight (approx.)	m	kg	2.7			3.8		
Type of protection	-	-	IP20 (EN60529)					
Connection terminals	A	mm^2	0.2 to 6			0,2 to 16		
Type of installation	-	-	vertical					
Environmental conditions								
Energy dissipation	P	W	115	145	200	240	310	420
Coolant temperature	T_n	°C	0 to 40 (3K3 DIN IEC 721-3-3)					
Storage temperature	T_L	°C	-25 to 55					
Transport temperature	T_T	°C	-25 to 70					
Relative humidity	-	%	15 to 85, non-condensing					

It is permissible to increase the switching frequency while at the same time reducing the output current to suit customer-specific requirements. The relevant standards and regulations are to be noted for this operational point.

Output current					
Frequency inverter nominal rating	Switching frequency				
	2 kHz	4 kHz	8 kHz	12 kHz	16 kHz
4.0 kW	10 A	9.3 A	7.8 A	6.6 A	5.3 A
5.5 kW	14 A	12.7 A	10 A	8.4 A	6.8 A
7.5 kW	18 A [1]	16.7 A [1]	14 A	11.8 A	9.5 A
11 kW	25 A	22.7 A	18 A	15.1 A	12.2 A
15 kW	32 A [1]	29.7 A [1]	25 A	21 A	17 A
18.5 kW	40 A [1]	37.3 A [1]	32 A [1]	26.9 A [1]	21.8 A

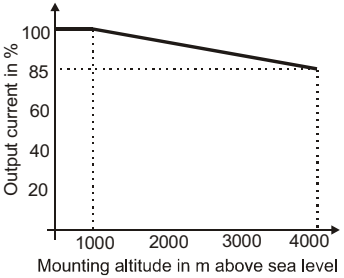
[1] Three phase connection requires line choke
[2] Mains current with a relative mains impedance of 1%

3.4 Operational Diagrams

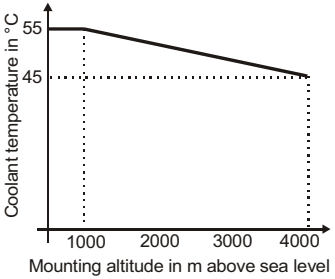
The technical data for the frequency inverter relates to the nominal rated point that was selected for a wide range of applications. It is possible to apply a functionally safe and economical dimensioning (derating) of the frequency inverter via the following diagrams for specific applications.

Mounting altitude

Power reduction (Derating);
5 %/1000m upper 1000 m above sea level;
hmax = 4000m

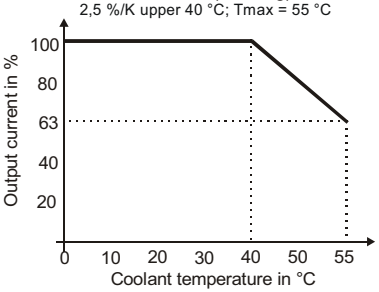


max. coolant temperature;
3.3°C/1000m upper 1000 m above sea level



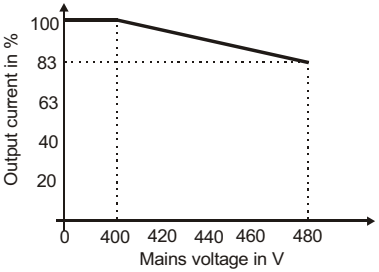
Coolant temperature

Power reduction (Derating);
2,5 %/K upper 40 °C; Tmax = 55 °C



Mains voltage

Power reduction (Derating);
0,22 %/V upper 400 V; Umax = 480 V



4 Mechanical Installation

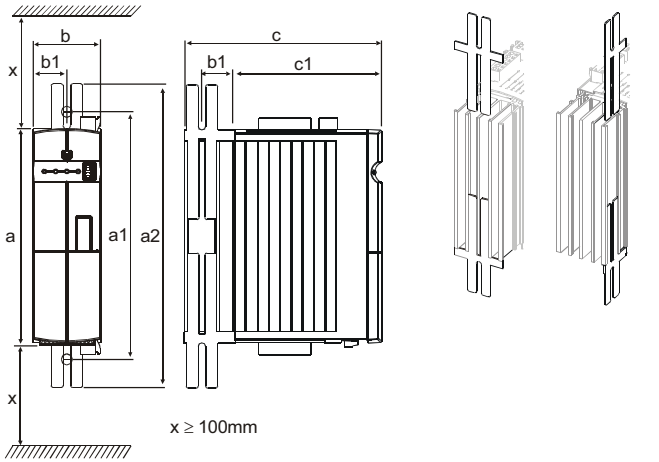
Frequency inverters built to protection type IP20 are normally intended for installation in an electrical cabinet. Follow the installation and safety guidelines, and carefully note the specifications of the unit.

Warning: The frequency inverters only comply with protection class IP20 once the covers are properly in place and the terminals connected up. Operation is permitted then.

4.1 Frequency Inverters (0.55 to 3.0 kW)

Installation is done with the standard fasteners in a vertical position onto the installation plate or with the feedthrough variant.
The following illustration shows the various options for attachment.

Standard installation



Installation is done by inserting the long side of the fastening sheet into the heat sink and fixing it to the installation plate with screws.
The dimensions and installation dimensions given are for the standard unit without any optional components.

Installation dimensions in mm

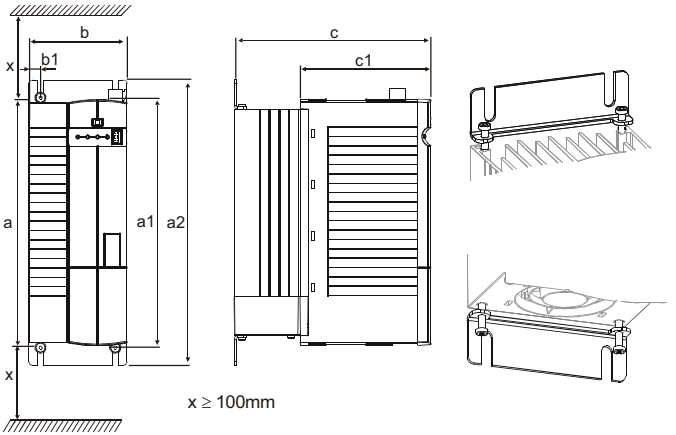
Frequency inverter	a	a1	a2	b	b1	c	c1
0.55 kW to 1.1 kW	190	210 to 230	255	60	30	175	130
2.2 kW to 3.0 kW	250	270 to 290	315	60	30	175	130

Caution: Ensure that there is sufficient space all around the equipment so that cooling air can circulate freely. Ensure that air pollution from sources such as dust, greases, aggressive gases, etc., is avoided.

4.2 Frequency Inverters (4.0 to 18.5 kW)

Installation is done with the standard fasteners in a vertical position onto the installation plate. The following illustration shows the standard form of attachment.

Standard installation



Installation is done by fixing the two angle brackets with the heat sink of the frequency inverter onto the installation plate with thread-forming tapping screws.
The frequency inverter in the power range 11.0 kW to 18.5 kW are delivered with angle brackets which are fixed with four thread-forming tapping screws.
The dimensions and installation dimensions given are for the standard unit without any optional components.

Installation dimensions in mm

Frequency inverter	a	a1	a2	b	b1	c	c1
4.0 kW to 7.5 kW	250	270 to 290	315	100	12	200	133
11.0 kW to 18.5 kW	250	270 to 290	315	125	17,5	200	133

Caution: Ensure that there is sufficient space all around the equipment so that cooling air can circulate freely. Ensure that air pollution from sources such as dust, greases, aggressive gases, etc., is avoided.

5 Electrical Installation

The electrical installation is to be carried out by qualified persons in accordance with the general and regional safety and installation regulations. Safe operation of the frequency inverter presupposes that the documentation and equipment specifications are followed during installation and commissioning. If special areas of application apply, then additional regulations and guidelines must be followed.

Danger: The mains terminals, DC terminals and motor terminals can still have dangerous voltages even after the frequency inverter has been properly disconnected.
It is essential to wait several minutes before starting work on the unit to allow the DC link capacitors time to discharge fully.

The mains fuses and cable cross-sections are to be as given in EN 60204-1 and DIN VDE 0298 part 4 for the nominal operating point of the frequency inverter. According to UL/CSA, approved copper cables of class 1 with a temperature range of 60/75°C are to be used for the power cables, together with the corresponding mains fuses.

Warning: The frequency inverters are to be connected to earth over a large area and with good conductivity. The leakage current of the frequency inverter can be >3.5 mA, a fixed connection must be provided as specified in standard EN 50178. The cross-section of the earth conductor for the installation area must be at least 10 mm², or else a second earth conductor must be laid electrically parallel to the first one. The cross-section must correspond to the recommended cross-section for such applications.

Connection conditions

- The connection for frequency inverters with a phase current ≤ 16 A to the public mains system (1st environment) is to be done with the recommended line choke as per the stipulations of standard EN 61000-3-2. Devices used professionally with a connection rating > 1 kW connected to the public mains system (1st environment) and frequency inverters in industrial applications (2nd environment) only require the recommended line choke if the ratio of active power (real power) to the mains short-circuit power is < 1 %.
- Frequency inverters ≤ 7.5 kW with a built-in EMC filter comply with the emission limit values of the product standard EN 61800-3, for a motor cable length of up to 10 m. Optional filters can be used to meet any customer-specific requirements.
- Operation on an unearthed network (IT network) is permissible after disconnecting the Y-capacitors inside the unit.
- Operation with fault current protective devices is only permissible in connection with a pulsed current or universal current-sensitive fault current relay with leakage current separation. The value of the leakage current depends on the installation, the environment and the length of the motor cables. Operation is possible with a fault current circuit breaker and a cable length of less than 10 m (shielded). The relevant standards and regulations must be complied with.

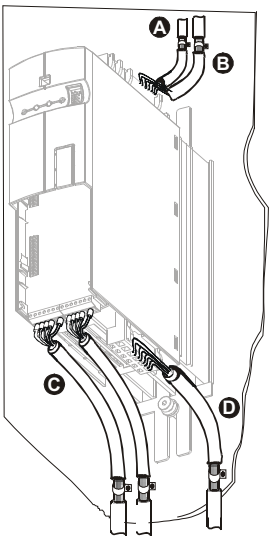
Note: Functionally safe and economic dimensioning of the unit is possible for a particular application. If you require additional product information, it can be obtained on request from the local representative of VECTRON Elektronik.

5.1 EMC Information

The frequency inverters are designed for an interference immunity factor corresponding to the requirements of standard EN61800-3 for use in industrial applications. Electromagnetic interference can be avoided by proper installation and following the specific information for a particular product.

Measures

- Ensure that there is good equipotential bonding within the system or unit. Unit parts such as electrical cabinets, control panels, machine frames, etc. are to be connected with PE cables with good conductivity over a wide area.
- Ensure that the frequency inverter, the line choke, external filter and other components are connected to each other via short cables with one earthing point.
- Avoid unnecessarily long cables and freely swinging loops of cable.
- Contactors, relays and solenoid valves in the electrical cabinet must be provided with suitable means to suppress electromagnetic interference.



A Mains connection

The mains supply line can be of any length, but it must be laid spatially separated from control, data and motor cables. The shield must be connected to earth on both sides with good conductivity over a wide area.

B DC link connection

The frequency inverters are to be connected with the same mains potential or with a direct voltage source.

C Control connection

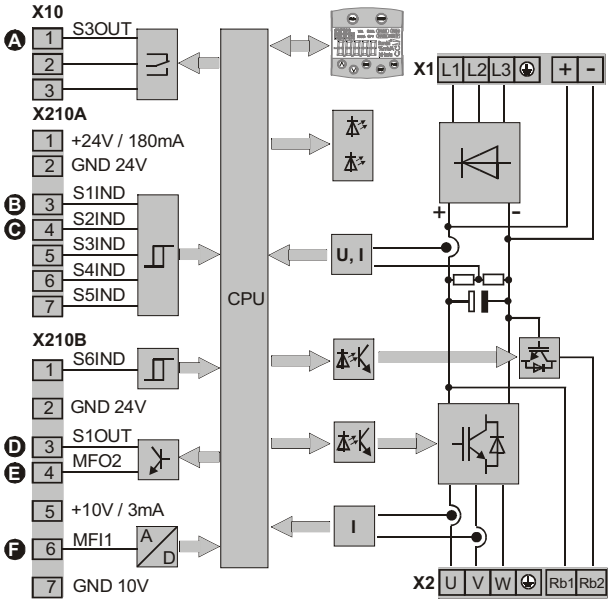
The control and signal cables must be laid spatially separated from the power cables. The shield of control cables must be connected to earth on both sides with good conductivity over a large area. Analog signal cables are to be connected at one side to the shield earth potential.

D Motor connection

The shielded motor cable is to be connected to the motor with a metallic PG screw fitting and to the frequency inverter with a suitable and highly conductive clip with earth potential. The signal cable to monitor the motor temperature is to be laid spatially separated from the motor cable.

Attention: The frequency inverters comply with the requirements of Low Voltage Guideline. 73/23/EWG and the requirements of EMC Guideline 89/336/EWG. EMC product standard EN 61800-3 relates to the drive unit system. The documentation gives information on how to comply with the standards to be applied if the frequency inverter is one component of the drive unit system. The person setting up the drive unit system must provide the statement of conformity.

5.2 Block diagram



A **Relay output S3OUT**

Changeover contact, 240 V AC / 5A, 24 V DC / 5 A (ohmic)

B **Digital input S1IND**

Digital signal, response time approx.16 ms (on), approx.10 μs (off),
U_{max} = 30 V, 10 mA at 24 V, PLC-compatible

C **Digital input S2IND ... S6IND**

Digital signal, response time approx.16 ms, PLC-compatible, U_{max} = 30 V,
10 mA at 24 V,
frequency signal, 0 to30 V, 10 mA at 24 V, f_{max} = 150 kHz

D **Digital output S1OUT**

PLC-compatible, overload proof and short-circuit proof
digital signal, 24 V, I_{max} = 40 mA

E **Multi function output MFO1**

PLC-compatible, overload proof and short-circuit proof
digital signal, 24 V, I_{max} = 40 mA,
frequency signal, 0 to 24V, I_{max} = 40 mA, f_{max} = 150 kHz

F **Multi function input MFI1**

Analog signal, resolution 12Bit, 0 to 10 V (Ri = 70 kΩ), 0 to 20 mA (Ri = 500 Ω),
digital signal, response time approx. 16 ms, PLC-compatible, U_{max}=30 V,
0.4 mA at 24 V,

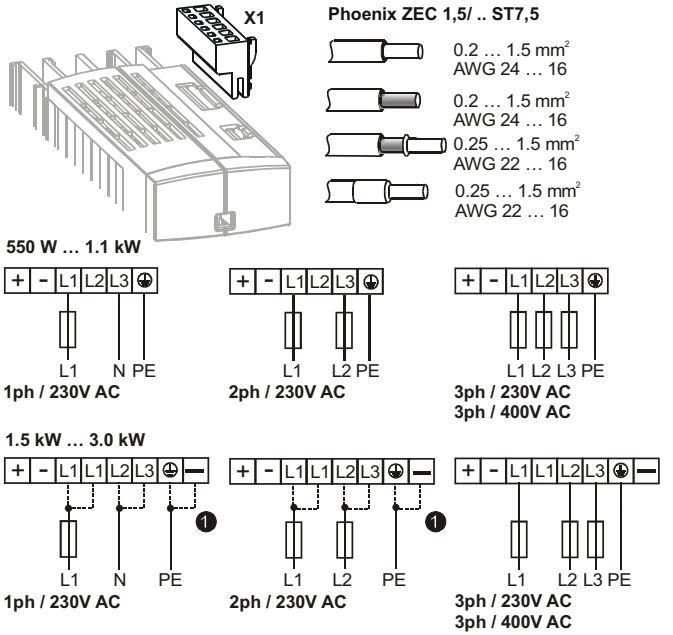
5.3 Mains Connection

The mains connection of the frequency inverters is made via plug-in terminal X1.
The mains fuses and cable cross-sections for the nominal operating point of the frequency inverter are to be as given in EN 60204-1 and DIN VDE 0298 part 4. According to UL/CSA, approved copper cables of class 1 with a temperature range of 60/75°C are to be used for the power cables, together with the corresponding mains fuses. The electrical installation is to be carried out in accordance with the equipment specifications of the standards and regulations to be applied.

Caution: The control, mains supply and motor cables must be laid spatially separated from each other. The cables connected to the frequency inverter may not be subjected to insulation testing with a higher test voltage without having taken suitable switching precautions beforehand.

5.3.1 Frequency Inverters (0.55 to 3.0 kW)

Mains connection 0.55 kW to 3.0 kW

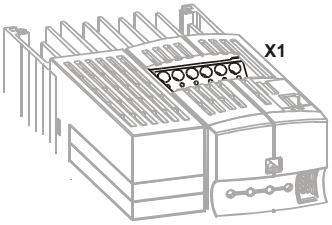


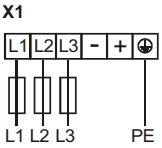
❶ The 230V mains connection 1ph/N/PE and 2ph/PE with the mains current above 10A requires the connection with two terminals.

Danger: Plug-in terminal X1, which cannot be connected up with an incorrect polarity, may only be connected when not live and after being disconnected. The mains terminals and the DC terminals can still have dangerous voltages even after the frequency inverter has been properly disconnected.
It is essential to wait several minutes before starting work to allow the DC link capacitors time to discharge fully.

5.3.2 Frequency Inverters (4.0 to 18.5 kW)

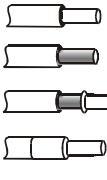
Mains connection 4.0 kW to 18.5 kW





3ph / 400V AC

4.0 kW … 7.5 kW
WAGO Serie 745 / 6qmm / RM7,5



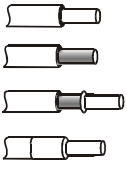
0.2 … 6 mm²
AWG 24 … 10

0.2 … 6 mm²
AWG 24 … 10

0.25 … 4 mm²
AWG 22 … 12

0.25 … 4 mm²
AWG 22 … 16

11 kW … 18.5 kW
WAGO Serie 745 / 16qmm / RM10+15



0.2 … 16 mm²
AWG 24 … 6

0.2 … 16 mm²
AWG 24 … 6

0.25 … 10 mm²
AWG 22 … 8

0.25 … 10 mm²
AWG 22 … 8

Danger: The terminal X1 may only be connected when not live and after being disconnected. The motor terminals and the terminals of the brake resistor can still have dangerous voltages even after the frequency inverter has been properly disconnected.
It is essential to wait several minutes before starting the installation work to allow the DC link capacitors time to discharge fully.