Altivar Process

Drive Systems

Installation manual

English

04/2017

NHA37119.02

www.schneider-electric.com

Schneider Electric

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

Table of Contents

Safety Information

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed to Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Qualification Of Personnel

Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product. In addition, these persons must have received safety training to recognize and avoid hazards involved. These persons must have sufficient technical training, knowledge and experience and be able to foresee and detect potential hazards that may be caused by using the product, by changing the settings and by the mechanical, electrical and electronic equipment of the entire system in which the product is used. All persons working on and with the product must be fully familiar with all applicable standards, directives, and accident prevention regulations when performing such work.

Intended Use

This product is a drive for three-phase synchronous and asynchronous motors and intended for industrial use according to the specifications and instructions in this manual. The product may only be used in compliance with all applicable safety regulations and directives, the specified requirements and the technical data. Prior to using the product, you must perform a risk assessment in view of the planned application. Based on the results, the appropriate safety measures must be implemented. Since the product is used as a component in an entire system, you must ensure the safety of persons by means of the design of this entire system (for example, machine design). Any use other than the use explicitly permitted is prohibited and can result in hazards. Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel.

Product Related Information

Read and understand these instructions before performing any procedure with this drive.

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation and who have received safety training to recognize and avoid hazards involved are authorized to work on and with this drive system. Installation, adjustment, repair and maintenance must be performed by qualified personnel.
- The system integrator is responsible for compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment.
- Many components of the product, including the printed circuit boards, operate with mains voltage. Do not touch.
- Only use properly rated, electrically insulated tools and measuring equipment.
- Do not touch unshielded components or terminals with voltage present.
- Motors can generate voltage when the shaft is rotated. Prior to performing any type of work on the drive system, block the motor shaft to prevent rotation.
- AC voltage can couple voltage to unused conductors in the motor cable. Insulate both ends of unused conductors of the motor cable.
- Do not short across the DC bus terminals or the DC bus capacitors or the braking resistor terminals.
- Before performing work on the drive system:
  - Disconnect all power, including external control power that may be present. Take into account that the circuit breaker or main switch does not de-energize all circuits.
  - Place a "Do Not Turn On" label on all power switches related to the drive system.
  - Lock all power switches in the open position.
  - Wait 15 minutes to allow the DC bus capacitors to discharge.
  - Follow the instructions given in the chapter “Verifying the Absence of Voltage”.
- Before applying voltage to the drive system:
  - Verify that the work has been completed and that the entire installation cannot cause hazards.
  - If the mains input terminals and the motor output terminals have been grounded and short-circuited, remove the ground and the short circuits on the mains input terminals and the motor output terminals.
  - Verify proper grounding of all equipment.
  - Verify that all protective equipment such as covers, doors, grids is installed and/or closed.

Failure to follow these instructions will result in death or serious injury.

Power Drive Systems (PDS) can generate strong local electrical and magnetic fields. This can cause interference in electromagnetically sensitive devices.

⚠ WARNING

ELECTROMAGNETIC FIELDS

- Keep persons with electronic medical implants, such as pacemakers, away from the equipment.
- Do not place electromagnetically sensitive devices in the vicinity of the equipment.

Failure to follow these instructions can result in death, serious injury or equipment damage.

Drive systems may perform unexpected movements because of incorrect wiring, incorrect settings, incorrect data or other errors.

⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION

- Carefully install the wiring in accordance with the EMC requirements.
- Do not operate the product with unknown or unsuitable settings or data.
- Perform a comprehensive commissioning test.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop, overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.
- Each implementation of the product must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Fans may continue to run for a certain period of time even after power to the product has been disconnected.

⚠ CAUTION

RUNNING FANS

Verify that fans have come to a complete standstill before handling them.

Failure to follow these instructions can result in injury or equipment damage.

The temperature of the products described in this manual may exceed 100 °C (212 °F) during operation.

⚠ WARNING

HOT SURFACES

- Ensure that any contact with hot surfaces is avoided.
- Do not allow flammable or heat-sensitive parts in the immediate vicinity of hot surfaces.
- Verify that the product has sufficiently cooled down before handling it.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

Failure to follow these instructions can result in death, serious injury or equipment damage.

Verifying the Absence of Voltage

The DC bus voltage level is determined by measuring the voltage between the DC bus terminals PA/+ and PC/-.

⚠ DANGER

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  - Lock all power switches in the open position.
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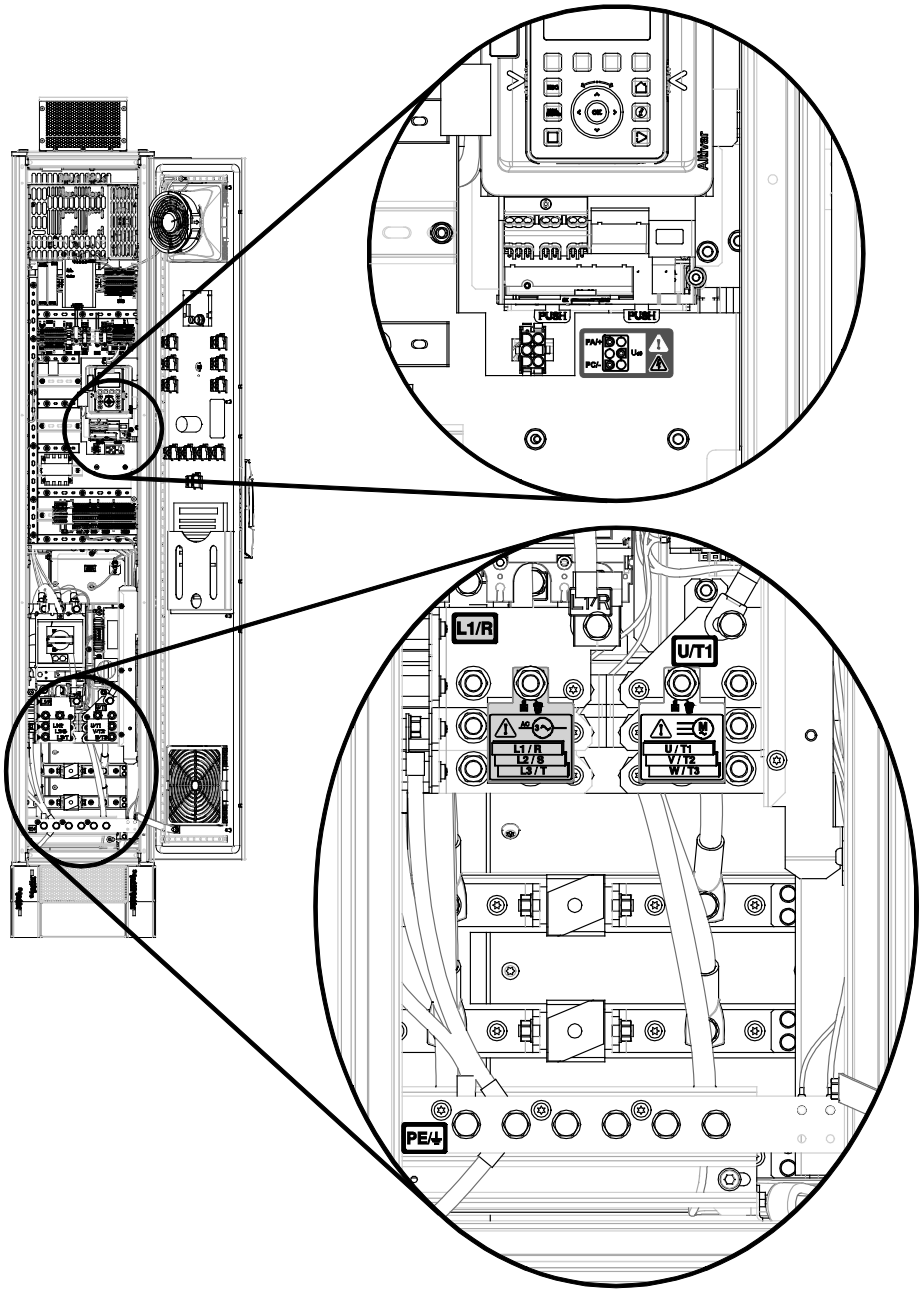
  - Verify that the work has been completed and that the entire installation cannot cause hazards.
  - If the mains input terminals and the motor output terminals have been grounded and short-circuited, remove the ground and the short circuits on the mains input terminals and the motor output terminals.
  - Verify proper grounding of all equipment.
  - Verify that all protective equipment such as covers, doors, grids is installed and/or closed.

Failure to follow these instructions will result in death or serious injury.

Step	Action
1	Measure the voltage (in AC mode and DC mode) on the mains input terminals and the motor output terminals between the phases and between each phase to ground to verify that no hazardous voltage is present.
2	Measure the voltage on the DC bus between the DC bus terminals (PA/+ and PC/-) to verify that the voltage is less than 10 Vdc.
3	If there is still voltage present on the terminals or if the DC bus capacitors do not discharge properly, contact your local Schneider Electric representative. Do not repair or operate the product.
4	Verify that no other voltage is present in the drive system.
5	Ground and short-circuit the mains input terminals and the motor output terminals.



About the Book

At a Glance

Document Scope

Providing mechanical and electrical information about the Altivar Process Drive System and instructions about mounting, wiring, commissioning and maintenance.

Validity Note

Original instructions and information given in this manual have been written in English (before optional translation).

This documentation is valid for the Altivar Process Drive Systems.

The technical characteristics of the devices described in this document also appear online. To access this information online:

Step	Action
1	o to the Schneider Electric home page *www.schneider-electric.com*.
2	In the **Search** box type the reference of a product or the name of a product range. ● Do not include blank spaces in the reference or product range. ● To get information on grouping similar modules, use asterisks (*).
3	If you entered a reference, go to the **Product Datasheets** search results and click on the reference that interests you. If you entered the name of a product range, go to the **Product Ranges** search results and click on the product range that interests you.
4	If more than one reference appears in the **Products** search results, click on the reference that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the data sheet.
6	To save or print a data sheet as a .pdf file, click **Download XXX product datasheet**.

The characteristics that are presented in this manual should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the manual and online information, use the online information as your reference.

Related Documents

Use your tablet or your PC to quickly access detailed and comprehensive information on all our products on *www.schneider-electric.com*.

The internet site provides the information you need for products and solutions:

- The whole catalog for detailed characteristics and selection guides
- The CAD files to help design your installation, available in over 20 different file formats
- Software and firmware to maintain your drive up to date
- A large quantity of White Papers, Environment documents, Application solutions, Specifications... to gain a better understanding of our electrical systems and equipment or automation
- And finally the User Guides related to your drive, listed below:

Title of Documentation	Reference number
ATV660 Handbook	*NHA37110* (German), *NHA37111* (English)
ATV680 Handbook	*NHA37112* (German), *NHA37113* (English)
ATV960 Handbook	*NHA37114* (German), *NHA37115* (English)
ATV980 Handbook	*NHA37116* (German), *NHA37117* (English)
Drive Systems – Installation manual	*NHA37118* (German), *NHA37119* (English), *NHA37121* (French), *NHA37122* (Spanish), *NHA37123* (Italian), *NHA37126* (Polish), *NHA37127* (Portuguese), *NHA37128* (Russian), *NHA37129* (Turkish), *NHA37130* (Chinese)
ATV6●● Programming manual	*EAV64318* (English), *EAV64320* (French), *EAV64321* (German), *EAV64322* (Spanish), *EAV64323* (Italian), *EAV64324* (Chinese)
ATV6●● Modbus serial link manual (embedded)	*EAV64325* (English)
ATV6●● Ethernet manual (embedded)	*EAV64327* (English)
ATV6●● Ethernet IP - Modbus TCP manual (VW3A3720, 721)	*EAV64328* (English)
ATV6●● PROFIBUS DP Manual (VW3A3607)	*EAV64329* (English)
ATV6●● PROFINET manual (VW3A3627)	*EAV64331* (English)
ATV6●● CANopen manual (VW3A3608, 618, 628)	*EAV64333* (English)
ATV6●● Communication parameters	*EAV64332* (English)
ATV6●● Safety function manual	*EAV64334* (English)
ATV6●● & ATV9●● ATEX manual	*NVE42416* (English)
SoMove: FDT	*SoMove_FDT* (English, French, German, Spanish, Italian, Chinese)
Altivar Process ATV6●●: DTM	*ATV6xx_DTM_Library_EN* (English), *ATV6xx_DTM_Library_FR* (French), *ATV6xx_DTM_Library_DE* (German), *ATV6xx_DTM_Library_SP* (Spanish), *ATV6xx_DTM_Library_IT* (Italian), *ATV6xx_DTM_Library_CN* (Chinese),

Title of Documentation	Reference number
ATV9●● Programming manual	*NHA80757* (English), *NHA80758* (French), *NHA80759* (German), *NHA80760* (Spanish), *NHA80761* (Italian), *NHA80762* (Chinese)
ATV9●● Modbus serial link manual (embedded)	*NHA80939* (English)
ATV9●● Ethernet manual (embedded)	*NHA80940* (English)
ATV9●● PROFIBUS DP manual (VW3A3607)	*NHA80941* (English)
ATV9●● DeviceNet manual (VW3A3609)	*NHA80942* (English)
ATV9●● PROFINET manual (VW3A3627)	*NHA80943* (English)
ATV9●● CANopen serial link manual (VW3A3608, 618, 628)	*NHA80945* (English)
ATV9●● EtherCAT manual (VW3A3601)	*NHA80946* (English)
ATV9●● Communication parameters	*NHA80944* (English)
ATV9●● Safety function manual	*NHA80947* (English)
ATV6●● & ATV9●● ATEX manual	*NVE42416* (English)
SoMove: FDT	*SoMove_FDT* (English, French, German, Spanish, Italian, Chinese)
Altivar Process ATV9●●: DTM	*ATV9xx_DTM_Library_EN* (English), *ATV9xx_DTM_Library_FR* (French), *ATV9xx_DTM_Library_DE* (German), *ATV9xx_DTM_Library_SP* (Spanish), *ATV9xx_DTM_Library_IT* (Italian), *ATV9xx_DTM_Library_CN* (Chinese),

You can download these technical publications and other technical information from our website at *www.schneider-electric.com*.

Terminology

The technical terms, terminology and the corresponding descriptions in this manual are inspired by the terms or definitions in the relevant standards.

In the area of drive systems this includes, but is not limited to, terms such as **error, error message, failure, fault, fault reset, protection, safe state, safety function, warning, warning message** and so on.

Among others, these standards include:

- IEC 61800 series: Adjustable speed electrical power drive systems
- EN 61439 series: Low-voltage switchgear and controlgear assemblies
- IEC 61508, Ed. 2 series: Functional safety of electrical/electronic/programmable electronic safety-related
- EN 954-1 Safety of machinery – Safety related parts of control systems
- EN ISO 13849-1 and 2 Safety of machinery – Safety related parts of control systems
- IEC 61158 series: Industrial communication networks – Fieldbus specifications
- IEC 61784 series: Industrial communication networks – Profiles
- IEC 60204-1: Safety of machinery – Electrical equipment of machines – Part 1: General requirements

In addition, the term **zone of operation** is used in conjunction with the description of specific hazards, and is defined as it is for a **hazard zone** or **danger zone** in the EC Machinery Directive (2006/42/EC) and in ISO 12100-1.

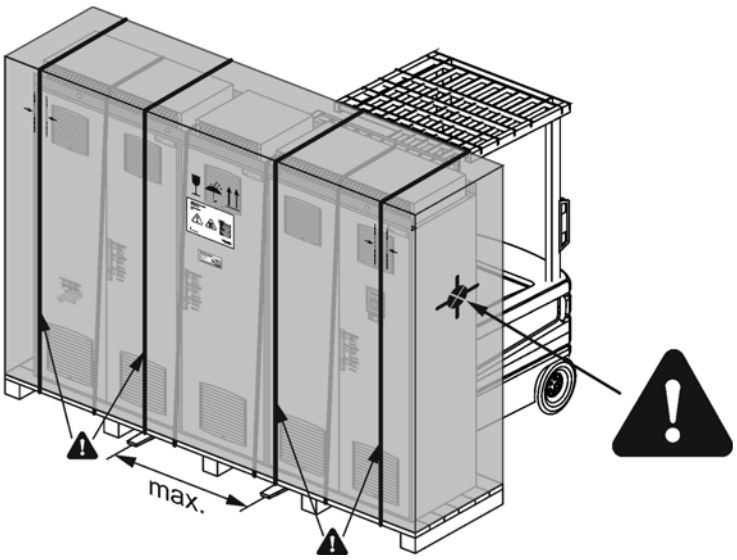
Chapter 1
Handling

What Is in This Chapter?

This chapter contains the following topics:

Transport

Before installation, handle and store the device in its packaging to help to protect the Altivar Process Drive System.



Verify that the ambient conditions for storage and transportation specified in the handbook are respected.

⚠ WARNING

TOPPLING

- Take into account the high center of gravity when handling the equipment.
- Only transport the equipment on the pallet using a suitable forklift.
- Do not remove the straps and the screws on the pallet before the equipment has been transported to the final installation position.

Failure to follow these instructions can result in death, serious injury or equipment damage.

Storage

If the drive was not connected to mains for an extended period of time, the capacitors must be restored to their full performance before the motor is started.

NOTICE

REDUCED CAPACITOR PERFORMANCE

- Apply mains voltage to the drive for one hour before starting the motor if the drive has not been connected to mains for the following periods of time:
  - 12 months at a maximum storage temperature of +50°C (+122°F)
  - 24 months at a maximum storage temperature of +45°C (+113°F)
  - 36 months at a maximum storage temperature of +40°C (+104°F)
- Verify that no Run command can be applied before the period of one hour has elapsed.
- Verify the date of manufacture if the drive is commissioned for the first time and run the specified procedure if the date of manufacture is more than 12 months in the past.

Failure to follow these instructions can result in equipment damage.

If the specified procedure cannot be performed without a Run command because of internal mains contactor control, perform this procedure with the power stage enabled, but the motor being at a standstill so that there is no appreciable mains current in the capacitors.

Checking the Scope of Delivery

Remove the packaging and verify that the Altivar Process Drive System has not been damaged during transport.

Damaged products or accessories may cause electric shock or unanticipated equipment operation.

DANGER

ELECTRIC SHOCK OR UNANTICIPATED EQUIPMENT OPERATION

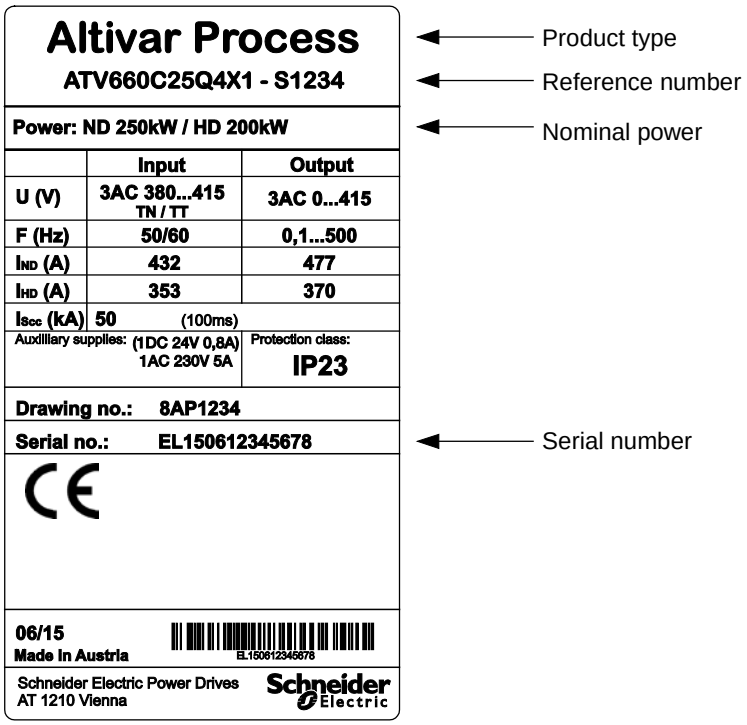
Do not use damaged products or accessories.

Failure to follow these instructions will result in death or serious injury.

Contact your local Schneider Electric sales office if you detect any damage whatsoever.

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

Example for a name plate:



Accessories and Options

Altivar Process Drive Systems can be ordered in different design variations and with numerous options to increase the functionality. A detailed description can be found in the respective Handbook on *www.schneider-electric.com*.

All options are already installed in the factory and considered in the documentation of the enclosure.

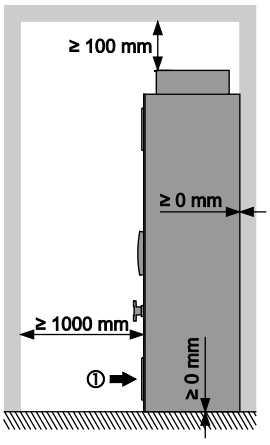
Chapter 2
Mechanical installation

What Is in This Chapter?

This chapter contains the following topics:

General Mounting Instruction

Altivar Process Drive Systems are qualified for vertical installation in electrical operating rooms as well as in the area of production facilities.



- Observe the specified minimum distances. Mounting the Drive Systems side by side or back to back is allowed.
- Install the Altivar Process Drive System vertically on a non-combustible, solid and vibration-free ground.
- Take care of compliance with the ambient conditions.
- Take care that the air exchange is sufficient for dissipation of the lost heat during operation.

① Air inflow temperature: -10...+50 °C (14...122 °F)
(below 0 °C (32 °F) with additional enclosure heating,
above +40 °C (104 °F) with derating)

This equipment has been designed to operate outside of any hazardous location. Only install this equipment in zones known to be free of hazardous atmosphere.

⚠ DANGER

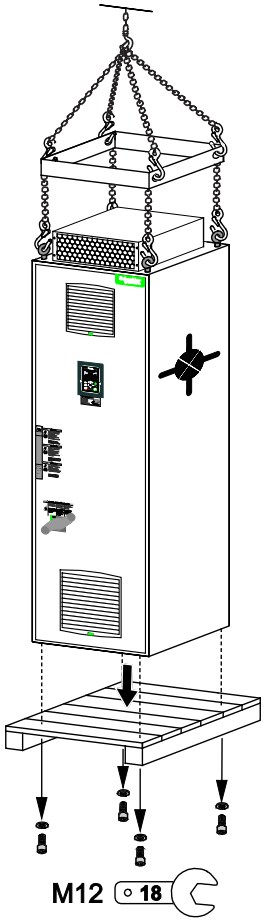
POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

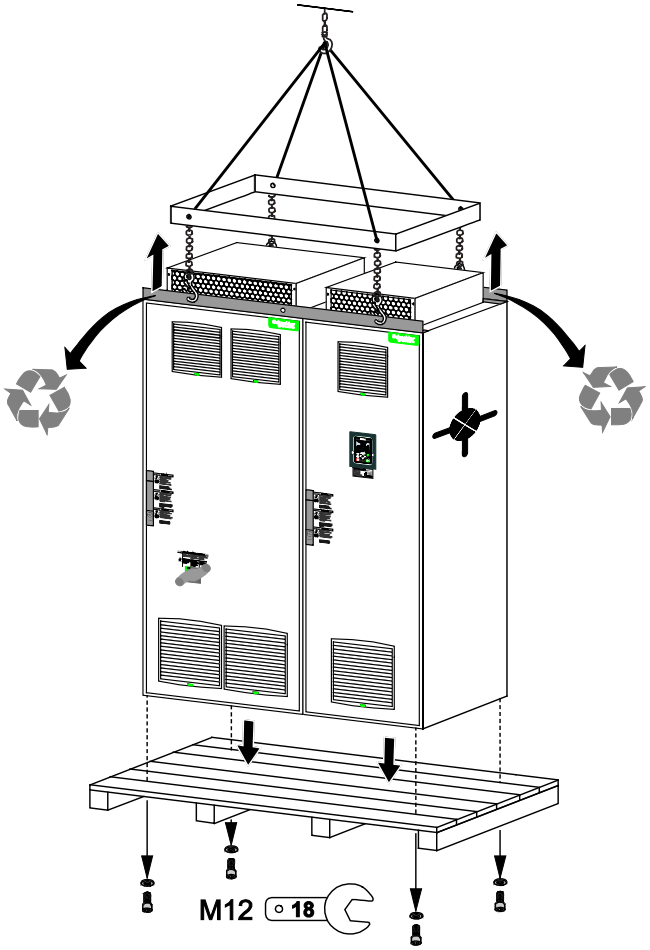
Failure to follow these instructions will result in death or serious injury.

Installation of the Enclosure

The enclosures are delivered with handling lugs or lifting rails for optimum handling with a hoist.



Mount the handling lugs, which are provided in a separate packaging.



Remove the lifting rails after final placement. Then fix the roof using the screws (M12 x 22 / 6 Nm) and washers provided in a separate packaging.

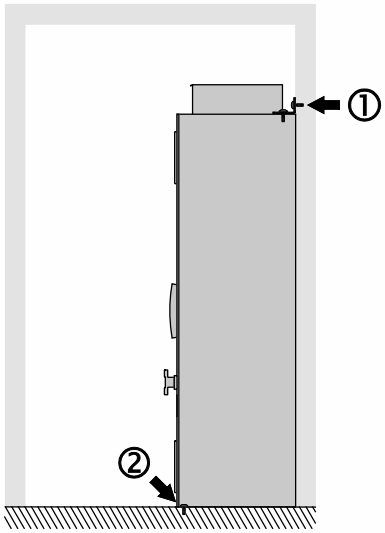
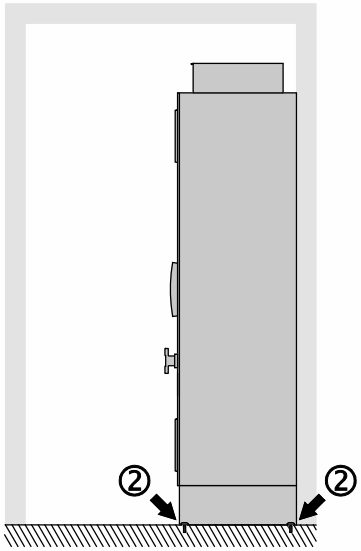
⚠ WARNING

TOPPLING

Fasten the equipment at the final installation position according to the instructions given in this document.

Failure to follow these instructions can result in death, serious injury or equipment damage.

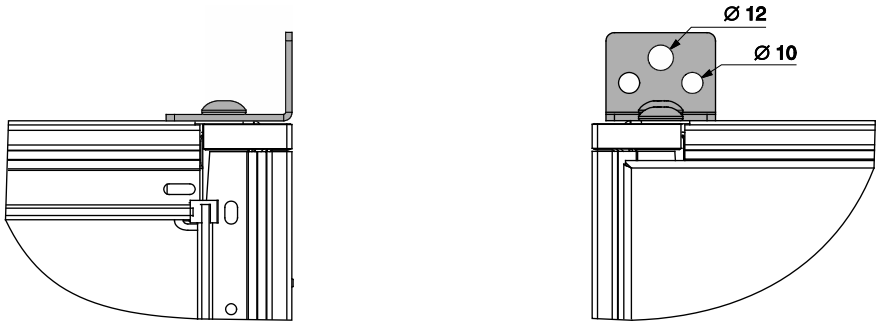
Fastening the Enclosure

Fastening the enclosure without plinth	Fastening the enclosure with plinth
	

① Fastening the enclosure at the wall

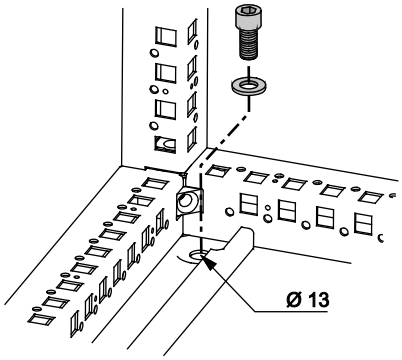
② Fastening the enclosure on the floor

① Fastening the enclosure at the wall



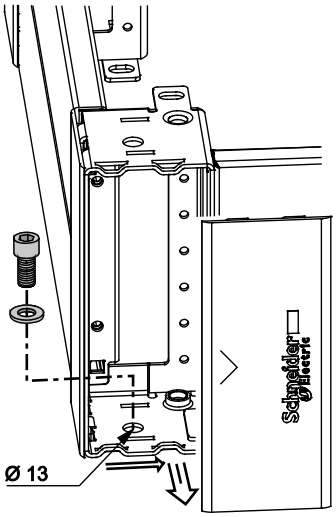
② Fastening the enclosure on the floor

Screw connection of an enclosure without plinth

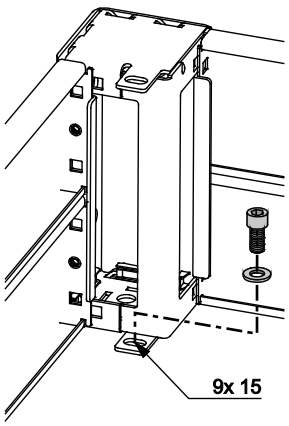


Screw connection of an enclosure with plinth

Exterior view



Interior view



Chapter 3
Wiring

What Is in This Chapter?

This chapter contains the following topics:

Wiring Instructions

DANGER

ELECTRIC SHOCK CAUSED BY INSUFFICIENT GROUNDING

- Verify compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of the entire drive system.
- Ground the drive system before applying voltage.
- The cross section of the protective ground conductor must comply with the applicable standards.
- Do not use conduits as protective ground conductors; use a protective ground conductor inside the conduit.
- Do not consider cable shields to be protective ground conductors.

Failure to follow these instructions will result in death or serious injury.

The product has a leakage current greater than 3.5 mA. If the protective ground connection is interrupted, a hazardous touch current may flow if the product is touched.

DANGER

ELECTRIC SHOCK CAUSED BY HIGH LEAKAGE CURRENT

Verify compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of the entire drive system.

Failure to follow these instructions will result in death or serious injury.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

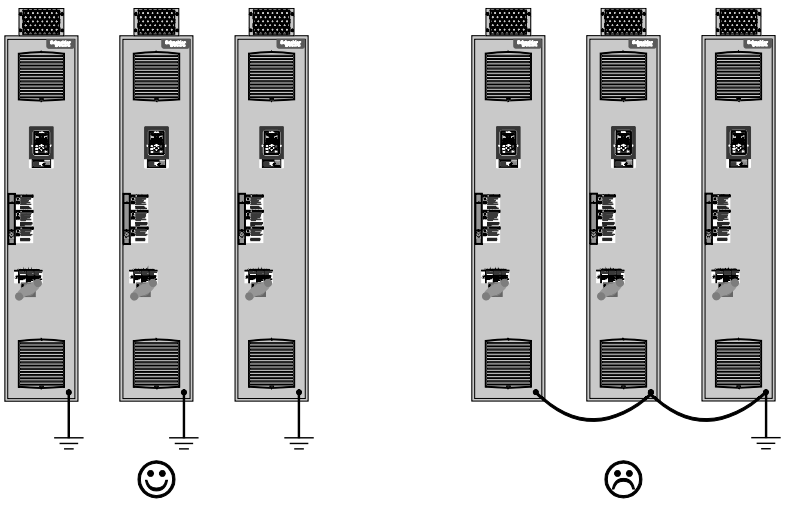
Before applying voltage to and configuring the product, verify that it is properly wired.

Failure to follow these instructions will result in death or serious injury.

Protective Grounding

There is a marked terminal (bar) inside the enclosure to connect the protective conductor. Furthermore there is a marked terminal (bar) to connect the protective grounding of the motor.

Connect each inverter directly to the protective grounding as shown below.



EMC Grounding

In addition to protective grounding, make ground connections with large surface which may be arranged parallel to the yellow-green protective grounding PE. The grounding lugs have to keep a minimum width of 40 mm (1.57 in).

This product meets the EMC requirements according to the standard IEC 61800-3 if the measures described in this manual are implemented during installation.

If the selected composition (product itself, mains filter, other accessories and measures) does not meet the requirements of category C1, the following information applies as it appears in IEC 61800-3:

⚠ WARNING

RADIO INTERFERENCE

In a domestic environment this product may cause radio interference in which case supplementary mitigation measures may be required.

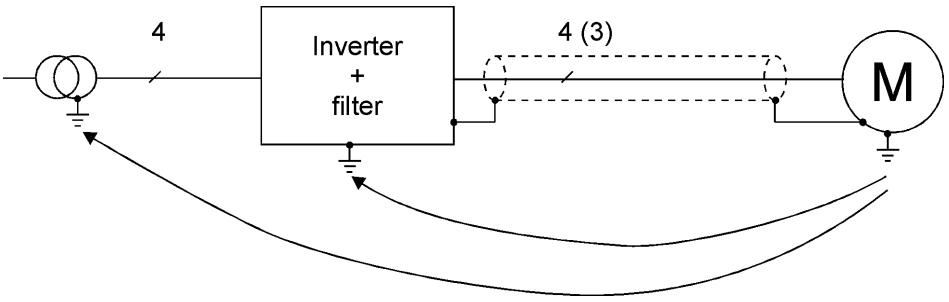
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Shield of the Motor Cable

The shield of the motor cable returns the interference currents back to the mains filter of the inverter.

Furthermore the shield of the motor cable reduces the radiated emissions as well as the coupling into neighboring lines.

Therefore, it is recommended to use shielded 4-pole motor cables and to connect the shield at both ends in accordance with the valid HF rules. The type of shield material (copper or steel) is less significant than the well connection at both ends. Alternatively, a metallic, closed and well conductive cable conduit can be used which is continuously connected.



Connection of Power Cables

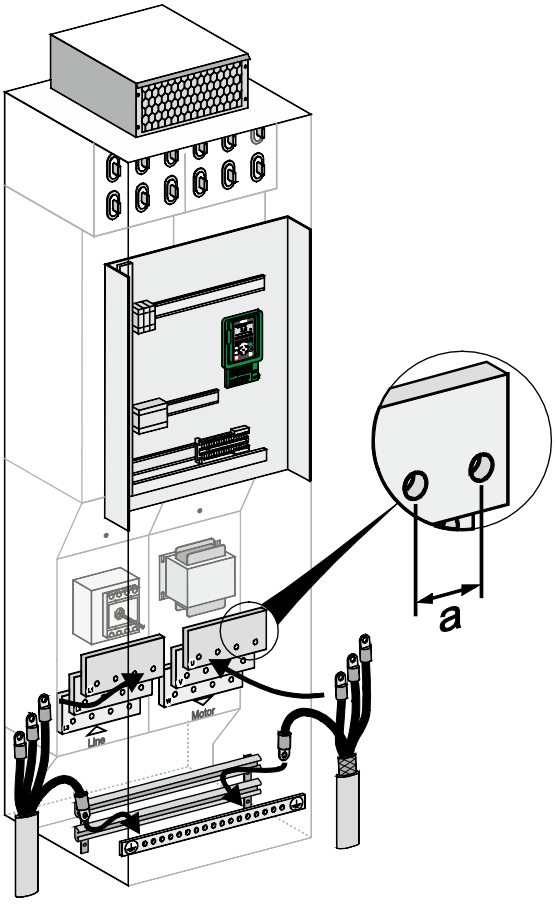
DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Verify that the cables are properly installed as specified.

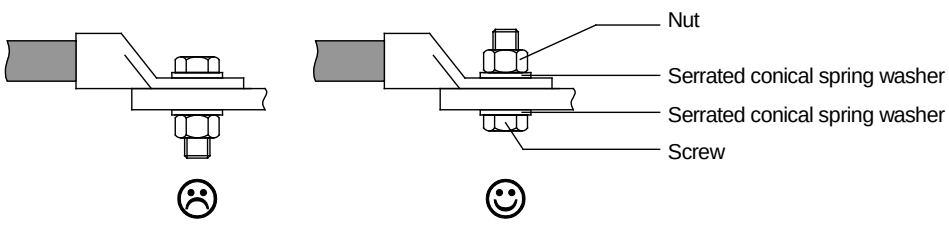
Failure to follow these instructions will result in death or serious injury.

Step	Action
1	Connect the mains cable to terminals L1/R, L2/S, L3/T and the motor cable to terminals U/T1, V/T2, W/T3 as well as the PE conductor to the ground bar.



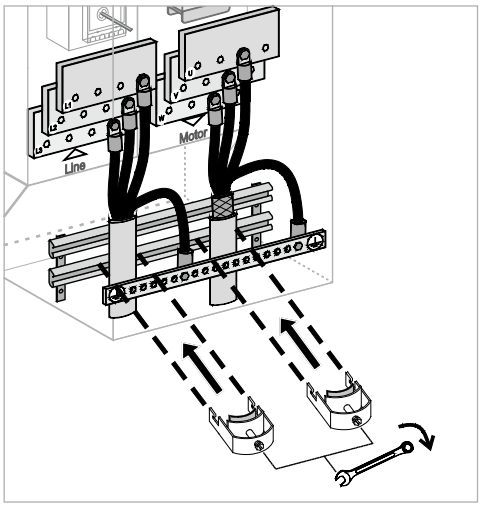
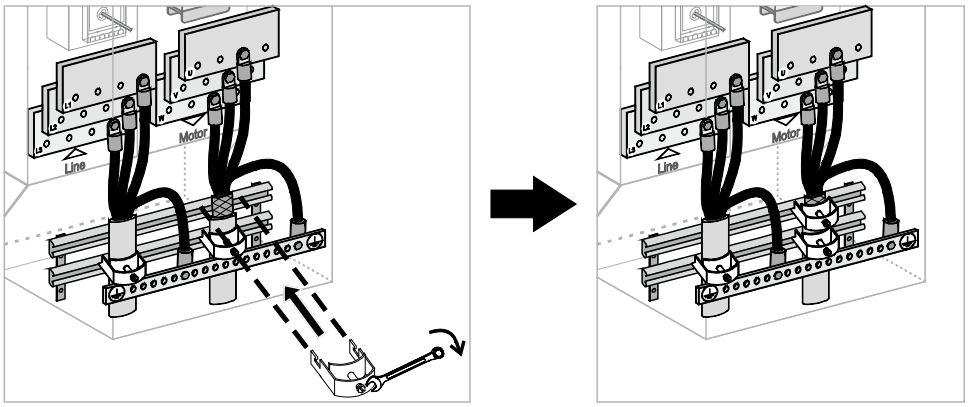
Size	Distance a
1p…3p 1a…3a	40 mm (1.57 in)
4p…5p 4a…5a	42 mm (1.65 in)

Material per mounting hole	Mains and motor terminals	Ground bar
1x nut (1)	M12, max. 47 Nm / 415 lb.in	M10, max. 24 Nm / 212 lb.in
2x serrated conical spring washer (2)	M12	M10
1x screw (1)	M12x35	M10x25



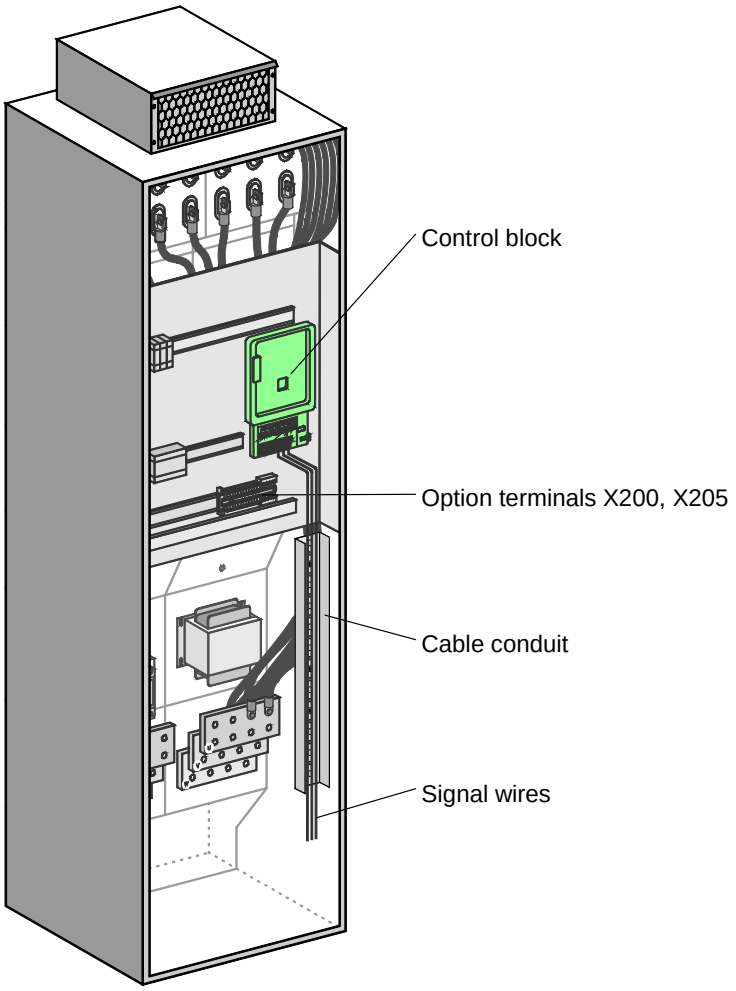
(1) Property class 8.8 according ISO 4017 or DIN 933

(2) According ISO 4032 or DIN 934

Step	Action
2	Fix the mains cable with a metal cable clamp (type AC) to the related bar now. Mount at the motor cable the insulated part of the motor cable to the lower EMC shield bar using a metal cable clamp. **NOTE:** Clamp a small plastic plate between the motor cable and the metal cable clamp to help to prevent the cable from damage. 
3	Fix the upper part (cable shield) of the motor cable using a metal cable clamp (type AC) to the upper EMC shield bar. 

Connection of the Control Cables

The signal wires are wired to the terminals via the internal cable conduit.



DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Verify that the temperature sensors in the motor meet the PELV requirements.
- Verify that the motor encoder meets the PELV requirements.
- Verify that any other equipment connected via signal cables meets the PELV requirements.

Failure to follow these instructions will result in death or serious injury.

Signal interference can cause unexpected responses of the drive and of other equipment in the vicinity of the drive.

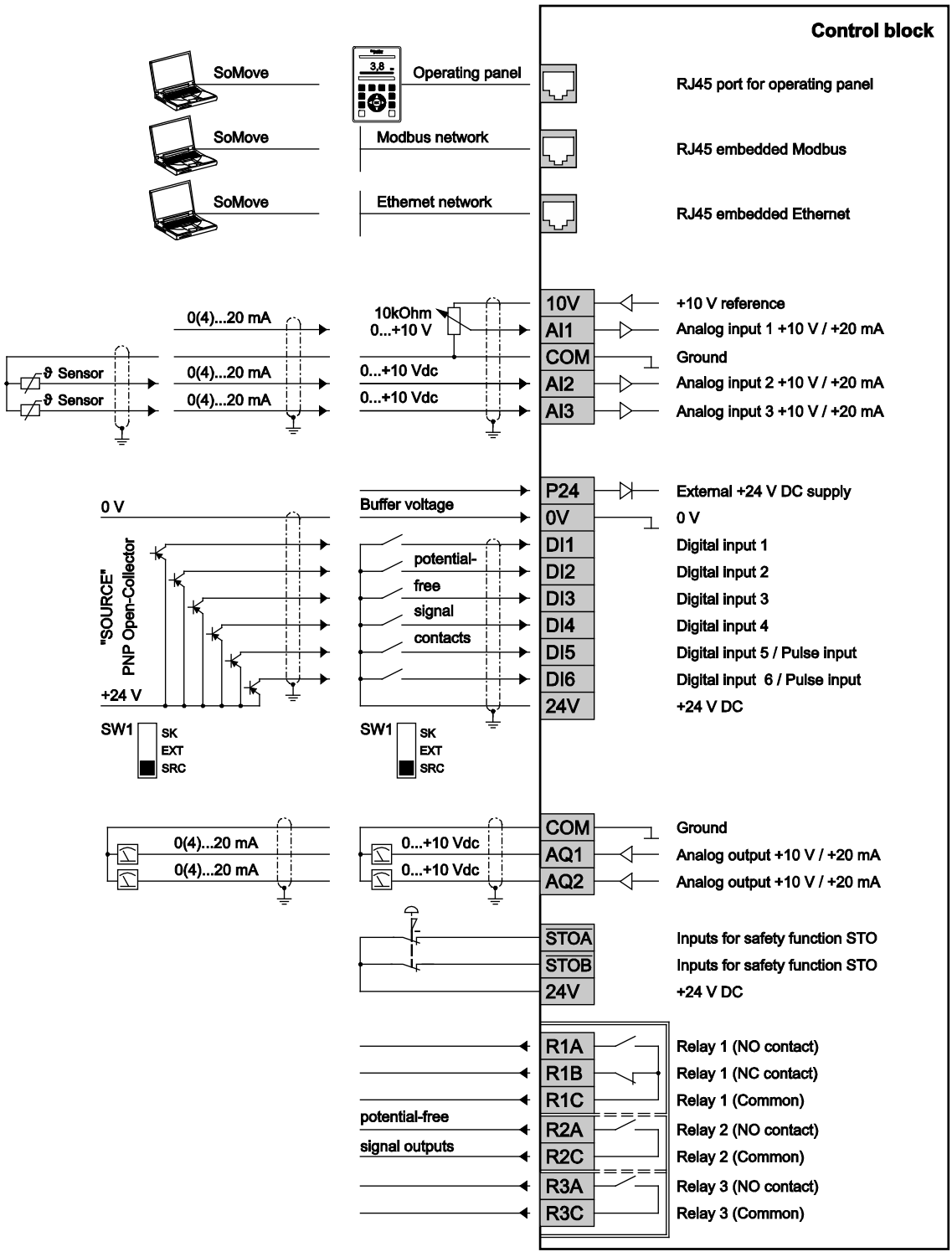
WARNING

SIGNAL AND EQUIPMENT INTERFERENCE

- Install the wiring in accordance with the EMC requirements described in this document.
- Verify compliance with the EMC requirements described in this document.
- Verify compliance with all EMC regulations and requirements applicable in the country in which the product is to be operated and with all EMC regulations and requirements applicable at the installation site.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Control Terminals at the ATV6●● Control Block



Screw terminals

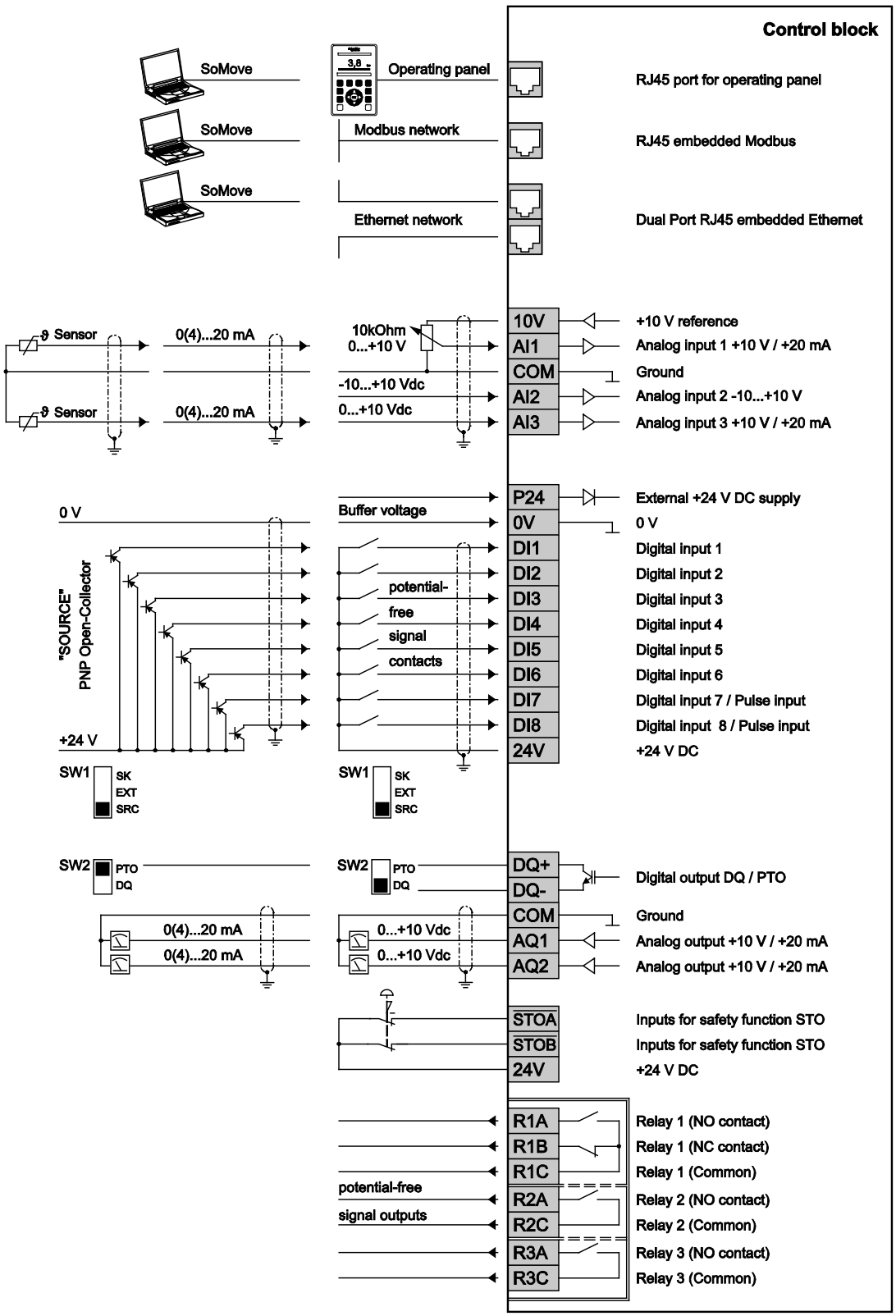
Maximum cable cross section for all terminals: 1.5 mm² (AWG 16), 0.25 Nm (2.2 lb.in)

Minimum cable cross section:

- For relay terminals 0.75 mm² (AWG 18)
- For all other terminals 0.5 mm² (AWG 20)
- Stripping length: 10 mm (0.39 in.)

Maximum length of signal wires: 50 m (164 ft)

Control Terminals at the ATV9●● Control Block



Screw terminals

Maximum cable cross section for all terminals: 1.5 mm² (AWG 16), 0.25 Nm (2.2 lb.in)

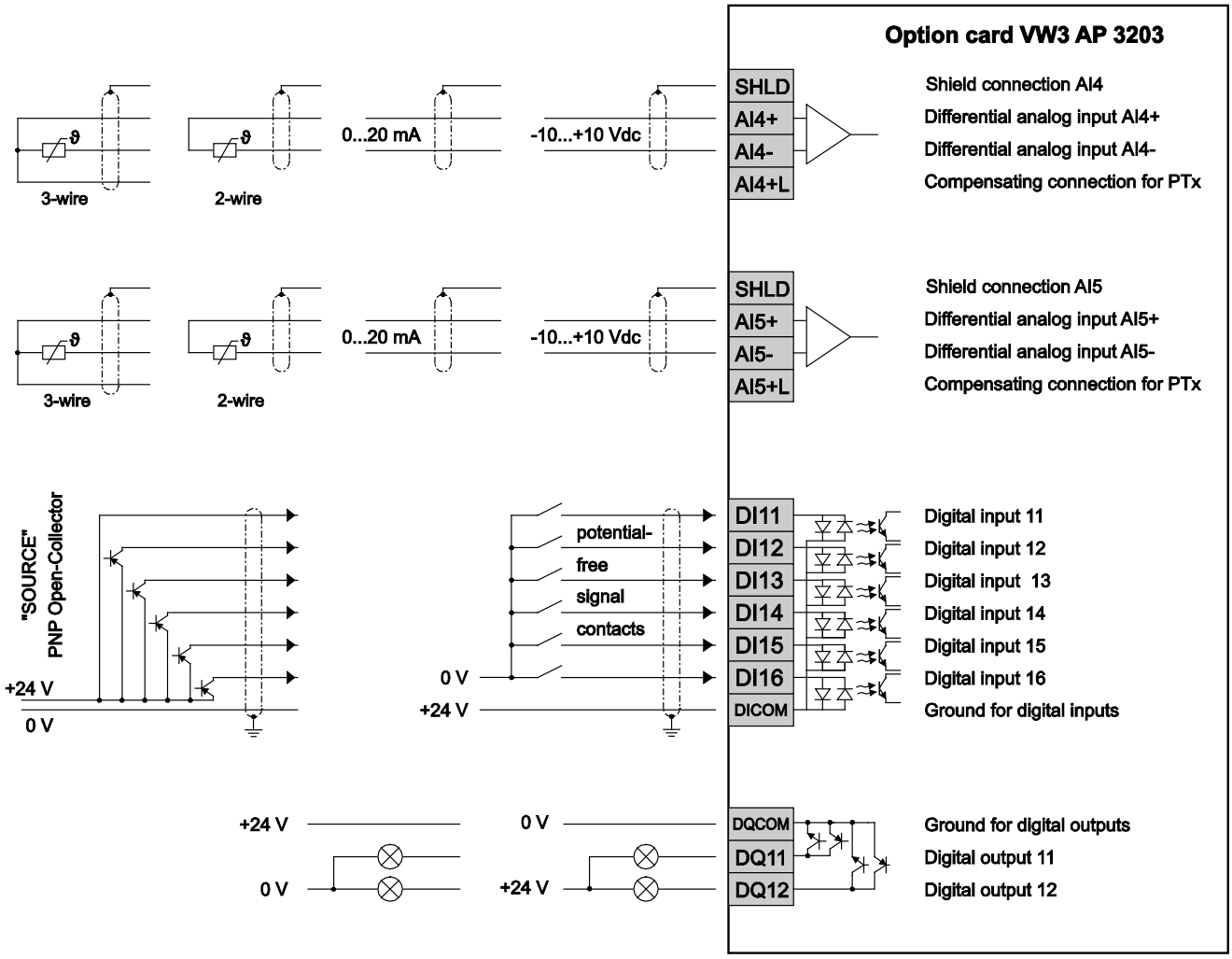
Minimum cable cross section:

- For relay terminals 0.75 mm² (AWG 18)
- For all other terminals 0.5 mm² (AWG 20)
- Stripping length: 10 mm (0.39 in.)

Maximum length of signal wires: 50 m (164 ft)

Option "Logic and Analog I/O Card"

Option to expand the control inputs and control outputs of the control block. The expansion card contains two analog inputs, six digital inputs and two digital outputs.

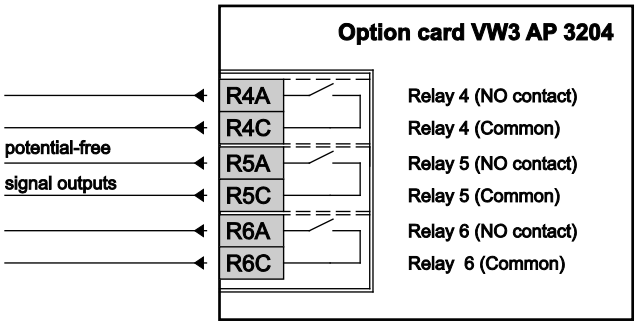


Spring terminals

Maximum cable cross section: 1 mm² (AWG 16)
Stripping length: 10 mm (0.39 in.)

Maximum length of signal wires: 50 m (164 ft)

Option "Relay Output Card"



Screw terminals

Maximum cable cross section: 1.5 mm² (AWG 16)
Maximum tightening torque: 0.5 Nm (4.4 lb.in)
Minimum cable cross section: 0.75 mm² (AWG 18)
Stripping length: 10 mm (0.39 in.)

Chapter 4
Commissioning

What Is in This Chapter?

This chapter contains the following topics:

Proceeding

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in chapter "Safety Information" before performing any procedure in this chapter.

Failure to follow these instructions will result in death or serious injury.

Inspection

Inspection of power wiring

Step	Action	✓
1	Is the power supply connected to the terminals provided for the mains voltage?	
2	Is the enclosure proper grounded for the purpose of human protection?	
3	Check the size of the pre-fuses.	
4	Does the length of the motor cable correspond to the permitted limits?	

Inspection of EMC measures

Step	Action	✓
1	Check whether there is a well HF connection between the shield of the motor cable, the motor and the inverter.	
2	All low-level signal wires (also the digital inputs) have to be shielded and taken separately from the motor cables.	
3	The enclosure requires a large surface connection to ground in order to keep the permitted interference limits.	

EMERGENCY STOP system

Step	Action	✓
1	Check all EMERGENCY STOP functions of the Altivar Process Drive System.	
2	Check the EMERGENCY STOP function of the (main) power supply.	

Power Up the Device Without Start of the Motor

Step	Action	✓
1	Ensure that the inputs $\overline{\text{STOA}}$ and $\overline{\text{STOB}}$ are deactivated (state 0).	
2	If existing, check the external control voltage and ask the responsible person to switch on.	
3	Check by control measurements whether all phase voltages are existing and whether they are symmetrical.	
4	Check whether the mains data correspond with the specification on the name plate: ● Mains voltage ● Type of mains ● Mains frequency ● Mains short-circuit power After that, ask the responsible person for switching on the mains voltage.	
5	Switch on the main switch or circuit breaker.	
6	Check the control and the settings of the motor circuit breaker according to the delivered circuit diagrams and put it into operation.	

NOTICE

DESTRUCTION DUE TO INCORRECT MAINS VOLTAGE

Before switching on and configuring the product, verify that it is approved for the mains voltage.

Failure to follow these instructions can result in equipment damage.

Unsuitable settings or unsuitable data or unsuitable wiring may trigger unintended movements, trigger signals, damage parts and disable monitoring functions.

⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION

- Only start the system, if there are no persons or obstructions in the zone of operation.
- Verify that a functioning emergency stop push-button is within reach of all persons involved in the operation.
- Do not operate the drive system with unknown settings or data.
- Verify that the wiring is appropriate for the settings.
- Never modify a parameter unless you fully understand the parameter and all effects of the modifications.
- When commissioning, carefully run tests for all operating states, operating conditions and potential error situations.
- Anticipate movements in unintended directions or oscillation of the motor.

Failure to follow these instructions can result in death, serious injury or equipment damage.

Parameterizing

Basic setting at the operating panel

Step	Action	✓
1	If requested, set the date, time and language.	
2	Check the parameter for the mains voltage and adapt it according to the used mains voltage, if required.	
3	Adjust the parameters according to the requirements of the application.	

Acquire the motor data

Step	Action	✓
1	Set the following parameters in menu [Simply start] according to the specification on the name plate of the motor.	
2	Perform the automatic motor measurement by setting parameter [Autotuning] tUn to [Apply Autotuning] YES. Autotuning is performed immediately. **NOTE:** The motor has to be cold and stopped during performing the autotuning function.	

Parameter	Description	Factory setting
[Basic Frequency] bFr	Basic frequency of the motor (Hz)	[50 Hz IEC] 50
[Nominal motor power] nPr	Nominal motor power given on the name plate (kW)	Dependent on type
[Nom Motor Voltage] UnS	Nominal motor voltage given on the name plate (VAC)	Dependent on type
[Nom Motor Current] nCr	Nominal motor current given on the name plate (A)	Dependent on type
[Nominal Motor Freq] FrS	Nominal motor frequency given on the name plate (Hz)	50
[Nominal Motor Speed] nSP	Nominal motor speed given on the name plate (rpm)	Dependent on type
[Max Frequency] tFr	Maximum motor frequency (Hz)	60
[Motor Th Current] ItH	Thermal motor current given on the name plate (A)	Dependent on type
[2/3-Wire Control] tCC	Control command by 2-wire or 3-wire control	2C

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- During [Autotuning] tUn nominal current flows through the motor but the motor is not turning.
- Verify that the same precautions are in place during [Autotuning] tUn as during normal operation of the motor (see manual of the motor).

Failure to follow these instructions will result in death or serious injury.

Starting the Drive

Step	Action	✓
1	Ask for written authorization before commissioning.	
2	Switch the operating panel to panel control (therefore parameter [HMI cmd.] bMP has to be set to [Stop] $StoP$).	
3	Press the RUN key and check the direction of the motor rotation.	
4	Try different speeds and check the load of the drive.	
5	Before switching back to remote operation check the active reference values and control commands.	
6	Switch to remote operation and check the reaction of the control commands.	

Final Tasks

Step	Action	✓
1	Lock unallowed operating modes by adequate parameter adjustment.	
2	Save all application parameters.	
3	Read out all parameters using the PC and print out the whole list, if applicable.	

Chapter 5
Maintenance

What Is in This Chapter?

This chapter contains the following topics:

Maintenance Intervals

The following table contains recommended time intervals for maintaining the individual components of the Drive System.

Components	Recommended maintenance intervals (1)
Power part fan	Every 35,000 operating hours or every 6 years
Fan in the enclosure door	Every 35,000 operating hours or every 6 years
Filter mats	Depending on the pollution, but check at least once a year and replace at least all 4 years
Electrical and mechanical screw connections	Check once a year
(1) As from the date of commissioning	

NOTE: The maintenance intervals really necessary depend on the ambient conditions.

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Altivar drives

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