

Altivar AFE

Active Front End

Option for Altivar 61 & Altivar 71

Mounting instructions for 120...860 kW

04/2010



General remarks

The following symbols should assist you in handling the instructions:



Advice, tip !



General information, note exactly !

The requirements for successful commissioning are correct selection of the device, proper planning and installation. If you have any further questions, please contact the supplier of the device.

Capacitor discharge !

Before performing any work on or in the device, disconnect it from the mains and wait at least 15 minutes until the capacitors have been fully discharged to ensure that there is no voltage on the device.

Automatic restart !

With certain parameter settings it may happen that the Active Front End restarts automatically when the mains supply returns after a power failure. Make sure that in this case neither persons nor equipment is in danger.

Commissioning and service !

Work on or in the device must be done only by duly qualified staff and in full compliance with the appropriate instructions and pertinent regulations. In case of a fault contacts which are normally potential-free and/or PCBs may carry dangerous voltages. To avoid any risk to humans, obey the regulations concerning "Work on Live Equipment" explicitly.

Terms of delivery

The latest edition "General Terms of Delivery of the Austrian Electrical and Electronics Industry Association" form the basis of our deliveries and services.

Specifications in this document

We are always anxious to improve our products and adapt them to the latest state of the art. Therefore, we reserve the right to modify the specifications given in this document at any time, particular those referring to weights and dimensions. All planning recommendations and connection examples are non-binding suggestions for which we cannot assume liability, particularly because the regulations to be complied depend on the type and place of installation and on the use of the devices.

All foreign-language translations result from the German or English version. Please consider those in case of unclarity.

Basis of contract

The specifications in text and drawings of this document are no subject of contract in the legal sense without explicit confirmation.

Regulations

The user is responsible to ensure that the device and its components are used in compliance with the applicable regulations. It is not permitted to use these devices in residential environments without special measures to suppress radio frequency interferences.

Trademark rights

Please note that we do not guarantee that the connections, devices and processes described herein are free from patent or trademark rights of third parties.

Copyright

Layout, equipment, logos, texts, diagrams and pictures of this document are copyrighted. All rights are reserved.

Mounting of the Active Front End

Altivar AFE

120...860 kW

Parameters and their settings refer to software version APSatvr_R1.1IE01 and higher

04/2010

8 P02 515 EN.03/03

Theme	Page	Theme	Page
Remarks.....	3	Installation	39
Safety	3	Installation remarks	39
Touch voltages	3	Typical cubicle installation	39
Inappropriate operation of the Active Front End.....	3	Exhaust concept for cubicle installation	41
Checking the mains voltage	4	Line Filter Module LFM.....	42
Device replacement	4	Technical data	42
Receiving the device.....	5	LFM 4V120 (VW3 A7 260)	44
Handling and storage	5	LFM 4V175 (VW3 A7 261)	45
Storage	6	LFM 4V340 (VW3 A7 262)	46
General specification.....	7	LFM 6V220 (VW3 A7 263)	47
Quality	7	LFM 6V430 (VW3 A7 264)	48
CE Marking	7	Line Filter Choke LFC	49
Installation regulations.....	7	Technical data	49
EMC product standard for PDS EN 61800-3.....	8	Active Infeed Converter AIC	52
Special safety notes	11	Technical data	52
Mains undervoltage	11	AIC 4V120 (VW3 A7 250).....	53
Short-time mains interrupts – Automatic start.....	11	AIC 4V145 (VW3 A7 251).....	54
Locking of the Active Front End.....	11	AIC 4V175 (VW3 A7 252).....	55
Parameter settings.....	11	AIC 4V240 (VW3 A7 253).....	56
Mains conditions.....	12	AIC 4V275 (VW3 A7 254) / AIC 4V340 (VW3 A7 255) /	
Mains voltage.....	12	AIC 4V240-13 (VW3 A7 283)	57
Radio interferences.....	12	AIC 4V430 (VW3 A7 256) / AIC 4V540 (VW3 A7 257) .	58
Mains current harmonics / Mains voltage distortion..	12	AIC 4V675 (VW3 A7 258) AIC 4V430-15 (VW3 A7 286) /	
Nongrounded mains	13	AIC 4V540-15 (VW3 A7 287)	59
Mains impedance / Short-circuit current	14	AIC 6V145 (VW3 A7 270) / AIC 6V175 (VW3 A7 271) /	
Power factor correction systems	14	AIC 6V220 (VW3 A7 272).....	60
Ripple control signals	14	AIC 6V275 (VW3 A7 273) / AIC 6V340 (VW3 A7 274) /	
Switching rate.....	14	AIC 6V430 (VW3 A7 275).....	61
Responsibility	14	AIC 6V540 (VW3 A7 276) / AIC 6V675 (VW3 A7 277) /	
Overvoltage protective circuit	14	AIC 6V860 (VW3 A7 278).....	62
Earth leakage circuit breaker.....	15	Access to phase 3L2	63
Automatic restarting	15	Options.....	65
Connecting and disconnecting the inverter	15	Operating options.....	65
Connecting and disconnecting the Active Front End	15	Door mounting kit.....	65
Insulation measurements.....	16	Control terminals	66
Wiring and connection.....	17	Control options.....	67
Technical data	17	Fieldbus Modbus.....	67
Active Front End AFE.....	17	Fieldbus adapter for CANopen	69
Wiring diagram.....	18	Logic extension card	71
Fuses and cable cross sections	20	Installing of an option card.....	73
Fan supply	22	External options.....	74
Fan supply at 400 / 480 V – 120kW to 340kW	22	Radio frequency interference filter RFI.....	74
Fan supply at 400 / 480 V - 430kW to 675kW	23	Commissioning	76
Fan supply at 690 V – 145kW to 430kW	25	Commissioning procedure	76
Fan supply at 690 V – 540kW to 860kW	28	Check of power wiring.....	76
Wiring of the control terminals	31	Factory setting.....	78
Standard control terminals	33	Settings at the inverter	79
Specification of the control terminals.....	34	Software	79
Control via the fieldbus.....	38	Parameter settings	80
		Required settings at the inverter	80

Remarks

Safety



Read these instructions carefully before using the components of the Active Front End and absolutely observe the following safety notes !

Touch voltages

- Read these instructions completely and carefully before installing and operating the Active Front End. Installation, adjustment and repair must be performed by qualified personnel.
- The user is responsible for compliance with all international and national electrical standards concerning protective grounding of the whole equipment.
- Many parts of the frequency inverter, including the printed circuit boards, are supplied by line voltage. Do not touch these parts.
Only use electrically insulated tools.
- Do not touch unshielded components or terminal screws when the device is energised.
- Do not short-circuit terminals PA/+ and PC/- or the capacitors of the DC bus.
- Install and close all the covers before applying power on the Active Front End.
- Execute the following precautions before maintenance or repair of the Active Front End:
 - Disconnect the power supply.
 - Place a label with the notation "DO NOT TURN ON" on the circuit breaker or disconnecting switch of the Active Front End.
 - Lock the circuit breaker or disconnecting switch in the opened position.
- Before any work, disconnect the Active Front End from the mains as well as from the external supply of the control part, if existing. Wait until the charging LED of the Active Front End is completely lapsed. Measure the voltage of the DC bus in order to check whether the DC voltage is below 45 V. The LED of the Active Infeed Converter which indicates the present DC bus voltage is not sufficient.



Electric shock may result in death or serious injury.

Inappropriate operation of the Active Front End

The requirements for successful commissioning are correct selection of the device, proper planning and installation.

Especially observe remarks and specifications regarding ambient conditions and cooling in order to ensure trouble-free operation.



Non-observance of these precautions may cause material damage.

Checking the mains voltage

Please ensure that the mains voltage corresponds with the nominal voltage of the Active Front End before you switch the Active Front End on.

Check the parameter settings of the Active Infeed Converter AIC after applying mains voltage.



An incompatible mains voltage may cause damage of the components of the Active Front End.

Device replacement



If you replace an Active Front End, please check whether the electrical connection corresponds to the wiring comments given in these instructions.

Receiving the device

Handling and storage

Before installation the components of the Active Front End should be packaged during movement and storage to protect the device. Ensure that the ambient conditions are permitted.

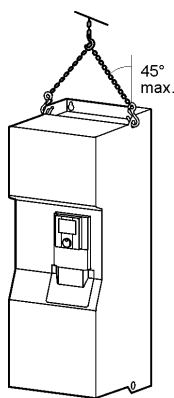
Open the packaging and check whether the components of the Active Front End were not damaged during transport.



If a component is damaged, do not install it and do not operate the Active Front End!



The manufacturer does not bear responsibility for damages which result from transport or unpacking. In this case please inform the insurance company.



The components of the Active Front End can be unpacked without any tools. A hoist is necessary to install the components. Therefore they are equipped with handling lugs.

Check whether the specification on the name plate complies with those of the order.

VW3 A7 250

AIC 4V120

120kW1.1IE01

		Input Alimentation Entrada	Output Sortie Salida
400	U	400V φ3 50/60Hz	650VDC
	I	177A	185ADC
	P	123kW	120kW
440	U	440V φ3 50/60Hz	720VDC
	I	177A	183ADC
	P	135kW	132kW
480	U	480V φ3 50/60Hz	770VDC
	I	177A	180ADC
	P	141kW	138kW

Short circuit withstand 100kA, 480V, when protected by Semiconductor fuse: 250A max

Serial No. EL0910000321

Made in Austria

CE

Schneider Electric

Order code

Description

Serial number

VW3 A7 260

LFM 4V120

120kW

		Characteristics
400	U	400V φ3 50/60Hz
	I	177A
440	U	440V φ3 50/60Hz
	I	177A
480	U	480V φ3 50/60Hz
	I	177A

Short circuit withstand 100kA, 480V, when protected by Semiconductor fuse: 250A max

Serial No. EL0910000123

Made in Austria

CE

Schneider Electric

M12
41 Nm/
360 lb-in

M12
41 Nm/
360 lb-in

Storage

Storage temperature -25°C to 70°C

When the Active Front End was disconnected over a longer period, the performance of its electrolyte capacitors is reduced. But due to the "active balancing system" no special treatment is necessary when the maximum storage time has not been exceeded:

- 12 months at a maximum storage temperature of +50°C
- 24 months at a maximum storage temperature of +45°C
- 36 months at a maximum storage temperature of +40°C

After exceeding the maximum storage time, it is necessary to operate the Active Front End with a load as low as possible for about one hour. We recommend to execute this process already after a shutdown period of 6 months.

⚠ Non-observance of these precautions may cause material damage.

6 | Remarks

04/2010
8 P02 515 EN.03/03

General specification

Quality

CE Marking

All devices and drives of the electric drive engineering may cause electromagnetic interferences and otherwise they may be influenced by such interferences. Therefore, they are subject to the **EMC directive 2004/108/EEC** since 1.1.1996.

The Active Front End units have an operating voltage which is clearly in the range of 50...1000 V AC or 75...1500 V DC. Therefore, they are also subject to the **Low-voltage directive 2006/95/EEC** since 1.1.1997.

Because of the line filter module of the Active Front End the device is in conformity with **EN 61800-3** and **EN 61800-5-1**.

Active Front End units are not considered as machines with at least one mechanically moving part. Therefore, they are not subject to the Machine directive 2006/42/EEC.



Active Front End units are a product of the restricted sales according to IEC 61800-3. In a residential environment this product can cause radio frequency interferences whereupon the user can be called on to take suitable measures.

The components of the Active Front End have a CE marking on the rating plate. However, it is necessary to observe the installation regulations to achieve the corresponding limits.

Installation regulations

- The Active Front End units AFE include a radio frequency interference filter in the line filter module LFM for use in industrial environments as standard. In case of long motor cables, when several inverters are operated on a common DC bus and for the use in residential environment the implementation of an additional external filter is necessary to reduce the radio interferences.

The installation regulations given in the respective device documentation are valid for the total drive unit:

- Use and proper connection of screened control cables
- Consider the protective separation when preparing control lines and coupling relays
- Separate laying of power cables and control wiring

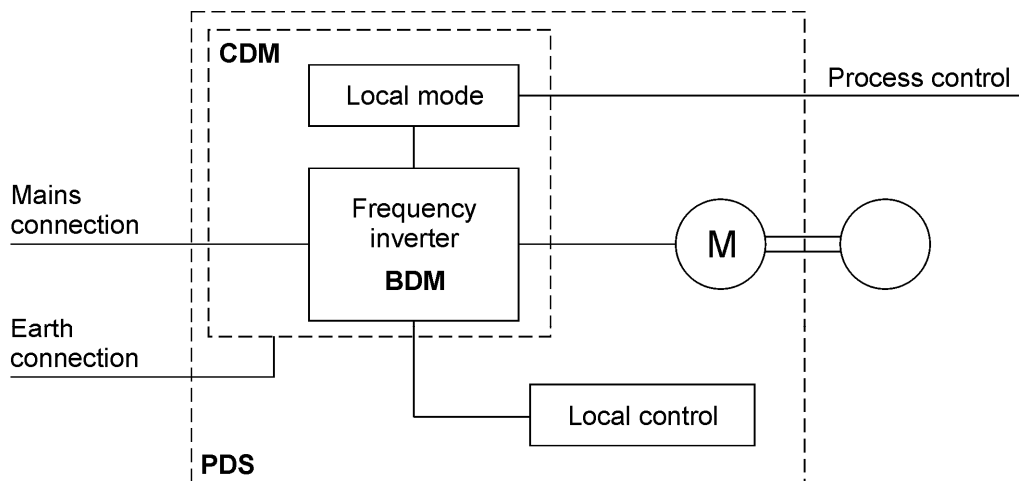
EMC product standard for PDS (Power Drive Systems) EN 61800-3

For frequency inverter drives the product standard EN/IEC 61800-3 edition 2 appeared. It has first priority over the existing general standards (generic standards). If a drive is installed into another device for which a separate EMC product standard exists, then this standard applies.

The aim of the EMC directive **2004/108/EC** is the ability of electric and electronic installations to operate satisfactorily in their electromagnetic environment without influencing the environment or other loads therein.

Therefore, the PDS product standard contains both limits for admissible interferences and requirements for the necessary interference resistance.

The power drive standard EN 61800-3 covers the complete drive from the mains supply to the motor shaft.



BDM: Base-Drive-Module	Basic drive consisting of the power part and the control electronics (e.g. frequency inverter - built-in unit)
CDM: Complete-Drive-Module	Drive modules consisting of BDM (basic drive) and extensions, if existing (e.g. cubicle including RFI filter, AMF, line contactor, ...)
PDS: Power-Drive-System	Drive system consisting of CDM (drive module) and motor, motor cable, local control, power transformer, ... (e.g. the complete electric drive of a machine)

The differentiation in respect of the sales method and the range of use is essential for the handling of frequency inverters.

04/2010

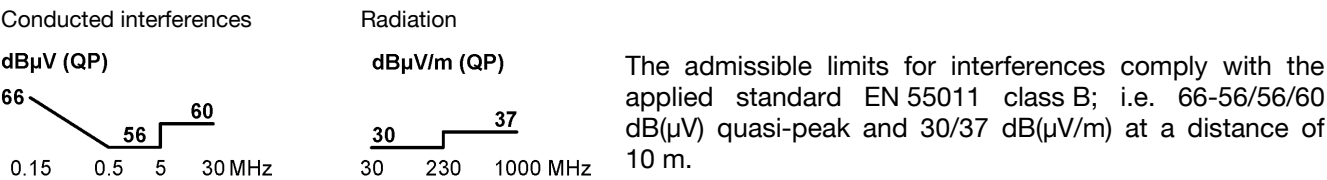
8 P02 515 EN.03/03

Use in residential environment

Drives which are connected without an intermediate transformer to the power supply network which also supplies residential areas. The standard refers to these application areas as "first environment".
The valid limits for interferences are very low and can only be observed by compliance with all installation instructions.

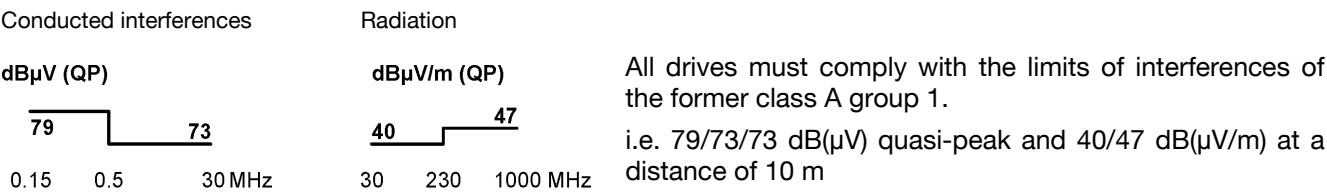
Category C1

Use in residential environments with general sales (unrestricted to every person)



Category C2

Use in residential environments with restricted sales (only EMC qualified resellers)



04/2010

8 P02 515 EN.03/03

Use in industrial environment

The standard refers to these application areas as "second environment". These are areas which are separated from the public network by means of an own transformer.

The use must ensure that the suppression components recommended by the manufacturer are used and that the introductions of the manufacturer are observed. Moreover, the user must ensure that strong interferences do not couple into neighbouring low-voltage networks.

If the neighbouring network is a public network with residential areas, the limits 66-56/56/60 dB(μ V) quasi-peak apply. In case of industrial networks the higher limits 79/73/73 dB(μ V) quasi-peak can be used.

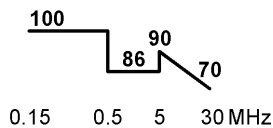
Furthermore, it is necessary to enhance the suppression of interferences if other devices are influenced. The operator of the plant is responsible for this improvement.

The limits for immunity are much stricter because they are based on a generally higher level of interferences.

Category C3

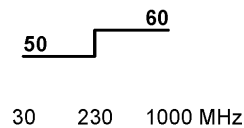
Use in industrial environments

Conducted interferences
drive ≤ 100 A
dB μ V (QP)



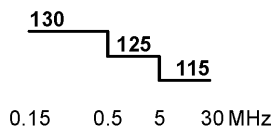
Radiation

dB μ V/m (QP)



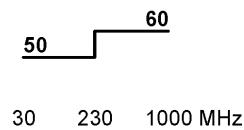
For drives with a size ≤ 100 A the admissible limits for interferences are 100/86/90-70 dB(μ V) quasi-peak and 50/60 dB(μ V/m) at a distance of 10 m (class A group 2).

Conducted interferences
drive > 100 A
dB μ V (QP)



Radiation

dB μ V/m (QP)



For drives with a size > 100 A the admissible limits for interferences are 130/125/115 dB(μ V) quasi-peak and 50/60 dB(μ V/m) at a distance of 10 m (class A group 2).

Category C4

Use in industrial environments for drives > 1000 V or > 400 A

For this drives are no limits defined. An EMC concept has to be compiled within project planning.

In case of non-grounded mains it is usually not possible to keep the limits. Filter capacitors make detection of insulation faults difficult and thus they interfere with the concept of a floating power supply. However, filters which are developed especially for IT mains can be used because they also cause a high reduction of the conducted interferences in non-grounded mains.



The basic requirements for compliance with the relevant limits are the observance and compliance of the installation requirements and the use of the recommended options.

Special safety notes

Mains undervoltage

The Active Front End is very in respect of mains undervoltages. Voltage drops of up to 40 % (depending on the nominal voltage) can be balanced without interruption of operation.

As the low voltage is compensated by a higher current, there is an overload situation that is limited in time. Therefore a switch-off due to overload may take place when the Active Front End operates already close to the performance limit.

Supplying the fans during mains undervoltage is also only possible for a limited time.

Short-time mains interrupts – Automatic start

In case of 1- or 3-phase mains failure, the Active Front End AFE can continue operation only for short time. The control system has to initiate a safety shutdown of the Active Front End and thus of the whole drive. When the mains returns within short time, a restart takes place as standard by means of the autoreset function when there is still a start command.

Locking of the Active Front End

The Active Front End can be locked by means of the logic input "PWR" so that a given or incoming start command is ignored. Independent thereof also an external emergency off command can be integrated into the control of the Active Front End. Also this command leads to an immediate mains cut-off and prevents any start. In both cases the device shows the device state "Lock" at the display.

Parameter settings

After device replacement, software update or reset to factory default, carry out all settings that are required to guarantee the protection of the drive.



This is also valid for the inverter because it has to be adapted for the operation with an Active Front End.

Mains conditions

Mains voltage

The Active Front End AFE is designed for the following mains voltages:

- AFE 400 V:
 - 3 AC 380...400 V $\pm 10\%$ (-30% for less than 1 min), 50 / 60 Hz $\pm 5\%$ (30...70 Hz short-term or with separate fan supply)
 - 3 AC 440 V $\pm 10\%$ (-40% for less than 1 min), 50 / 60 Hz $\pm 5\%$ (30...70 Hz short-term or with separate fan supply)
- AFE 480V
 - 3 AC 480 V $\pm 10\%$ (-40% for less than 1 min), 50 / 60 Hz $\pm 5\%$ (30...70 Hz short-term or with separate fan supply)
- AFE 690 V:
 - 3 AC 500...525 V $\pm 10\%$ (-20% for less than 1 min), 50 Hz $\pm 5\%$
 - 3 AC 600 V $\pm 10\%$ (-30% for less than 1 min), 50 / 60 Hz $\pm 5\%$ (30...70 Hz short-term or with separate fan supply)
 - 3 AC 690 V $\pm 10\%$ (-40% for less than 1 min), 50 / 60 Hz $\pm 5\%$ (30...70 Hz short-term or with separate fan supply)

The nominal mains voltage has to be set at the Active Infeed Converter AIC and the inverter INV. Thereby an optimal adjustment of the undervoltage protective function takes place in both devices.

Radio interferences

The Active Front End units include a radio frequency interference filter in as standard. This filter fulfils the requirements for category "C3 – industrial environments" according to EN/IEC 61800-3 (in the past: EN 55011 class A group 2).



Active Front End units are a product of the restricted sales according to IEC 61800-3. In a residential environment this product can cause radio frequency interferences whereupon the user can be called on to take suitable measures.

Mains current harmonics / Mains voltage distortion

Due to the Active Front End the typical harmonic currents of frequency inverters, caused by the mains supply via diode rectifier, do not occur. The remaining total current distortion factor THD(i) is clearly less than 4 % during mains supply operation as well as during regenerating operation.

Also the distortion of the mains voltage is very low according to the lower current harmonics.

This table represents typical values of the individual current harmonics at operation with the Active Front End.

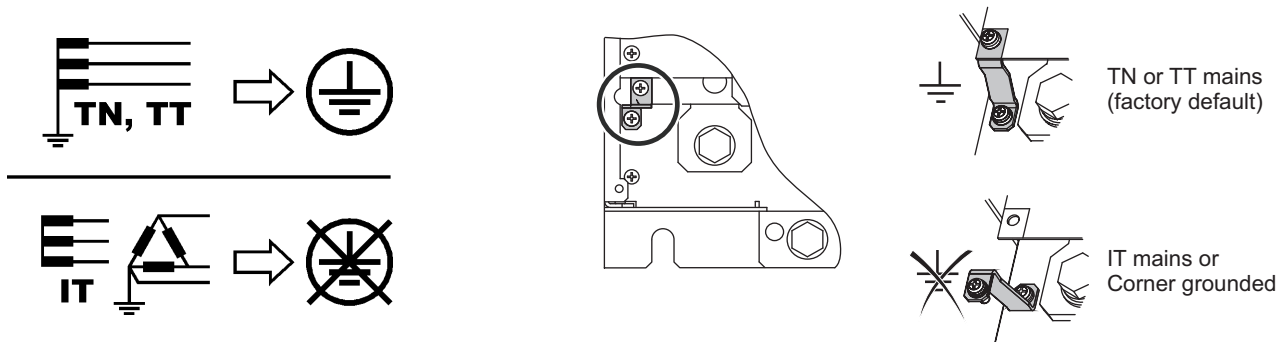
Operating mode	Current harmonics in %																	
	H1	H5	H7	H11	H13	H17	H19	H23	H25	H29	H31	H35	H37	H41	H43	H47	H49	THD
motor	100	1.33	1.06	0.39	0.20	0.20	0.20	0.35	0.24	0.08	0.04	0.16	0.12	0.24	0.16	0.04	0.04	2.42
generator	100	1.30	0.55	0.39	0.39	0.71	0.63	0.24	0.43	0.20	0.24	0.16	0.20	0.16	0.08	0.04	0.04	2.40

Nongrounded mains

The use of the Active Front End units is basically in all mains variants permitted.

Necessary settings at the Line Filter Module LFM

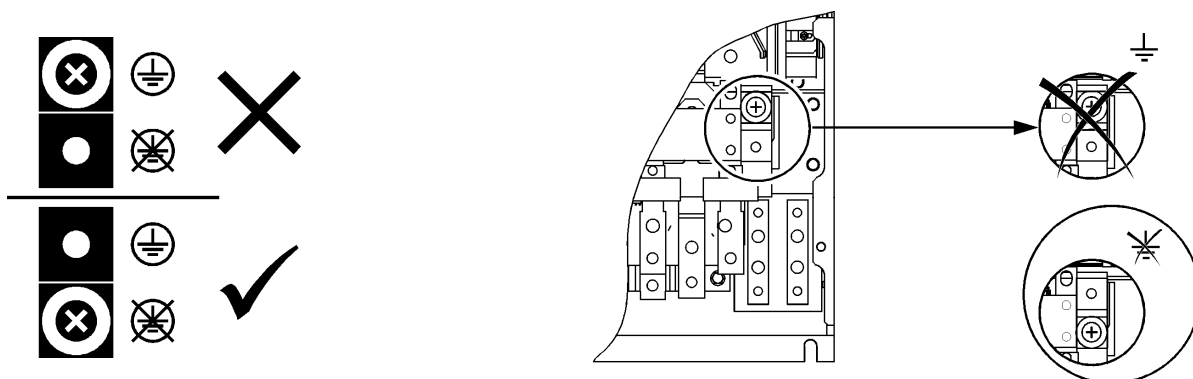
The radio frequency interference filter built-in into the line filter module LFM has to be adapted to the respective mains by means of switch-over/reconnection.



In case of nongrounded mains a single earth fault in the supplying mains has no effect to the function of the Active Front End. If the earth fault occurs in the motor or the motor cables, the inverter is switched off. But the recognition heavily depends on the earth capacitance of the mains.

Necessary settings at the Active Infeed Converter AIC

The integrated RFI filter has to be deactivated (position IT, non-grounded mains) at all devices because there exists no direct mains connection of the frequency inverter in case of operation with an Active Front End.



The radio frequency interference filters of the Active Infeed Converter AIC and the inverter INV must be always set to position "non-grounded mains".

Mains impedance / Short-circuit current

The Active Front End is designed for a maximum mains short-circuit current of 100 kA. A corresponding supply and correct fuse protection must be provided.

Power factor correction systems

In spite of the heavily reduced harmonics, resonances in power factor correction systems without chokes cannot be excluded.



To protect against overload, we recommend the installation of chokes for those parts.

Ripple control signals

The effects of the operation of Active Front End units on ripple control signals in a system have to be checked from the operator of the plant.

Switching rate

The maximum switching rate for the whole life cycle must not exceed 10 switching operations per hour.

Responsibility



The users are responsible to integrate the Active Front End units into the protection and safety concept of the plant or machine.

All stated connection recommendations and planning remarks are to be taken merely as suggestions which must be adapted to the local conditions and regulations concerning installation and usage.

This applies especially to the safety regulations for machines, the EMC regulations and the general regulations for human protection.

Overvoltage protective circuit



All inductivities like relays, contactors, magnetic brakes, etc. have to be equipped with an overvoltage protective circuit. It prevents malfunctions of the conventional device control as well as of the fieldbus.

A free-wheeling diode is provided for DC control circuits.

For AC control circuits the R/C wiring is preferable compared to a wiring with varistors because as a result not only the peak overvoltage is reduced but also the rise-time.



The protective circuit must be qualified for inverter operation !

Earth leakage circuit breaker

The Active Front End as well as the inverter lead an increased leakage current against earth.



Particularly because of the capacitors of the radio frequency interference filter, an unintentional triggering of an earth leakage circuit breaker may occur at the moment of switching on. As well, the earth capacitances may cause an incorrect triggering during operation. On the other hand, it is possible that the triggering is blocked by means of DC component.

Therefrom, you should observe following:

- Only use short-time delayed and pulse current sensitive earth leakage circuit breakers with considerably higher tripping current.
- Protect the other loads by means of a separate earth leakage circuit breaker.
- Earth leakage circuit breakers in front of an Active Front End AFE do not provide absolutely reliable protection in case of direct contact!! So they should be always used in combination with other protective measures.
- The Active Front End units have no current-limiting effect (in case of earth leakage currents) and therefore they do not violate the protective multiple earthing.

Depending on the conditions, the leakage current can be absolutely higher than 100 mA!!



The earth leakage detection built into the inverter INV has no current-limiting effect. It only protects the drive and is no human protection.

Automatic restarting

By fixed wiring of a logic input and setting of the required parameters at the Active Infeed Converter AIC, the Active Front End is switched on automatically after each mains switch-on or mains recurrence without the power failure having to be confirmed. This is an important and valuable function for the increase in availability, especially for drives that are not integrated into the plant control via a fieldbus system.

The automatic start of the Active Front End takes place in case of:

- Switch-on of the mains voltage and given start command (only in case of 2-wire control)
- After a mains failure when there is still a start command (only in case of 2-wire control)
- After each trip confirmation and given start command (only in case of 2-wire control)

Connecting and disconnecting the inverter

Due to the capacities, connecting and disconnecting an inverter INV is only allowed when the Active Front End is switched off and when the DC link is discharged.



Connecting the inverter leads to a current pulse and thus may cause damage of the devices connected to the DC bus.

Connecting and disconnecting the Active Front End

In case of parallel operation at a common DC bus, connecting and disconnecting an Active Front End AFE is only allowed when there is no mains connection and the DC link is discharged because of the capacities.

Insulation measurements

All Active Front End units are tested regarding voltage resistance and insulation resistance according to EN 61800-5-1. When measuring the insulation resistance for these devices (e.g. in case of inspection) unconditionally pay attention to following points:

1. Short-circuit all power terminals of the Active Front End (L1, L2, L3, PA/+, PC/-, as well as the red X labelled terminals).
2. The internal RFI filter in the line filter module LFM must not be grounded, i.e. the screw on the RFI-board has to be removed (position of the screw see chapter "Nongrounded mains", page 13).
3. Carry out the measurements of the insulation resistance only between the short-circuited power terminals and ground.
4. Test voltage: at 400V and 480V devices: max. 2.8 kV DC
at 690V devices: max. 3.11 kV DC

The testing period must not exceed 5 s.

5. Before measuring the insulation resistance of the Active Front End, the inverter has to be safely separated from the Active Front End by disconnection. Non-observance leads to damage of the Active Front End!



Do not carry out insulation resistance measurements at the control terminals !!!



Use a checking device which is qualified for tests with high capacities and leakage currents up to 10 mA.

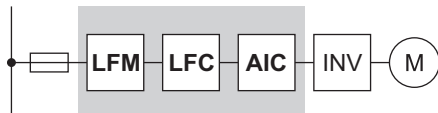
04/2010

8 P02 515 EN.03/03

Wiring and connection

Technical data

Active Front End AFE



The Active Front End AFE is used to reduce the mains current harmonics as well as to return excess energy to the mains. It consists of following components:

- Line Filter Module LFM
- Line Filter Choke LFC
- Active Infeed Converter AIC

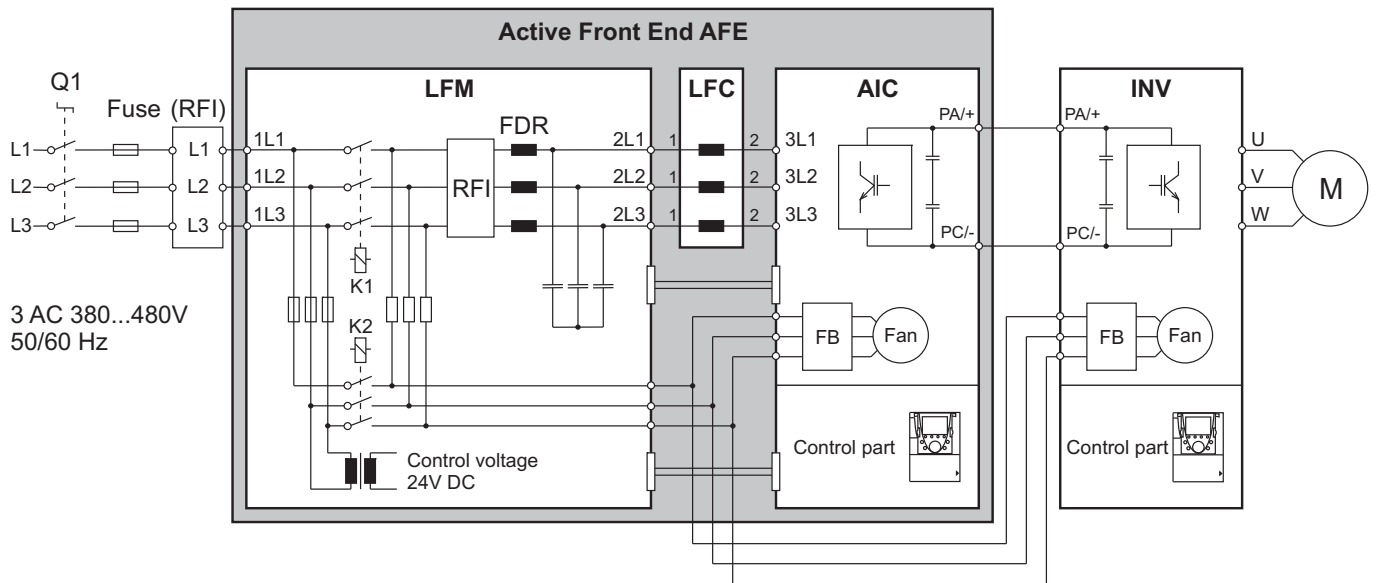
Active Front End AFE	400 V	480 V	500 V / 690 V
Input			
Voltage	380...400 V ± 10 % (during operation: -30 % for less than 1 min) for TT, TN or IT mains	480 V ± 10 % (during operation: -40 % for less than 1 min) for TT, TN or IT mains	500...525 V ± 10 % (during operation: -20 % for less than 1 min) for TT, TN or IT mains
	440 V ± 10 % (during operation: -40 % for less than 1 min) for TT, TN or IT mains		600 V ± 10 % (during operation: -30 % for less than 1 min) for TT, TN or IT mains
			690 V ± 10 % (during operation: -40 % for less than 1 min) for TT, TN or IT mains
Frequency	50/60 Hz ± 5 % (30...70 Hz short-term or with separate fan supply)		50 Hz ± 5 % at 500...525 V
			50/60 Hz ± 5 % at 600 V (30...70 Hz short-term or with separate fan supply)
			50/60 Hz ± 5 % at 690 V (30...70 Hz short-term or with separate fan supply)
Overvoltage class	Class III according to EN 61800-5-1		
Output			
Nominal output voltage	650 V DC at a mains voltage of 3AC 380V/400V	770 V DC at a mains voltage of 3AC 480V	840 V DC at a mains voltage of 3AC 500V/525V
	720 V DC at a mains voltage of 3AC 440V		960 V DC at a mains voltage of 3AC 600V
			1100 V DC at a mains voltage of 3AC 690V
Overload	20 % for 60 seconds per 10 minutes, 35 % for 2 seconds		



Active Front End units are a product of the restricted sales according to IEC 61800-3. In a residential environment this product can cause radio frequency interferences whereupon the user can be called on to take suitable measures.

Wiring diagram

The following presentation shows a typical wiring diagram of an Active Front End with a frequency inverter.

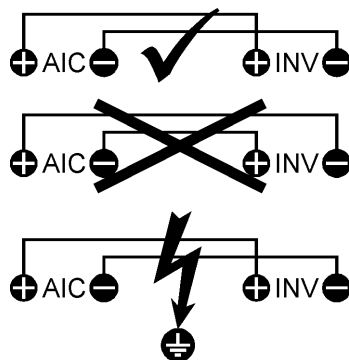


- Q1Main switch (to be used if required according to the local regulations)
- FuseFuses according to table "Fuses and cable cross sections", page 20 (absolutely necessary)
- RFI.....Optional radio interference filter for use in residential environment
- AFEconsisting of
- Line Filter Module LFM
 - Line Filter Choke LFC
 - Active Infeed Converter AIC
- INVInverter

In case of a single drive an Active Front End AFE is directly connected to the DC link of the inverter (= standard frequency inverter).

In case of the common DC bar all inverters are connected to the DC output of the Active Front End AFE.

In case of parallel connection of Active Front End units they are connected to all inverters via a DC bus.

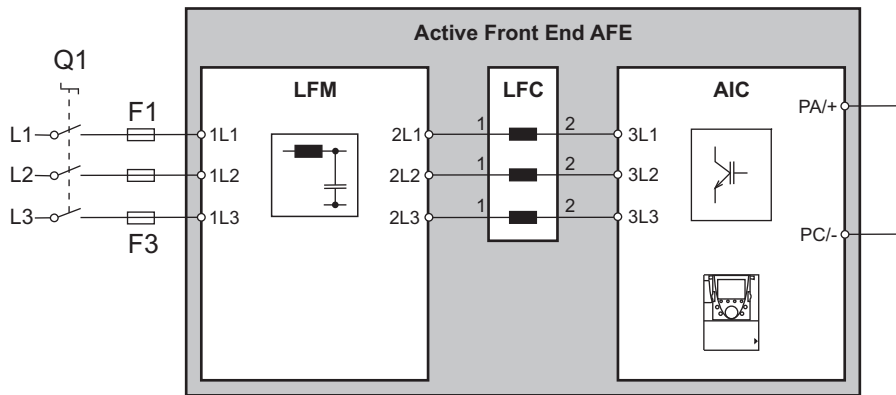


! In case of faulty wiring of the DC link, e.g. due to exchanging terminals PA/+ and PC/- or an earth fault, the inverter as well as the Active Front End may be damaged or destroyed.

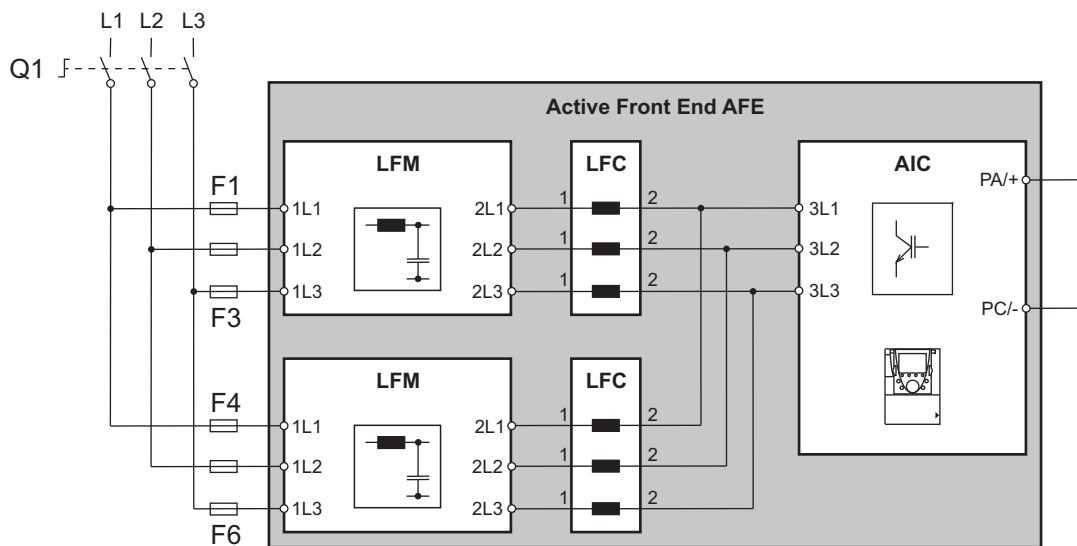
The Active Front End consists of three components in principle: the Line Filter Module LFM, the Line Filter Choke LFC and the Active Infeed Converter AIC.

The 3-phase mains connection is done at the Line Filter Module LFM. Further power connection is done via the Line Filter Choke LFC (3 single phase chokes) to the Active Infeed Converter AIC.

In the power range to 340 kW (up to 430 kW at 500 / 690 V) **one** LFM and **one** LFC (consisting of three parts) is connected upstream to the Active Infeed Converter AIC.



In the power range from 430 kW (from 540 kW at 500 / 690 V) the Active Front End consists of an AIC, **two** LFM and **two** LFCs (each consisting of three single phase chokes).



04/2010

8 P02 515 EN.03/03

Fuses and cable cross sections

The Active Front End is equipped with comprehensive protective devices.

It is absolutely necessary to protect the mains side of the whole Active Front End AFE with superfast (semiconductor) fuses additionally as secondary protection. This protects the individual components in case of an internal short-circuit or if the electronic protective mechanisms fail. It is also a precondition for operation at mains with high short-circuit power.

The protection at the DC output side is only required in case of connection variant "Active Front End units parallel". When selecting the fuses, pay attention to the nominal voltage of the fuses and their special qualification to switch-off DC currents.

The mentioned diameters for 3-wire cables are recommended values for laying the cable in air at max. 40°C ambient temperature, based on the regulations ÖVN EN 1 and VDE 0100.

The lines in the cubicles are dimensioned according to the specification for single conductors XLPE/EPR copper 90°C.



In case of other ambient conditions and different regulations the cable diameters must be adjusted.

Mains supply 3AC 400...440 V						AFE	DC output		
Pre- or conduit fuses	Cu cable [mm²]	Mains fuse "AFE protection"	Lines in the cubicle [mm²] (per phase)	Cont. current AC [A]	Connection LFM	Type	Cont. current DC	Connection AIC	Cable for DC connection (per pole) [mm²]
250 A	3x120	250 A sf	95	177 A	1 x M10	120	185 A	1 x M12	95
315 A	3x185	315 A sf	120	212 A	1 x M10	145	220 A	1 x M12	120
400 A	2x (3x120)	350 A sf	150	255 A	1 x M10	175	265 A	1 x M12	150
500 A	2x (3x150)	500 A sf	2x95	348 A	1 x M10	240	366 A	1 x M12	2x95
630 A	2x (3x185)	550 A sf	2x95	395 A	1 x M10	275	412 A	2 x M12	2x95
800 A	3x (3x185)	700 A sf	2x150	495 A	1 x M10	340	517 A	2 x M12	2x150
1000 A	4x (3x185)	450 A sf	2x95	314 A	1 x M10	430	654 A	4 x M12	4x95
		450 A sf	2x95	314 A	1 x M10				
1250 A	4x (3x240)	550 A sf	2x95	390 A	1 x M10	540	815 A	4 x M12	4x120
		550 A sf	2x95	390 A	1 x M10				
1600 A	6x (3x240)	700 A sf	2x150	490 A	1 x M10	675	1023 A	4 x M12	4x185
		700 A sf	2x150	490 A	1 x M10				

Mains supply 3AC 480 V						AFE	DC output		
Circuit breaker Rated current	Cu cable [mm²]	Mains fuse "AFE protection"	Lines in the cubicle [mm²] (per phase)	Cont. current AC [A]	Connection LFM	Type	Cont. current DC	Connection AIC	Cable for DC connection (per pole)
250	1x (3x250 MCM)	250 A sf	AWG 1/0	160 A	1 x M10	120	163 A	1 x M12	AWG 1/0
250	1x (3x 350 MCM)	315 A sf	AWG 3/0	200 A	1 x M10	145	203 A	1 x M12	AWG 3/0
400	2x (3x AWG 4/0)	350 A sf	AWG 4/0	200 A	1 x M10	175	203 A	1 x M12	AWG 4/0
400	2x (3x350 MCM)	500 A sf	300 MCM	348 A	1 x M10	240	366 A	1 x M12	350 MCM
600	2x (3x 400 MCM)	550 A sf	350 MCM	395 A	1 x M10	275	412 A	2 x M12	400 MCM or 2x AWG 4/0
600	2x (3x 400 MCM)	700 A sf	2x 250 MCM	495 A	1 x M10	340	517 A	2 x M12	2x 300 MCM
800	5x (3x 400 MCM)	500 A sf *)	300 MCM	314 A	1 x M10	430	654 A	4 x M12	2x 400 MCM
		500 A sf *)	300 MCM	314 A	1 x M10				
1000	6x (3x 500 MCM)	550 A sf *)	350 MCM	390 A	1 x M10	540	815 A	4 x M12	2x 600 MCM or 3x 350 MCM
		550 A sf *)	350 MCM	390 A	1 x M10				
1200	6x (3x 700 MCM)	700 A sf *)	2x 250 MCM	490 A	1 x M10	675	1023 A	4 x M12	3x 500 MCM
		700 A sf *)	2x 250 MCM	490 A	1 x M10				

*) Parallel connection of 2 LFM and 2 LFC

04/2010

8 P02 515 EN.03/03

Mains supply 3AC 500/690 V						AFE	DC output		
Pre- or conduit fuse	Cu cable [mm ²]	Mains fuse "AFE protection"	Lines in the cubicle [mm ²] (per phase)	Cont. current AC [A]	Connection LFM	Type	Cont. current DC	Connection AIC	Cable for DC connection (per pole) [mm ²]
200 A	3x95	160 A sf	50	120 A	1 x M10	145	130 A	1 x M12	50
250 A	3x120	200 A sf	70	150 A	1 x M10	175	156 A	1 x M12	70
315 A	3x185	250 A sf	95	185 A	1 x M10	240	195 A	1 x M12	95
400 A	2x (3x120)	315 A sf	120	228 A	1 x M10	275	244 A	2 x M12	120
400 A	2x (3x120)	400 A sf	150	285 A	1 x M10	340	305 A	2 x M12	150
500 A	2x (3x150)	500 A sf	2x 95	360 A	1 x M10	430	386 A	2 x M12	2x 95
800 A	3x (3x185)	315 A sf *)	120	225 A	1 x M10	540	481 A	4 x M12	2x 120
		315 A sf *)	120	225 A	1 x M10				
800 A	3x (3x185)	400 A sf *)	150	282 A	1 x M10	675	604 A	4 x M12	2x 150
		400 A sf *)	150	282 A	1 x M10				
1000 A	4x (3x185)	500 A sf *)	2x 95	358 A	1 x M10	860	765 A	4 x M12	3x 150
		500 A sf *)	2x 95	358 A	1 x M10				

Mains supply 3AC 600 V						AFE	DC output		
Circuit breaker Rated current	Cu cable [mm ²]	Mains fuse "AFE protection"	Lines in the cubicle [mm ²] (per phase)	Cont. current AC [A]	Connection LFM	Type	Cont. current DC	Connection AIC	Cable for DC connection (per pole)
160	1x (3x AWG 2/0)	160 A sf	AWG 2	120 A	1 x M10	145	130 A	1 x M12	AWG 2
250	1x (3x AWG 4/0)	200 A sf	AWG 1/0	150 A	1 x M10	175	156 A	1 x M12	AWG 1/0
250	1x (3x 300 MCM)	250 A sf	AWG 2/0	160 A	1 x M10	240	170 A	1 x M12	AWG 2/0
400	1x (3x 400 MCM)	315 A sf	AWG 3/0	228 A	1 x M10	275	244 A	2 x M12	AWG 3/0
400	2x (3x 250 MCM)	400 A sf	AWG 4/0	285 A	1 x M10	340	305 A	2 x M12	250 MCM
600	2x (3x 350 MCM)	500 A sf	350 MCM	360 A	1 x M10	430	386 A	2 x M12	350 MCM
600	3x (3x 350 MCM)	315 A sf *)	AWG 3/0	225 A	1 x M10	540	481 A	4 x M12	500 MCM or 2x250 MCM
		315 A sf *)	AWG 3/0	225 A	1 x M10				
800	3x (3x 500 MCM)	400 A sf *)	AWG 4/0	282 A	1 x M10	675	604 A	4 x M12	2x350 MCM
		400 A sf *)	AWG 4/0	282 A	1 x M10				
1000	6x (3x 400 MCM)	500 A sf *)	350 MCM	358 A	1 x M10	860	765 A	4 x M12	3x350 MCM
		500 A sf *)	350 MCM	358 A	1 x M10				

*) Parallel connection of 2 LFM and 2 LFC



As mains fuses for protection of the AFE superfast (semiconductor) fuses have to be used.



If the mains fuses blow the Active Front End already has a primary defect. Therefore, exchanging the blown fuses and switching the Active Front End on again is not effective.



In order to meet the requirements of UL/CSA, copper cables with temperature class 60/70°C have to be used.



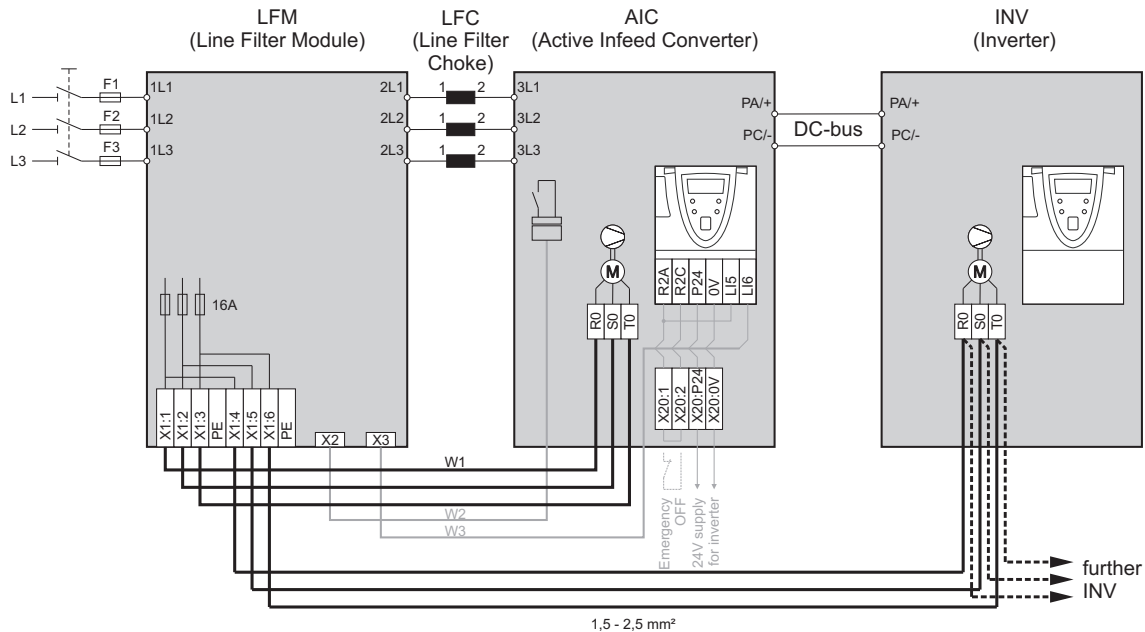
In order to meet the requirements of UL/CSA, a listed circuit breaker has to be used.

Fan supply

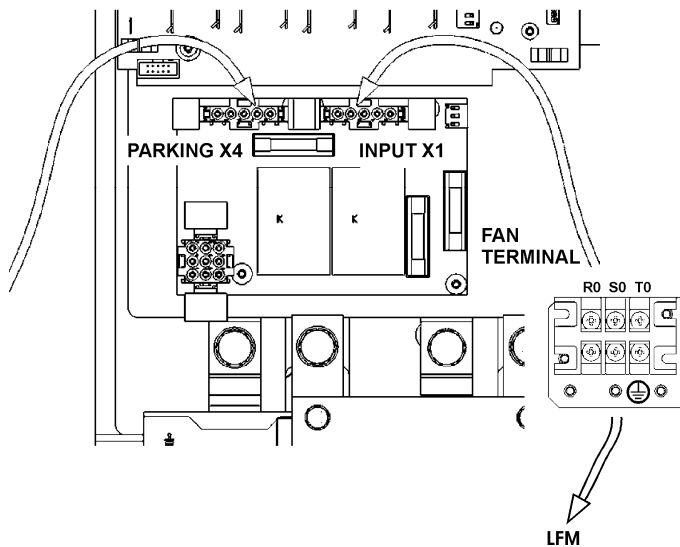
Fan supply at 400 / 480 V – 120kW to 340kW

The voltage for fan supply is generated in the line filter module LFM. With the fan supply it is possible to supply all fans of the Active Infeed Converter AIC and the fans of up to four inverters of same power.

For the 400 V devices (except VW3 A7 250 - DC fans) the cable W1 has to be connected to the line filter module LFM in order to supply the fans in the Active Infeed Converter AIC.



The fans in the inverter INV are supplied from the drive side between the terminals 4/5/6 at the terminal strip X1 in the line filter module LFM and the auxiliary terminal block R0/S0/T0 in the INV. Thereby the installation instructions of the inverter INV for external fan supply have to be observed (switching to external supply). The cable cross section for the fan supply has to be 1.5 – 2.5 mm².

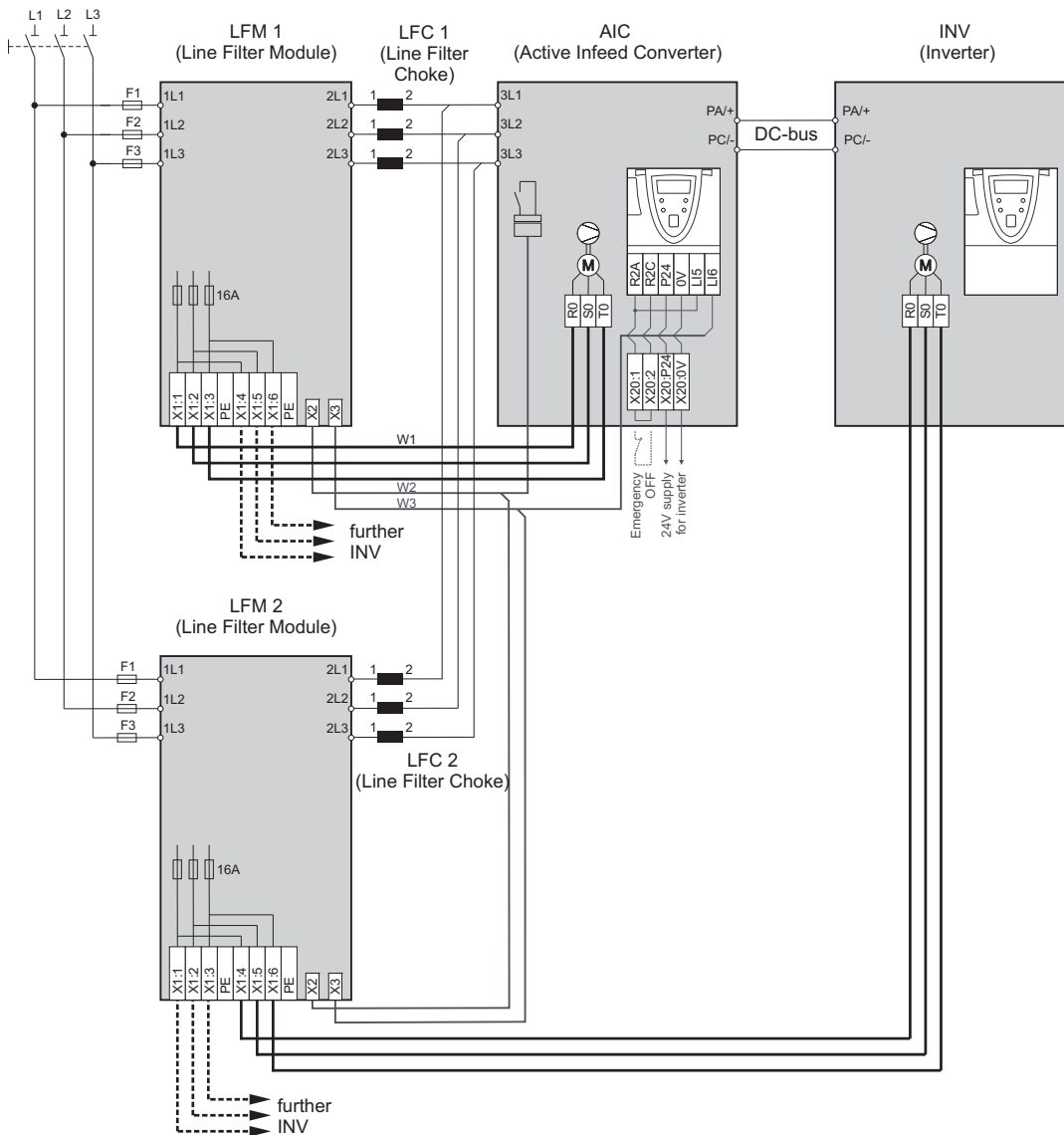


The inverters INV of the types
ATV61H075N4 ... HC11N4
ATV71H075N4 ... HD90N4
do not require an external fan supply from the line filter module LFM.

Fan supply at 400 / 480 V - 430kW to 675kW

The voltage for fan supply is generated in the line filter module LFM. With the fan supply it is possible to supply all fans of the Active Infeed Converter AIC and the fans of up to four inverters of same power.

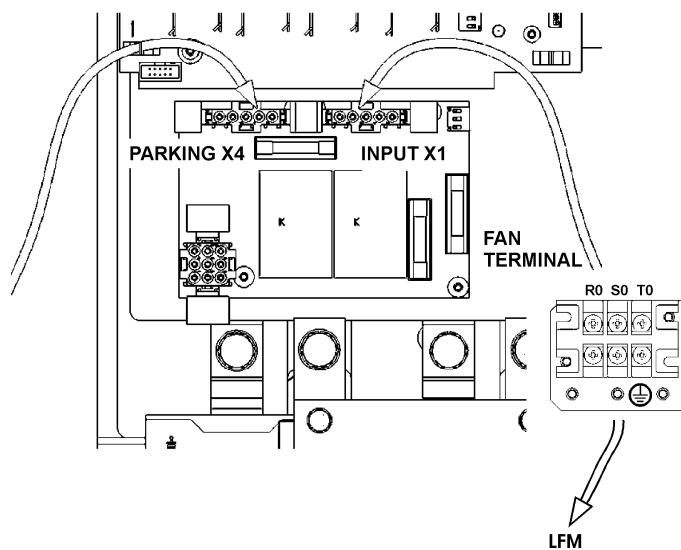
For the 400 V devices the cable W1 has to be connected to the line filter module LFM in order to supply the fans in the Active Infeed Converter AIC.



04/2010

8 P02 515 EN.03/03

The fans in the inverter INV are supplied from the drive side between the terminals 4/5/6 at the terminal strip X1 in the line filter module LFM and the auxiliary terminal block R0/S0/T0 in the INV. Thereby the installation instructions of the inverter INV for external fan supply have to be observed (switching to external supply). The cable cross section for the fan supply has to be 1.5 – 2.5 mm².

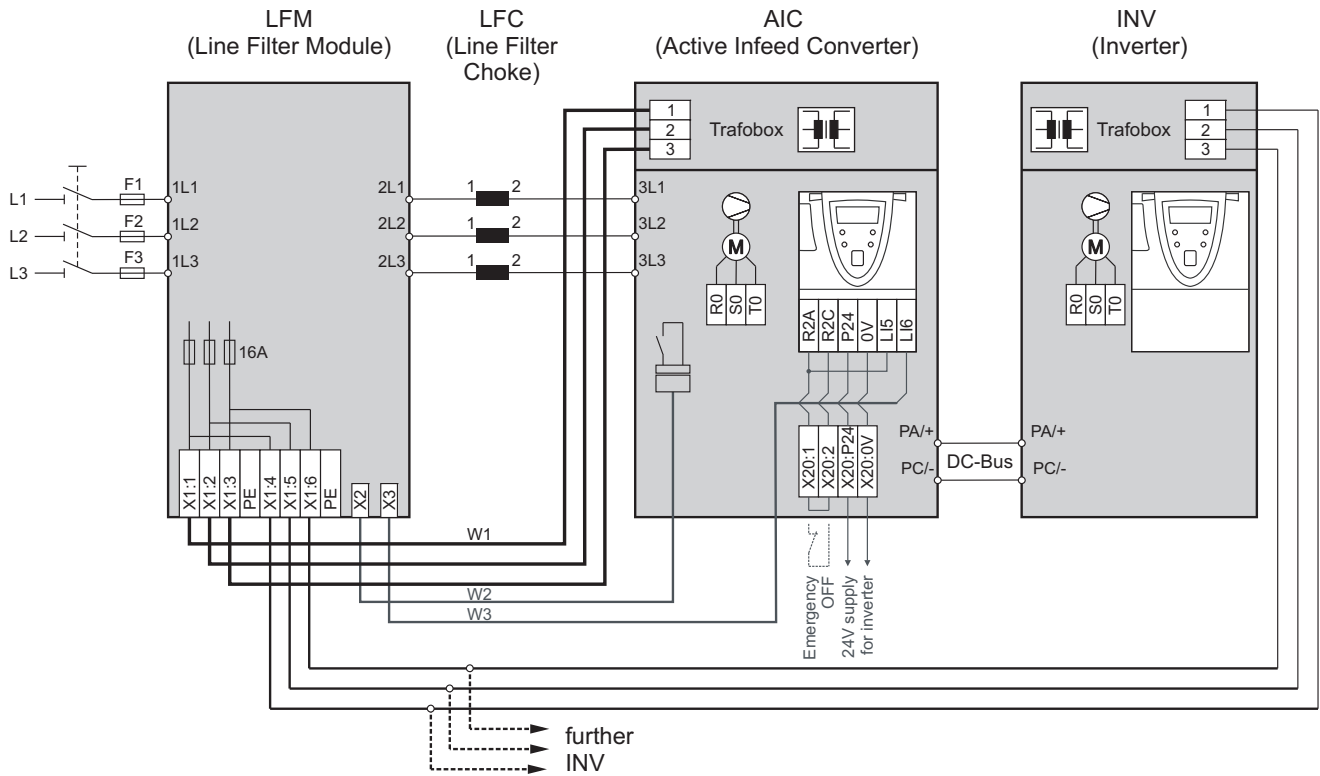


The inverters INV of the types
 ATV61H075N4 ... HC11N4
 ATV71H075N4 ... HD90N4
 do not require an external fan supply from the line filter module LFM.

Fan supply at 690 V – 145kW to 430kW

For the 690 V devices the fans are supplied via the transformer box at the top side of the devices. The connection to the Active Infeed Converter AIC is included in delivery and has to be connected to the line filter module LFM only.

The fans in the inverter INV are supplied from the drive side between the terminals 4/5/6 in the line filter module LFM and the transformer box at the top side of the inverter INV. Therefore a terminal module is necessary (deliverable as option Fan wiring 6V - VW3 A7 280).



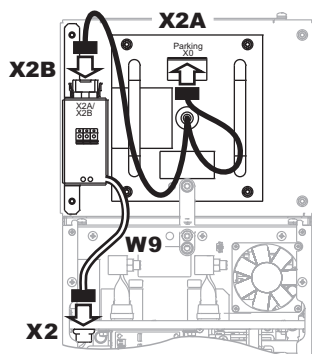
To wire the fan supply at the inverters ATV71HC11Y to HC31Y and ATV61HC11Y to HC40Y respectively option Fan wiring 6V (VW3 A7 280) has to be ordered once.

Depending on the line voltage the wiring in the Active Infeed Converter AIC and in the inverter INV has to be done as follows:

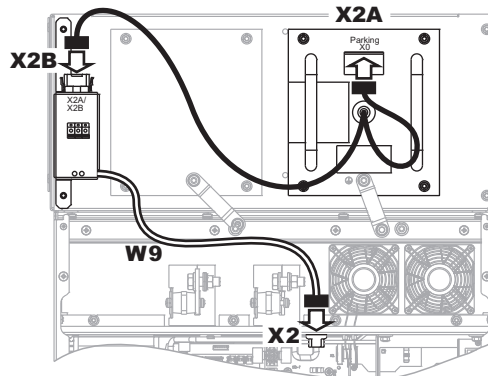
Mains voltage 690 V

- Build in the option Fan Wiring 6V into the inverter INV
- Put the connector X2A from the built-in transformer box to the parking position X0.
- Connect plug X2B with the option Fan Wiring 6V.
- Connect the cable W9 of the option Fan wiring 6V to the socket X2 on the device.

up to 220 kW



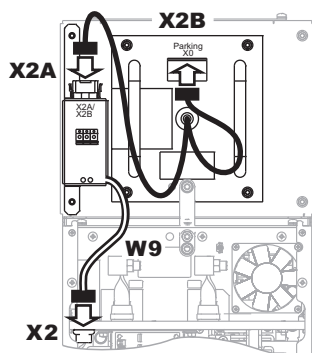
up to 430 kW



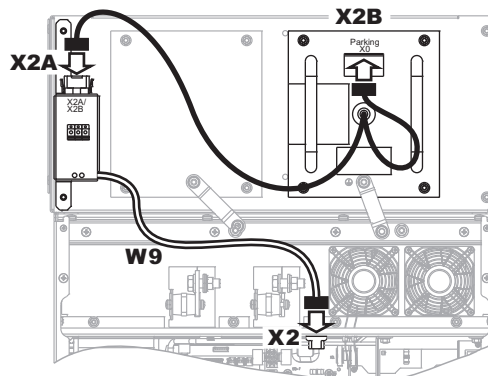
Mains voltage 500...600 V

- Build in the option Fan Wiring 6V into the inverter INV
- Put the connector X2B from the built-in transformer box to the parking position X0.
- Connect plug X2A with the option Fan wiring 6V.
- Connect the cable W9 of the option Fan wiring 6V to the socket X2 on the device.

up to 220 kW



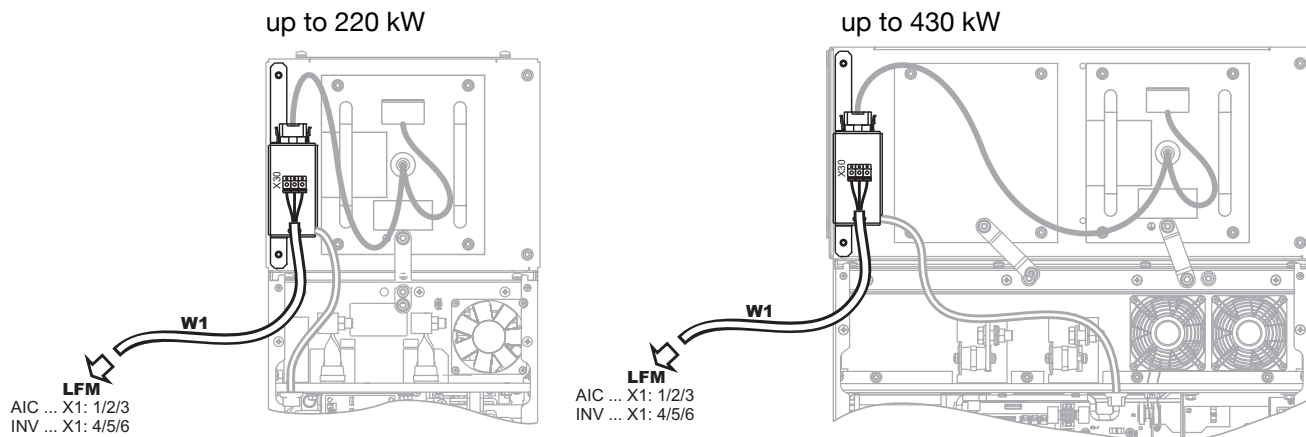
up to 430 kW



Connection to the line filter module LFM

The connection from the line filter module LFM to the Active Infeed Converter AIC takes place by means of the connection cable which is included in delivery. It has to be connected to the line filter module LFM at the terminals 1/2/3 of terminal strip X1.

The inverters ATV71HC11Y - HC31Y and ATV61HC11Y - HC40Y have to be supplied from the drive side. Therefore a connection between the line filter module LFM (X1:4/5/6) and the inverter INV (X30:1/2/3) at the option Fan wiring 6V) has to be performed.



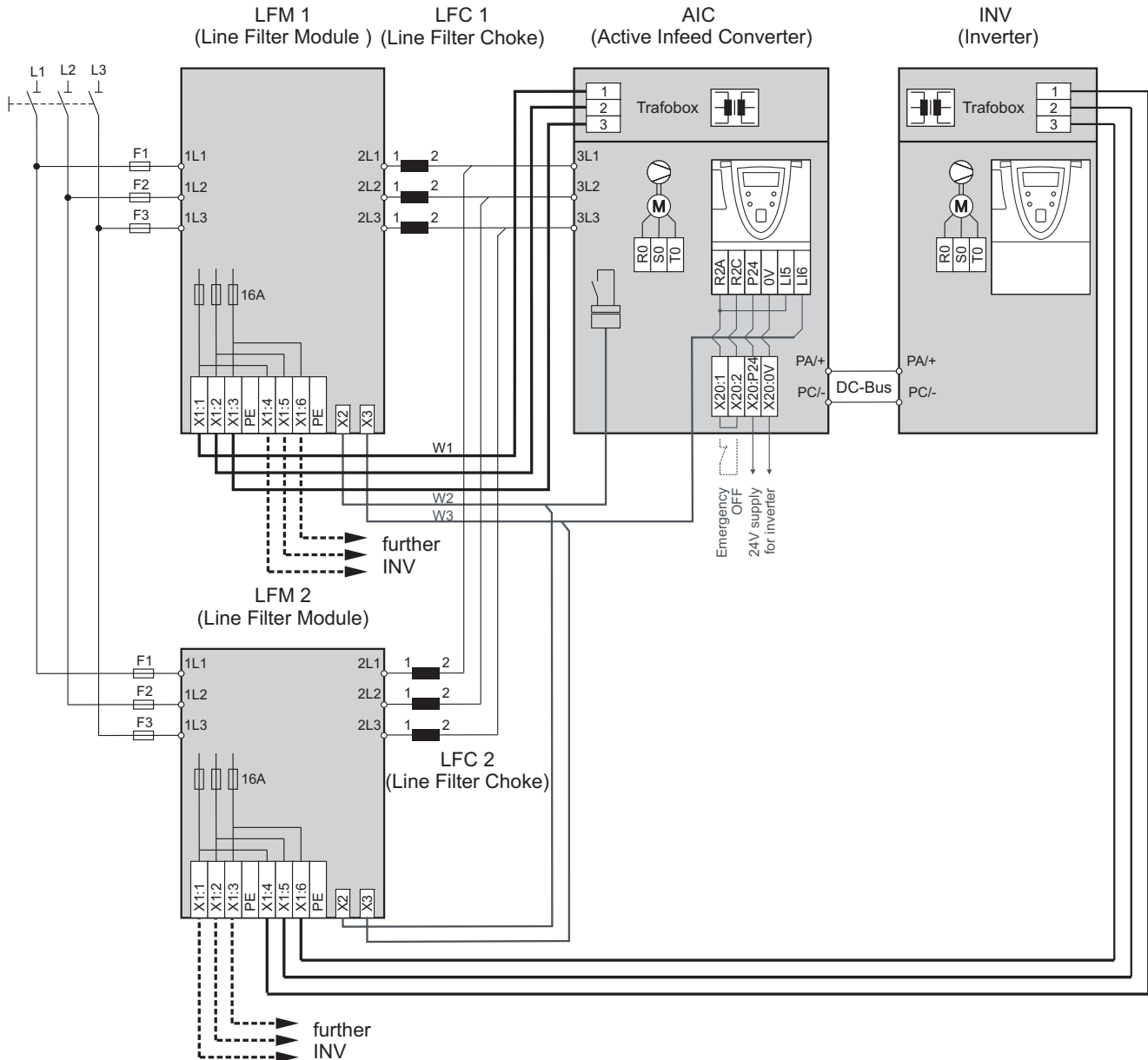
04/2010

8 P02 515 EN.03/03

Fan supply at 690 V – 540kW to 860kW

For the 690 V devices the fans are supplied via the transformer box at the top side of the devices. The connection to the Active Infeed Converter AIC is included in delivery and has to be connected to the line filter module LFM only.

The fans in the inverter INV are supplied from the drive side between the terminals 4/5/6 in the line filter module LFM and the transformer box at the top side of the inverter INV. Therefore a terminal module is necessary (deliverable as option Fan wiring 6V - VW3 A7 280).



04/2010

8 P02 515 EN.03/03

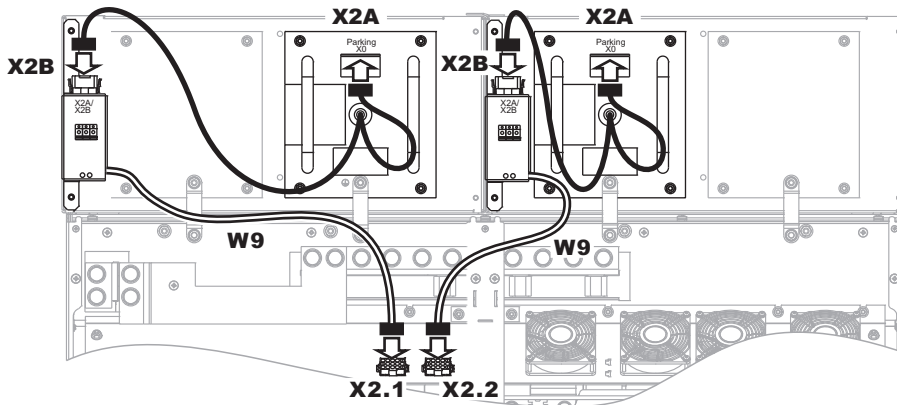


To wire the fan supply at the inverters ATV71HC40Y to HC63Y and ATV61HC50Y to HC80Y respectively option "Fan wiring 6V" (VW3 A7 280) has to be ordered twice.

Depending on the line voltage the wiring in the Active Infeed Converter AIC and in the inverter INV has to be done as follows:

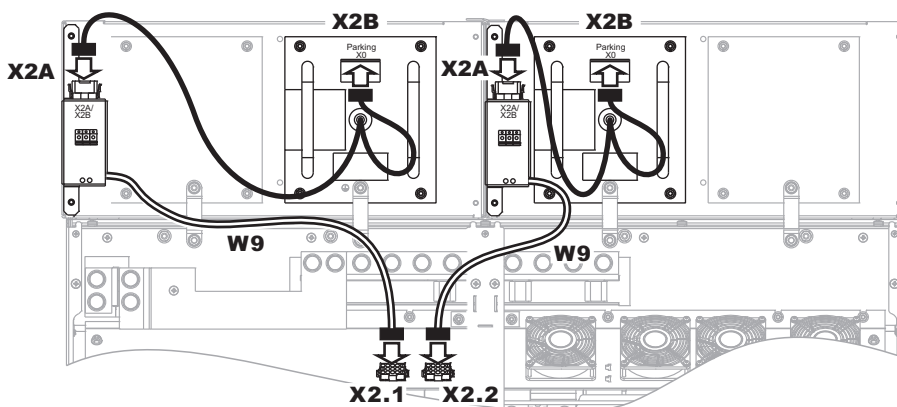
Mains voltage 690 V

- Build in the options Fan wiring 6V twice into the inverter INV
- Put the connectors X2A of the built-in transformer boxes to parking position X0.
- Connect plugs X2B with the respective option Fan wiring 6V.
- Connect the cables of the options Fan wiring 6V to the sockets X2.1 and X2.2 on the device.



Mains voltage 500...600 V

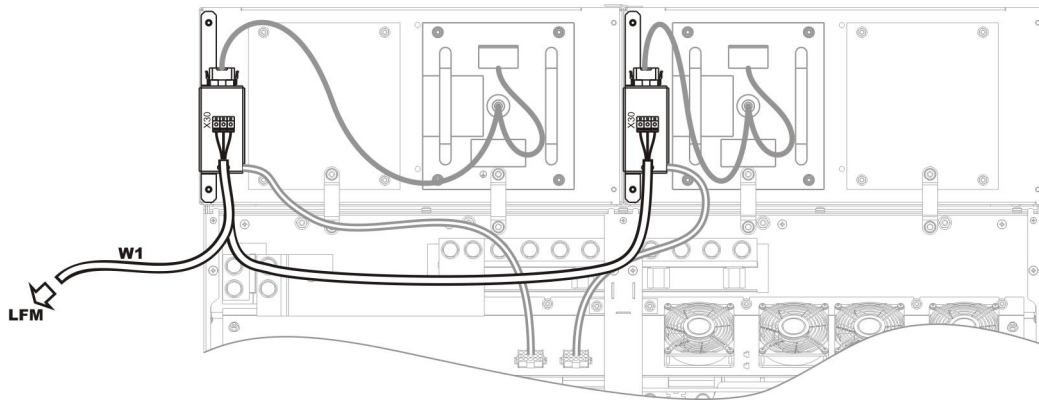
- Build in the options Fan wiring 6V twice into the inverter INV
- Put the connectors X2B of the built-in transformer boxes to parking position X0.
- Connect plugs X2A with the respective option Fan wiring 6V.
- Connect the cables of the options Fan wiring 6V to the sockets X2.1 and X2.2 on the device.



Connection to the line filter module LFM

The connection from the line filter module LFM to the Active Infeed Converter AIC takes place by means of the connection cable which is included in delivery. It has to be connected to the line filter module LFM at the terminals 1/2/3 of terminal strip X1.

The inverters ATV71HC40Y - HC63Y and ATV61HC50Y - HC80Y have to be supplied from the drive side. Therefore a connection between the line filter module LFM (X1:4/5/6) and the inverter INV (X30:1/2/3 at the option Fan wiring 6V) has to be performed. Furthermore a connection to the second option Fan wiring 6V has to be set up.



In case of applications with several inverters it has to be observed that the power of the fan supply is split up to both line filter modules LFM.

04/2010

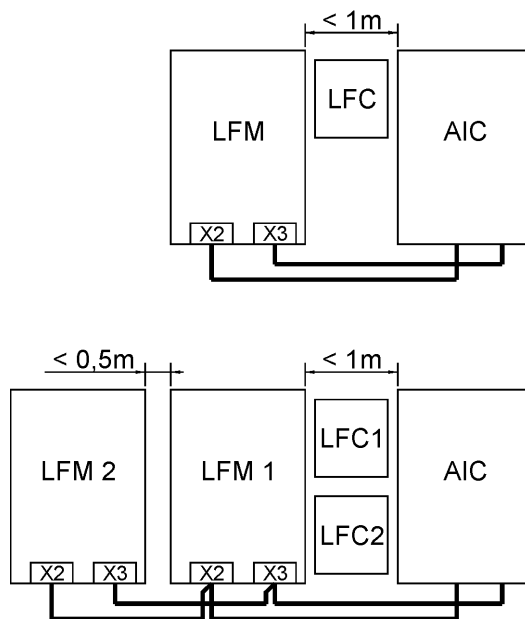
8 P02 515 EN.03/03

Wiring of the control terminals

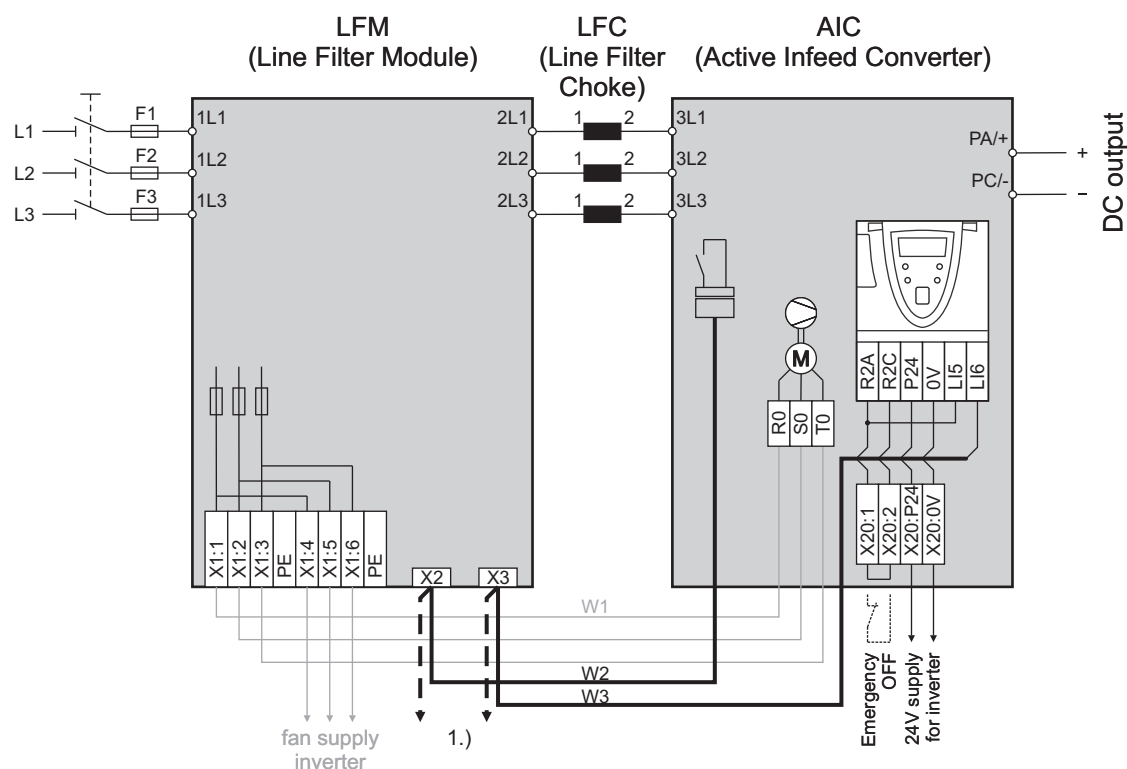
The auxiliary voltages to control the Active Front End AFE are generated in the Line Filter Module LFM. As soon as mains voltage is applied to the terminals 1L1, 1L2, 1L3, a 24 V auxiliary voltage is produced to supply the Active Infeed Converter AIC. It can be also used to buffer the control electronics of one inverter INV.

The control wiring between the Line Filter Module LFM and the Active Infeed Converter AIC is realized by the provided connecting cables W2 (plug X2) and W3 (plug X3). These cables are designed for a maximum distance of 1 m between Active Infeed Converter AIC and Line Filter Module LFM.

At higher power from 430 kW (at 400V devices) and 540 kW (at 690V devices) the Active Infeed Converter AIC is wired to two Line Filter Modules LFM. Thereby the cables are designed for a maximum distance of 0.5 m between Line Filter Modules LFM. The cables are designed, that there is enough reserve to mount the Active Infeed Converter AIC and the Line Filter Module LFM (or the Line Filter Modules) into two side by side standing cubicles and wire them.



At 400 V devices up to 340 kW and at 690 V devices up to 430 kW, the Active Infeed Converter AIC is connected with only one Line Filter Module LFM. In case of higher power the Active Infeed Converter AIC is connected with two Line Filter Modules LFM.



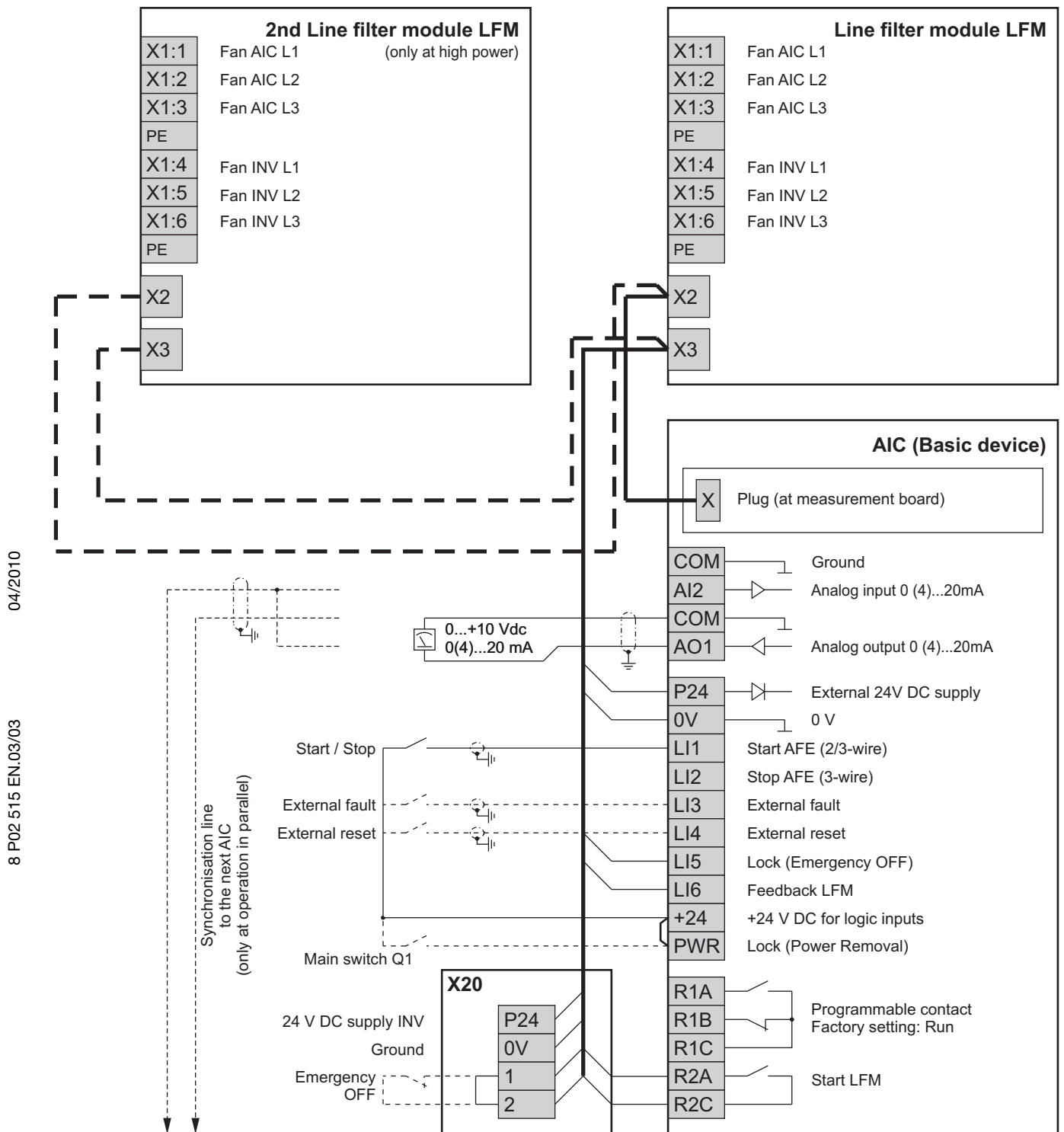
1.) Connection to the second Line Filter Module LFM

The connecting cables W1, W2 and W3 are pre-assembled at the Active Infeed Converter AIC and only have to be connected (W1) or plugged-in (W2 and W3) at the Line Filter Module LFM.



For parallel operation of Active Front End units an additional control line is required. It "synchronizes" the individual Active Front End units.

Standard control terminals



For an automatic operation, immediately after connecting the mains, the start command can also occur by a wire link (terminal +24 to L1).



Use a cable with a cross-section of 0.1 – 0.5 mm² for the control lines.

Specification of the control terminals

The logic inputs of the Active Infeed Converter AIC can be only used with positive logic (Source). So the built-in sliding switch always has to be in position "Source".

The synchronisation line is only required in case of parallel operation of two to four Active Front End units. It "synchronizes" the individual Active Front End units. Thereby the analog output is used for synchronisation and thus it is not any longer available for free use!

The ground (0 V) can float up to 35 V compared to PE. The connection 0 V - ground necessary to limit the voltage can therefore e.g. also occur far away in the PLC (if necessary by the analog output related to 0 V).

The device fulfills all requirements for protective separation between power and electronic connections according to EN 61800-5-1.



Also all connected circuits must fulfil the requirements for protective separation to guarantee protective separation.

Terminal marking Line Filter Module LFM

Terminal	Designation	Specification
X1:1	Terminals for external fan supply of the Active Infeed Converter AIC	400V 3-phase current
X1:2		
X1:3		
X1:PE		
X1:4	Terminals for external fan supply of up to 4 inverters INV (same power as AIC)	400V 3-phase current
X1:5		
X1:6		
X1:PE		
X2	2-pole plug	Pre-assembled for the connection to the Active Infeed Converter AIC
X3	5-pole plug	Pre-assembled for the connection to the Active Infeed Converter AIC

04/2010

8 P02 515 EN.03/03

Terminal marking Active Infeed Converter AIC

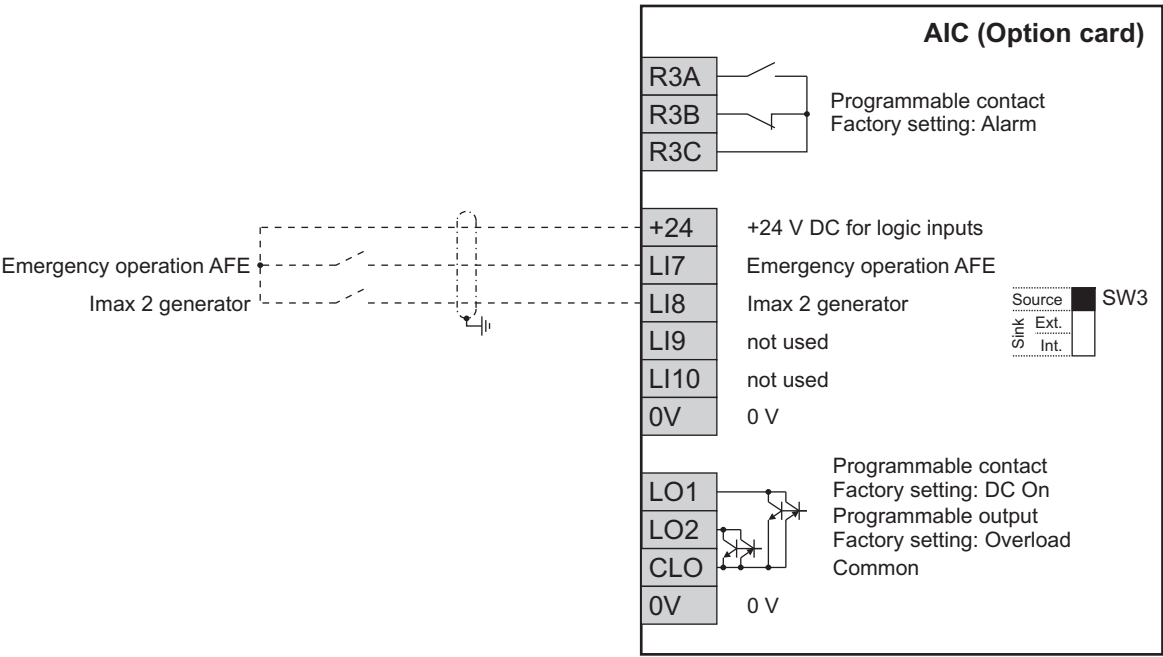
Terminal	Designation	Specification
+10	Not used	–
AI+ / AI-	Not used	–
COM	Ground	0 V reference potential for analog in-/outputs
AI2	Analog input	With parameter 2.1.02 Parallel operation the analog input is used for synchronisation.
COM	Ground	0 V reference potential for analog in-/outputs
AO1	Analog output AO1 (Selection, usage and limits can be parameterized)	0... +10 V DC, load impedance 500Ω or 0(4)... 20 mA, max load impedance 500 Ω Resolution 10 Bits, reaction time 2ms (0.5ms, Accuracy ±1% at $\Delta\theta = 60^{\circ}\text{C}$ (140 °F), linearity ±0.2 % Caution: With parameter 2.1.02 Parallel operation the analog output is used for synchronisation and thus it is not any longer available for free use!
P24	Supply Buffer voltage	+24 V DC (min. 19 V, max. 30V) external supply of the control part, power demand 30 W
0V	Ground	Reference potential of the logic inputs and 0V of the external voltage supply P24
LI1	Start AFE (2/3 wire)	+24 V DC (max. 30 V), impedance 3.5 kΩ, reaction time 2 ms ±0.5 ms positive logic (Source) compatible with level 1 PLC standard IEC 65A-68 SW1 at Source (factory setting): High > 11 V DC, Low < 5 V DC SW1 at Sink is not permitted
LI2	Stop AFE (3 wire)	
LI3	External fault	
LI4	External reset	
+24	Sampling voltage for logic inputs	Selector switch SW1 in position Source: +24 V DC (min. 21 V, max. 27 V), short-circuit proof max. 100 mA (incl. all options) Selector switch SW1 in position Sink not permitted
PWR	Input lock (Power removal)	Logic input 24 V DC (max. 30 V) Impedance 1.5 kΩ, filter time 10 ms, High > 17 V, Low < 2 V For release of the AIC always 24V have to be applied to the input.
R1A R1B R1C	Relay output 1 (R1A N.O. contact, R1B N.C. contact)	Switching capacity min. 3 mA at 24 V DC (relay as good as new) Switching capacity max. 5 A at 250 V AC ($\cos \varphi = 1$) or 30 V DC, max. 2 A at 250 V AC ($\cos \varphi = 0.4$) or 30 V DC (L/R = 7 ms) Reaction time 7 ms ±0.5 ms, life cycle 100,000 switching cycles at max. switching capacity Sampling voltage must correspond to overvoltage category II so that the PELV conditions for the remaining control terminals are fulfilled.

Maximum connection cross-section: 1.5 mm² (AWG16), 0.25 Nm (2.5 mm² (AWG14), 0.6 Nm for relay terminals)

Primarily, screen the wiring of all control terminals and lay it separate from power cables!

Control terminals of the I/O extension card

With the I/O extension card (order number: VW3 A3 201) there are additional logic inputs and outputs as well as a relay output available.



Unlike the logic inputs of the basic device the inputs of the extension card can be switched between positive and negative logic using sliding switch SW3. Parameters that belong to the outputs of the option cards are only available at the Active Infeed Converter when the card is plugged.

Specification of the control terminals at I/O extension card VW3 A3 201

Terminal	Designation	Specification
R3A R3B R3C	Relay output 3 (R3A N.O. contact, R3B N.C. contact)	Switching capacity min. 3 mA at 24 V DC (relay as good as new) Switching capacity max. 5 A at 250 V AC ($\cos \varphi = 1$) or 30 V DC, max. 2 A at 250 V AC ($\cos \varphi = 0.4$) or 30 V DC ($L/R = 7$ ms) Reaction time 7 ms \pm 0.5 ms, life cycle 100,000 switching cycles at max. switching capacity Sampling voltage must correspond to overvoltage category II so that the PELV conditions for the remaining control terminals are fulfilled.
-10	Not used	–
+24	Sampling voltage for logic inputs (Sink/Source-switching with selector switch SW3)	– <i>Selector switch SW3 in position Source or Sink Int.:</i> +24 V DC (min. 21 V, max. 27 V), short-circuit proof max. 50 mA (incl. all options) – <i>Selector switch SW3 in position Sink Ext.:</i> Input for external voltage supply +24 V DC of the logic inputs
LI7	Emergency operation AFE	+24 V DC (max. 30 V), impedance 3.5 k Ω , reaction time 2 ms \pm 0.5 ms
LI8	I max 2 generator	Positive logic (Source) or negative logic (Sink)
LI9	Not used	compatible with Level 1 PLC Standard IEC 65A-68
LI10	Not used	SW3 at Source (factory setting): High > 11 V DC, Low < 5 V DC SW3 at Sink Int. or Sink Ext.: High < 10 V DC, Low > 16 V DC
0 V	Weight	0 V reference potential for logic inputs
LO1	Logic output LO1 (can be parameterized)	+24 V DC Open-Collector-Outputs, floating ground Positive logic (Source) or negative logic (Sink)
LO2	Logic output LO2 (can be parameterized)	compatible with Level 1 PLC Standard IEC 65A-68 Switching capacity max. 200 mA at 12...30 VDC Reaction time: 2 ms \pm 0.5 ms
CLO	Common	Reference potential of the digital outputs
0 V	Weight	0 V general use

Maximum connection cross-section: 1.5 mm² (AWG16), 0.25 Nm (2.5 mm² (AWG14), 0.6 Nm for relay terminals)

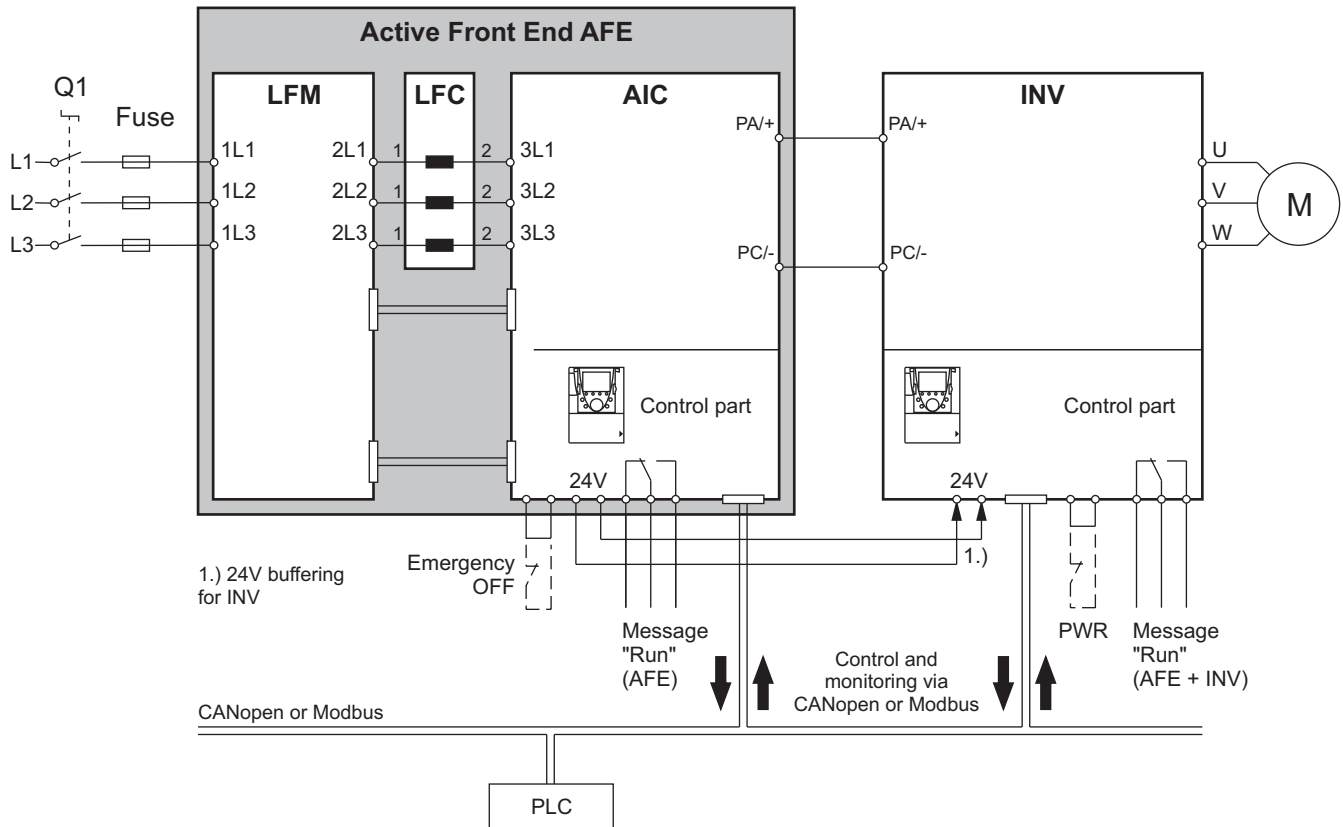
*) Primarily, screen the wiring of all control terminals and lay it separate from power cables on principle!

Control via the fieldbus

Next to the control terminals the Active Front End AFE units are equipped with a built-in interface for control via Modbus. In addition to the external wiring (connection to the T-pieces in the bus line) only the adjustment of few parameters is necessary.

Alternatively, this interface can be also used for the CANopen bus. Therefore, an adapter is required for conversion of the RJ45 plug to SUB-D (CANopen standard CiA DRP 303-1). The bus wiring is taken by connection to the next device.

When the communication at the PLC system takes place with CANopen or Modbus, the inverter and the Active Infeed Converter can be directly connected to and controlled by the bus system.



04/2010

8 P02 515 EN.03/03

Installation

Installation remarks

Typical cubicle installation

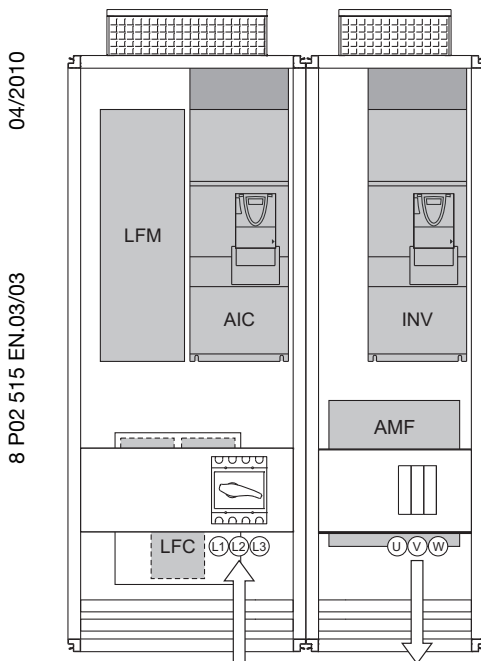
The components of the Active Front End AFE are designed in protection class IP00 and thus they are intended for cubicle installation.

The following illustrations show the recommended installation of the individual components into the cubicle. In order to avoid air short-cuts, it is necessary to install a suitable air guide above the Active Infeed Converter AIC. The losses of the line filter module LFM must be exhausted by means of filter fans in the cubicle door.

AFE 400V to 175kW

AFE 480V to 175kW

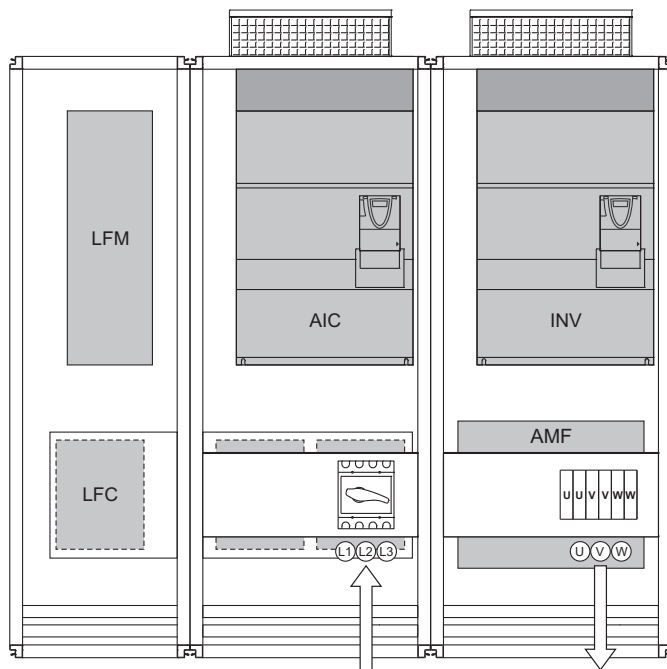
AFE 690V to 220kW



AFE 400V to 340kW

AFE 480V to 340kW

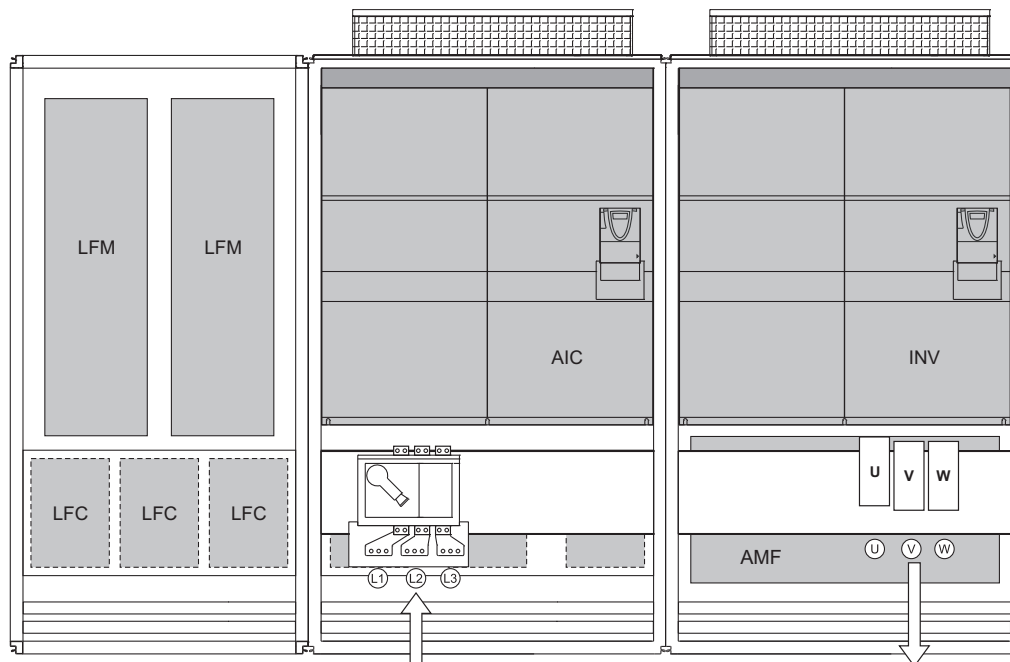
AFE 690V to 430kW



AFE 400V to 675kW

AFE 480V to 675kW

AFE 690V to 860kW

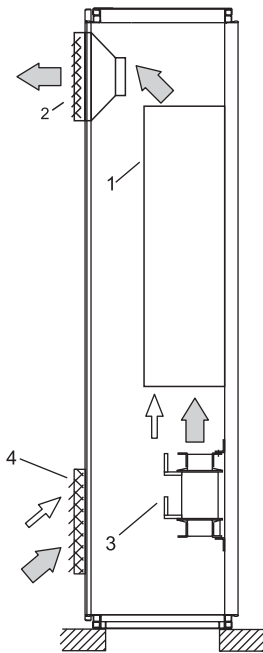


04/2010

8 P02 515 EN.03/03

Exhaust concept for cubicle installation

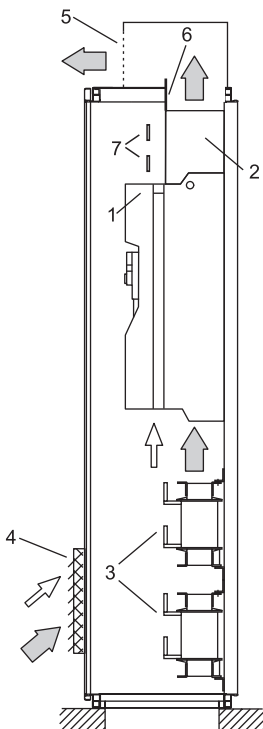
Line Filter Module LFM



As the line filter module does not include an internal fan, it is necessary to provide a fan in the door of the cubicle for exhaust. This prevents heat accumulation and it also provides cooling of the Line Filter Choke LFC. The air flow must not be constrained by means of fixtures or filter mats. The air flow has to be determined regarding the ambient conditions and the losses in the Line Filter Module LFM and Line Filter Choke LFC.

1. Line Filter Module LFM
2. Fan (without filter mat for IP23, with filter mat for IP54)
3. Line Filter Choke LFC
4. Air inlet grid (without filter mat for IP23, with filter mat for IP54)

Active Infeed Converter AIC



The illustration besides shows the typical cubicle design in protection degree IP23. The stated losses and minimum cross sections for air inlet are related to the Active Infeed Converter AIC. Further heat sources like fuses and contactors must be considered additionally. The fan of the power part, which is inside the device, provides the exhaust of the enclosure. The air flow must not be constrained by means of fixtures or filter mats. Provide a separation of the power part air to avoid internal air short-cuts.

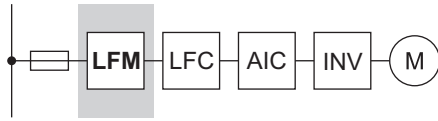
1. Active Infeed Converter AIC
2. Air guide or transformer
3. Line Filter Choke LFC
4. Air inlet grid (without filter mat)
5. Metal cover with splash water protection
6. Separation wall to avoid internal air short-cuts
7. DC bus



A design with higher protection degrees (e.g. IP54) is possible on the basis of the inverters INV.

Line Filter Module LFM

Technical data



The line filter module LFM contains next to the real filter components also all components of the charging circuit, the main contactor (= line contactor), the supply of all device fans and the required supply units for the control voltages.

Line Filter Module LFM		400 V	500 V / 690 V
General			
Design	Built-in unit for vertical mounting		
Cooling	Natural convection / no forced ventilation		
Switching rate	Max. 10 switching operations per hour		
Short circuit protection	Due to upstream semiconductor fuses		
Auxiliary voltage output	24 V DC, suitable to supply the control electronics of the AIC and of an inverter		
Fan supply	380...480 V (according to mains voltage) suitable to supply the fans in the AIC and 4 inverters of the same power (direct connection possible)	500...690 V (according to mains voltage) suitable to supply the fans in the AIC and 4 inverters of the same power (fan supply via transformer box in the AIC and INV)	
Mechanical strength			
Mechanical vibration	According to IEC/EN 60068-2-6 1.5 mm in the range of 3...10 Hz, 0.6 g of 10...200 Hz (3M3 according to IEC/EN 60721-3-3)		
Shock	According to IEC/EN 60068-2-27 7 g for 11 ms (3M3 according to IEC/EN 60721-3-3)		
Ambient conditions			
Operating temperature	-10...+45°C (3K3 according to IEC/EN 60721-3-3) Beyond power decrease of 2 % per 1°C up to +60°C		
Storage / Transport temperature	-25...+70°C		
Protection degree	IP00		
Environmental class / Humidity	Class 3K3 in accordance with IEC/EN 60721-3-3 / no condensation, max. 95 % relative humidity		
Altitude	Up to 1000 m, beyond power decrease of 1 % per 100 m up to 3000 m	Up to 1000 m, beyond power decrease of 1 % per 100 m up to 2400 m	
Allowed pollution	Pollution degree 2 according to EN 61800-5-1 3C2 and 3S2 according to EN 60721-3-3		
Protection class	Class 1 according to EN 61800-5-1		
Standards			
Basic standard	The devices are designed, built and tested on the basis of EN 61800-5-1.		
Insulation	Galvanic insulation from the control electronics in accordance with EN 61800-5-1 PELV (Protective Extra Low Voltage)		
Approvals	CE, in preparation: UL, CSA		

04/2010

8 P02 515 EN.03/03

Losses regarding the Active Infeed Converter AIC

As the line filter module LFM is used in different Active Front End units AFE, its losses are varying. In the following table the losses of the line filter module LFM are given related to the respective Active Infeed Converter AIC.

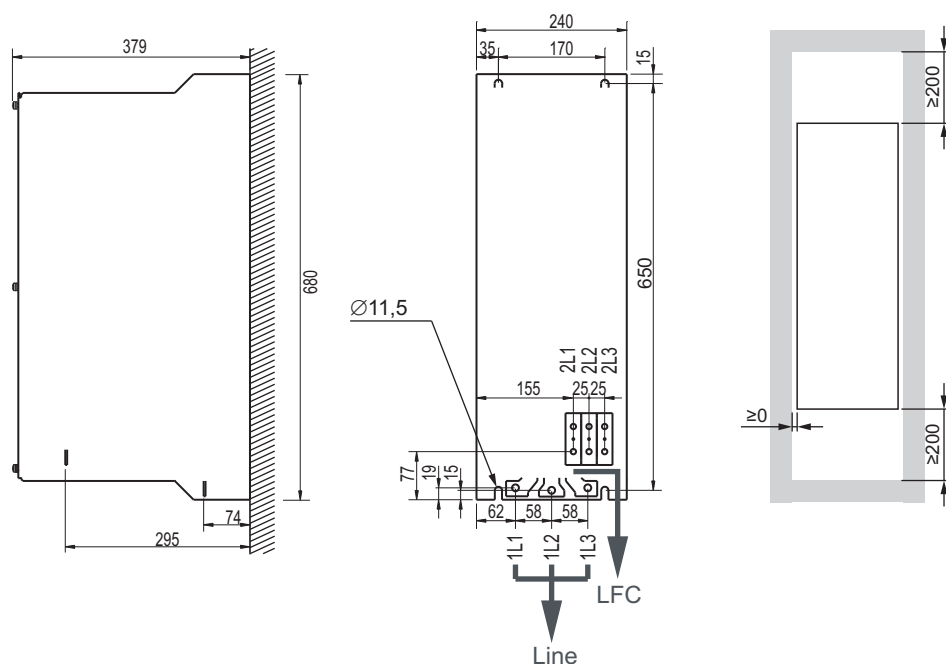
Losses			
Active Front End	Line Filter Module LFM		
	Type	Order number	Losses
400V 120kW	LFM 4V120	VW3A7260	290 W
400V 145kW	LFM 4V175	VW3A7261	320 W
400V 175kW	LFM 4V175	VW3A7261	360 W
400V 240kW	LFM 4V340	VW3A7262	410 W
400V 275kW	LFM 4V340	VW3A7262	480 W
400V 340kW	LFM 4V340	VW3A7262	560 W
400V 430kW	2x LFM 4V340	2x VW3A7262	2x 410 W
400V 540kW	2x LFM 4V340	2x VW3A7262	2x 480 W
400V 675kW	2x LFM 4V340	2x VW3A7262	2x 560 W
480V 120kW	LFM 4V120	VW3A7260	290 W
480V 145kW	LFM 4V175	VW3A7261	320 W
480V 175kW	LFM 4V175	VW3A7261	360 W
480V 240kW	LFM 4V340	VW3A7262	410 W
480V 275kW	LFM 4V340	VW3A7262	480 W
480V 340kW	LFM 4V340	VW3A7262	560 W
480V 430kW	2x LFM 4V340	2x VW3A7262	2x 410 W
480V 540kW	2x LFM 4V340	2x VW3A7262	2x 480 W
480V 675kW	2x LFM 4V340	2x VW3A7262	2x 560 W
690V 145kW	LFM 6V220	VW3A7263	350 W
690V 175kW	LFM 6V220	VW3A7263	370 W
690V 220kW	LFM 6V220	VW3A7263	400 W
690V 275kW	LFM 6V430	VW3A7264	430 W
690V 340kW	LFM 6V430	VW3A7264	510 W
690V 430kW	LFM 6V430	VW3A7264	600 W
690V 540kW	2x LFM 6V430	2x VW3A7264	2x 430 W
690V 675kW	2x LFM 6V430	2x VW3A7264	2x 510 W
690V 860kW	2x LFM 6V430	2x VW3A7264	2x 600 W

04/2010

8 P02 515 EN.03/03

LFM 4V120 (VW3 A7 260)

Dimensions



Terminals

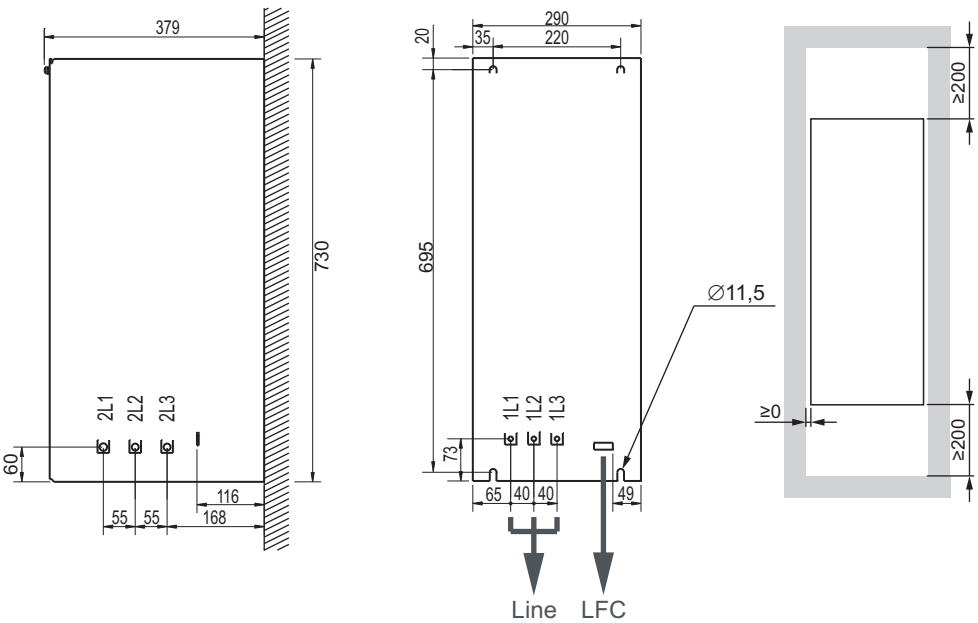
Designation	Connection	Tightening torque	Max. connection cross-section
X1:1 – X1:6	UK5N	0.6...0.8 Nm	2.5 mm²
1L1, 1L2, 1L3	M10	24 Nm	95 mm²
2L1, 2L2, 2L3	UK95 (Allen screw)	15...20 Nm	95 mm²
PE	M10	24 Nm	95 mm²

Technical data

Nominal data	
Nominal current @50°C	185 A
Max. losses	290 W
Weight	60 kg

LFM 4V175 (VW3 A7 261)

Dimensions



Terminals

Designation	Connection	Tightening torque	Max. connection cross-section
X1:1 – X1:6	UK5N	0.6...0.8 Nm	2.5 mm ²
1L1, 1L2, 1L3	M10	24 Nm	150 mm ² or 2x95 mm ²
2L1, 2L2, 2L3	WFF185 with M12	14...31 Nm	185 mm ² or 2x95 mm ²
PE	M10	24 Nm	95 mm ²

Technical data

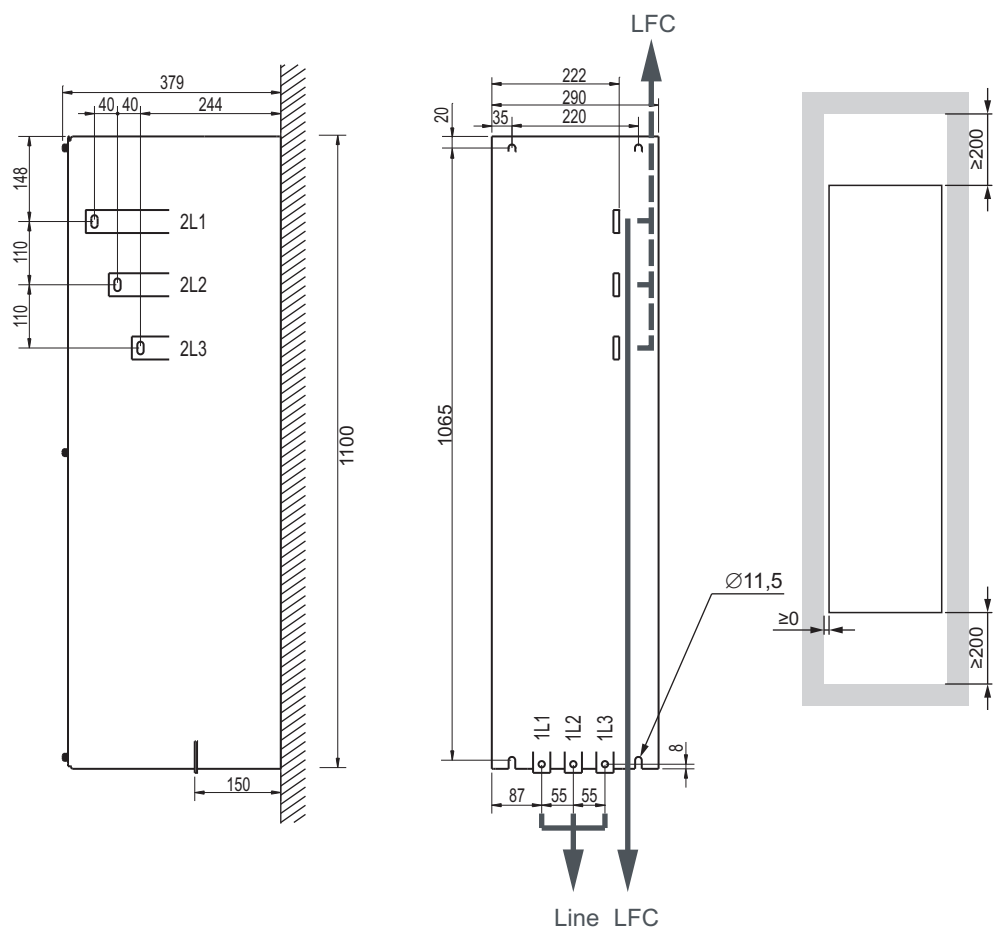
Nominal data	
Nominal current @50°C	255 A
Max. losses	360 W
Weight	80 kg

04/2010

8 P02 515 EN.03/03

LFM 4V340 (VW3 A7 262)

Dimensions



Terminals

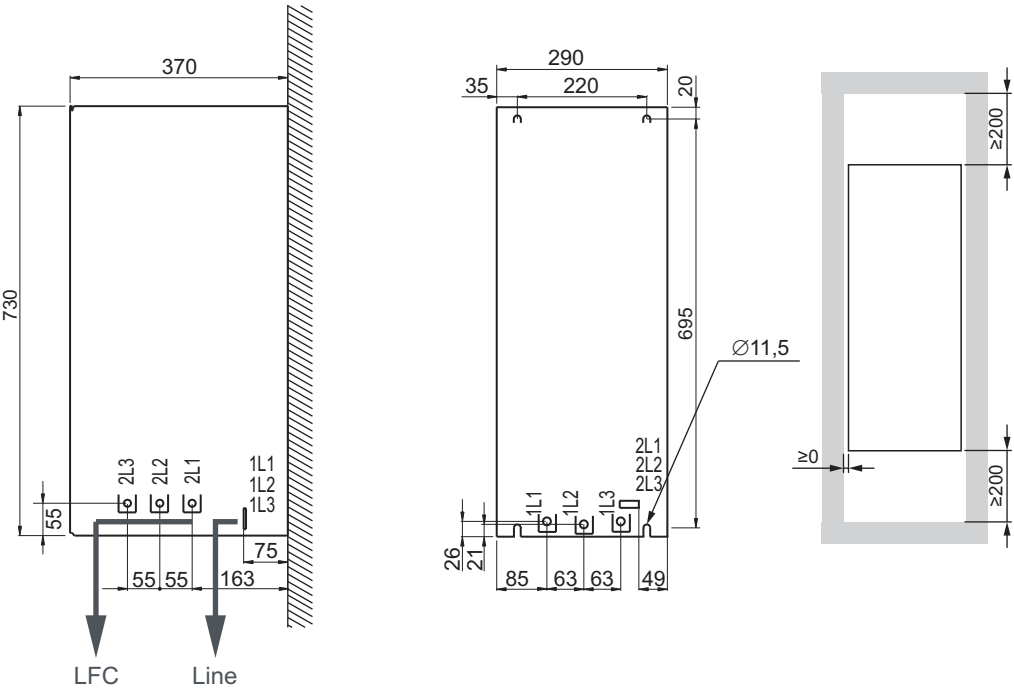
Designation	Connection	Tightening torque	Max. connection cross-section
X1:1 – X1:6	UK5N	0.6...0.8 Nm	2.5 mm ²
1L1, 1L2, 1L3	M10	24 Nm	2x 185 mm ²
2L1, 2L2, 2L3	Slotted hole at choke M10	24 Nm	2x 185 mm ²
PE	M10	24 Nm	95 mm ²

Technical data

Nominal data	
Nominal current @50°C	495 A
Max. losses	560 W
Weight	125 kg

LFM 6V220 (VW3 A7 263)

Dimensions



Terminals

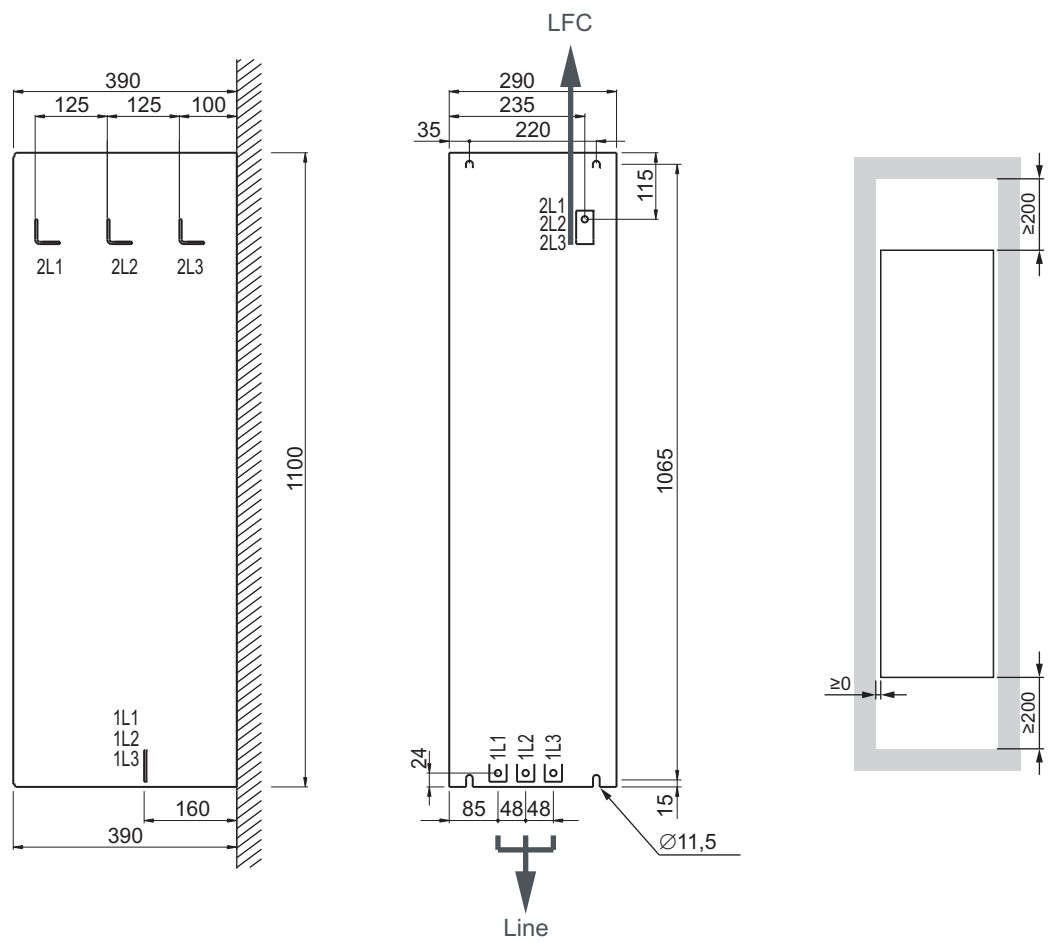
Designation	Connection	Tightening torque	Max. connection cross-section
X1:1 – X1:6	UK5N	0.6...0.8 Nm	2.5 mm ²
1L1, 1L2, 1L3	M10	24 Nm	185 mm ²
2L1, 2L2, 2L3	M10	24 Nm	185 mm ²
PE	M10	24 Nm	95 mm ²

Technical data

Nominal data	
Nominal current @50°C	185 A
Max. losses	360 W
Weight	80 kg

LFM 6V430 (VW3 A7 264)

Dimensions



Terminals

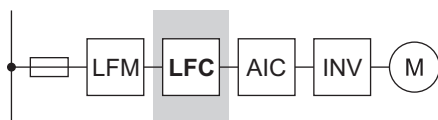
Designation	Connection	Tightening torque	Max. connection cross-section
X1:1 – X1:6	UK5N	0.6...0.8 Nm	2.5 mm²
1L1, 1L2, 1L3	M10	24 Nm	2x 150 mm²
2L1, 2L2, 2L3	M10	24 Nm	2x 150 mm²
PE	M10	24 Nm	95 mm²

Technical data

Nominal data	
Nominal current @50°C	360 A
Max. losses	560 W
Weight	125 kg

Line Filter Choke LFC

Technical data



The line filter choke LFC is an essential component of the Active Front End AFE. It is connected in the power path between the line filter module LFM and the Active Infeed Converter AIC and consists of three single-phase chokes.

Line Filter Choke LFC	400 V	500 V / 690 V
General		
Nominal voltage	380 V -30 % / 480 V +10 %	500 V -20 % / 690 V +10 %
Design	Open constructions for installation into the cubicle	
Cooling	Natural convection / no forced ventilation	
Mechanical strength		
Winding protection	Drenched in synthetic resin	
Mechanical vibration	According to IEC/EN 60068-2-6 1.5 mm in the range of 3...10 Hz, 0.6 g of 10...200 Hz (3M3 according to IEC/EN 60721-3-3)	
Shock	According to IEC/EN 60068-2-27 7 g for 11 ms (3M3 according to IEC/EN 60721-3-3)	
Ambient conditions		
Operating temperature	45°C, up to +60°C with derating	
Storage / Transport temperature	-25...+70°C	
Protection degree	IP00	
Environmental class / Humidity	Class 3K3 in accordance with IEC/EN 60721-3-3 / no condensation, max. 95 % relative humidity	
Altitude	Up to 1000 m, beyond power decrease of 1 % per 100 m up to 3000 m	Up to 1000 m, beyond power decrease of 1 % per 100 m up to 2400 m
Standards		
Insulation class	H	
Approvals	CE, in preparation: UL, CSA	

04/2010

8 P02 515 EN.03/03

Losses regarding the Active Infeed Converter AIC

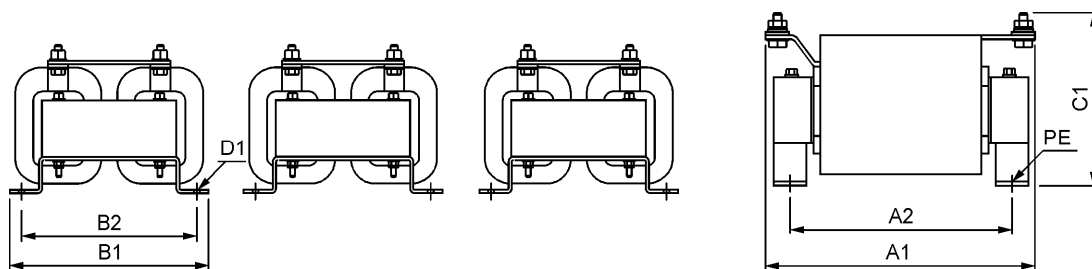
As the line filter choke LFC (as the line filter module LFM) is used in different Active Front End units AFE, its losses are varying. In the following table the losses of the line filter choke LFC are given related to the respective Active Infeed Converter AIC.

Losses			
Active Front End	Line Filter Choke LFC Type	Order number	Losses
400V 120kW	LFC 4V120	VW3A7265	3x 320 W
400V 145kW	LFC 4V175	VW3A7266	3x 370 W
400V 175kW	LFC 4V175	VW3A7266	3x 425 W
400V 240kW	LFC 4V340	VW3A7267	3x 530 W
400V 275kW	LFC 4V340	VW3A7267	3x 620 W
400V 340kW	LFC 4V340	VW3A7267	3x 790 W
400V 430kW	2x LFC 4V340	2x VW3A7267	2x (3x 530) W
400V 540kW	2x LFC 4V340	2x VW3A7267	2x (3x 620) W
400V 675kW	2x LFC 4V340	2x VW3A7267	2x (3x 790) W
480V 120kW	LFC 4V120	VW3A7265	3x 320 W
480V 145kW	LFC 4V175	VW3A7266	3x 370 W
480V 175kW	LFC 4V175	VW3A7266	3x 425 W
480V 240kW	LFC 4V340	VW3A7267	3x 530 W
480V 275kW	LFC 4V340	VW3A7267	3x 620 W
480V 340kW	LFC 4V340	VW3A7267	3x 790 W
480V 430kW	2x LFC 4V340	2x VW3A7267	2x (3x 530) W
480V 540kW	2x LFC 4V340	2x VW3A7267	2x (3x 620) W
480V 675kW	2x LFC 4V340	2x VW3A7267	2x (3x 790) W
690V 145kW	LFC 6V220	VW3A7268	3x 360 W
690V 175kW	LFC 6V220	VW3A7268	3x 380 W
690V 220kW	LFC 6V220	VW3A7268	3x 410 W
690V 275kW	LFC 6V430	VW3A7269	3x 440 W
690V 340kW	LFC 6V430	VW3A7269	3x 540 W
690V 430kW	LFC 6V430	VW3A7269	3x 650 W
690V 540kW	2x LFC 6V430	2x VW3A7269	2x (3x 440) W
690V 675kW	2x LFC 6V430	2x VW3A7269	2x (3x 540) W
690V 860kW	2x LFC 6V430	2x VW3A7269	2x (3x 650) W

04/2010

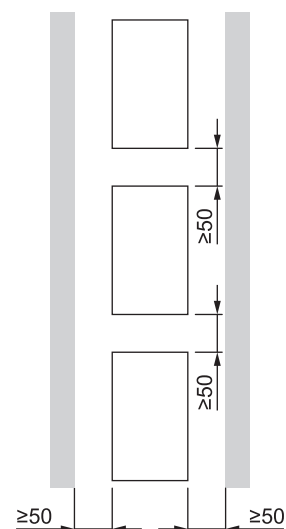
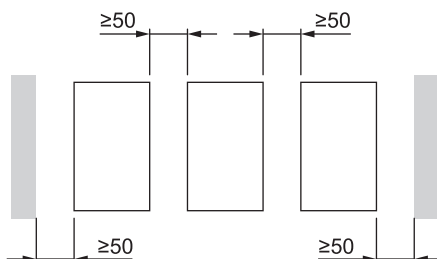
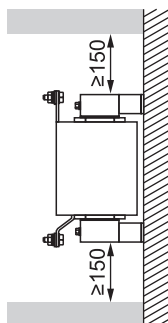
8 P02 515 EN.03/03

	400 V and 480 V			690 V	
	LFC 4V120	LFC 4V175	LFC 4V340	LFC 6V220	LFC 6V430
Order number	VW3 A7 265	VW3 A7 266	VW3 A7 267	VW3 A7 268	VW3 A7 269
Nominal current @50°C [A]	180	255	495	185	360
Max. losses [W]	3x 320	3x 425	3x 790	3x 410	3x 650
Weight [kg]	3x 18	3x 23	3x 44	3x 33	3x 70
Dimension A1 [mm]	210	295	360	295	540
Dimension A2 [mm]	190	250	313	250	452
Dimension B1 [mm]	245	245	290	245	295
Dimension B2 [mm]	215	215	250	215	255
Dimension C1 [mm]	185	195	255	210	250
Fixing D1 [mm]	9x15	9x15	11x18	9x22.5	11x18



The line filter chokes LFC consist of 3 single-phase chokes.

During installation observe the free space above and below as well as the required minimum distance between the three components.



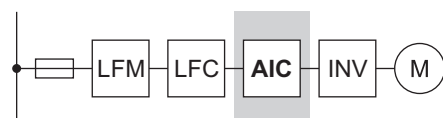
It is recommended to install the chokes of the LFC one upon the other only at forced cooling because in case of worse ventilation the topmost choke may overheat.

Terminals

Designation	Connection	Tightening torque	Max. connection cross-section
1	M10	24 Nm	2x 150 mm ²
2	M10	24 Nm	2x 150 mm ²
PE	M10	24 Nm	95 mm ²

Active Infeed Converter AIC

Technical data



The Active Infeed Converter AIC is connected to the inverter INV via the DC bus. During operation the energy is supplied to the DC bus or the accumulating braking energy is feed back into the mains.

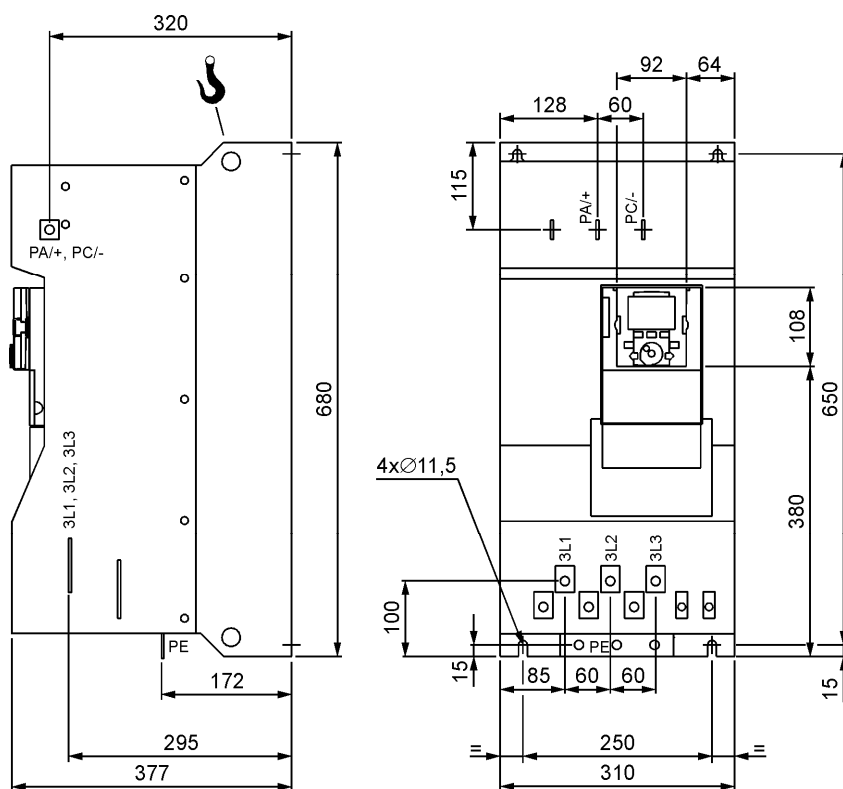
Active Infeed Converter AIC	400 V	500 V / 690 V
General		
Design	Built-in unit for vertical mounting	
Cooling	Forced	
Mechanical strength		
Mechanical vibration	According to IEC/EN 60068-2-6 1.5 mm in the range of 3...10 Hz, 0.6 g of 10...200 Hz (3M3 according to IEC/EN 60721-3-3)	
Shock	According to IEC/EN 60068-2-27 AIC 4V120...AIC 4V175: 7 g for 11 ms (3M3 according to IEC/EN 60721-3-3) AIC 4V240...AIC 4V675: 4 g for 11 ms (3M2 according to IEC/EN 60721-3-3)	AIC 6V145...AIC 6V220: 7 g for 11 ms (3M3 according to IEC/EN 60721-3-3) AIC 6V275...AIC 6V860: 4 g for 11 ms (3M2 according to IEC/EN 60721-3-3)
Ambient conditions		
Operating temperature	-10...+45°C (3K3 according to IEC/EN 60721-3-3) Beyond power decrease of 2 % per 1°C up to +60°C	
Storage / Transport temperature	-25...+70°C	
Protection degree	IP00	
Environmental class / Humidity	Class 3K3 in accordance with IEC/EN 60721-3-3 / no condensation, max. 95 % relative humidity	
Altitude	Up to 1000 m, beyond power decrease of 1 % per 100 m up to 3000 m	Up to 1000 m, beyond power decrease of 1 % per 100 m up to 2400 m
Allowed pollution	Pollution degree 2 according to EN 61800-5-1 3C2 and 3S2 according to EN 60721-3-3	
Protection class	Class 1 according to EN 61800-5-1	
Standards		
Basic standard	The devices are designed, built and tested on the basis of EN 61800-5-1.	
EMC immunity	According to EN 61800-3, 1 st and 2 nd environment (IEC 1000-4-2; IEC 1000-4-3; IEC 1000-4-4; IEC 1000-4-5; IEC 1000-4-6)	
EMC emission	In accordance with product standard EN 61800-3, 2 nd environment, category C3	
Insulation	Galvanic insulation from the control electronics in accordance with EN 61800-5-1 PELV (Protective Extra Low Voltage)	
Approvals	CE, in preparation: UL, CSA	

04/2010

8 P02 515 EN.03/03

04/2010

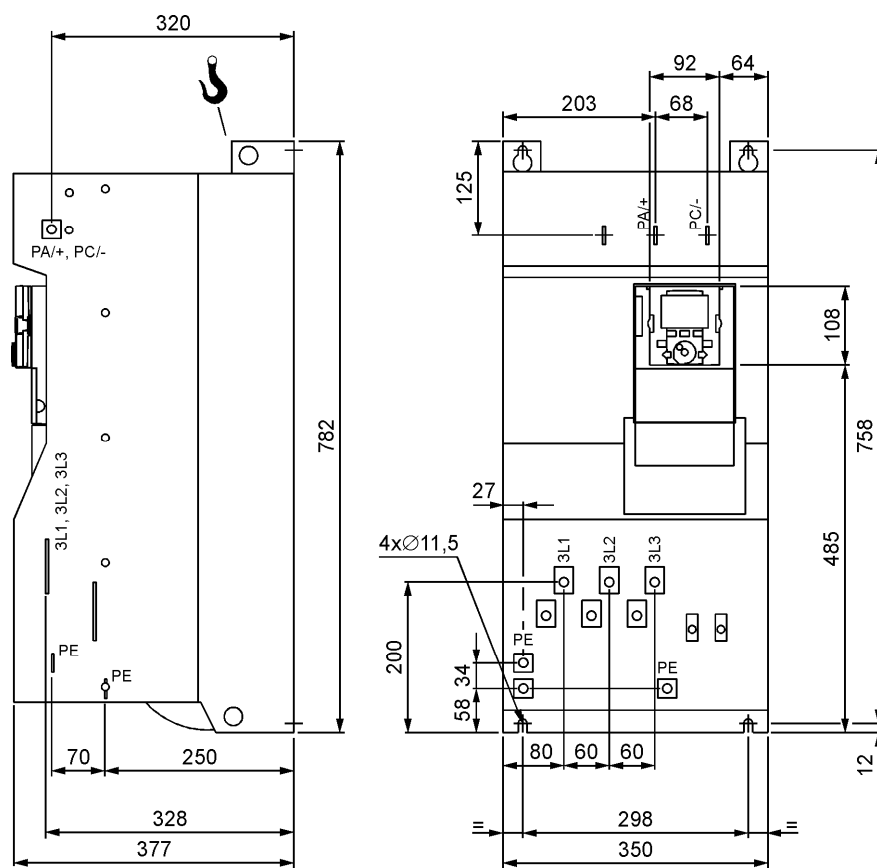
8 P02 515 EN.03/03



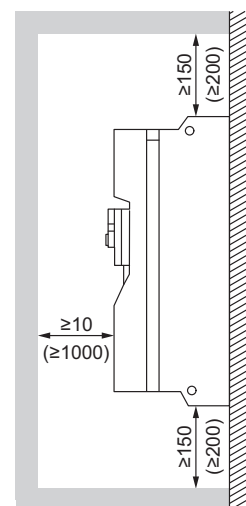
- (when mounting without any distance sideways)

AIC 4V145 (VW3 A7 251)

Dimensions



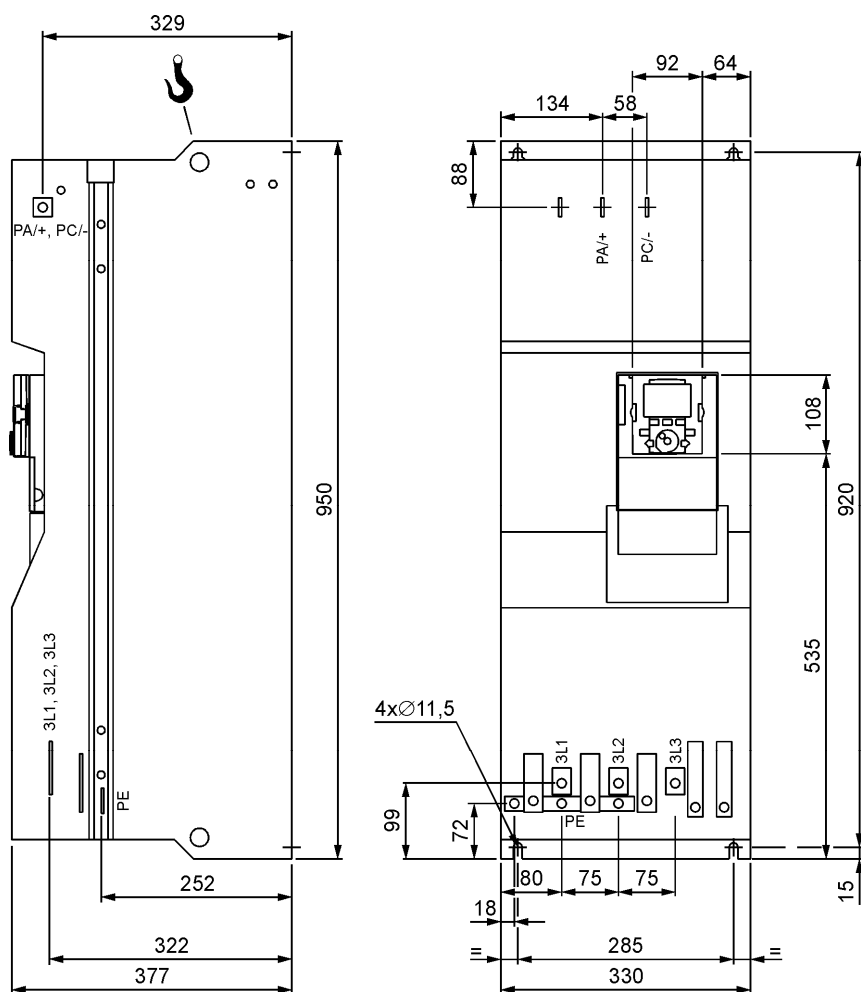
Power terminals			
Designation	Connection	Tightening torque	Max. connection cross-section
PA/+ and PC/-	M12	41 Nm	2x 150 mm ²
3L1, 3L2, 3L3	M10	24 Nm	2x 95 mm ²
PE	M10	24 Nm	95 mm ²
Control terminals			
X20	M2.6	0.5...0.6 Nm	2.5 mm ²
I/O terminals	M2	0.25 Nm	1.5 mm ²
Relay terminals	M2.6	0.6 Nm	2.5 mm ²
Technical data		AIC 4V145	
Order number		VW3 A7 251	
Characteristics			
Losses at I _N		2660 W	
Losses control part		300 W	
Losses power part		2360 W	
Weight approx.		74 kg	
Ambient conditions			
Volume of cooling air		600 m³/h	
Min. air inflow and air outlet		7 dm²	



(when mounting without any distance sideways)

AIC 4V175 (VW3 A7 252)

Dimensions



Power terminals

Designation	Connection	Tightening torque	Max. connection cross-section
PA/+ and PC/-	M12	41 Nm	2x 120 mm ²
3L1, 3L2, 3L3	M10	24 Nm	2x 120 mm ²
PE	M10	24 Nm	120 mm ²

Control terminals

X20	M2.6	0.5...0.6 Nm	2.5 mm ²
I/O terminals	M2	0.25 Nm	1.5 mm ²
Relay terminals	M2.6	0.6 Nm	2.5 mm ²

Technical data

AIC 4V175

Order number

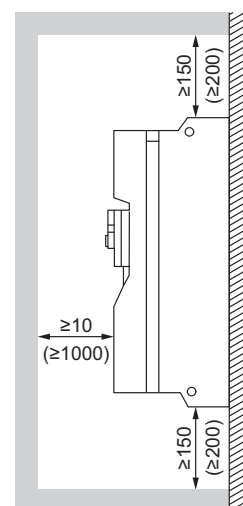
VW3 A7 252

Characteristics

Losses	at I _N	2970 W
Losses control part		360 W
Losses power part		2610 W
Weight approx.		80 kg

Ambient conditions

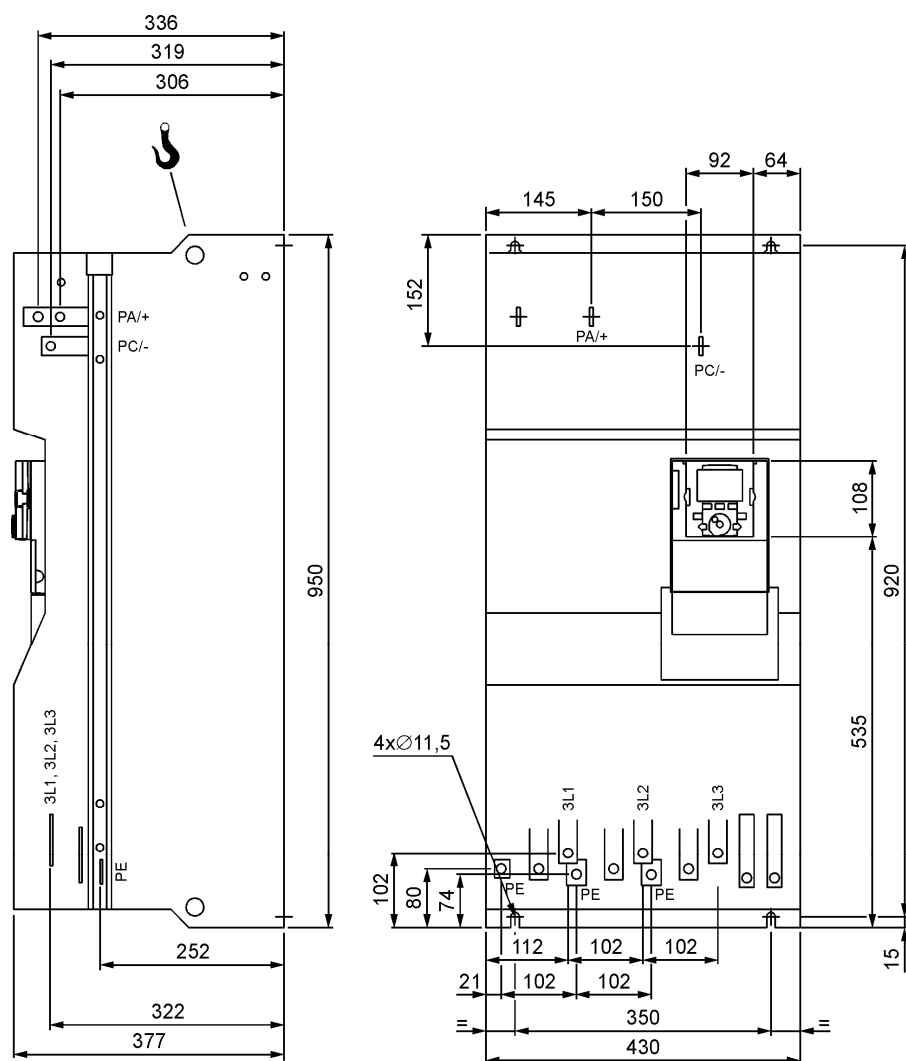
Volume of cooling air	600 m ³ /h
Min. air inflow and air outlet	7 dm ²



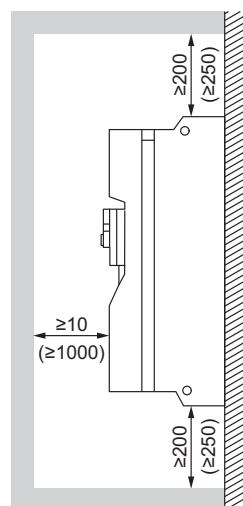
(when mounting without any distance sideways)

AIC 4V240 (VW3 A7 253)

Dimensions



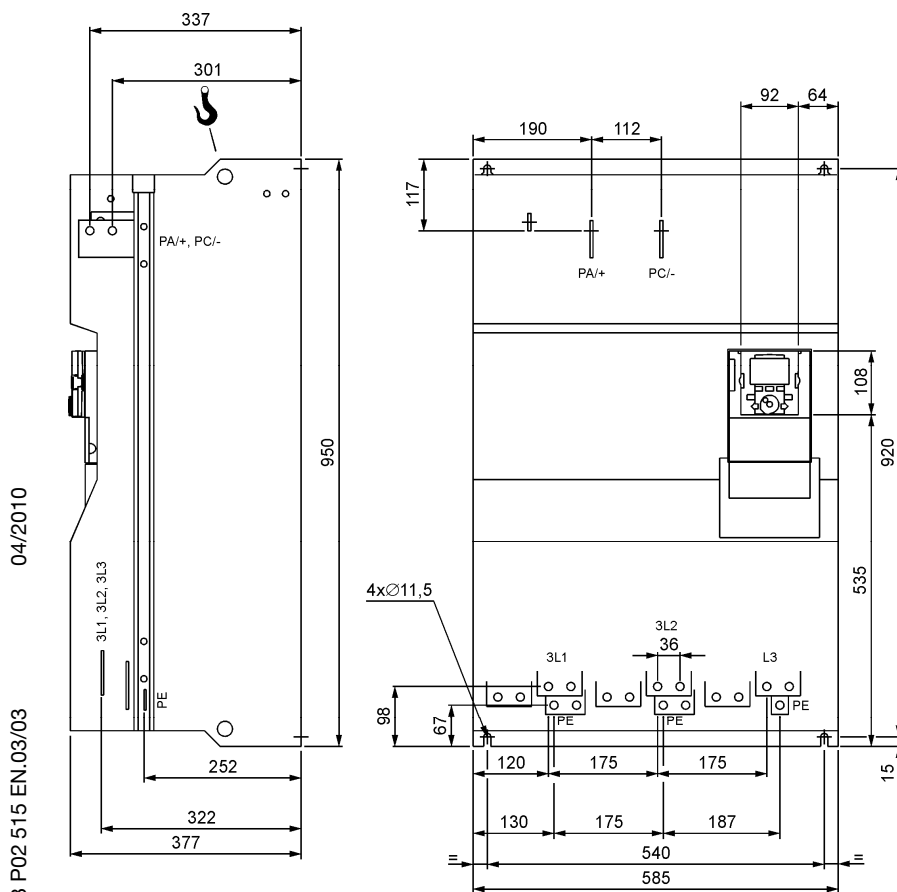
Power terminals			
Designation	Connection	Tightening torque	Max. connection cross-section
PA/+ and PC/-	M12	41 Nm	2x 150 mm ²
3L1, 3L2, 3L3	M12	41 Nm	2x 150 mm ²
PE	M12	41 Nm	150 mm ²
Control terminals			
X20	M2.6	0.5...0.6 Nm	2.5 mm ²
I/O terminals	M2	0.25 Nm	1.5 mm ²
Relay terminals	M2.6	0.6 Nm	2.5 mm ²
Technical data		AIC 4V240	
Order number		VW3 A7 253	
Characteristics			
Losses at I _N		3560 W	
Losses control part		430 W	
Losses power part		3130 W	
Weight approx.		110 kg	
Ambient conditions			
Volume of cooling air		800 m³/h	
Min. air inflow and air outlet		8 dm²	



(when mounting without any distance sideways)

AIC 4V275 (VW3 A7 254) / AIC 4V340 (VW3 A7 255) / AIC 4V240-13 (VW3 A7 283)

Dimensions



Power terminals

Designation	Connection	Tightening torque	Max. connection cross-section
PA/+ and PC/-	M12	41 Nm	4x 185 mm ²
3L1, 3L2, 3L3	M12	41 Nm	4x 185 mm ²
PE	M12	41 Nm	2x 185 mm ²

Control terminals

X20	M2.6	0.5...0.6 Nm	2.5 mm ²
I/O terminals	M2	0.25 Nm	1.5 mm ²
Relay terminals	M2.6	0.6 Nm	2.5 mm ²

Technical data

	AIC 4V240-13	AIC 4V275	AIC 4V340
--	--------------	-----------	-----------

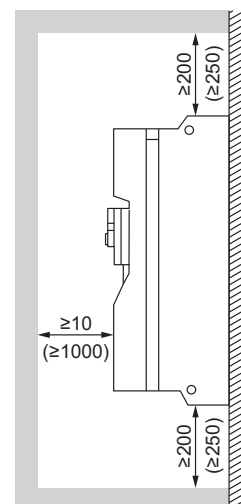
Order number	VW3 A7 283	VW3 A7 254	VW3 A7 255
--------------	------------	------------	------------

Characteristics

Losses	at I _N	3560 W	4710 W	5800 W
Losses control part		430 W	610 W	770 W
Losses power part		3130 W	4100 W	5030 W
Weight approx.		140 kg	140 kg	140 kg

Ambient conditions

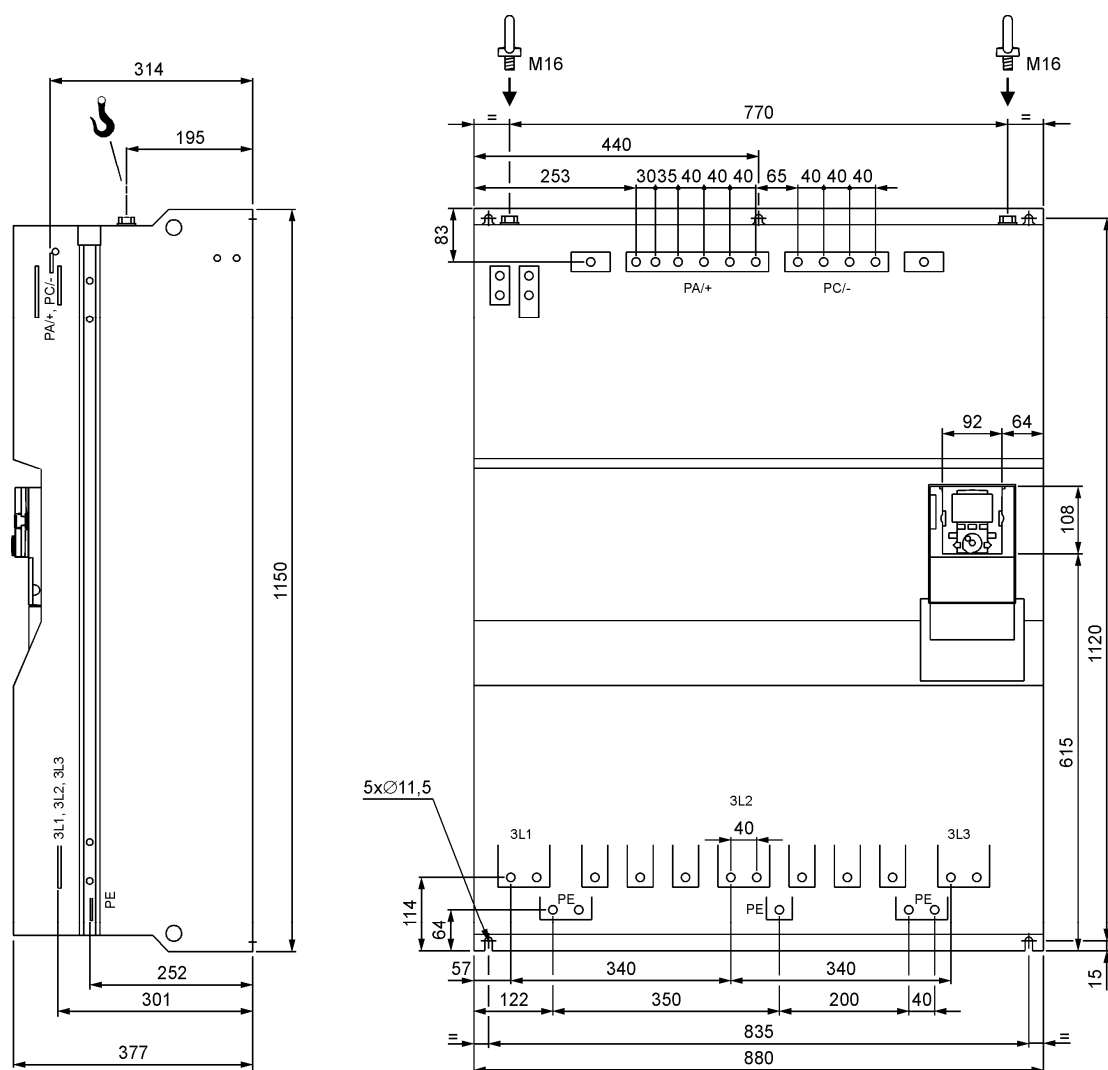
Volume of cooling air	1200 m ³ /h	1200 m ³ /h	1200 m ³ /h
Min. air inflow and air outlet	10 dm ²	10 dm ²	10 dm ²



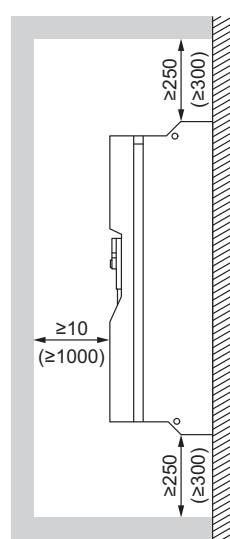
(when mounting without any distance sideways)

AIC 4V430 (VW3 A7 256) / AIC 4V540 (VW3 A7 257)

Dimensions



Power terminals			
Designation	Connection	Tightening torque	Max. connection cross-section
PA/+ and PC/-	M12	41 Nm	8x 185 mm ²
3L1, 3L2, 3L3	M12	41 Nm	2x (2x185) mm ²
PE	M12	41 Nm	2x 185 mm ²
Control terminals			
X20	M2.6	0.5...0.6 Nm	2.5 mm ²
I/O terminals	M2	0.25 Nm	1.5 mm ²
Relay terminals	M2.6	0.6 Nm	2.5 mm ²
Technical data		AIC 4V430	AIC 4V540
Order number		VW3 A7 256	VW3 A7 257
Characteristics			
Losses	at I _N	6130 W	8920 W
Losses control part		860 W	1190 W
Losses power part		5270 W	7730 W
Weight approx.		215 kg	225 kg
Ambient conditions			
Volume of cooling air		1800 m ³ /h	1800 m ³ /h
Min. air inflow and air outlet		15 dm ²	15 dm ²



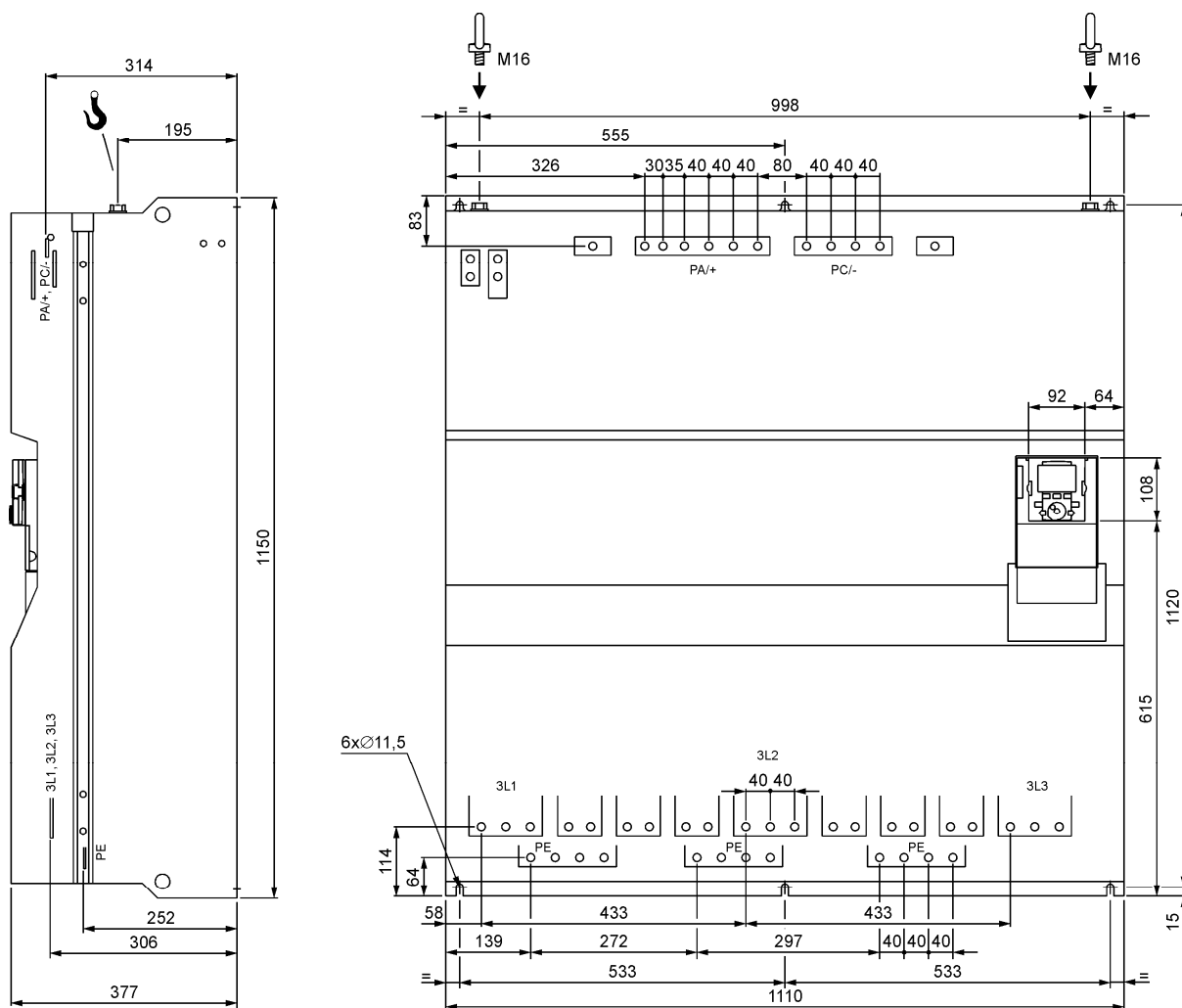
AIC 4V675 (VW3 A7 258)

AIC 4V430-15 (VW3 A7 286) / AIC 4V540-15 (VW3 A7 287)

Dimensions

04/2010

8 P02 515 EN.03/03



Power terminals

Designation	Connection	Tightening torque	Max. connection cross-section
PA/+ and PC/-	M12	41 Nm	8x 185 mm ²
3L1, 3L2, 3L3	M12	41 Nm	2x (4x 185) mm ²
PE	M12	41 Nm	4x 185 mm ²

Control terminals

X20	M2.6	0.5...0.6 Nm	2.5 mm ²
I/O terminals	M2	0.25 Nm	1.5 mm ²
Relay terminals	M2.6	0.6 Nm	2.5 mm ²

Technical data

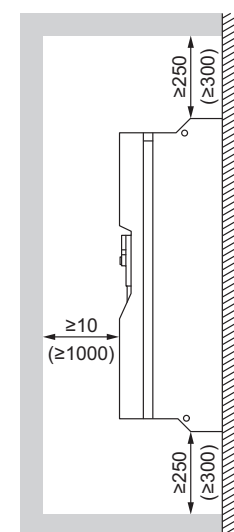
	AIC 4V430-15	AIC 4V540-15	AIC 4V675
Order number	VW3 A7 286	VW3 A7 287	VW3 A7 258

Characteristics

Losses	at I _N	6130 W	8920 W	11060 W
Losses control part		860 W	1190 W	1500 W
Losses power part		5270 W	7730 W	9560 W
Weight approx.		300 kg	300 kg	300 kg

Ambient conditions

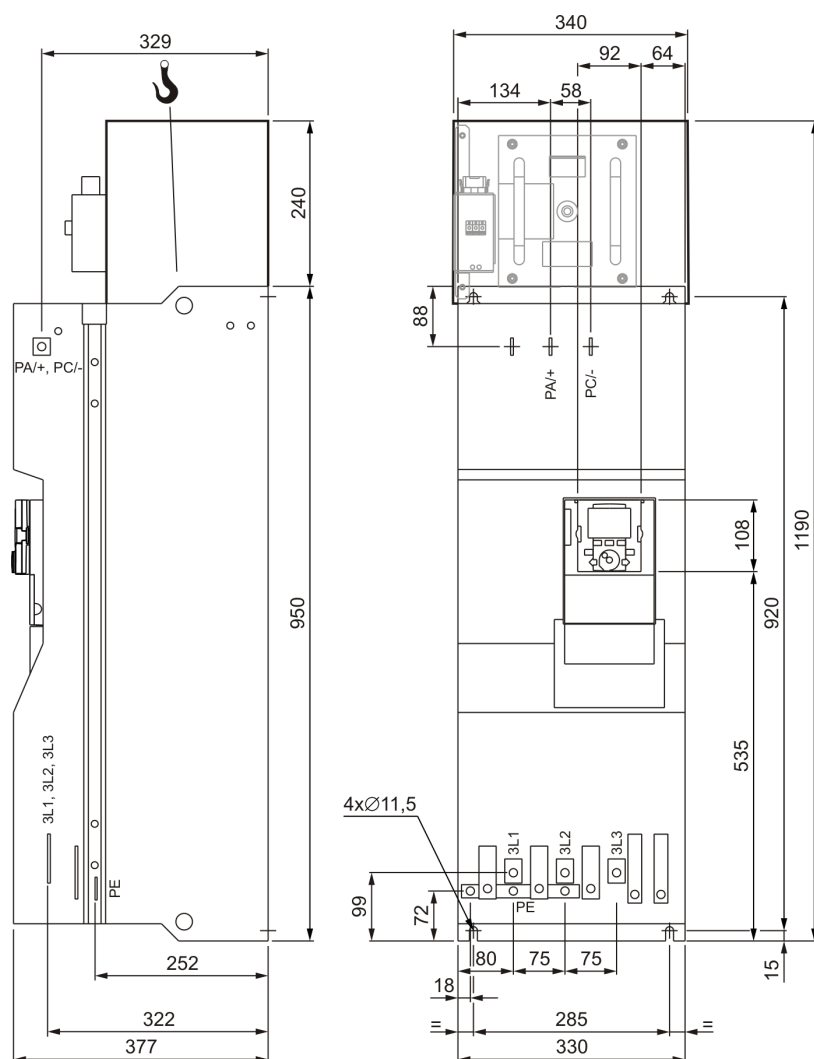
Volume of cooling air	2400 m ³ /h	2400 m ³ /h	2400 m ³ /h
Min. air inflow and air outlet	20 dm ²	20 dm ²	20 dm ²



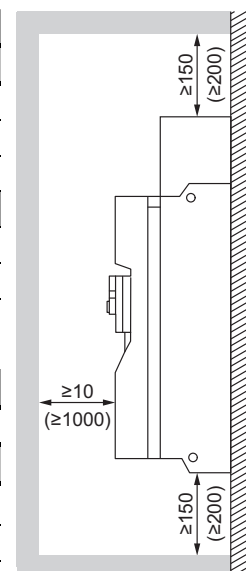
(when mounting without any distance sideways)

AIC 6V145 (VW3 A7 270) / AIC 6V175 (VW3 A7 271) / AIC 6V220 (VW3 A7 272)

Dimensions



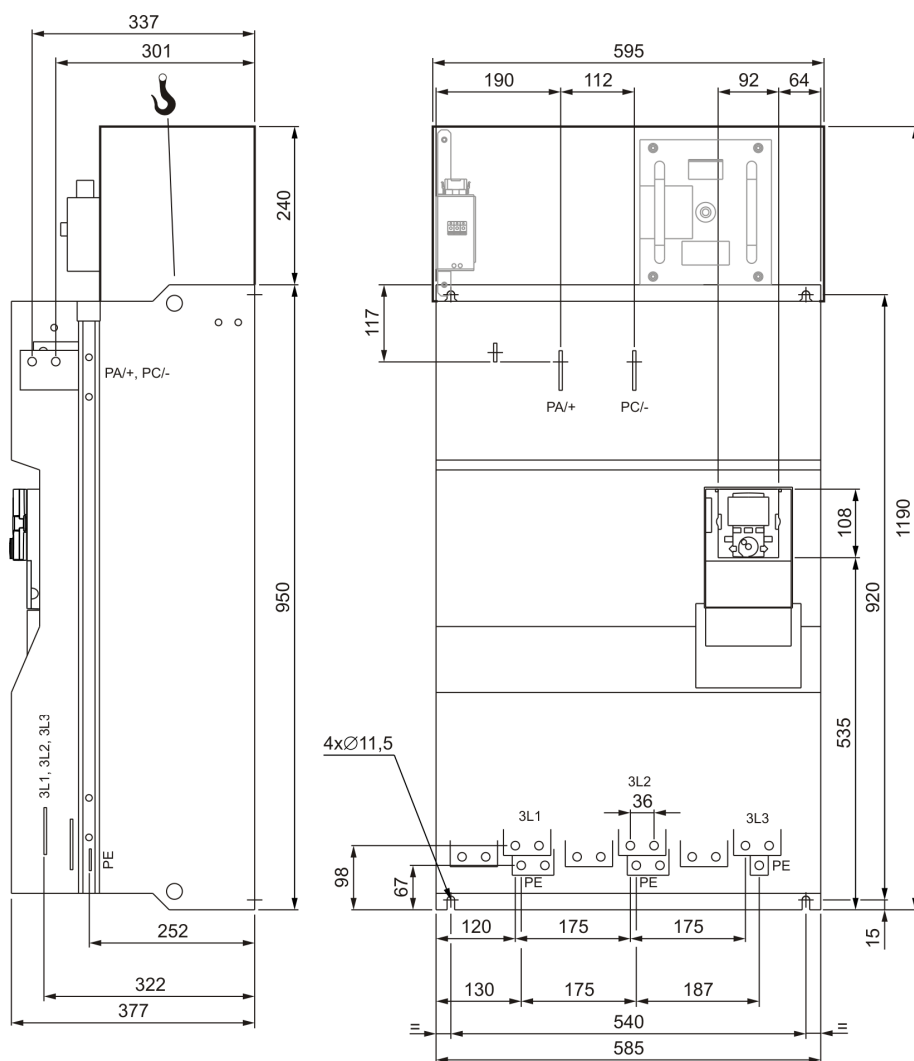
Power terminals			
Designation	Connection	Tightening torque	Max. connection cross-section
PA/+ and PC/-	M12	41 Nm	2x 120 mm ²
3L1, 3L2, 3L3	M10	24 Nm	120 mm ²
PE	M10	24 Nm	120 mm ²
Control terminals			
X20	M2.6	0.5...0.6 Nm	2.5 mm ²
I/O terminals	M2	0.25 Nm	1.5 mm ²
Relay terminals	M2.6	0.6 Nm	2.5 mm ²
Technical data			
	AIC 6V145	AIC 6V175	AIC 6V220
Order number	VW3 A7 270	VW3 A7 271	VW3 A7 272
Characteristics			
Losses at I _N	2200 W	2630 W	3220 W
Losses control part	190 W	220 W	250 W
Losses power part	2010 W	2410 W	2970 W
Weight approx.	110 kg	110 kg	110 kg
Ambient conditions			
Volume of cooling air	600 m ³ /h	600 m ³ /h	600 m ³ /h
Min. air inflow and air outlet	7 dm ²	7 dm ²	7 dm ²



(when mounting without any distance sideways)

AIC 6V275 (VW3 A7 273) / AIC 6V340 (VW3 A7 274) / AIC 6V430 (VW3 A7 275)

Dimensions



Power terminals

Designation	Connection	Tightening torque	Max. connection cross-section
PA/+ and PC/-	M12	41 Nm	4x 185 mm ²
3L1, 3L2, 3L3	M12	41 Nm	4x 185 mm ²
PE	M12	41 Nm	2x 185 mm ²

Control terminals

X20	M2.6	0.5...0.6 Nm	2.5 mm ²
I/O terminals	M2	0.25 Nm	1.5 mm ²
Relay terminals	M2.6	0.6 Nm	2.5 mm ²

Technical data

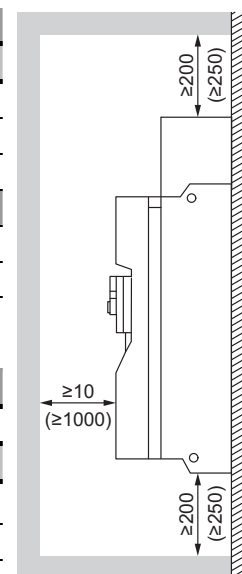
Technical data	AIC 6V275	AIC 6V340	AIC 6V430
Order number	VW3 A7 273	VW3 A7 274	VW3 A7 275

Characteristics

Losses	at I _N	4130 W	5050 W	6040 W
Losses control part		330 W	380 W	440 W
Losses power part		3800 W	4670 W	5600 W
Weight approx.		190 kg	190 kg	190 kg

Ambient conditions

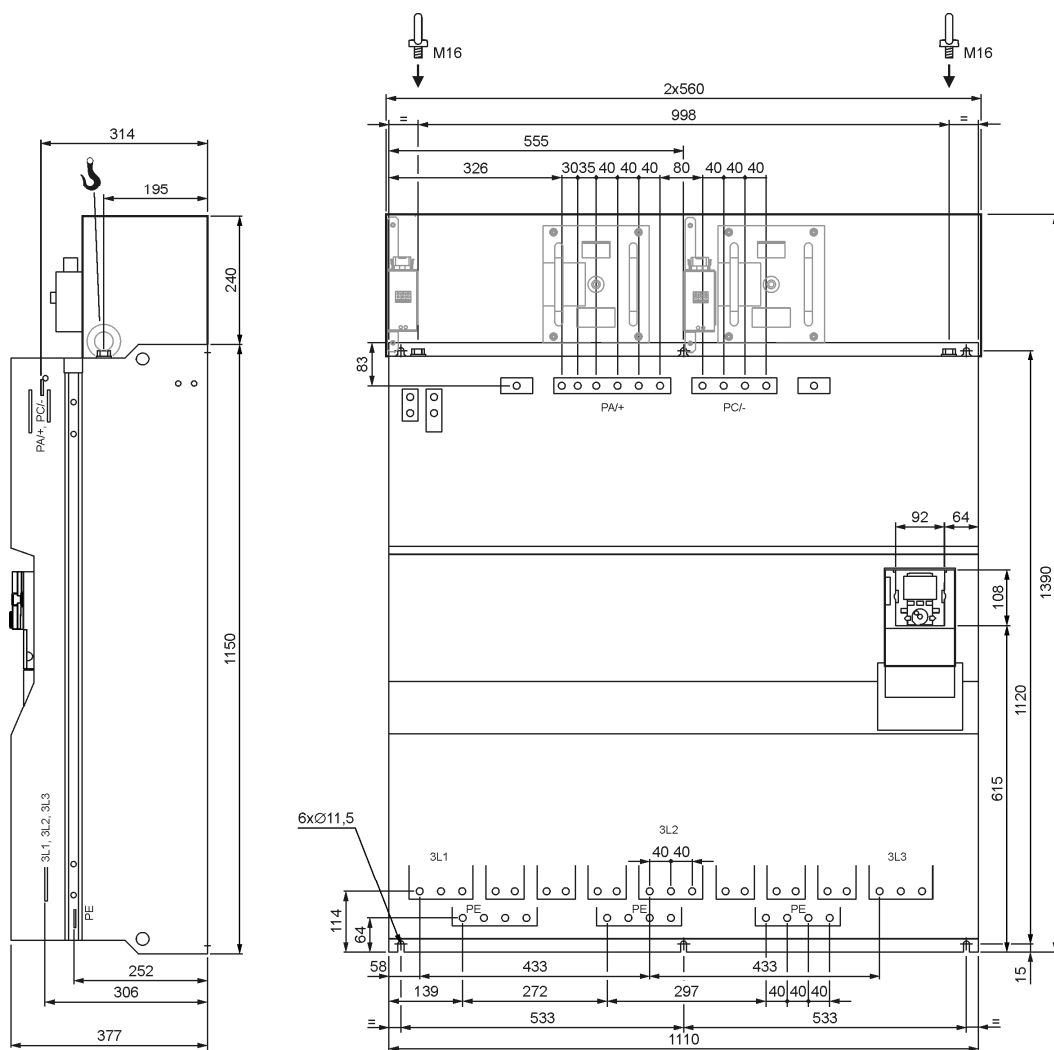
Volume of cooling air	1200 m ³ /h	1200 m ³ /h	1200 m ³ /h
Min. air inflow and air outlet	10 dm ²	10 dm ²	10 dm ²



(when mounting without any distance sideways)

AIC 6V540 (VW3 A7 276) / AIC 6V675 (VW3 A7 277) / AIC 6V860 (VW3 A7 278)

Dimensions



Power terminals

Designation	Connection	Tightening torque	Max. connection cross-section
PA/+ and PC/-	M12	41 Nm	8x 185 mm ²
3L1, 3L2, 3L3	M12	41 Nm	2x (2x 185) mm ²
PE	M12	41 Nm	4x 185 mm ²

Control terminals

X20	M2.6	0.5...0.6 Nm	2.5 mm ²
I/O terminals	M2	0.25 Nm	1.5 mm ²
Relay terminals	M2.6	0.6 Nm	2.5 mm ²

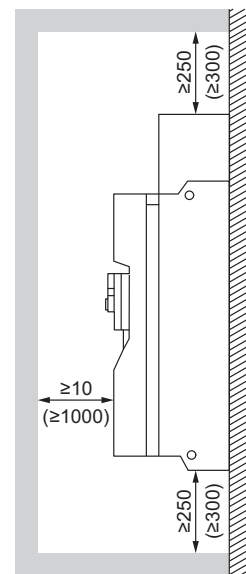
Technical data	AIC 6V540	AIC 6V675	AIC 6V860
Order number	VW3 A7 276	VW3 A7 277	VW3 A7 278

Characteristics

Losses	at I _N	7730 W	9560 W	11980 W
Losses control part		580 W	690 W	860 W
Losses power part		7150 W	8870 W	11120 W
Weight approx.		400 kg	400 kg	400 kg

Ambient conditions

Volume of cooling air	2400 m ³ /h	2400 m ³ /h	2400 m ³ /h
Min. air inflow and air outlet	20 dm ²	20 dm ²	20 dm ²



(when mounting without any distance sideways)

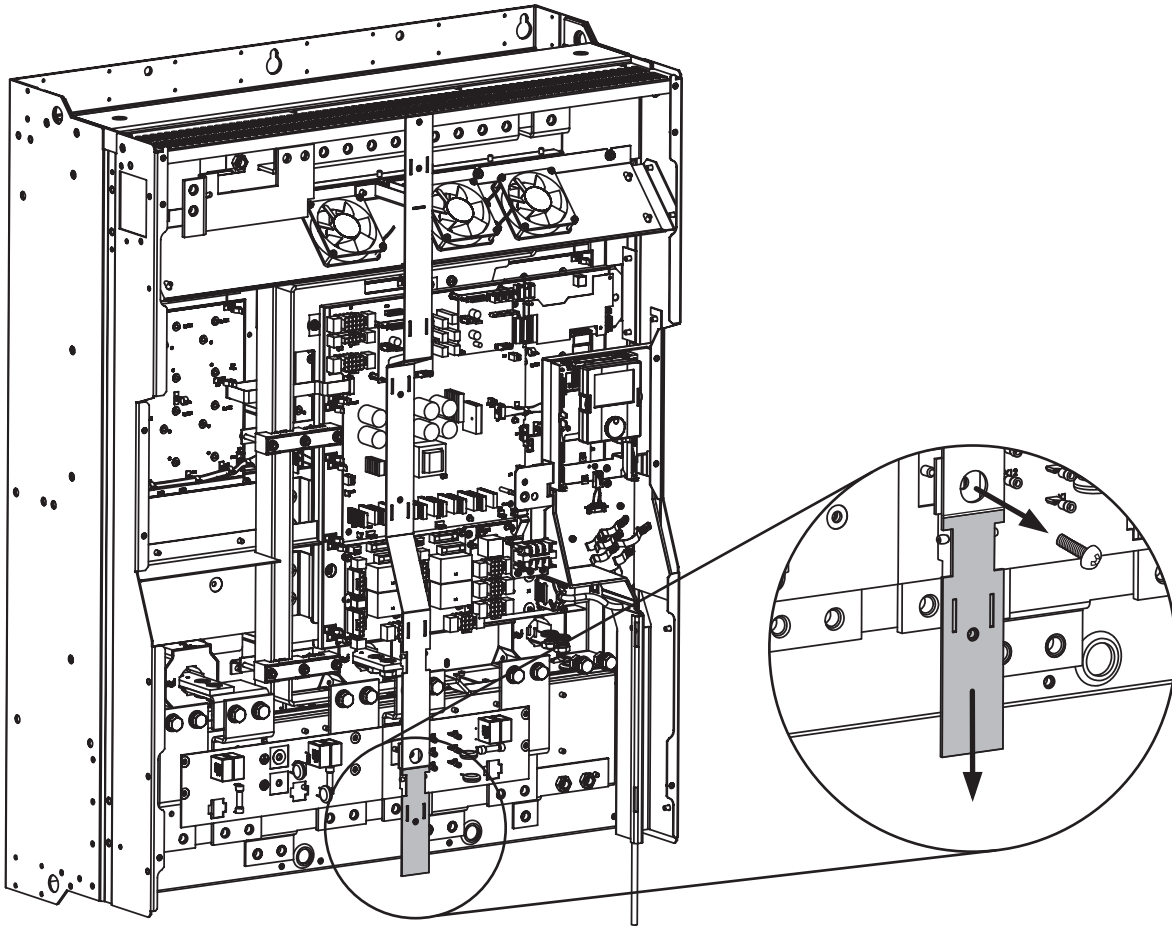
04/2010

8 P02 515 EN.03/03

Access to phase 3L2

Therefor unscrew the lower part of the middle front cover support.

Required tool: Torx TX30



04/2010

8 P02 515 EN.03/03

Options

Operating options

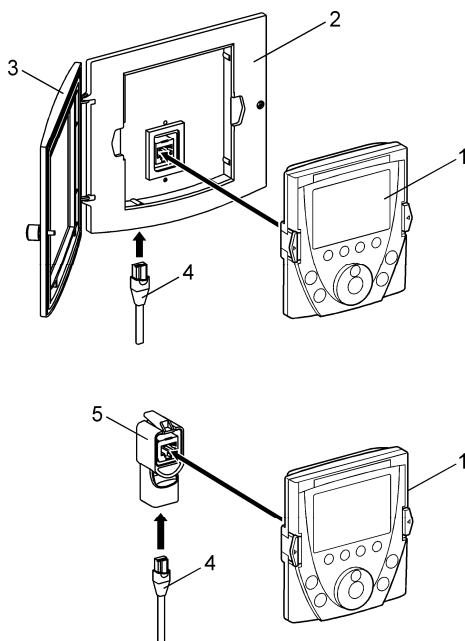
Door mounting kit

The door mounting kit enables the installation of the operating panel in the cubicle door (protection degree IP54). It guarantees safe operation of the Active Infeed Converter with closed cubicle door and separates the position of the Active Infeed Converter AIC in the cubicle from the optimal height for handling.

An additional "IP65 transparent cover" protects the made device settings against unintentional modifications whereas the operating state can be still read off.

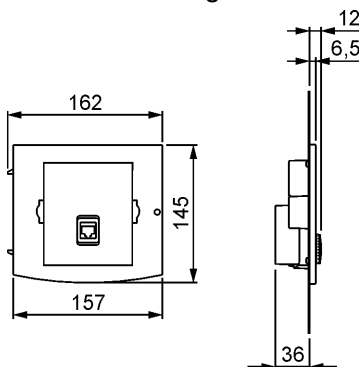
04/2010

8 P02 515 EN.03/03

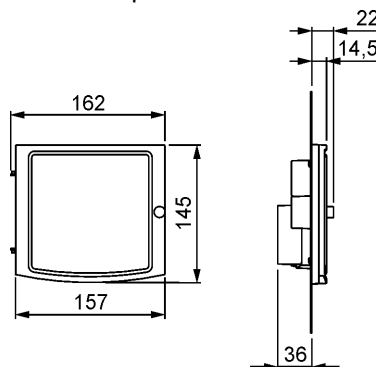


- 1 Operating panel
- 2 Door mounting kit
Order number: VW3 A1 102
- 3 IP65 transparent cover
Order number: VW3 A1 103
- 4 Connecting cable operating panel – Active Infeed Converter AIC
Length 1 m:
Order number: VW3 A1 104 R10
Length 3 m:
Order number: VW3 A1 104 R30
Length 5 m:
Order number: VW3 A1 104 R50
Length 10 m:
Order number: VW3 A1 104 R100
- 5 RJ45 adapter socket (socket / socket)
for connection between connecting cable and operating panel
Order number: VW3 A1 101

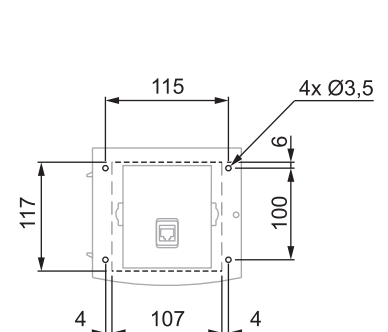
Dimensions in mm Remote mounting kit



IP65 transparent cover



Drilling plan 117 x 107 mm cut-out



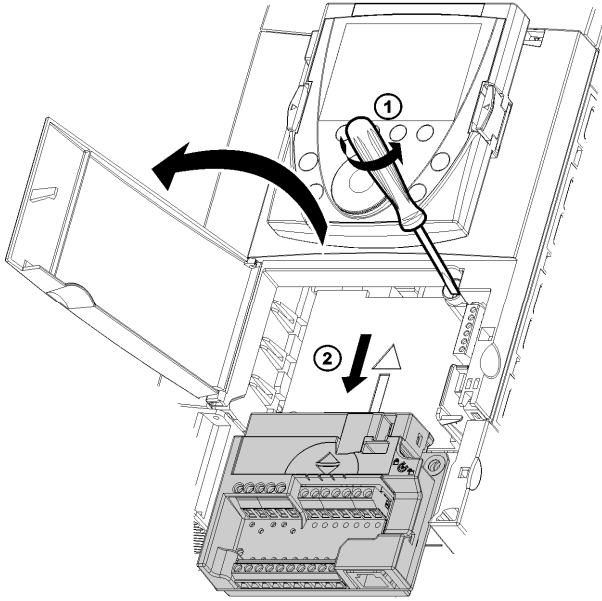
Thickness of sheet metal:
1.5...3 mm



The connecting cable for the door mounting kit can be connected to the front of the Active Infeed Converter AIC or to RJ45 plug next to the terminals, alternatively. In this case, the parameters for adjusting the Modbus must be set to the factory setting.

Control terminals

Access to the control terminals



Open the control trap (①) to get access to the control terminals.

In order to simplify the wiring at the control part of the inverter it is possible to pull out the control terminals.

Unscrew the screw until the spring is expanded (②). Pull out the option card (③) by pushing it downwards.

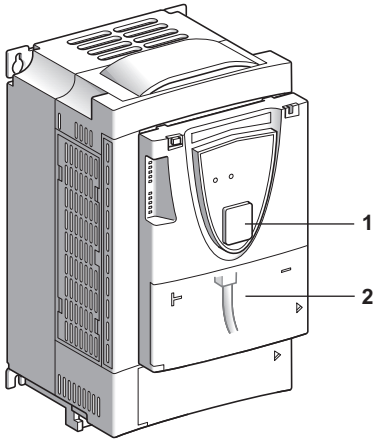


After reassembling the control terminal board tighten the captive screw.

Non-observance of these precautions may cause material damage.

Control options

Fieldbus Modbus



The Active Infeed Converters AIC are equipped with a Modbus interface to control and monitor the drive as standard.

1. A RJ45 plug for the Modbus connection is at the front side of the AIC. It is used for the removable operating panel.
2. A RJ45 plug for the Modbus connection is at the control terminals of the Active Infeed Converter AIC. It is provided for control via a PLC or another control system. It is also possible to connect a terminal or diagnosis tool.

Technical data:

- Max. 247 subscribers in all segments
- Max. 32 subscribers including repeater per segment
- Max. 1000 m line length at 19.2 kBaud
- Bus cable: screened, 2 x twisted, two-wire line (typ. Cat5)
- Bus termination: serial connection of $R = 120 \Omega$ and $C = 1 \text{ nF}$ for each bus segment
- RJ45 port: screened, pin assignment 4, 5, 8
- No galvanic isolation

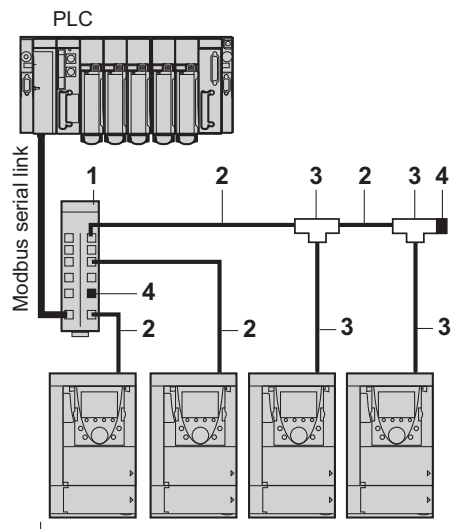


The Modbus interface cannot be used at the same time as the ADAP-CAN option!



More information on the Modbus network and a precise description of the Modbus parameters can be found in the Modbus operating instructions.

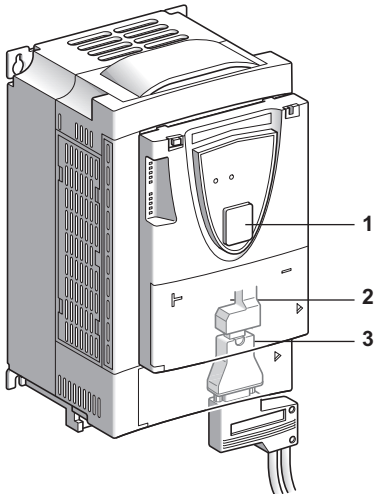
Example for a Modbus network:



Example of Modbus diagram, connection via splitter boxes and RJ45 connectors

Accessories for Modbus connection				
No	Designation	Brief description	Order number	Weight [kg]
1	Modbus splitter	Divides the Modbus signal into eight additional channels using a star configuration. Several Modbus splitters can be connected parallel.	LU9 GC3	0.500
2	Connecting cable	Pre-assembled RJ45 connecting cable 0.3 m	VW3 A8 306 R03	0.025
		Pre-assembled RJ45 connecting cable 1 m	VW3 A8 306 R10	0.060
		Pre-assembled RJ45 connecting cable 3 m	VW3 A8 306 R30	0.130
3	Modbus T-adapter	Modbus T-adapter with 0.3 m connecting cable	VW3 A8 306 TF03	0.190
		Modbus T-adapter with 1 m connecting cable	VW3 A8 306 TF10	0.210
4	Bus termination	Bus termination RC	VW3 A8 306 RC	0.010

Fieldbus adapter for CANopen



All Active Infeed Converters AIC support the fieldbus system CANopen as standard. For the integration of the CANopen-typical Sub-D fieldbus connection, an optional CANopen adapter must be installed at the RJ45 interface next to the terminals of the Active Infeed Converter.

In the CANopen network the Active Infeed Converter AIC is operated as a slave.

1. A RJ45 plug for the Modbus connection is at the front side of the AIC. It is used for the removable operating panel.
2. A RJ45 plug for the Modbus connection is at the control terminals of the Active Infeed Converter AIC. It is provided for control via a PLC or another control system. It is also possible to connect a terminal or diagnosis tool.
3. The Sub-D fieldbus connection can be connected to the modbus interface using a CANopen adapter.

Technical data:

- Max. 32...126 subscribers (according to the CAN controller used)
- Bus cable: screened, twisted two-wire line
- Bus terminating resistor: $R = 120 \Omega$ (108...132 Ω)
- SUB-D port according to ISO 11898
- CAN interface according to CiA DS 102
- No galvanic isolation

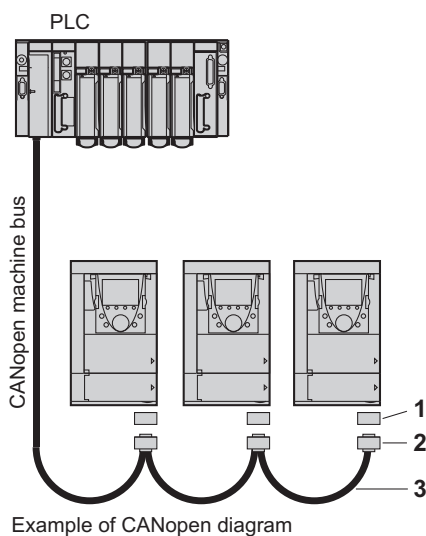


The ADAP-CAN option cannot be used at the same time as the Modbus interface!



More information on the CANopen network and a precise description of the CANopen parameters can be found in the CANopen operating instructions.

Example for a CANopen network:

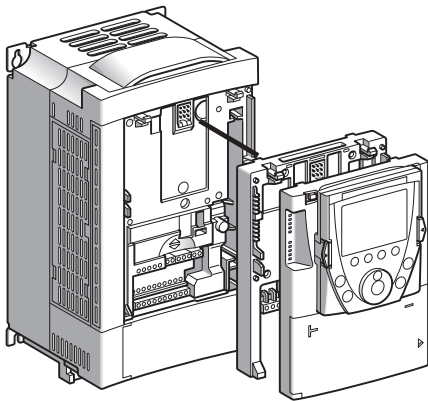


Accessories for CANopen connection				
No.	Designation	Brief description	Order number	Weight [kg]
1	CANopen adapter	RJ45/Sub-D adapter for connecting the Active Front End to a CANopen fieldbus system.	VW3 CAN A71	–
2	Plug connector	Connecting plug for CANopen fieldbus system	VW3 CAN KCDF 180T	–
3	Standard connecting cable	Pre-assembled standard connecting cable 50 m minimal smoke emission, non-halogen self-extinguishing (IEC 60332-1)	TSX CAN CA 50	4.930
		Pre-assembled standard connecting cable 100 m minimal smoke emission, non-halogen self-extinguishing (IEC 60332-1)	TSX CAN CA 100	8.800
		Pre-assembled standard connecting cable 300 m minimal smoke emission, non-halogen self-extinguishing (IEC 60332-1)	TSX CAN CA 300	24.560
3	UL connecting cable	Pre-assembled UL connecting cable 50 m self-extinguishing (IEC 60332-2)	TSX CAN CB 50	3.580
		Pre-assembled UL connecting cable 100 m self-extinguishing (IEC 60332-2)	TSX CAN CB 100	7.840
		Pre-assembled UL connecting cable 300 m self-extinguishing (IEC 60332-2)	TSX CAN CB 300	21.870
3	Connecting cable for difficult environment	Pre-assembled connecting cable 50 m for difficult ambient conditions or mobile installation. Minimal smoke emission, non-halogen self-extinguishing (IEC 60332-1)	TSX CAN CD 50	3.510
		Pre-assembled connecting cable 100 m for difficult ambient conditions or mobile installation. Minimal smoke emission, non-halogen self-extinguishing (IEC 60332-1)	TSX CAN CD 100	7.770
		Pre-assembled connecting cable 300 m for difficult ambient conditions or mobile installation. Minimal smoke emission, non-halogen self-extinguishing (IEC 60332-1)	TSX CAN CD 300	21.700

04/2010

8 P02 515 EN.03/03

Logic extension card



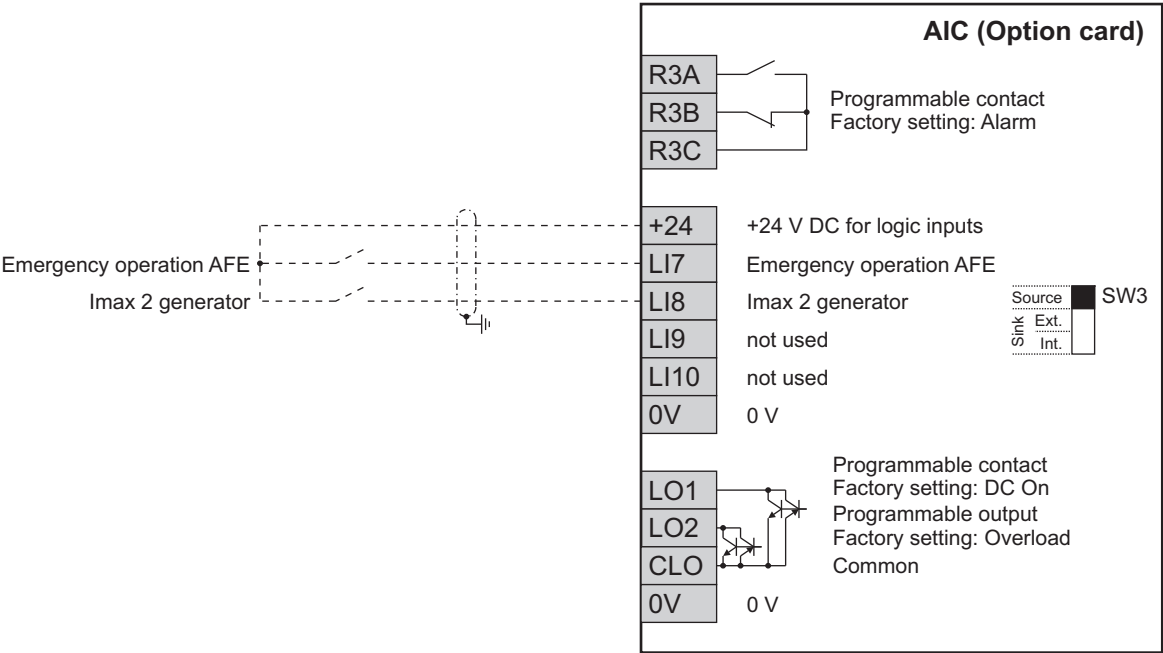
The Active Infeed Converters AIC are equipped with extensive control terminals as standard. As the Active Front End AFE is an option of an inverter, these inputs and outputs are already fixed in their function and usage.

For further functions the logic I/O extension card can be used.

Only one I/O extension card can be installed in the Active Infeed Converter AIC.

Designation: Logic I/O extension card
Order number: VW3 A3 201

With the I/O extension card (order number: VW3 A3 201) there are additional logic inputs and outputs as well as a relay output available.



Unlike the logic inputs of the basic device the inputs of the extension card can be switched between positive and negative logic using sliding switch SW3. Parameters that belong to the outputs of the option cards are only available at the Active Infeed Converter when the card is plugged.

Specification of the control terminals at I/O extension card VW3 A3 201

Terminal	Designation	Specification
R3A R3B R3C	Relay output 3 (R3A N.O. contact, R3B N.C. contact)	Switching capacity min. 3 mA at 24 V DC (relay as good as new) Switching capacity max. 5 A at 250 V AC ($\cos \varphi = 1$) or 30 V DC, max. 2 A at 250 V AC ($\cos \varphi = 0.4$) or 30 V DC ($L/R = 7$ ms) Reaction time 7 ms \pm 0.5 ms, life cycle 100,000 switching cycles at max. switching capacity Sampling voltage must correspond to overvoltage category II so that the PELV conditions for the remaining control terminals are fulfilled.
-10	Not used	–
+24	Sampling voltage for logic inputs (Sink/Source-switching with selector switch SW3)	– <i>Selector switch SW3 in position Source or Sink Int.:</i> +24 V DC (min. 21 V, max. 27 V), short-circuit proof max. 50 mA (incl. all options) – <i>Selector switch SW3 in position Sink Ext.:</i> Input for external voltage supply +24 V DC of the logic inputs
LI7	Emergency operation AFE	+24 V DC (max. 30 V), impedance 3.5 k Ω , reaction time 2 ms \pm 0.5 ms
LI8	I max 2 generator	Positive logic (Source) or negative logic (Sink)
LI9	Not used	compatible with Level 1 PLC Standard IEC 65A-68
LI10	Not used	SW3 at Source (factory setting): High > 11 V DC, Low < 5 V DC
0 V	Weight	SW3 at Sink Int. or Sink Ext.: High < 10 V DC, Low > 16 V DC
LO1	Logic output LO1 (can be parameterized)	0 V reference potential for logic inputs
LO2	Logic output LO2 (can be parameterized)	+24 V DC Open-Collector-Outputs, floating ground Positive logic (Source) or negative logic (Sink) compatible with Level 1 PLC Standard IEC 65A-68 Switching capacity max. 200 mA at 12...30 VDC Reaction time: 2 ms \pm 0.5 ms
CLO	Common	Reference potential of the digital outputs
0 V	Weight	0 V general use

Maximum connection cross-section: 1.5 mm² (AWG16), 0.25 Nm (2.5 mm² (AWG14), 0.6 Nm for relay terminals)

*) Primarily, screen the wiring of all control terminals and lay it separate from power cables on principle!

04/2010

8 P02 515 EN.03/03

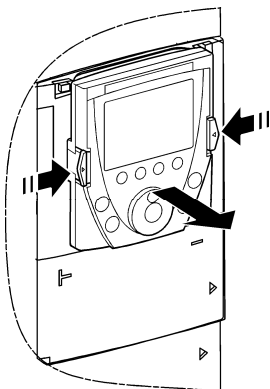
Installing of an option card

Installing of the option card is finished after a few steps.

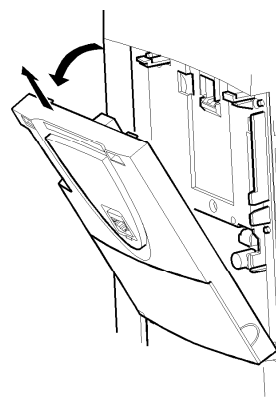
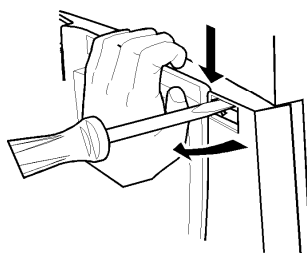
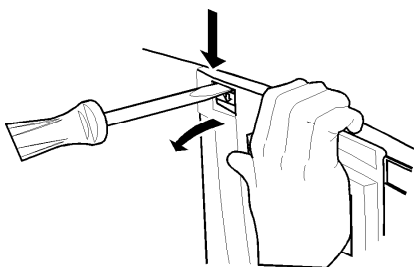


Only install the option card when there is no voltage present.

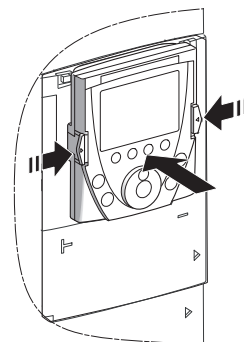
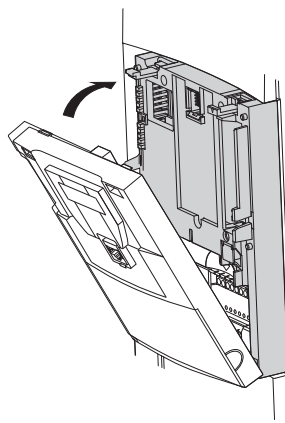
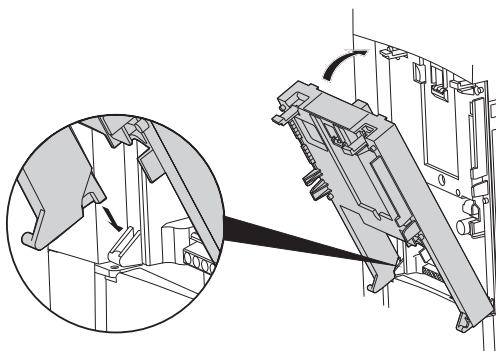
1. Remove the operating panel from the front side of the device.



2. Remove the front cover of the device by releasing both mechanical interlocks.

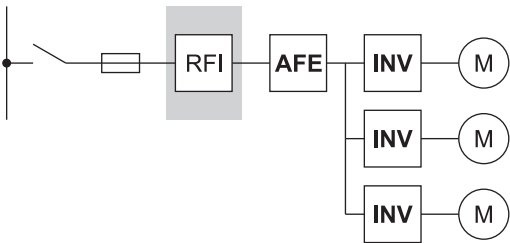


3. Mount the option card.



External options

Radio frequency interference filter RFI



The Active Front End units include a radio frequency interference filter for use in industrial environments according to EN 61800-3 category C3 as standard.

For applications in "1st environment - residential environments" of category C2, when several inverters INV are operated at the DC bus and in case of long motor cables, the use of the additional RFI filters is required. These filters are connected at the mains side of the Active Front End.



The determining factor for the radio frequency interference filters to be effective is a HF connection as good as possible between motor, motor cable screen, inverter components, line filter module and filter!

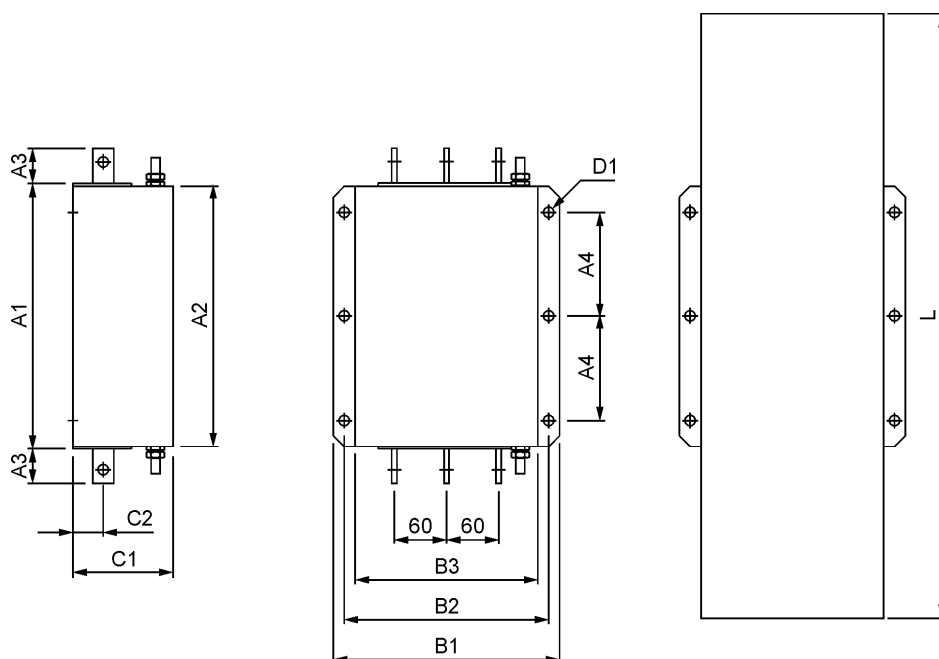


The RFI filters are not qualified for nongrounded (IT) mains as well as for "Corner Grounded Networks". The radio frequency interference filter which is built-in as standard can be switched-over/reconnected.

	General technical data
Operating voltage RFI 480	3AC 380 V -15 % ... 480 V +10 %
Operating voltage RFI 6V	3AC 500 V -15 % ... 690 V +10 %
Nominal frequency	50/60 Hz ±5 %
Overload capability	150 % for 60 s per 10 min, 200 % for 2 s
Ambient temperature	-10...+50 °C (up to 60 °C with derating)
Storage temperature	-40...+70 °C
Altitude	0...1000 m (up to 3000 m with derating)
Vibration resistance	1.5 mm at 3...13 Hz, 1 g at 13...200 Hz according to IEC/EN 60068-2-6
Shock resistance	15 g for 11 ms according to IEC/EN 60068-2-27
Approvals	CE, UR, GOST

Allocation table			
Description	Altivar	Order number	Weight [kg]
RFI filter 400V	4V120 ... 4V175	VW3 A4 410	13.000
	4V240 ... 4V340	VW3 A4 411	15.000
	4V430 ... 4V675	2x VW3 A4 411	30.000
RFI filter 690V	6V145 ... 6V220	VW3 A4 414	14.000
	6V275 ... 6V430	VW3 A4 415	18.000
	6V540 ... 6V860	2x VW3 A4 415	36.000

	Radio frequency interference filter			
	RFI 480/300-TN	RFI 480/600-TN	RFI 6V220-TN	RFI 6V430-TN
Order number	VW3 A4 410	VW3 A4 411	VW3 A4 414	VW3 A4 415
Nominal current	300 A	580 A	220 A	430 A
Max. leakage current	350 mA	350 mA	450 mA	450 mA
Cont.leakage current	3 mA	3 mA	5 mA	5 mA
Protection degree	IP00, with protection against contact			
Losses	60 W	125 W	45 W	90 W
Weight	13 kg	15 kg	14 kg	18 kg
Dimension A1	306 mm	306 mm	306 mm	306 mm
Dimension A2	300 mm	300 mm	300 mm	300 mm
Dimension A3	40 mm	95 mm	40 mm	95 mm
Dimension A4	120 mm	120 mm	120 mm	120 mm
Dimension B1	260 mm	260 mm	260 mm	260 mm
Dimension B2	235 mm	235 mm	235 mm	235 mm
Dimension B3	210 mm	210 mm	210 mm	210 mm
Dimension C1	135 mm	135 mm	135 mm	135 mm
Dimension C2	65 mm	65 mm	65 mm	65 mm
Protective cover L	800 mm	800 mm	800 mm	800 mm
Fixing D1	6 x Ø 12 mm	6 x Ø 12 mm	6 x Ø 12 mm	6 x Ø 12 mm
Connection bar	25 x 6 mm 1 x M10	32 x 8 mm 2 x M10	25 x 6 mm 1 x M10	30 x 8 mm 2 x M10
PE connection	M12	M12	M12	M12



Commissioning

Commissioning procedure

Check of power wiring

- The mains supply has to be connected to the terminals 1L1 / 1L2 / 1L3 at the Line Filter Module LFM.
- The Line Filter Choke LFC is connected between the Line Filter Module (at the terminals 2L1 / 2L2 / 2L3) and the Active Infeed Converter AIC (at the terminals 3L1 / 3L2 / 3L3).
For 400 V devices from 430 kW (for 500/690 V devices from 540 kW) there are two Line Filter Modules and two Line Filter Chokes connected in parallel.
- The values of the main fuses correspond to the table in chapter "Fuses and cable cross sections" in the mounting instructions.
- Commissioning is only allowed with a connected inverter.
- Check whether there is no reverse polarity, no short circuit and no earth fault in the DC connection between the Active Infeed Converter and the inverter.

Check of control and power wiring

- The fan supply of the Active Infeed Converter AIC is properly connected to the Line Filter Module LFM (terminal strip X1 / terminal 1 / 2 / 3).
- The fan supply between the inverter and the Line Filter Module LFM is established (terminal strip X1 / terminal 4 / 5 / 6).
- The plugs on the "Fan-Supply-Board" of the inverter are connected in the right position (see mounting instructions chapter "Fan supply").
- The control wires (W2 and W3) of the Active Infeed Converter AIC are connected to the Line Filter Module LFM (X2 / X3).
- For parallel operation of Active Front End units the synchronisation line has to be established.

Check of the RFI-filter

- Does the setting of the integrated RFI-filter in the Line Filter Module LFM correspond to the mains situation (TT, TN or IT, Corner Grounded)?
- Is the integrated RFI-filter in the inverter deactivated (position IT mains or corner grounded)?

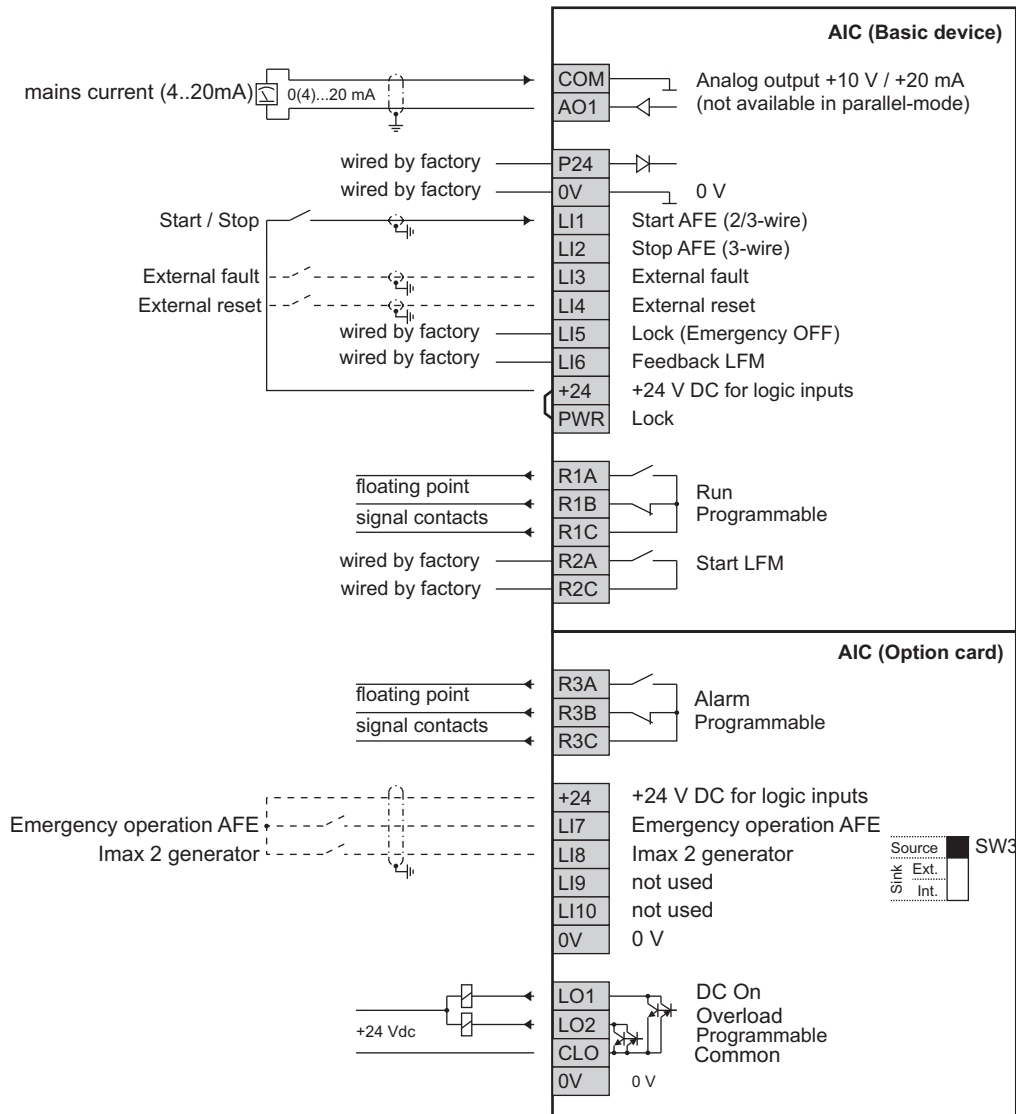
Switch on mains voltage and make control measurements

- Are the three phase voltages available and are they symmetrical?
(observe the regulation "Work on Live Equipment")
- Switch on mains.
- Check the 24 V buffer voltage.
- Adjust the parameter 2.1.01 [Mains voltage] at the Active Infeed Converter according to the used mains voltage.
- Adjust the parameter UrES [Mains voltage] at the inverter (or at the inverters) according to the used mains voltage.
- Activate the parameter OIR [Regen. connection] at the inverter.
- Further settings at the inverter see chapter "Settings at the inverter", page 79.

Factory setting

The Active Front End is factory-set for the most common operating conditions:

- Supply voltage: 480V – 60Hz / 690V – 60Hz
- Control source: 2-wire (level rated)



- Display
 - Selection upper field: mains current AFE [%]
 - Selection lower field: effective power [kW]
- External fault
 - Ext. fault monitoring: N.O. always active
 - Ext. fault reaction: -Δt-fault
- Fault management
 - Autoreset: active (only for mains failure or input phase loss)
- Parallel operation: no parallel operation



Further functions as well as a detailed description of the setting possibilities are given in the description of functions Altivar AFE.

Settings at the inverter

Software

The ATV61/71 frequency inverters with the following software versions are able to operate with an Active Front End. The necessary parameters can be readout only via the graphic display terminal

Altivar 61

Menu [1.11 IDENTIFICATION]

- [APPL. SOFTWARE] = B2.1IE20 or higher
- [MC-SOFTWARE] = A2.3IE34, P1.5IE20 or higher
- [PRODUCT] = V2.1IE23 or higher

Altivar 71

Menu [1.11 IDENTIFICATION]

- [APPL. SOFTWARE] = A3.3IE40 or higher
- [MC-SOFTWARE] = A2.3IE34, P1.5IE20 or higher
- [PRODUCT] = V3.3IE43 or higher

Altivar 71...383

Menu [1.11 IDENTIFICATION]

- [APPL. SOFTWARE] = D3.4IE41 or higher
- [MC-SOFTWARE] = C2.4IE35, P1.5IE20 or higher
- [PRODUCT] = V3.4IE44 or higher

04/2010

8 P02 515 EN.03/03

Parameter settings

Required settings at the inverter

It is absolutely necessary to carry out the following settings for all frequency inverters connected to an Active Front End:

- ***AFE*** [Regen. connection] in menu [1.7 APPLICATION FUNCT.] (FUn-) in submenu [REGEN. CONNECTION] (Olr-) Setting: [Yes] (YES)
Thereby the undervoltage level of the frequency inverter is adapted to the operation with the Active Front End.
Please contact our service team if this parameter is not available in the parameter list of your device!
- ***brR*** [Braking balance] in menu [1.7 APPLICATION FUNCT.] (FUn-) in submenu [RAMP TYPE] (rPt-) Setting: [No] (nO)
- ***dEC*** [Deceleration] in menu [1.7 APPLICATION FUNCT.] (FUn-) in submenu [RAMP TYPE] (rPt-) For dynamic processes a very short deceleration ramp can cause an overload on the DC-bus with an overvoltage fault shut-down.
This can be prevented by an extension or rounding of the deceleration ramp (parameters ***LR3*** [Begin Dec round]; ***LR4*** [End Dec round]).
- ***UrES*** [Mains voltage] in menu [1.8 FAULT MANAGEMENT] (FLt-) in submenu [UNDERVOLTAGE MGT.] (USb-) Same setting as the Active Front End.
Thereby the internal voltage levels of the frequency inverter are adapted.
- ***IPL*** [Input phase loss] in menu [1.8 FAULT MANAGEMENT] (FLt-) in submenu [INPUT PHASE LOSS] (OPL-) Setting: [Ignore] (nO)
- ***bUb*** [Brake res. fault Mgt] in menu [1.8 FAULT MANAGEMENT] (FLt-) in submenu [BU PROTECTION] (bUF-) Setting: [Ignore] (nO)
- ***LEL*** [2 wire type] in menu [1.5 INPUTS/OUTPUTS CFG] (I-O-) Setting: [Level] (LEL)
In order to ensure an automatic restart by the AFE after an undervoltage recognition. An automatic restart only possible with 2-wire control.
- **RFI filter**
The integrated RFI filter has to be deactivated (position IT, non-grounded mains) at all devices because there exists no direct mains connection of the frequency inverter in case of operation with an Active Front End.



Non-observance of these precautions may cause material damage.



The 24 V control voltage of the Active Front End AFE can also be used to buffer the control electronics of the frequency inverter.



When the frequency inverter is supplied via the DC link an external supply for the device fans is required!

Via the LFM (line filter module) it is possible to supply the device fans with up to 4 additional inverters (with the same power as the AIC).

Schneider Electric Power Drives GmbH

Ruthnergasse 1
A-1210 Vienna
Phone: +43 (0) 1 29191 0
Fax: +43 (0) 1 29191 15

Due to evolution of standards and equipment, the characteristics indicated in texts and images of this document do not constitute a commitment on our part without confirmation.
Design: Schneider Electric Power Drives
Photos: Schneider Electric Power Drives