Altivar HVAC ATH600

Variable Speed Drives for Asynchronous and Synchronous Motors for HVAC Applications

Installation manual

NAT19018.01

04/2026

www.se.com

Legal Information

The information provided in this document contains general descriptions, technical characteristics and/or recommendations related to products/solutions.

This document is not intended as a substitute for a detailed study or operational and site-specific development or schematic plan. It is not to be used for determining suitability or reliability of the products/solutions for specific user applications. It is the duty of any such user to perform or have any professional expert of its choice (integrator, specifier or the like) perform the appropriate and comprehensive risk analysis, evaluation and testing of the products/solutions with respect to the relevant specific application or use thereof.

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Safety Information

Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, 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 by 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 intended for industrial use according to this manual.

The product may only be used in compliance with all applicable safety standard and local regulations and directives, the specified requirements and the technical data. The product must be installed outside the hazardous ATEX zone. 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.

About the document

Document Scope

The purpose of this document is:

- to give you mechanical and electrical information related to the Altivar HVAC drives.
- to show you how to install and wire this drive.

Validity Note

Original instructions and information given in the present document have been written in English (before optional translation).

This documentation is valid for the Altivar HVAC ATH600 drives: ATH630 and ATH650.

The characteristics of the products described in this document are intended to match the characteristics that are available on www.se.com. As part of our corporate strategy for constant improvement, we may revise the content over time to enhance clarity and accuracy. If you see a difference between the characteristics in this document and the characteristics on www.se.com, consider www.se.com to contain the latest information.

Product Related Information

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

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Only appropriately trained persons who are familiar with and fully understand the contents of the present manual and all other pertinent product documentation and who have received all necessary training to recognize and avoid hazards involved are authorized to work on and with this device system.
- Installation, adjustment, repair and maintenance must be performed by qualified personnel.
- Verify compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment.
- Only use properly rated, electrically insulated tools and measuring equipment.
- Do not touch unshielded components or terminals with voltage present.
- Prior to performing any type of work on the device system, block the motor shaft to prevent rotation.
- 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.

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

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Before performing work on the device 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 device system.
- Lock all power switches in the open position.
- Wait 15 minutes to allow the DC bus capacitors to discharge.
- Verify the absence of hazardous voltage. (1)

Before applying voltage to the device 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.

(1) Refer to the Verifying the Absence of Hazardous Voltage, page 17 chapter.

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.

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

Your application consists of a whole range of different interrelated mechanical, electrical, and electronic components, the device being just one part of the application. The device by itself is neither intended to nor capable of providing the entire functionality to meet all safety-related requirements that apply to your application. Depending on the application and the corresponding risk assessment to be conducted by you, a whole variety of additional equipment is required such as, but not limited to, external encoders, external brakes, external monitoring devices, guards, etc.
As a designer/manufacturer of machines, you must be familiar with and observe all standards that apply to your machine. You must conduct a risk assessment and determine the appropriate Performance Level (PL) and/or Safety Integrity Level (SIL) and design and build your machine in compliance with all applicable standards. In doing so, you must consider the interrelation of all components of the machine. In addition, you must provide instructions for use that enable the user of your machine to perform any type of work on and with the machine such as operation and maintenance in a safe manner.
The present document assumes that you are fully aware of all normative standards and requirements that apply to your application. Since the device cannot provide all safety-related functionality for your entire application, you must ensure that the required Performance Level and/or Safety Integrity Level is reached by installing all necessary additional equipment.

⚠WARNING

INSUFFICIENT PERFORMANCE LEVEL/SAFETY INTEGRITY LEVEL AND/ OR UNINTENDED EQUIPMENT OPERATION

- Conduct a risk assessment according to EN ISO 12100 and all other standards that apply to your application.
- Use redundant components and/or control paths for all critical control functions identified in your risk assessment.
- Implement all monitoring functions required to avoid any type of hazard identified in your risk assessment, for example, slipping or falling loads.
- Verify that the service life of all individual components used in your application is sufficient for the intended service life of your overall application.
- Perform extensive commissioning tests for all potential error situations to verify the effectiveness of the safety-related functions and monitoring functions implemented, for example, but not limited to, speed monitoring by means of encoders, short circuit monitoring for all connected equipment, correct operation of brakes and guards.
- Perform extensive commissioning tests for all potential error situations to verify that the load can be brought to a safe stop under all conditions.

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

Product 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 (1).
- 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.

(1) For USA: Additional information, refer to NEMA ICS 1.1 (latest edition), Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control and to NEMA ICS 7.1 (latest edition), Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems.

The temperature of the products described in this manual may exceed 80°C (176°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.

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.

General Cybersecurity Information

In recent years, the growing number of networked machines and production plants has seen a corresponding increase in the potential for cyber threats, such as unauthorized access, data breaches, and operational disruptions. You must, therefore, consider all possible cybersecurity measures to help protect assets and systems against such threats.

To help keep your Schneider Electric products secure and protected, it is in your best interest to implement the cybersecurity best practices as described in the Cybersecurity Best Practices document.

Schneider Electric provides additional information and assistance:

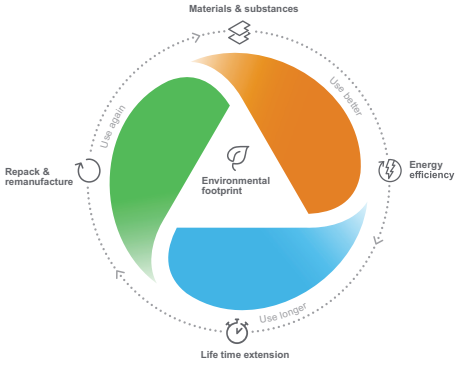
- Subscribe to the Schneider Electric security newsletter.
- Visit the Cybersecurity Support Portal web page to:
  - Find Security Notifications.
  - Report vulnerabilities and incidents.
- Visit the Schneider Electric Cybersecurity and Data Protection Posture web page to:
  - Access the cybersecurity posture.
  - Learn more about cybersecurity in the cybersecurity academy.
  - Explore the cybersecurity services from Schneider Electric.

Environmental Data

The Environmental Data Program is a framework for how we measure, categorize, and compare the environmental attributes and footprint of our products.

Using a rigorous, fact-based methodology, the program provides environmental data from across the product lifecycle.

Five data categories across the product lifecycle



Use Better: How sustainable a product is, including environmental footprint, materials and substances, packaging, and energy efficiency.

Use Longer: How a product's life time can be effectively extended in terms of repairability and updatability.

Use Again: How a product can be reused, from dismantling and remanufacturing to recyclability and manufacturer take back.

With this transparent, verified data, customers and partners are empowered to make conscious environmental choices and accurately evaluate and report on sustainability performance.

All our hardware offers have an associated environmental data available on se.com product pages.

Refer to Environmental Data Program for more information.

Related Documents

Use your tablet or your PC to quickly access detailed and comprehensive information on all our products on www.se.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,
- All software and firmware to maintain your installation 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 all the User Guides related to your drive, listed below:

To find documents online, visit the Schneider Electric download center (www.se.com/ww/en/download/).

Title of Documentation	Reference number	
Catalog: Altivar HVAC ATH600 variable speed drives	DIA2ED2260301EN (English)	DIA2ED2260301FR (French)
ATH600 Getting Started	NAT16141 (English) NAT16142 (French) NAT16143 (German) NAT16144 (Spanish)	NAT16149 (Italian) NAT16151 (Chinese) NAT27844 (Portuguese) NAT27843 (Turkish)
ATH600 Getting Started Annex (SCCR)	NAT16152 (English)	
ATH630, ATH650 Installation Manual	NAT19018 (English) NAT19019 (French) NAT19021 (German) NAT19022 (Spanish)	NAT19020 (Italian) NAT19024 (Chinese) NAT19026 (Portuguese) NAT19025 (Turkish)
ATH600 Programming Manual	NAT19027 (English) NAT19028 (French) NAT19031 (German) NAT19032 (Spanish)	NAT19029 (Italian) NAT19033 (Chinese) NAT19036 (Portuguese) NAT19035 (Turkish)
ATH600 Enclosed Handling Instruction Sheet	JPS53591 (English + French)	
ATH600 Enclosed Instruction Bulletin	JPS53593 (English)	JPT22730 (French)
ATH600 ATEX/IEC Manual	JPS89265 (English)	
ATH600 Embedded Safety Function Manual	JPS89266 (English)	
ATV212 to ATH600 & ATH200 Substitution Manual	JPS89284 (English)	
ATH600 BACnet Manual	JPS89285 (English)	
ATH600 Modbus Manual	JPS89286 (English)	
ATH600 communication addresses	JPS89292 (English)	
SoMove: FDT	SoMove_FDT (English, French, German, Spanish, Italian, Chinese)	
ATH600: DTM	ATH600_DTM_Library_EN (English - to be installed first) ATH600_DTM_Lang_FR (French) ATH600_DTM_Lang_DE (German)	ATH600_DTM_Lang_SP (Spanish) ATH600_DTM_Lang_IT (Italian) ATH600_DTM_Lang_CN (Chinese)
ATH600 Application Note – Air handling units	JPS89313 (English)	
ATH600 Application Note – Bloc scroll compressor	JPS89314 (English)	

Title of Documentation	Reference number
ATH600 Application Note – Fire mode	JPS89316 (English)
ATH600 latest Firmware	ATH600-Firmware
EcoStruxure Automation Device Maintenance	EcoStruxure Automation Device Maintenance (English)
EcoStruxure Automation Device Maintenance - Altivar User Manual	JYT50472 (English) JYT50482 (German) JYT50474 (French) JYT50476 (Spanish) JYT50478 (Italian) JYT50485 (Portuguese) JYT50484 (Turkish) JYT50483 (Chinese)

ATV212 to ATH600 & ATH200 Substitution Manual

The ATV212 to ATH600 & ATH200 Substitution Manual is available JPS89284.

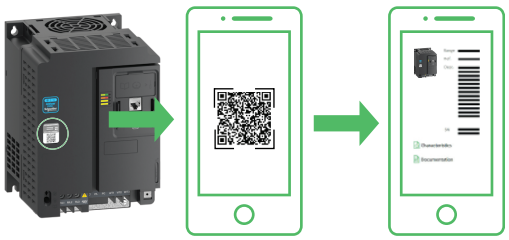
This information includes product selection based on existing installations, technical differences between product ranges, product frame size, wiring information, and available options.

Information on Non-Inclusive or Insensitive Terminology

As a responsible, inclusive company, Schneider Electric is constantly updating its communications and products that contain non-inclusive or insensitive terminology. However, despite these efforts, our content may still contain terms that are deemed inappropriate by some customers.

Electronic product data sheet

Scan the QR code in front of the drive to get the product data sheet.



Terminology used in this document

The technical terms, terminology, and the corresponding descriptions in this manual normally use the terms or definitions in the relevant standards.

Among others, these standards include:

- ISO 13849: The Foundation of Functional Safety in the Machinery
- IEC/UL 60204-1: Safety of machinery - Electrical equipment of machines – Part 1: General requirements.
- IEC/UL 61010: Safety requirements for electrical equipment for measurement, control, and laboratory use.
- IEC 61158 series: Industrial communication networks - Fieldbus specifications
- IEC/UL 61508 Ed.2 series: Functional safety of electrical/electronic/ programmable electronic safety-related.
- IEC 61784 series: Industrial communication networks - Profiles.
- IEC 61784-5-3: Industrial communication networks - Profiles - Part 5-3: Installation of fieldbuses - Installation profiles for CPF 3
- IEC/UL 61800 series: Adjustable speed electrical power drive systems.
- IEC 61918: Industrial communication networks - Installation of communication networks in industrial premises.
- IEC 62443 /UL 2900: Security for industrial automation and control systems.

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.

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.

Also see the Glossary at the end of this manual.

Contact us

Select your country on www.se.com/contact.

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92000 Nanterre

France

Introduction

What's in This Part

Verifying the Absence of Hazardous Voltage

Instructions

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

The location of the DC bus terminals depends on the drive model.

Identify your drive model by referring to the nameplate of the drive.

Then, refer to the chapter Wiring The Power Part, page 153 for the location of the DC bus terminals PA/+ and PC/-.

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

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Only appropriately trained persons who are familiar with and fully understand the contents of the present manual and all other pertinent product documentation and who have received all necessary training to recognize and avoid hazards involved are authorized to work on and with this device system.
- Installation, adjustment, repair and maintenance must be performed by qualified personnel.
- Verify compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment.
- Only use properly rated, electrically insulated tools and measuring equipment.
- Do not touch unshielded components or terminals with voltage present.
- Prior to performing any type of work on the device system, block the motor shaft to prevent rotation.
- 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.

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

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Before performing work on the device 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 device system.
- Lock all power switches in the open position.
- Wait 15 minutes to allow the DC bus capacitors to discharge.
- Verify the absence of hazardous voltage. (1)

Before applying voltage to the device 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.

(1) Refer to the procedure in the present document, page 18.

Procedure

Perform the following actions to verify the absence of hazardous voltage:

Step	Action
1	The red LED near PA+/+ and PC/- flashes when voltage is present between PA+/+ and PC/-. If there is no flash, measure the voltage on the DC bus between the DC bus terminals (PA/+ and PC/-) using a properly rated voltmeter to verify that the voltage is less than 42 Vdc
2	If the DC bus capacitors do not discharge properly, contact your local Schneider Electric representative. Do not repair or operate the product.
3	Verify that no other voltage is present in the drive system.

Drive Overview

About The Drive Frame Sizes

The drive frame size first digits are related to the drive footprint.

NOTE: For a given frame size, there may be different depth values, details are visible in the Dimensions and Weight section, page 47.

Products intended to Cabinet Integration – Open Type

5 frame sizes of IP20 products

Frame size 0	Frame size 1	Frame size 2A
380...440 V, 0.75...2.2 kW 440...480 V, 1...3 HP	380...440 V, 3..5.5 kW 440...480 V, 3...7.5 HP	380...440 V, 7.5...11 kW 440...480 V, 10...15 HP
		
ATH630U07N4Z ATH630U15N4Z ATH630U22N4Z	ATH630U30N4Z ATH630U40N4Z ATH630U55N4Z	ATH630U75N4Z ATH630D11N4Z

Frame size 2B	Frame size 3
380...440 V, 15...18.5 kW 440...480 V, 20...25 HP	380...440 V, 22 kW 440...480 V, 30 HP
	
ATH630D15N4Z ATH630D18N4Z	ATH630D22N4Z

5 frame sizes IP20 on upper part and IP00 on lower part

Frame size 4	Frame size 5
380...440 V, 30...45 kW 440...480 V, 40...60 HP	380...440 V, 55...90 kW 440...480 V, 75...125 HP
	
ATH630D30N4Z ATH630D37N4Z ATH630D45N4Z	ATH630D55N4Z ATH630D75N4Z ATH630D90N4Z

Frame size 6	Frame size 7A	Frame size 7B
380...440 V, 110...160 kW 440...480 V, 150...250 HP	380...440 V, 220 kW 440...480 V, 350HP	380...440 V, 250 kW 440...480 V, 400 HP
		
ATH630C11N4Z ATH630C13N4Z ATH630C16N4Z	ATH630C22N4Z	ATH630C25N4Z

Frame Sizes for IP21, UL type 1 Products- Wall Mounting

Frame size 0	Frame size 1
380...440 V, 0.75...2.2 kW 440...480 V, 1...3 HP	380...440 V, 3..5.5 kW 440...480 V, 3...7.5 HP
	
ATH630U07N4 ATH630U15N4 ATH630U22N4	ATH630U30N4 ATH630U40N4 ATH630U55N4

Frame size 2A	Frame size 2B
380...440 V, 7.5...11 kW 440...480 V, 10...15 HP	380...440 V, 15...18.5 kW 440...480 V, 20...25 HP
	
ATH630U75N4 ATH630D11N4	ATH630D15N4 ATH630D18N4

Frame size 3	Frame size 4	Frame size 5
380...440 V, 22 kW 440...480 V, 30 HP	380...440 V, 30...45 kW 440...480 V, 40...60 HP	380...440 V, 55...90 kW 440...480 V, 75...125 HP
		
ATH630D22N4	ATH630D30N4 ATH630D37N4 ATH630D45N4	ATH630D55N4 ATH630D75N4 ATH630D90N4

Frame Sizes for IP55, UL type 12 Products - Wall Mounting

NOTE: If the customer disassembles the pre-assembled gland or installs a different model during use, please ensure proper assemble for sealing IP degree.

6 frame sizes for IP55 products

Frame size A0	Frame size A1
380...440 V, 0.75...2.2 kW 440...480 V, 1...3 HP	380...440 V, 3...5.5 kW 440...480 V, 3...7.5 HP
	
ATH650U07N4(C) ATH650U15N4(C) ATH650U22N4(C)	ATH650U30N4(C) ATH650U40N4(C) ATH650U55N4(C)

Frame size A2	Frame size A3
380...440 V, 7.5...18.5 kW 440...480 V, 10...25 HP	380...440 V, 22 kW 440...480 V, 30 HP
	
ATH650U75N4(C) ATH650D11N4(C) ATH650D15N4(C) ATH650D18N4(C)	ATH650D22N4(U)

Frame size B	Frame size C
380...440 V, 30...45 kW 440...480 V, 40...60 HP	380...440 V, 55...90 kW 440...480 V, 75...125 HP
	
ATH650D30N4(U) ATH650D37N4(U) ATH650D45N4(U)	ATH650D55N4(U) ATH650D75N4(U) ATH650D90N4(U)

Catalog Number Description

ATH	630	D	22	N4	Z

Product range

ATH	Altivar HVAC

Product type

630	Standard product
650	Harsh Environment Wall product IP55/IP54

Factor for power rating

U	power x 0.1
D	power x 1
C	power x 10

Power rating [kW]

07 - 11 - 13 - 15 - 16 - 18 - 22 - 25 - 30 - 37 - 40 - 45 - 55 - 75 - 90

Power part supply

N4	3-phase, 400 Vac (380…480 Vac)

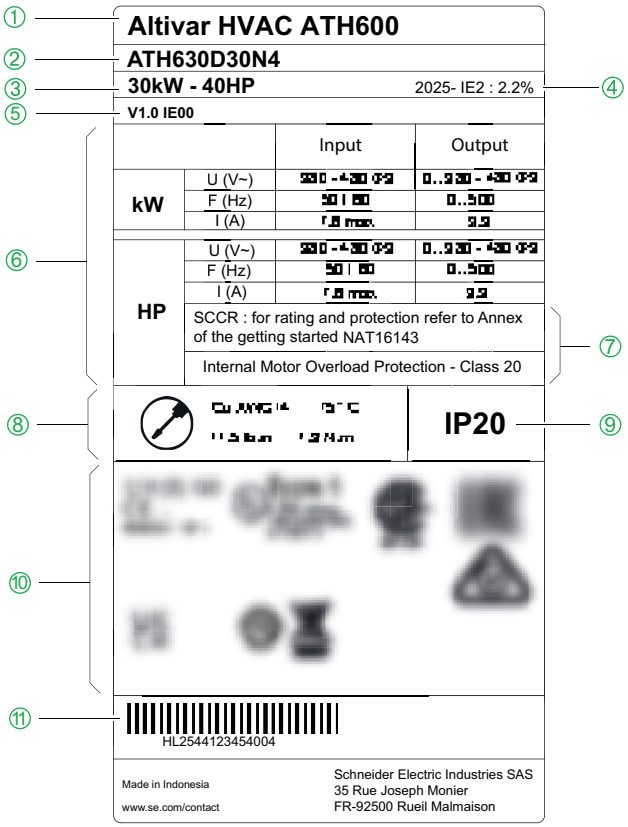
Product variants

Z	(ATH630) for cabinet integration, without top cover, conduit box and display terminal
C	EMC C1
U	(ATH650) US version type 12

NOTE: see the catalog for possible combinations.

Nameplate example

The nameplate contains the following data:



①	Product type	④	Ecodesign regulation code	⑦	Fuses and overload protection information	⑩	Certifications
②	Catalog number	⑤	Firmware version	⑧	Power part cable information	⑪	Serial number
③	Power rating	⑥	Power part supply	⑨	Degree of protection		

Manufacturing Date

Use the serial number ⑪ of the drive to retrieve its manufacturing date.

The five digits after the first 2 characters of the serial number provide respectively the year, the week and the day of manufacture.

In the nameplate example illustrated above HL2544123454004 the manufacturing date is year 2025, week 44, day 1.

Manufacturing Plant

Use the serial number ⑪ of the drive to retrieve its manufacturing plant.

The three digits after the first 7 characters of the serial number provide respectively the manufacturing plant.

In the nameplate example illustrated above HL2544123454004 the manufacturing plant is 234.

Accessories and Options

Introduction

Altivar HVAC drives are designed to take numerous accessories and options to increase their functionality. For a detailed description and catalog numbers, refer to the **Catalog** on www.se.com.

All accessories and options come with an instruction sheet to help installation and commissioning. Therefore you will only find here a short product description.

Accessories

- **Fan replacement kit**
- **Graphic display terminal and Plain text display terminal**
  - Remote mounting kit for mounting on enclosure door
  - Multidrop connection accessories for connecting several drives to the RJ45 terminal port
- **Drive mounting kits (VW3A95116, VW3A9513, VW3A95134)**

  Flange-mounting kit, page 102 for separation of air flow
- **EMC Plates for IP20/IP00 drives of frame sizes 0...5 (VW3A4433... VW3A4436, VW3A47803...VW3A47805)**

  These EMC plates are intended to be mounted on IP20 drives for cabinet integration, page 19. Refer to the dedicated instruction sheet JPS84157.
- **Conduit Box for frame 6, 7A, 7B**

  Metal conduit box product for IP21 degree of protection on bottom side.

Frame size 6	VW3A9704
Frame size 7A	VW3A9212
Frame size 7B	VW3A9213

- **Option module adapter (VW3A36001)**
  - for frame size 0 to frame size 2B,
  - for frame size A0 to frame size A2.
- **Modbus Communication tools**
  - Flashing Cordset (VW3A8127).
  - Connection cable (TCSMCNAM3M002P).

Options

I/O extension modules

- Digital and analog I/O module (VW3A3203)
- Relay output module (VW3A3204)

Communication modules

- BACnet IP (VW3A3726)

Filters

- **EMC input filters**
- **Passive input filters**
- **dv/dt output filters**

Display Terminals

Description of the Graphic Display Terminal HVAC — VW3A1121

This Graphic Display Terminal is a local control unit which can be either plugged on the drive or mounted on the door of the wall-mounted. It has a cable with connectors, which is connected to the drive front Modbus serial link.

NOTE: While both display terminals are compatible, it is recommended to use the VW3A1121 instead of the VW3A1111

1 OFF / RESET: Stop command / apply a Fault Reset.

2 AUTO: used to switch from local (Graphic display terminal) to remote control of the drive.

3 ESC: used to quit a menu/parameter or remove the currently displayed value in order to revert to the previous value retained in the memory

4 F1 to F4: function keys used to access drive id, QR code, quick view, and submenus. Simultaneous press of F1 and F4 keys generates a screenshot file in the Graphic Display Terminal internal memory.

5 Graphic display.

6 Home: used to access directly at the home page.

7 Information: used to have more information about parameters. The selected parameter code is displayed on the first line of the information page.

8 HAND: Hold (2s) to switch to control by Graphic display terminal (Press Ok to confirm after the popup message). A second press will start the motor.

9 Touch wheel / OK: used to save the current value or access the selected menu/parameter. The touch wheel is used to scroll fast into the menus. Up/down arrows are used for precise selections, right/left arrows are used to select digits when setting a numerical value of a parameter.

10 RJ45 Modbus serial port: used to connect the Graphic Display Terminal to the drive.

11 Mini USB port: used to connect the Graphic Display Terminal to a computer.

12 Battery (10 years service life. Type: CR2032). The battery positive pole points to the front face of the Graphic Display Terminal.

13 RJ45 male connector: used to plug the Graphic Display Terminal on the Altivar or the door mounting kit.

NOTE: Keys 1, 8 and 9 can be used to control the drive if control via the Graphic Display Terminal is activated. To activate the keys on the Graphic Display Terminal, you first need to set **[Ref Freq 1 Config]** `FR1` to **[HMI]** `LCC`.

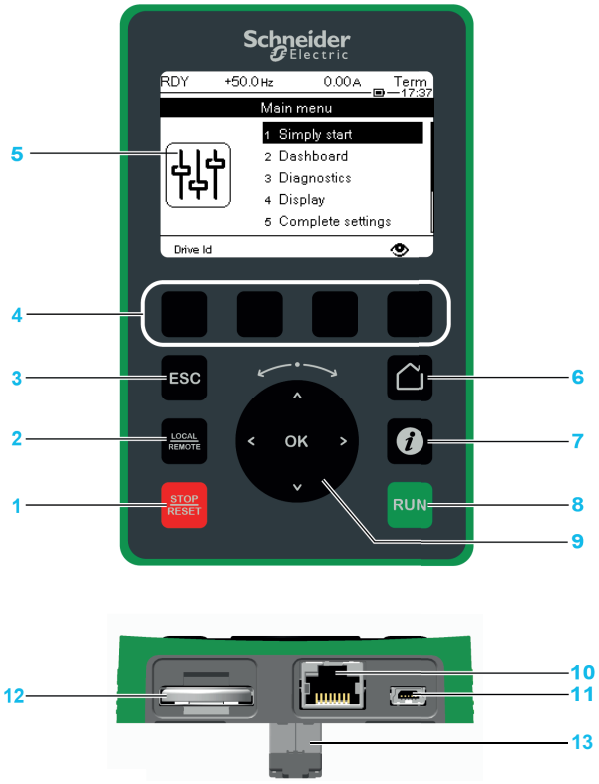
NOTE: The maximum length for extending a Graphic Display Terminal is 3 m (9,84 ft).

NOTE: In case of no connection with the Graphic Display Terminal, an issue on RJ45 power supply or on Graphic Display Terminal is probable. For additional support, contact our Customer Care Center on: www.se.com/CCC.

Description of the Graphic Display Terminal — VW3A1111

This Graphic Display Terminal is a local control unit which can be either plugged on the drive or mounted on the door of the wall-mounted or floor-standing enclosure. It has a cable with connectors, which is connected to the drive front Modbus serial link.

NOTE: While both display terminals are compatible, it is recommended to use the VW3A1121 instead of the VW3A1111



1 STOP / RESET: Stop command / apply a Fault Reset.

2 LOCAL / REMOTE: used to switch between local and remote control of the drive.

3 ESC: used to quit a menu/parameter or remove the currently displayed value in order to revert to the previous value retained in the memory

4 F1 to F4: function keys used to access drive id, QR code, quick view, and submenus. Simultaneous press of F1 and F4 keys generates a screenshot file in the Graphic Display Terminal internal memory.

5 Graphic display.

6 Home: used to access directly at the home page.

7 Information: used to have more information about parameters. The selected parameter code is displayed on the first line of the information page.

8 RUN: executes the function assuming it has been configured.

9 Touch wheel / OK: used to save the current value or access the selected menu/parameter. The touch wheel is used to scroll fast into the menus. Up/down arrows are used for precise selections, right/left arrows are used to select digits when setting a numerical value of a parameter.

10 RJ45 Modbus serial port: used to connect the Graphic Display Terminal to the drive.

11 Mini USB port: used to connect the Graphic Display Terminal to a computer.

12 Battery (10 years service life. Type: CR2032). The battery positive pole points to the front face of the Graphic Display Terminal.

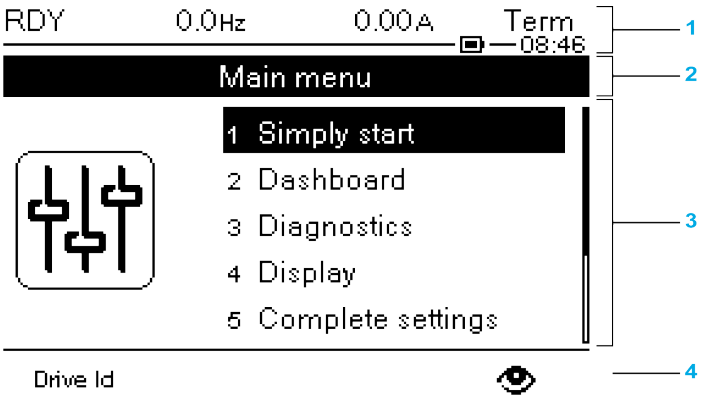
13 RJ45 male connector: used to plug the Graphic Display Terminal on the Altivar or the door mounting kit.

NOTE: Keys 1, 8 and 9 can be used to control the drive if control via the Graphic Display Terminal is activated. To activate the keys on the Graphic Display Terminal, you first need to set **[Ref Freq 1 Config]** `FR1` to **[HMI]** `LCC`.

NOTE: The maximum length for extending a Graphic Display Terminal is 3 m (9,84 ft).

NOTE: In case of no connection with the Graphic Display Terminal, an issue on RJ45 power supply or on Graphic Display Terminal is probable. For additional support, contact our Customer Care Center on: www.se.com/CCC.

Description of the Graphic Display



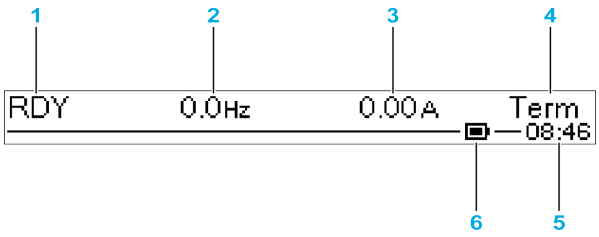
1 Display line: its content can be configured

2 Menu line: indicates the name of the current menu or submenu

3 Menus, submenus, parameters, values, bar charts, and so on, are displayed in drop-down window format on a maximum of five lines. The line or value selected by the navigation button is displayed in reverse video

4 Section displaying tabs (1 to 4 by menu), these tabs can be accessed using F1 to F4 keys

Display line details:

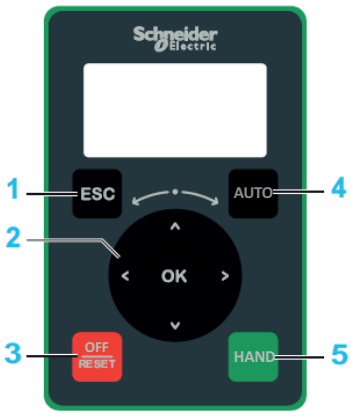


Key	
1	Drive state
2	Customer defined
3	Customer defined
4	Active control channel • TERM: terminals • HMI / HND: Graphic Display Terminal • MDB: integrated Modbus serial • NET: fieldbus module • EBM: Embedded BACnet MS/TP
5	Present time
6	Battery level

Plain Text Display Terminal HVAC — VW3A1123

This Plain Text Display Terminal is a local control unit plugged on drive. The Display Terminal can be removed to be mounted on the door of the wallmounted or floor-standing enclosure, using a dedicated door-mounting kit. The Display Terminal communicates with the soft starter using Modbus serial link. Both embedded Modbus connections (Modbus HMI & Modbus Fieldbus) can be used but only one Display Terminal is active (not possible to connect 2 Display Terminals).

NOTE: While both display terminals are compatible, it is recommended to use the VW3A1123 instead of the VW3A1113



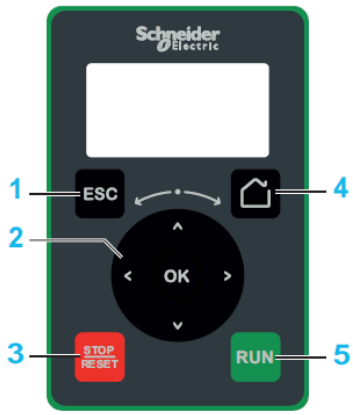
1. **ESC:** used to quit a menu/parameter, to clear the display of the triggered error or remove the currently displayed value in order to revert to the previous value retained in the memory
2. **Touch wheel / OK:** used to save the current value or access the selected menu/parameter. The touch wheel is used to scroll fast into the menus. Up/down arrows are used for precise selections, right/left arrows are used to select digits when setting a numerical value of a parameter.
3. **OFF / RESET** stop command / apply a Fault Reset (a).
4. **AUTO**: used to switch from local (display terminal) to remote control of the drive.
5. **HAND:** executes the function (a).

(a) The second press on **HAND** to run the motor and **RESET** functions are active only if the active command channel is HMI (**[Cmd channel 1]** `CD1` or **[Cmd channel 2]** `CD2` is set to **[HMI]** `LCC`)

Plain Text Display Terminal — VW3A1113

This Plain Text Display Terminal is a local control unit plugged on drive. The Display Terminal can be removed to be mounted on the door of the wallmounted or floor-standing enclosure, using a dedicated door-mounting kit. The Display Terminal communicates with the soft starter using Modbus serial link. Both embedded Modbus connections (Modbus HMI & Modbus Fieldbus) can be used but only one Display Terminal is active (not possible to connect 2 Display Terminals).

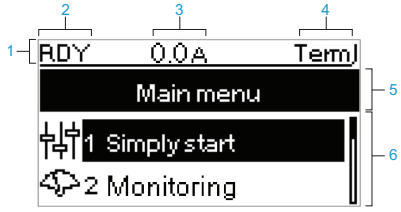
NOTE: While both display terminals are compatible, it is recommended to use the VW3A1123 instead of the VW3A1113



1. **ESC:** used to quit a menu/parameter, to clear the display of the triggered error or remove the currently displayed value in order to revert to the previous value retained in the memory
2. **Touch wheel / OK:** used to save the current value or access the selected menu/parameter. The touch wheel is used to scroll fast into the menus. Up/down arrows are used for precise selections, right/left arrows are used to select digits when setting a numerical value of a parameter.
3. **STOP / RESET:** stop command / apply a Fault Reset (a).
4. **Home:** used to access the home page.
5. **RUN:** executes the function (a).

(a) The **RUN** and **RESET** functions are active only if the active command channel is HMI (**[Cmd channel 1]** `CD1` or **[Cmd channel 2]** `CD2` is set to **[HMI]** `LCC`)

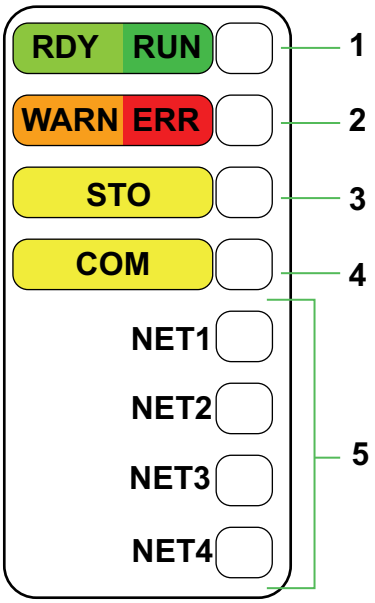
Description of the Plain Text Display



Key	
1	**Display line**
2	Drive State
3	Monitored parameter user defined. Can be configured in **[My preferences]**.
4	Active control channel • TERM: terminals • HMI / HND: Graphic Display Terminal • MDB: integrated Modbus serial • NET: fieldbus module • EBM: Embedded BACnet MS/TP
5	**Menu line: indicates the name of the current menu or submenu.**
6	Menus, submenus, parameters, values, bar charts, and so on, are displayed in drop-down window format on a maximum of 2 lines. The line or value selected by the navigation button is displayed in reverse video.

Description of the Product Front LEDs

NOTE: The leds figure will be updated with the new Led setup.



Following table provides the details of the drive status LEDs:

Item	LED	Color & status	Description
1	**STATUS**	OFF	Indicates that the drive is powered off
		Green flashing	Indicates that the drive is not running, ready to start
		Green blinking	Indicates that the drive is in transitory status (acceleration, deceleration, and so on)
		Green on	Indicates that the drive is running
		Yellow on	Indicates that the drive localization is in progress
2	**Warning/Error**	Red flashing	Indicates that the drive has detected a warning
		Red on	Indicates that the drive has detected an error
3	**STO**	Yellow on	Indicates that the safety function is activated or has been triggered

Following table provides the details of the embedded Modbus serial or BacNet MSTP LEDs:

Item	LED	Color & status	Description
4	**COM**	Yellow flashing	Modbus or BacNet MSTP communication activity

Following table provides the details of the fieldbus module LEDs:

Item	LED	Color & status	Description
5	**NET 1**	Green/Yellow	for details, refer to the fieldbus manual
	NET 2	Green/Red	for details, refer to the fieldbus manual
	NET 3	Green/Yellow	for details, refer to the fieldbus manual
	NET 4	Green/Red	for details, refer to the fieldbus manual

Altivar Efficiency Calculator

Description

This tool calculates the level of energy efficiency of your variable speed drive according to the Ecodesign standard EN/IEC 61800-9-2.

In 2 specific cases :

- **Drive Efficiency** (CDM Complete Drive Module) :

  Performance is determined according to 8 operating points taking into account torque and speed.
- **System Efficiency** (PDS Power Drive System) :

  This includes the efficiency of the variable speed drive and its motor. Performance is determined according to 8 operating points taking into account torque and speed.

Easy access to the tool

The tool is available at the address: altivar-efficiency-calculator.se.app

Steps for setting up the drive

1. Receive and inspect the drive

□ Check that the catalog number printed on the label is the same as that on the purchase order.

□ Remove the drive from its packaging and check that it has not been damaged.

2. Verify the supply mains

□ Verify that the supply mains is compatible with the power part supply range of the drive.

3. Mount the drive

□ Mount the drive in accordance with the instructions in this document.

□ Install any options and/or accessories.

4. Wire the drive

□ Connect the motor, ensuring that its connections correspond to the voltage.

□ Connect the supply mains, after making sure that the power is off.

□ Connect the control.

5. Programming

□ Refer to the programming manual.

Preliminary Instructions

Inspecting the product

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.

Step	Action
1	Verify that the catalog number printed on the nameplate corresponds to the purchase order.
2	Before performing any installation work, inspect the product for visible damage.

Store the product in its original packaging if not installed immediately after inspection.

NOTICE

INCORRECT STORAGE

Do not crush the packaging during transport and storage.

Failure to follow these instructions can result in equipment damage.

Refer to the stacking instructions on the packaging. The environment during transportation and storage must be dry and free from dust.

	IEC Standard	Transport and Storage
Relative humidity	IEC 60068–2–3	Maximum 93 % without condensation or dripping water
Vibration resistance	IEC 60068–2–6	• 1.5 mm peak to peak from 2 to 13Hz • 1 m/s² from 13 to 200 Hz
Shock resistance	IEC 60068–2–27	150 m/s² (15 g) during 11 ms

Long Time 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 specified periods of time.(1)
- 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.

(1) Period 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)

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.

Handling

If the drive must be shipped to another location, use the original shipping material.

⚠WARNING

INCORRECT HANDLING

- Lifting and handling must be performed by qualified personnel in accordance with the requirements of the site and in compliance with all pertinent regulations.
- Verify that there are no persons or obstructions in the area of operation of the lifting and handling equipment.
- Use lifting and handling equipment appropriate for the load and take all necessary measures to avoid swinging, inclination, toppling and any other potentially hazardous conditions.
- Follow all handling instructions provided in this manual and in all associated product documentation.
- Take all measures required to avoid damage to the product and other hazards when handling or opening the packaging.
- Handle and store the product in its original packaging.
- Do not handle and store the product if the packaging is damaged or appears to be damaged.

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

To help protect the product before installation, handle and store it in its packaging.

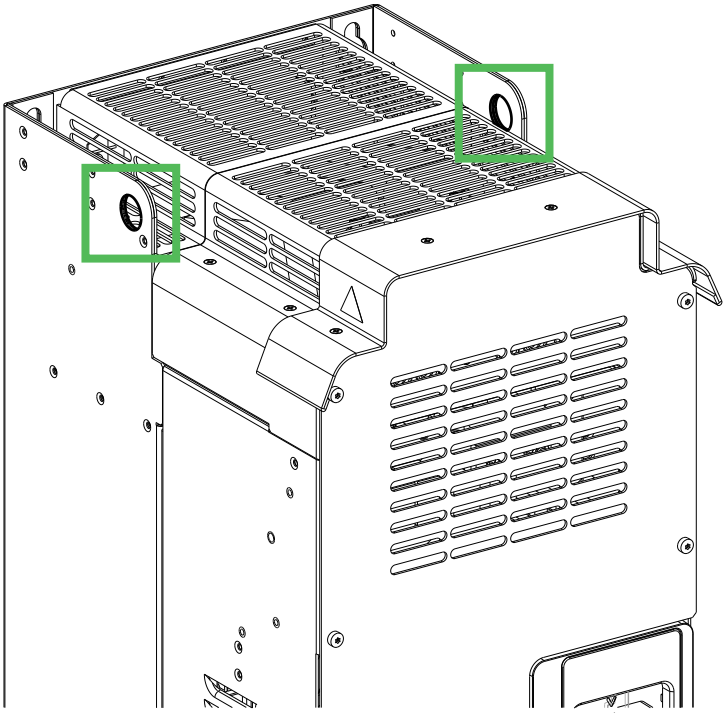
Ensure that the specified ambient conditions are followed.

Handling the Wall Mounting Drives Up to Frame Size 6 and Size C

Drives of frame size A0 to A3, and frame size 0 up to 3 can be removed from their packaging and installed without a handing device.

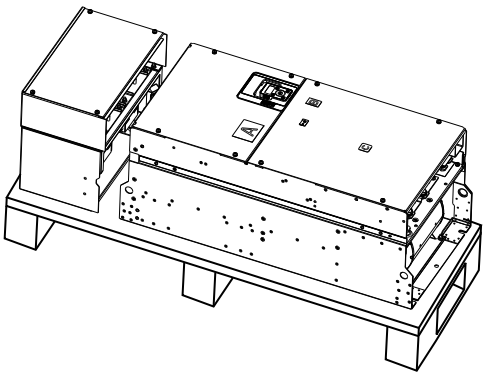
Higher frame size drives from size 4 and size B require a handling device. All drives have either lifting eyes or lifting lugs for handling.

⚠CAUTION
SHARP EDGES Use all necessary personal protective equipment (PPE) such as gloves when removing the components from the pallet. **Failure to follow these instructions can result in injury or equipment damage.**



Unpacking the Frame Size 7A and 7B Drives

The drive and the DC choke(s) are mounted on a pallet with screws.



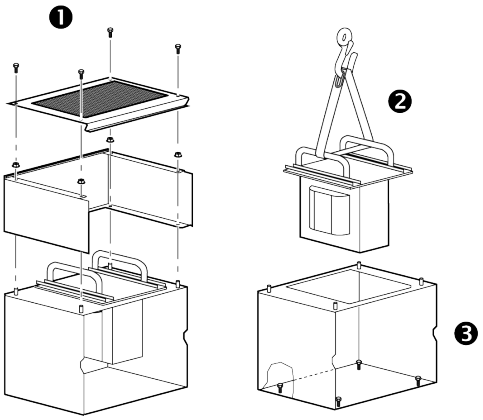
Removing the DC Chokes of Frame Size 7A and 7B Drives from the Pallet

⚠CAUTION

SHARP EDGES

Use all necessary personal protective equipment (PPE) such as gloves when removing the components from the pallet.

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



Procedure:

Step	Action
1	Remove the screws as shown in the illustration
2	Remove the DC choke(s) by means of a hoist
3	Remove the fixing screws from the DC choke housing
4	Remove the DC choke housing from the pallet

Keep all parts and components for the mounting procedures, page 121.

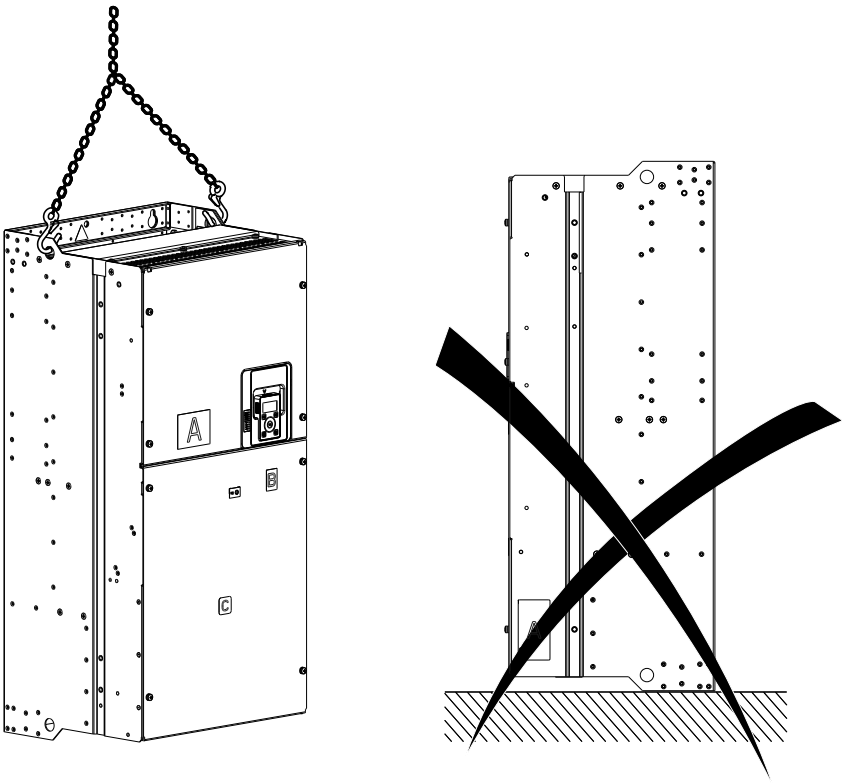
Hoisting the Frame Size 7A and 7B Drives

⚠WARNING

TOPPLING, SWINGING, OR FALLING EQUIPMENT

- Take all measures necessary to keep the equipment from swinging, toppling and falling.
- Follow the instructions provided to remove the equipment from the packaging and to mount it at its final position.

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



Procedure:

Step	Action
1	Remove the screws holding the drive on the pallet
2	Lift the drive by means of a hoist. Use the handling lugs of the drive to fasten the lifting equipment
3	Keep the drive suspended by means of appropriate equipment until it is securely fastened in the final installation position
4	Move the drive to the final installation position on a wall or the back of the enclosure in accordance with the instructions given in this document, page 99

Technical Data

What's in This Part

Environment Data

What's in This Chapter

Temperature Conditions

Climatic Environmental Conditions for Transportation and Storage

The environment during transportation and storage must be dry and free from dust.

Storage Temperature	Frame size 0 to size 6 Frame size A...C	°C	-40...70
		°F	-40...158
	Frame sizes 7 drives	°C	-25...70
		°F	-13...158
Transportation Temperature	Frame size 0 to size 6 Frame size A...C	°C	-40...70
		°F	-40...158
	Frame size 7 drives	°C	-25...70
		°F	-13...158
Relative humidity		%	5...95

Climatic Environmental Conditions for Operation

The maximum permissible ambient temperature during operation depends on the mounting distances between the devices and on the required power. Observe the pertinent instructions in the chapter Drive Mounting, page 98.

NOTE: The drive is designed to be used in a controlled indoor environment. It is not allowed to install the device outdoor without specific protection.

Frame sizes 0...6	Temperature without derating	°C	-15...50
		°F	5...122
	Temperature with derating of output power (1)	°C	Up to 60
		°F	Up to 140
Frame size 7 drives Frame size A...C	Temperature without derating	°C	-15...40
		°F	5...104
	Temperature with derating of output power (1)	°C	Up to 50
		°F	Up to 122
All products	Relative humidity without condensing	%	5...95

(1) Refer to Derating Curves, page 108.

Altitude Conditions

Operating Altitude

Altitude	Supply voltage (1)	Supply Electrical Network			Derating
		TT/TN	IT	Corner-Grounded	
Up to 1000 m (3300 ft)	380…480 V	✓	✓	✓	o
1000…2000 m (3300…6600 ft)	380…480 V	✓	✓	✓ (2)	✓
2000…3000 m (6600…9900 ft)	380…480 V	✓	✓	–	✓

(1) Tolerance: –15...+10%

(2): In case of using frame size 7A or 7B with corner earthed power supply system, supply cooling fan power by separated power supply under the surrounding according to OVC II.

Legend:

✓: Derate the nominal current of the drive by 1% for each additional 100 m.

o: Without derating

–: Not applicable

Chemical and Mechanical Conditions

Withstand to harsh environments, conforming to IEC/EN 60721-3-3

Drive	Chemical active substances	Mechanical active substances	Mechanical conditions
All products	class 3C3	class 3S3	class 3B1

Mechanical Data

What's in This Chapter

Dimensions and Weights

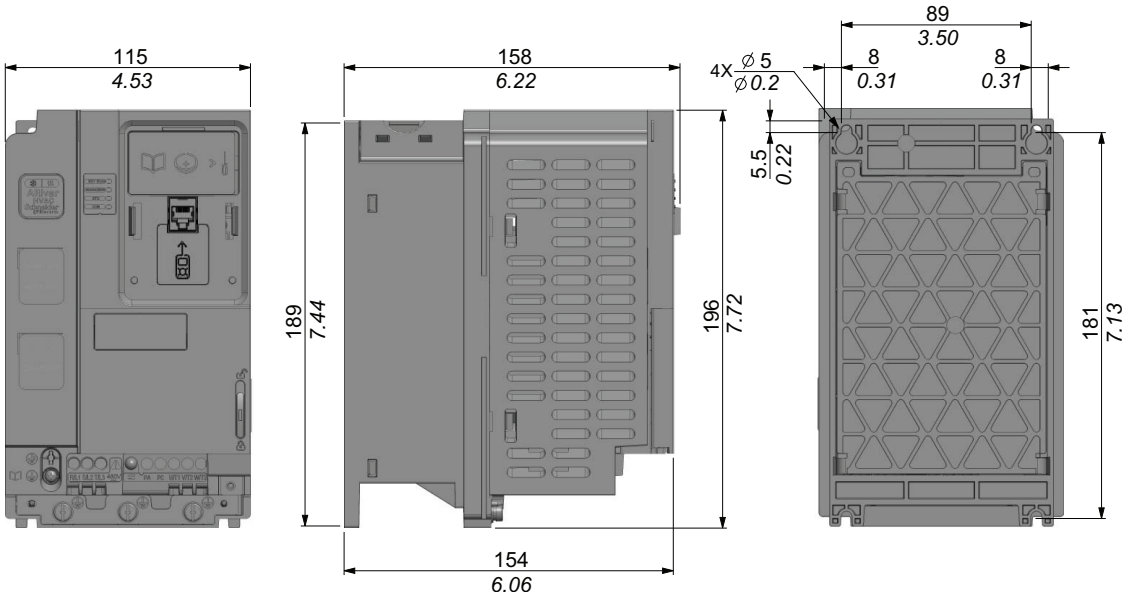
About the drawings

All drawings CAD files can be downloaded from www.se.com.

Frame Size 0

IP20 Drives - Front, Side and Rear View

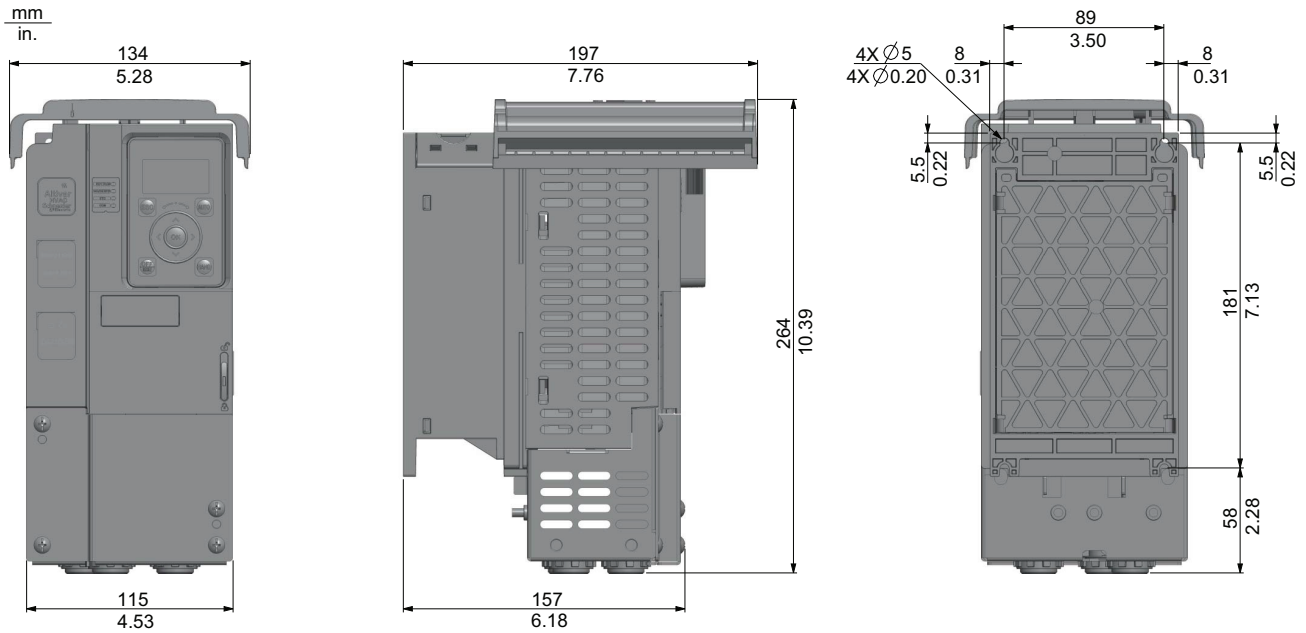
mm
in.



Weights

Catalog Number	Weight in kg (lb)
ATH630U07N4Z...ATH630U22N4Z	1.7 kg (3.75 lb)

IP21 / UL Type 1 Drives - Front, Side and Rear View

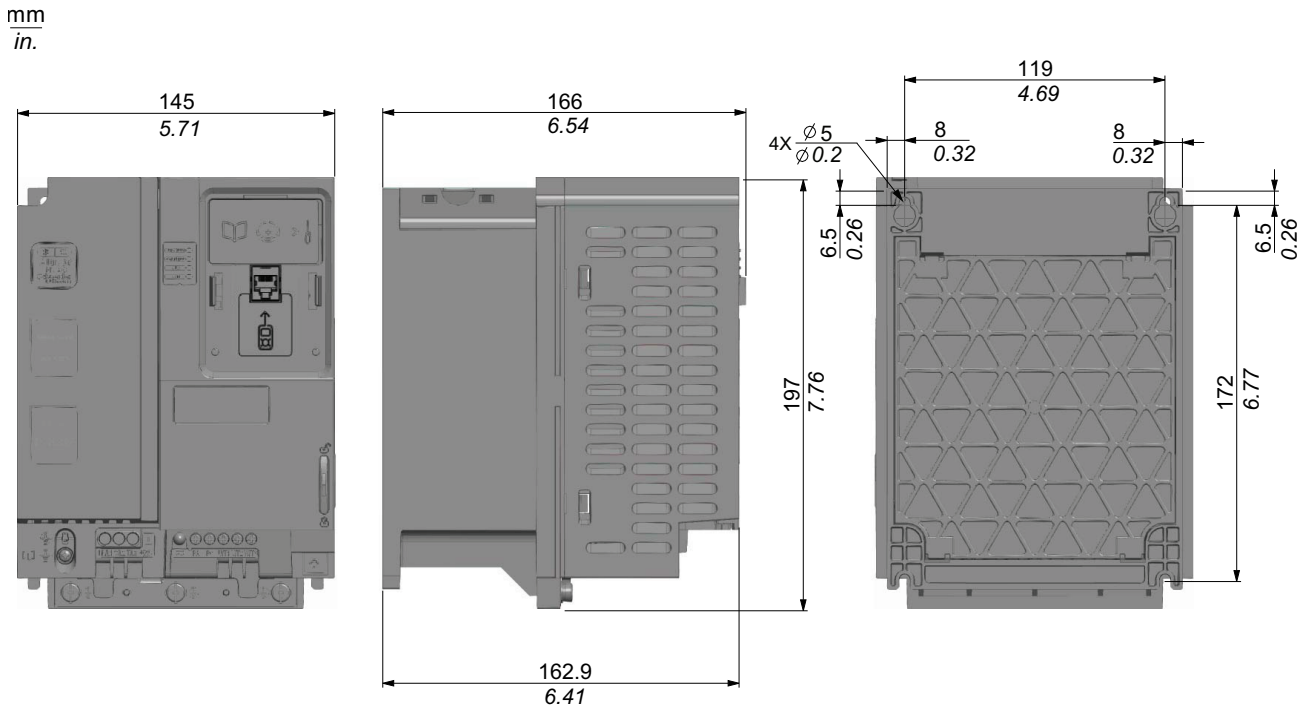


Weights

Catalog Number	Weight in kg (lb)
ATH630U07N4...ATH630U22N4	2.3 kg (5.07 lb)

Frame Size 1

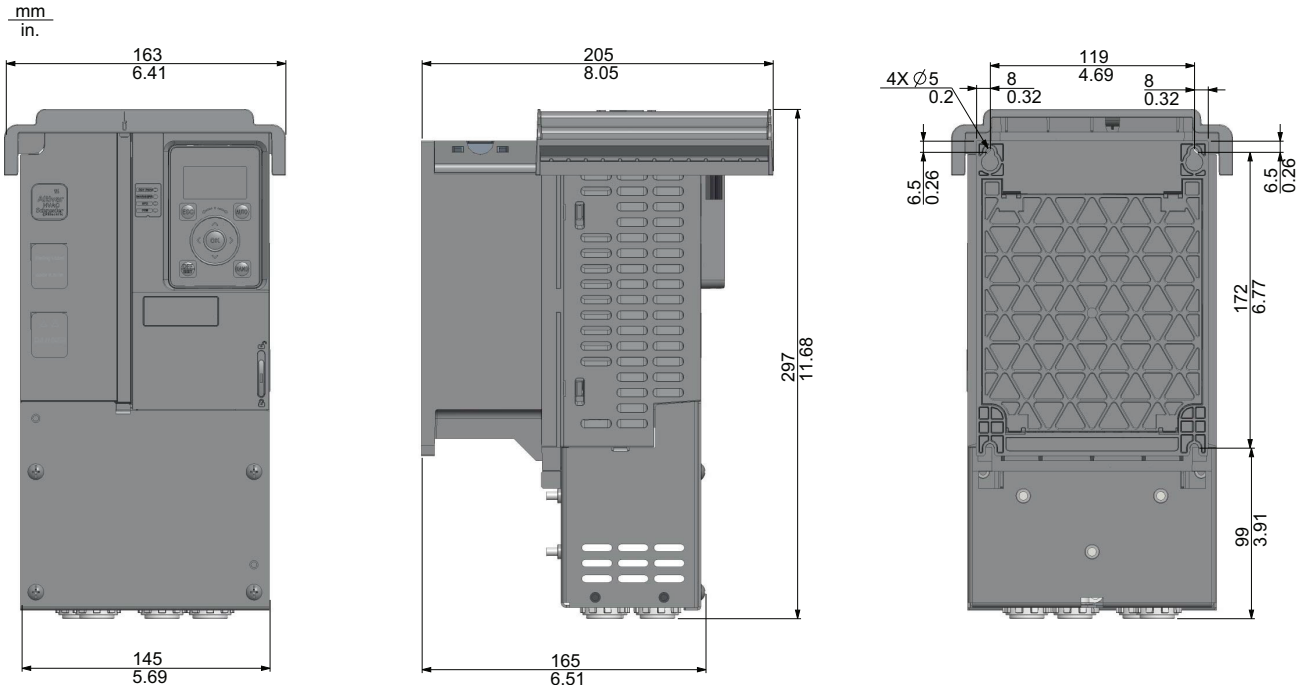
IP20 Drives - Front, Side and Rear View



Weights

Catalog Number	Weight in kg (lb)
ATH630U30N4Z...ATH630U55N4Z	2.4 kg (5.29 lb)

IP21 / UL Type 1 Drives - Front, Side and Rear View

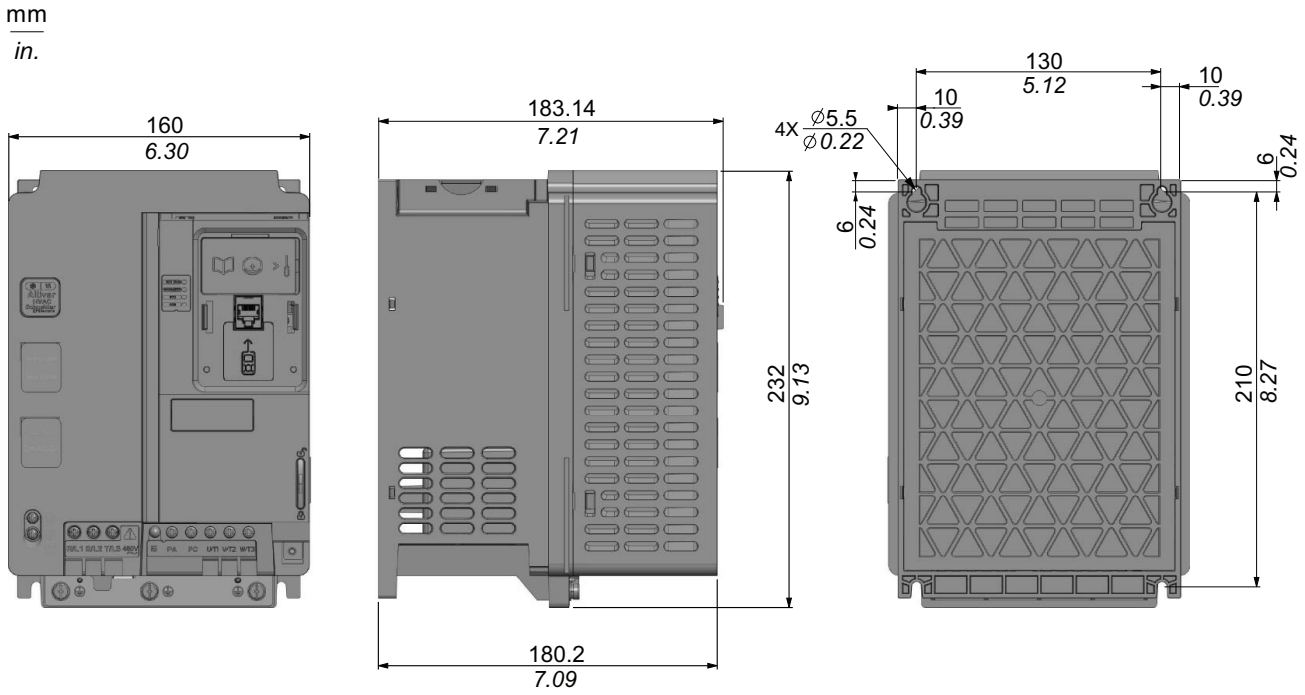


Weights

Catalog Number	Weight in kg (lb)
ATH630U30N4...ATH630U55N4	3.4 kg (7.5 lb)

Frame size 2A

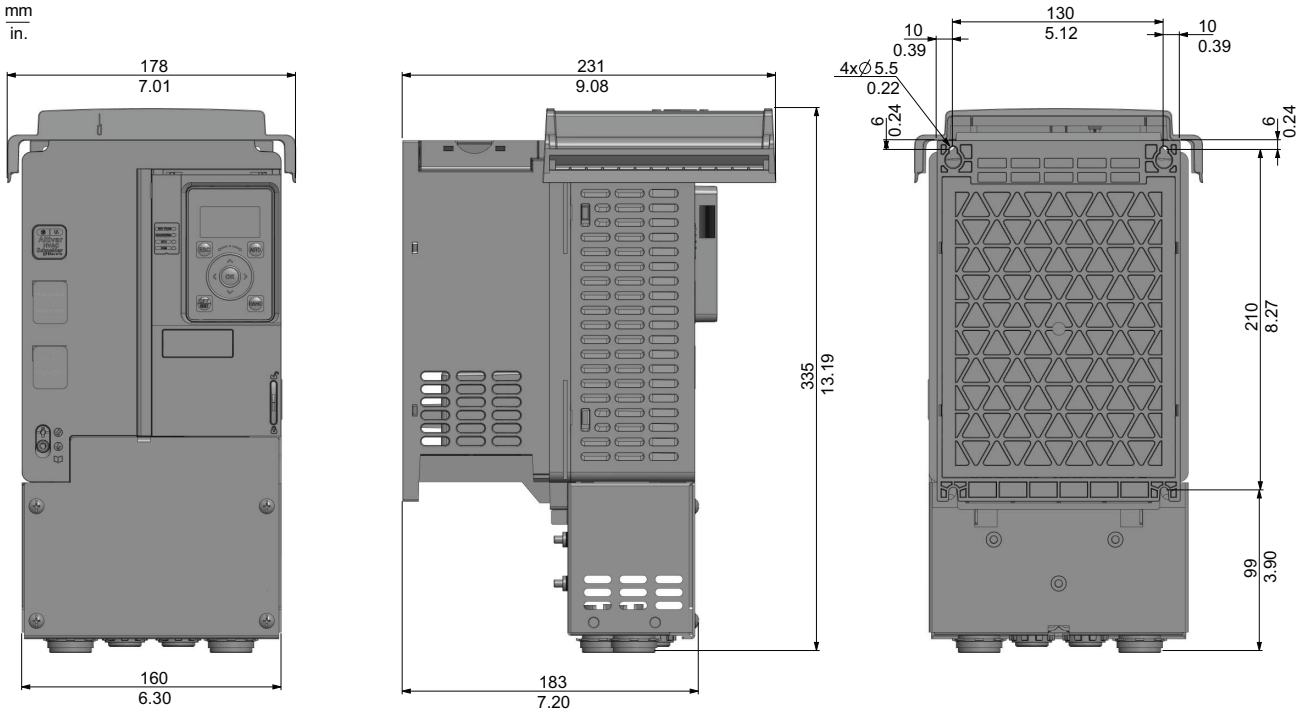
IP20 Drives - Front, Side and Rear View



Weights

Catalog Number	Weight in kg (lb)
ATH630U75N4Z, ATH630D11N4Z	3.8 kg (8.38 lb)

IP21 / UL Type 1 Drives - Front, Side and Rear View



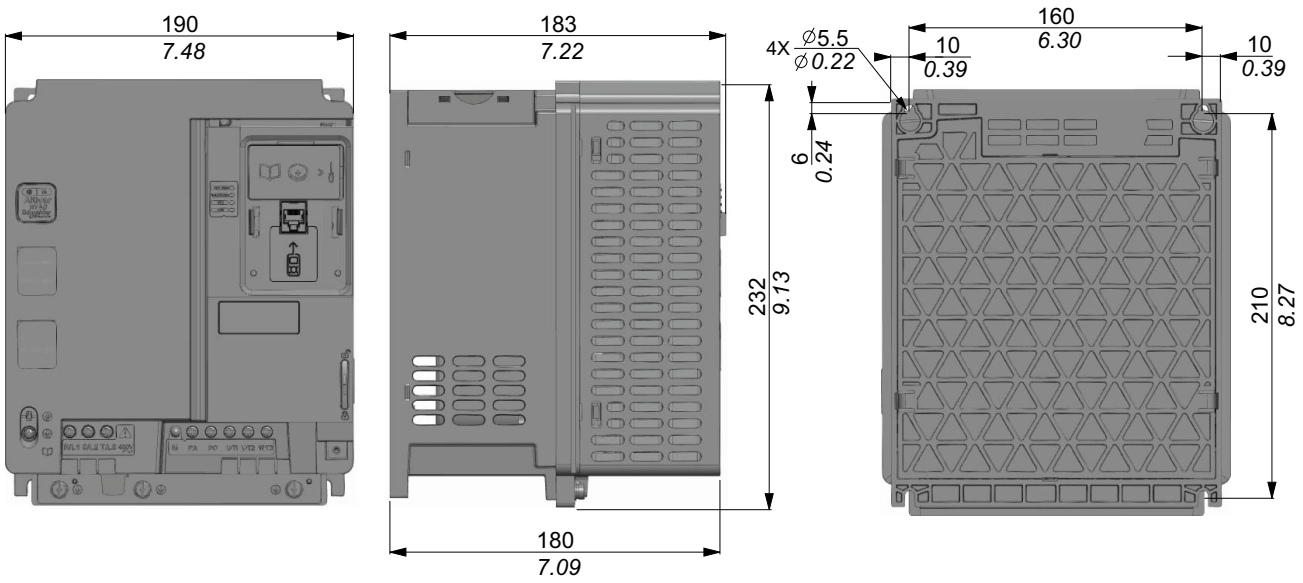
Weights

Catalog Number	Weight in kg (lb)
ATH630U75N4, ATH630D11N4	4.7 kg (10.36 lb)

Frame size 2B

IP20 Drives - Front, Side and Rear View

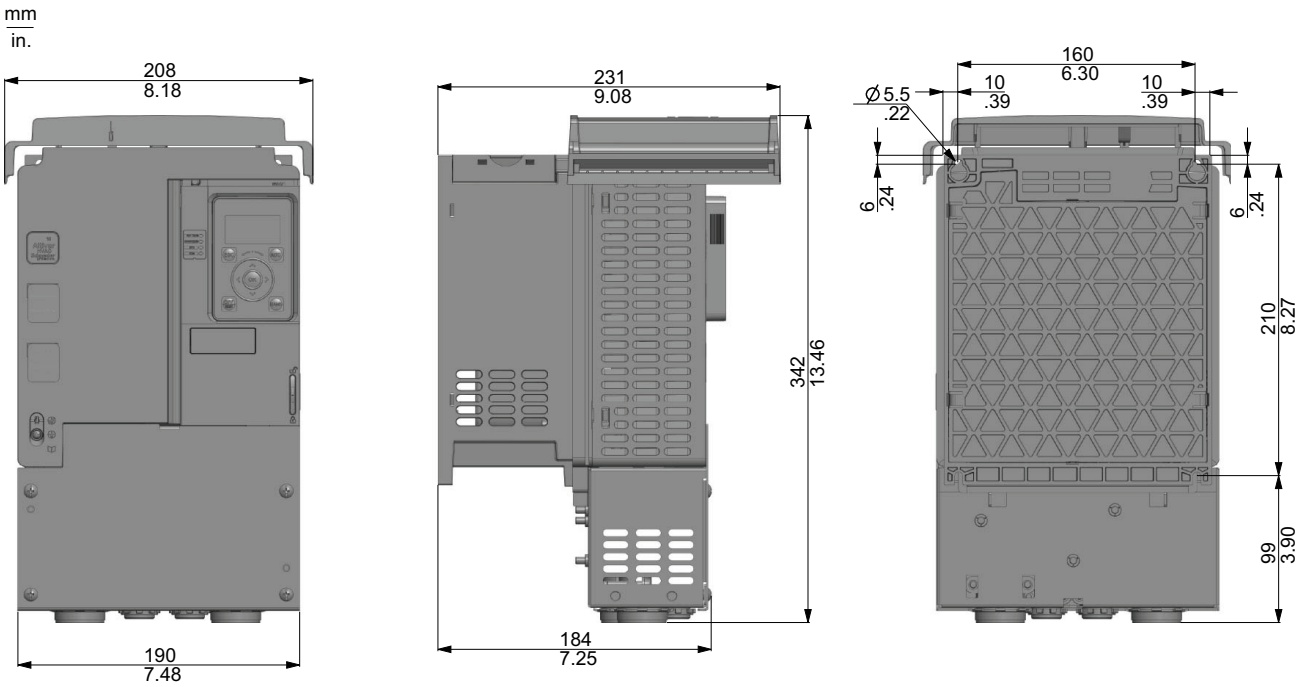
mm
in.



Weights

Catalog Number	Weight in kg (lb)
ATH630D15N4Z, ATH630D18N4Z	4.6 kg (10.14 lb)

IP21 / UL Type 1 Drives - Front, Side and Rear View

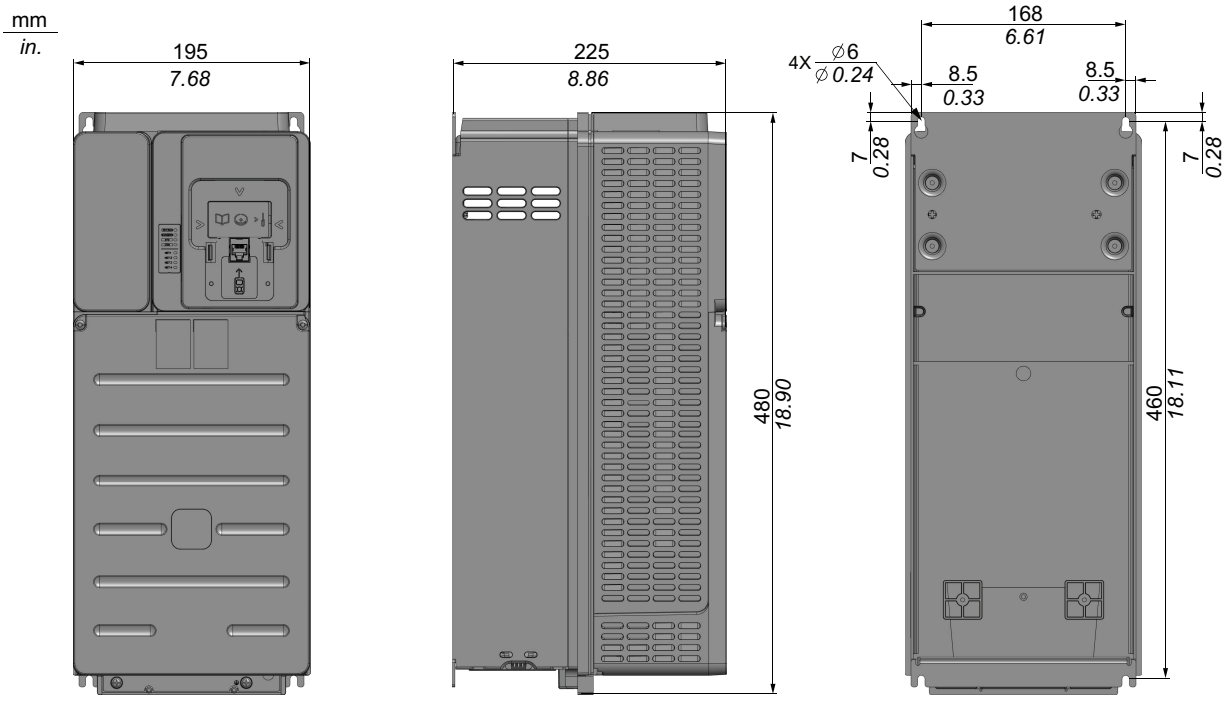


Weights

Catalog Number	Weight in kg (lb)
ATH630D15N4, ATH630D18N4	5.7 kg (12.57 lb)

Frame size 3

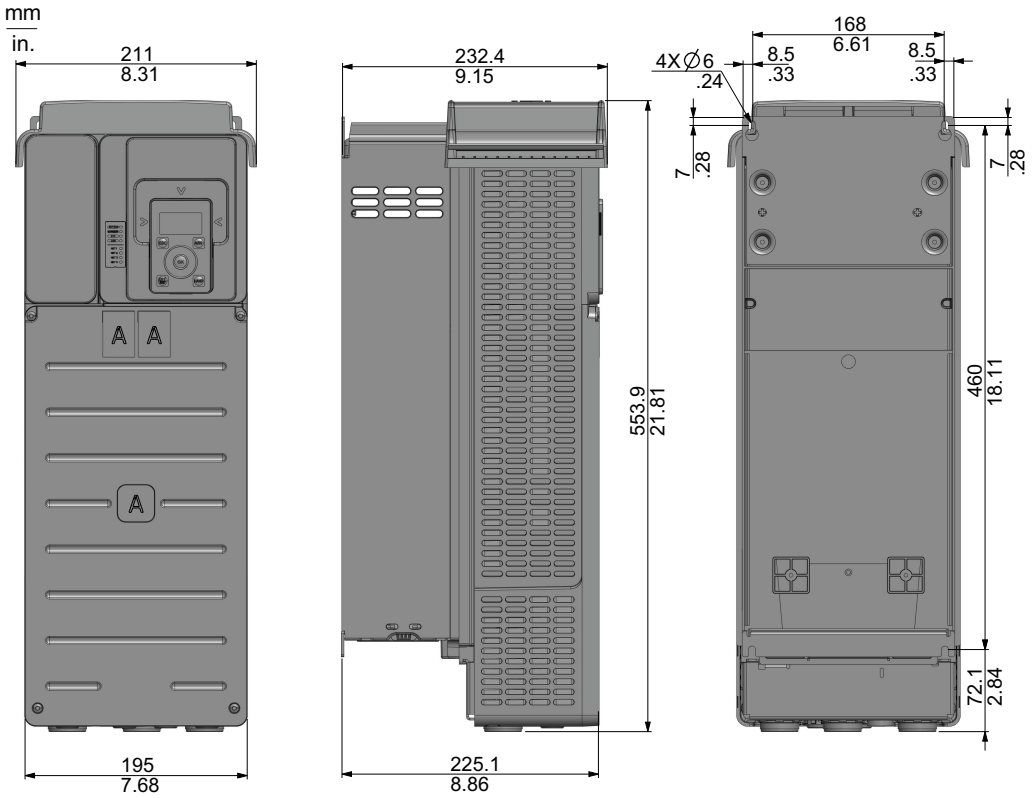
IP20 Drives - Front, Side and Rear View



Weights

Catalog Number	Weight in kg (lb)
ATH630D22N4Z	13.7 kg (30.20 lb)

IP21 / UL Type 1 Drives - Front, Side and Rear View

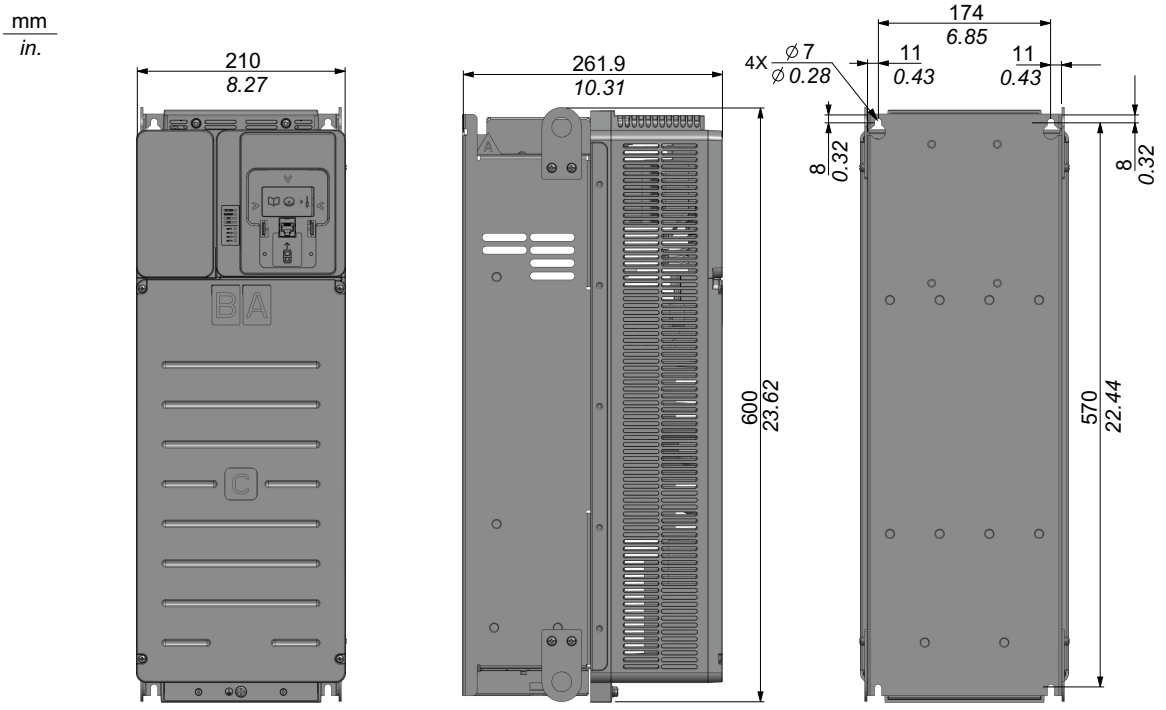


Weights

Catalog Number	Weight in kg (lb)
ATH630D22N4	14.3 kg (31.53 lb)

Frame size 4

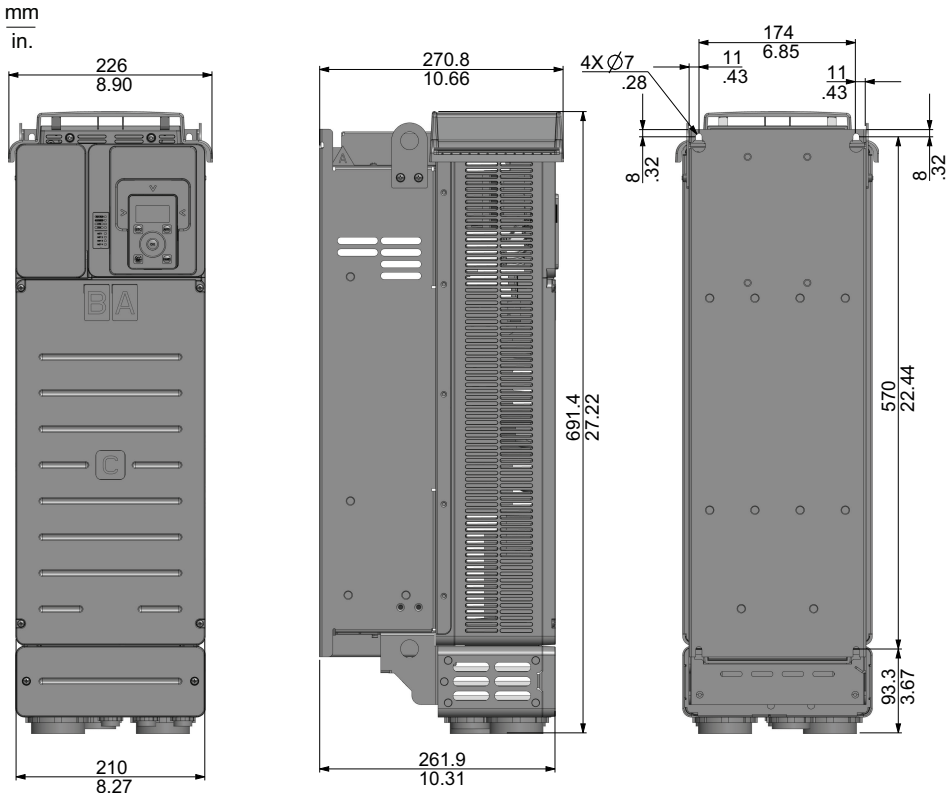
IP20 Drives, except on Lower Part (IP00) - Front, Side And Rear View



Weights

Catalog Number	Weight in kg (lb)
ATH630D30N4Z	25.8 kg (56.88 lb)
ATH630D37N4Z	26 kg (57.32 lb)
ATH630D45N4Z	26.5 kg (58.42 lb)

IP21 / UL Type 1 Drives - Front, Side and Rear View

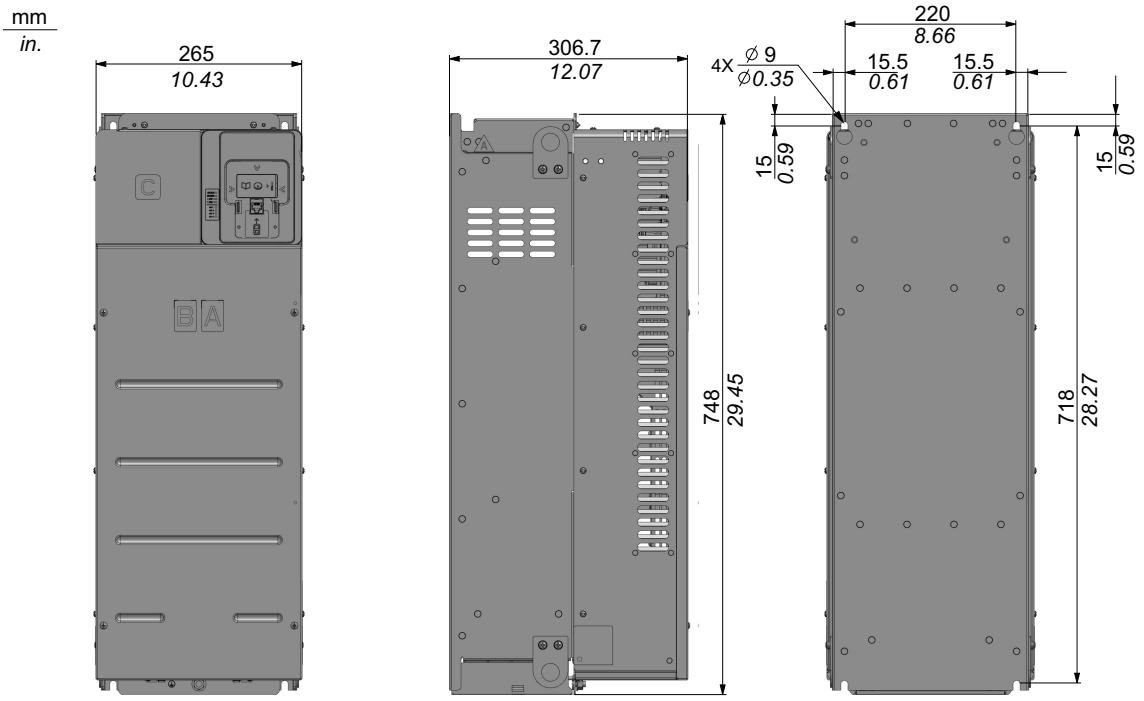


Weights

Catalog Number	Weight in kg (lb)
ATH630D30N4	28 kg (61.73 lb)
ATH630D37N4	28.2 kg (62.17 lb)
ATH630D45N4	28.7 kg (63.27 lb)

Frame size 5

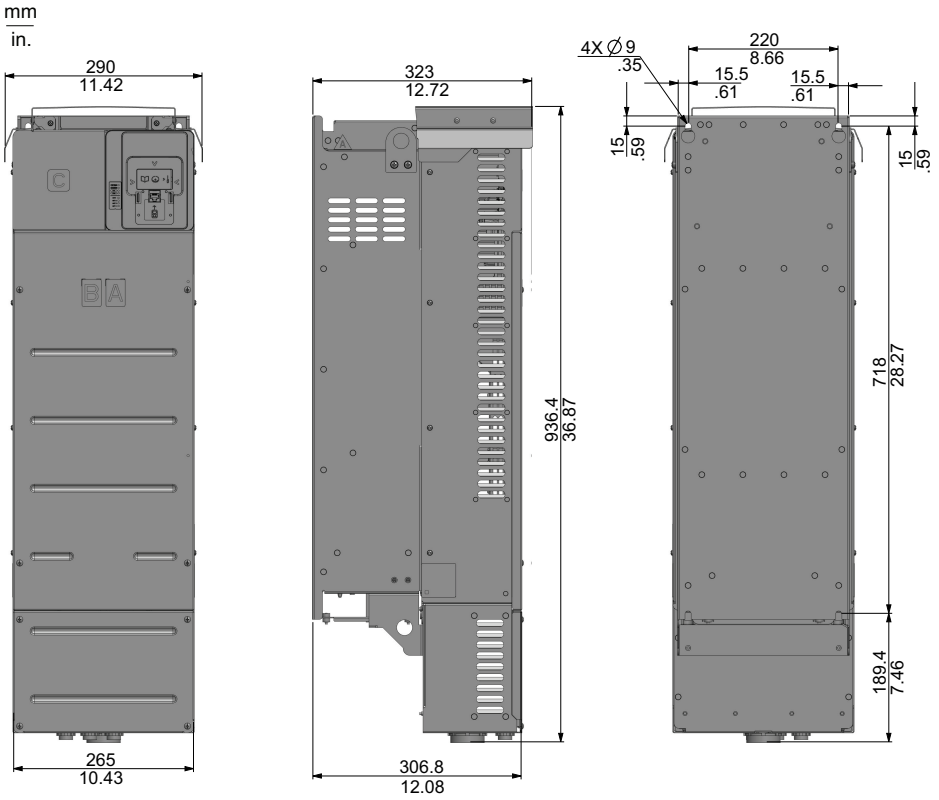
IP20 Drives, except on Lower Part (IP00) - Front, Side And Rear View



Weights

Catalog Number	Weight in kg (lb)
ATH630D55N4Z	52.6 kg (115.96 lb)
ATH630D75N4Z	54.1 kg (119.27 lb)
ATH630D90N4Z	54.6 kg (120.37 lb)

IP21 / UL Type 1 Drives – Front, Side and Rear View

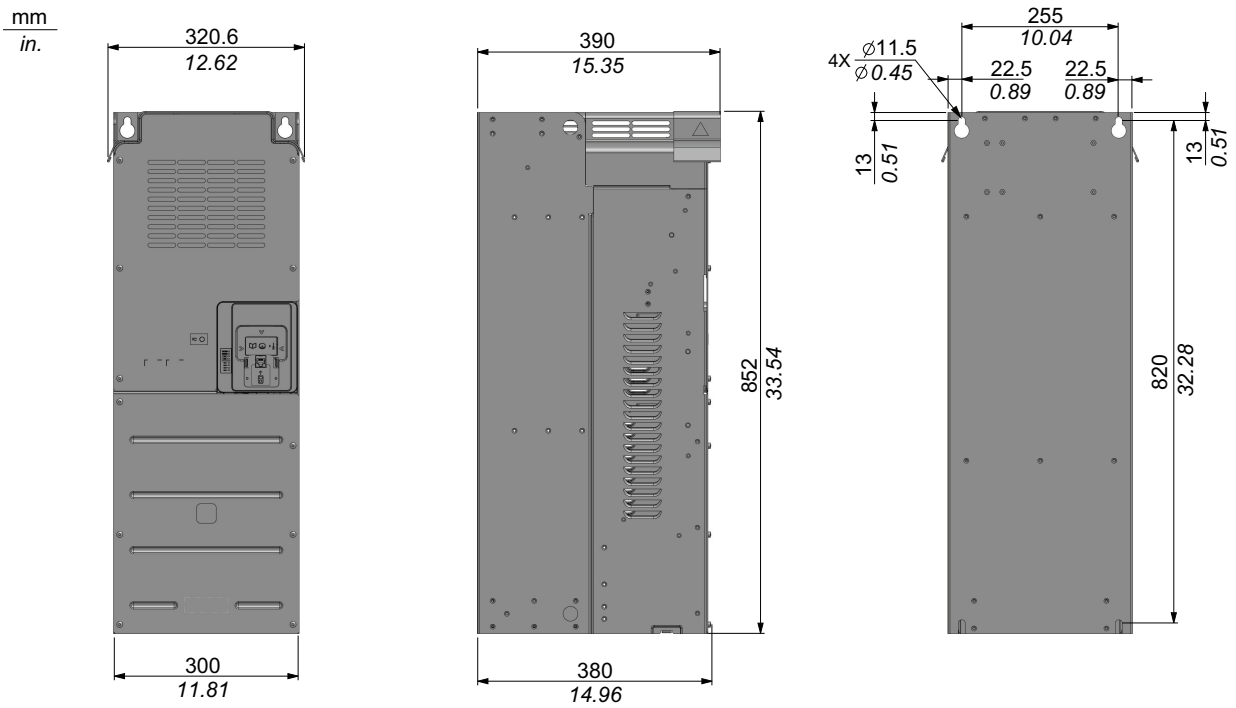


Weights

Catalog Number	Weight in kg (lb)
ATH630D55N4	56.5 kg (124.56 lb)
ATH630D75N4	58 kg (127.87 lb)
ATH630D90N4	58.5 kg (128.97 lb)

Frame size 6

IP20 on Upper Part and IP00 on Lower Part Drives - Front, Rear and Side View

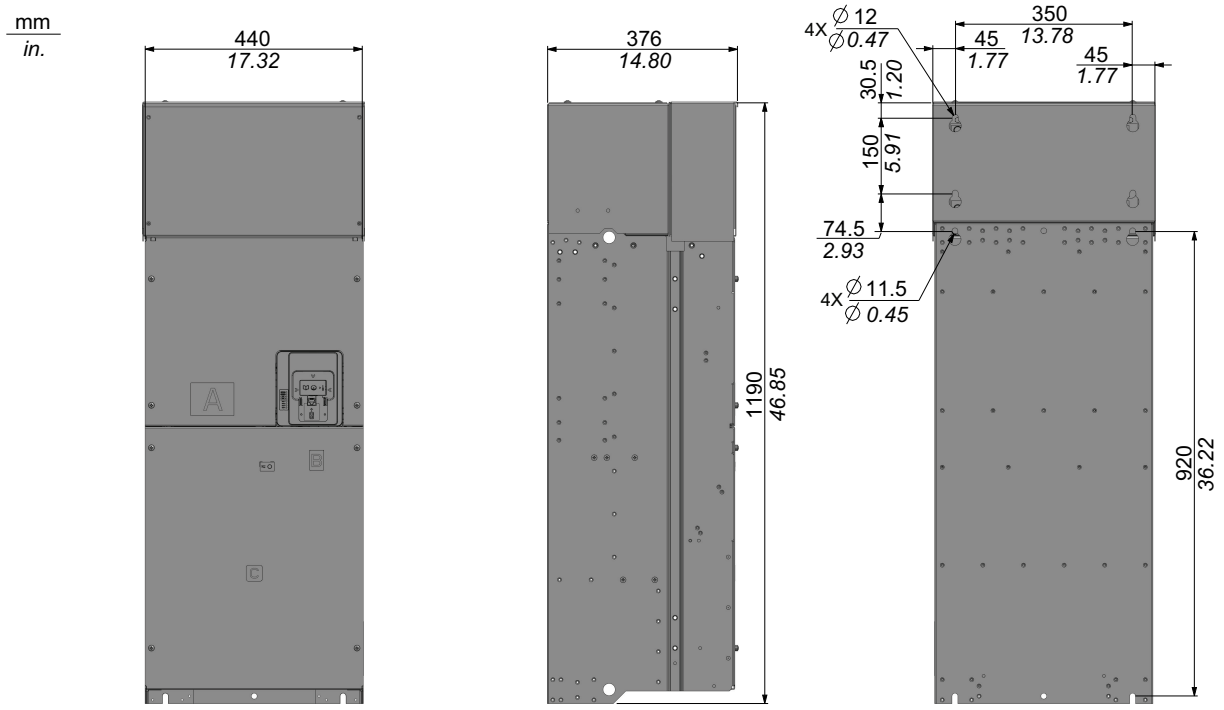


Weights

Catalog Number	Weight in kg (lb)
ATH630C11N4Z	82 kg (180.78 lb)
ATH630C13N4Z	82 kg (180.78 lb)
ATH630C16N4Z	82 kg (180.78 lb)

Frame Size 7A

IP20 on Upper Part and IP00 on Lower Part Drives - Front, Side and Rear View

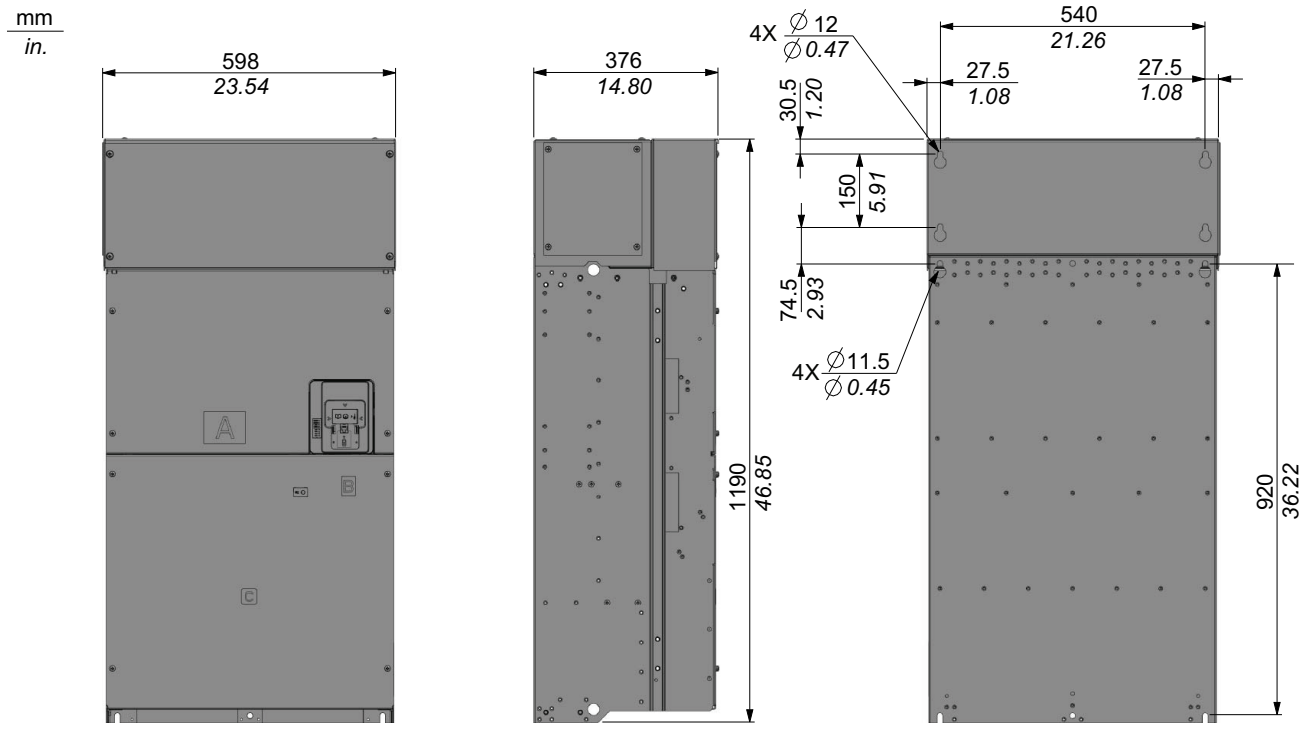


Weights

Catalog Number	Weight in kg (lb)
ATH630C22N4Z	172 kg (379.20 lb)

Frame Size 7B

IP20 on Upper Part and IP00 on Lower Part Drives - Front, Side and Rear View

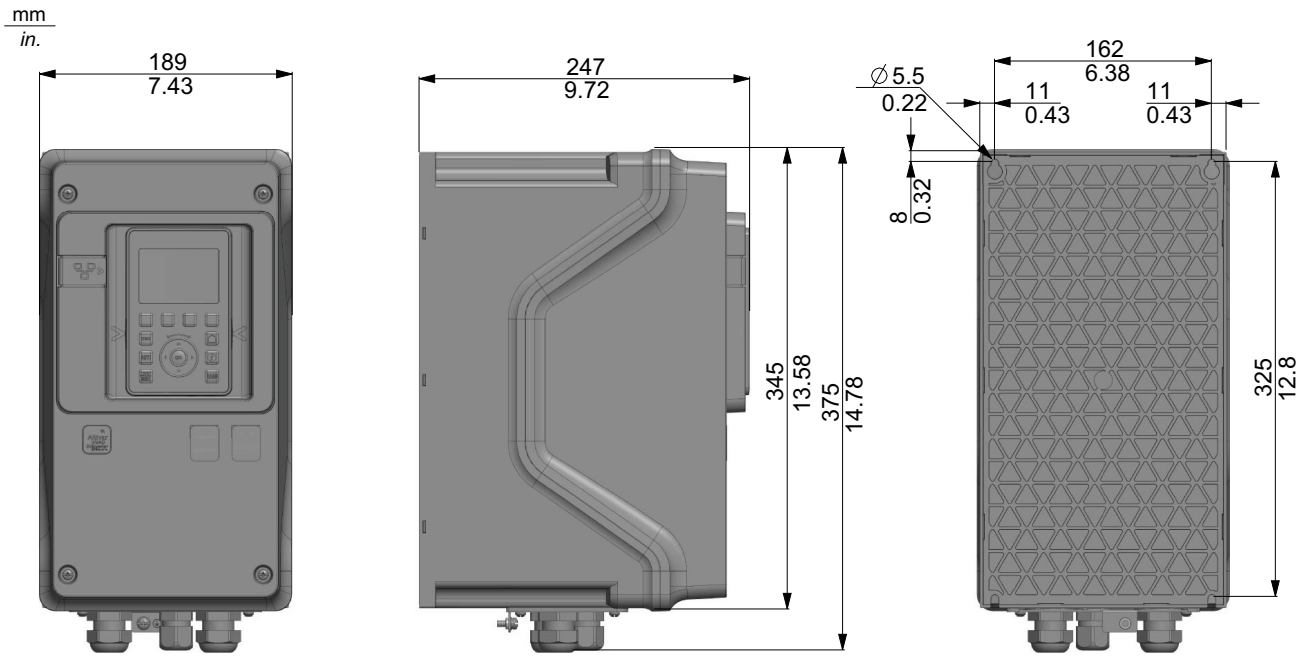


Weights

Catalog Number	Weight in kg (lb)
ATH630C25N4Z	203 kg (447.54 lb)

Frame Size A0

IP55 / UL Type 1 Drives Without Load Switch - Front, Side and Rear View

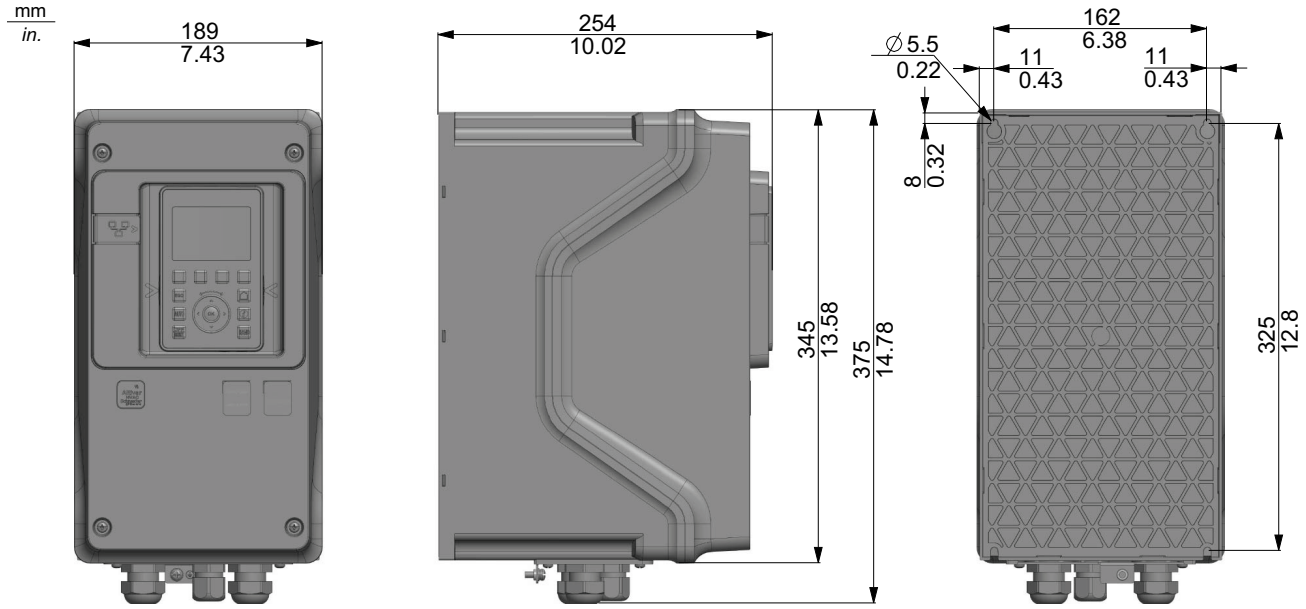


Weights

Catalog Number	Weight in kg (lb)
ATH650U07N4	4.5 kg (9.92 lb)
ATH650U15N4	4.5 kg (9.92 lb)
ATH650U22N4	4.5 kg (9.92 lb)
ATH650U07N4C	5.0 kg (11.02 lb)
ATH650U15N4C	5.0 kg (11.02 lb)
ATH650U22N4C	5.0 kg (11.02 lb)

Frame Size A1

IP55 / UL Type 1 Drives Without Load Switch - Front, Side and Rear View

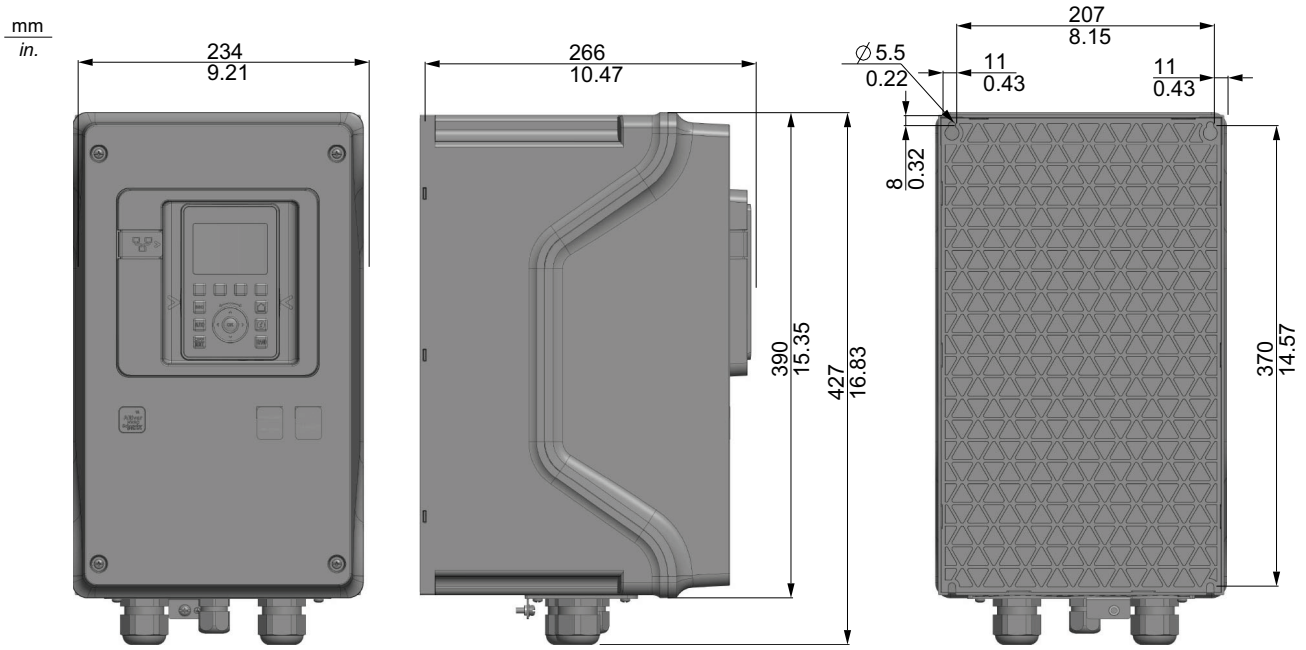


Weights

Catalog Number	Weight in kg (lb)
ATH650U30N4	5.1 kg (11.24 lb)
ATH650U40N4	5.1 kg (11.24 lb)
ATH650U55N4	5.1 kg (11.24 lb)
ATH650U30N4C	5.6 kg (12.35 lb)
ATH650U40N4C	5.6 kg (12.35 lb)
ATH650U55N4C	5.6 kg (12.35 lb)

Frame Size A2

IP55 / UL Type 1 Drives Without Load Switch - Front, Side and Rear View

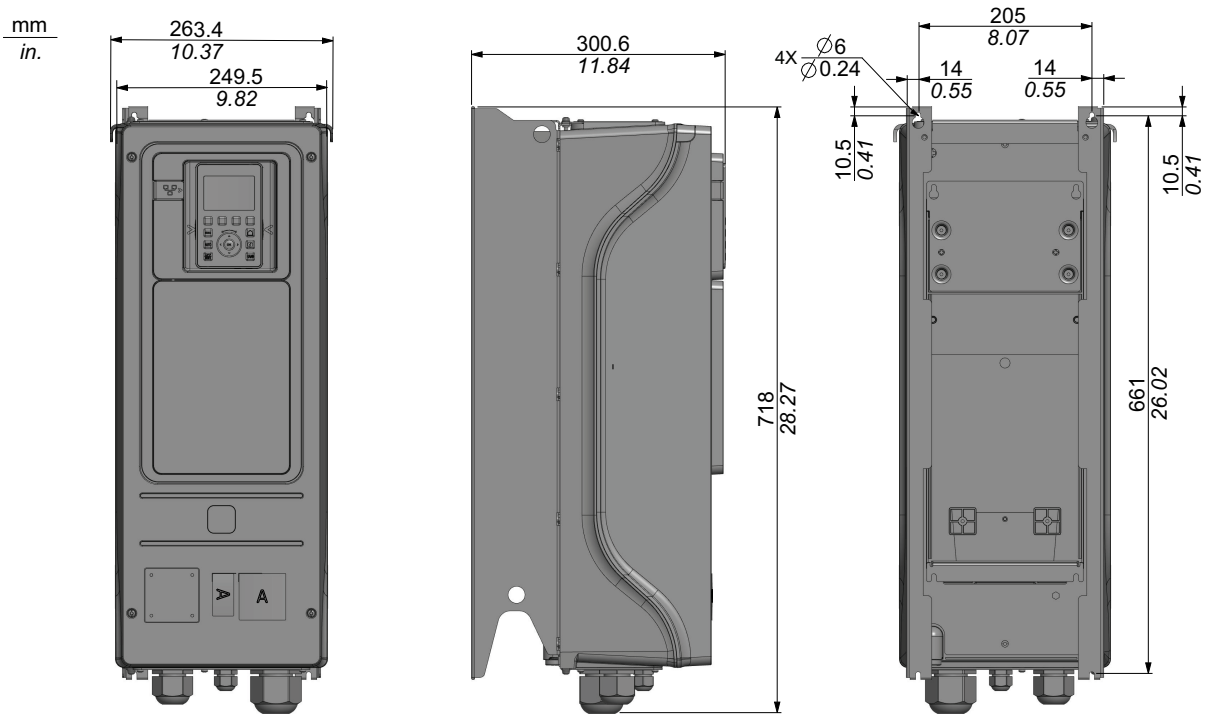


Weights

Catalog Number	Weight in kg (lb)
ATH650U75N4	7.3 kg (16.09 lb)
ATH650D11N4	7.3 kg (16.09 lb)
ATH650D15N4	7.9 kg (17.42 lb)
ATH650D18N4	7.9 kg (17.42 lb)
ATH650U75N4C	8.1 kg (17.86 lb)
ATH650D11N4C	8.1 kg (17.86 lb)
ATH650D15N4C	8.7 kg (19.18 lb)
ATH650D18N4C	8.7 kg (19.18 lb)

Frame Size A3

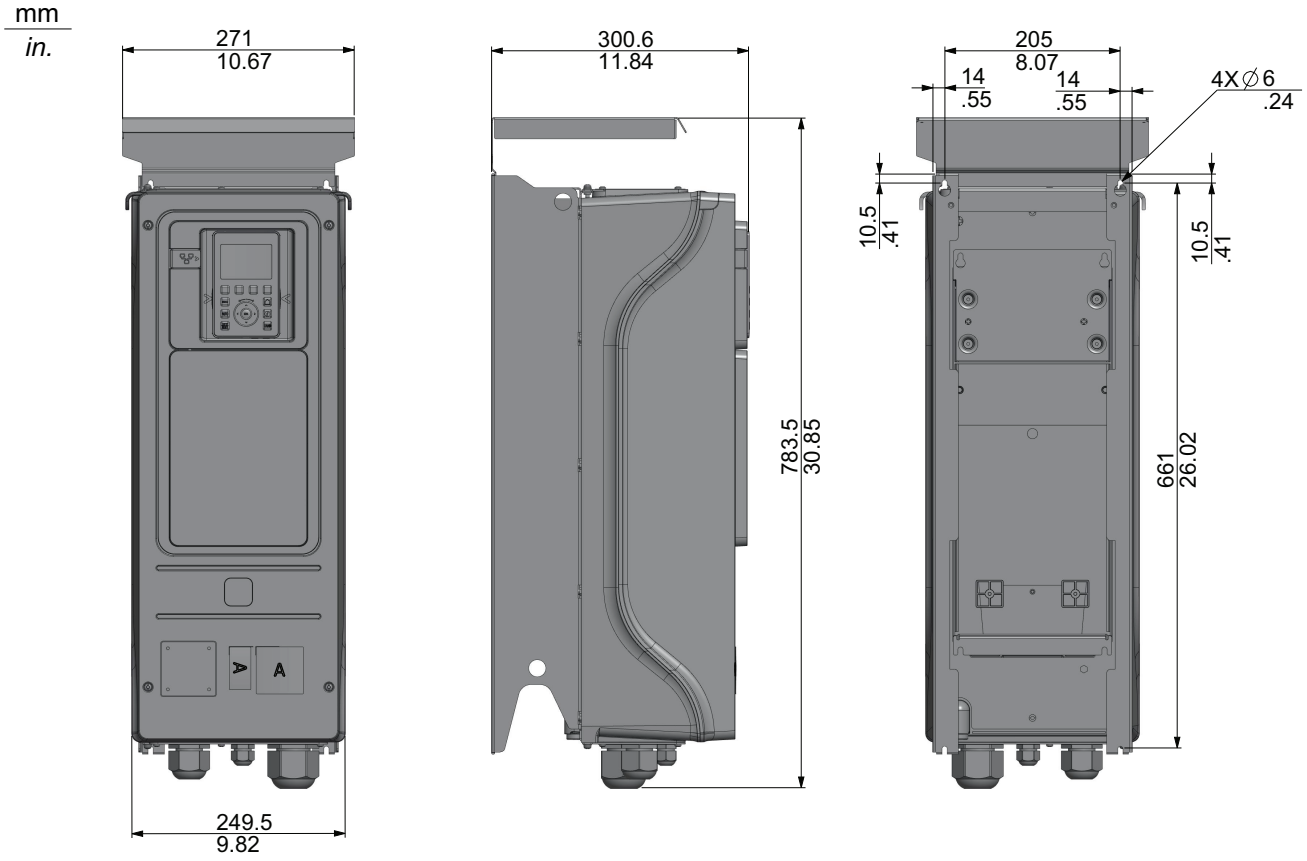
IP55 / UL Type 1 Drives Without Load Switch - Front, Side and Rear View



Weights

Catalog Number	Weight in kg (lb)
ATH650D22N4	20.6 kg (45.42 lb)

UL Type 12 Drives Without Load Switch - Front, Side and Rear View

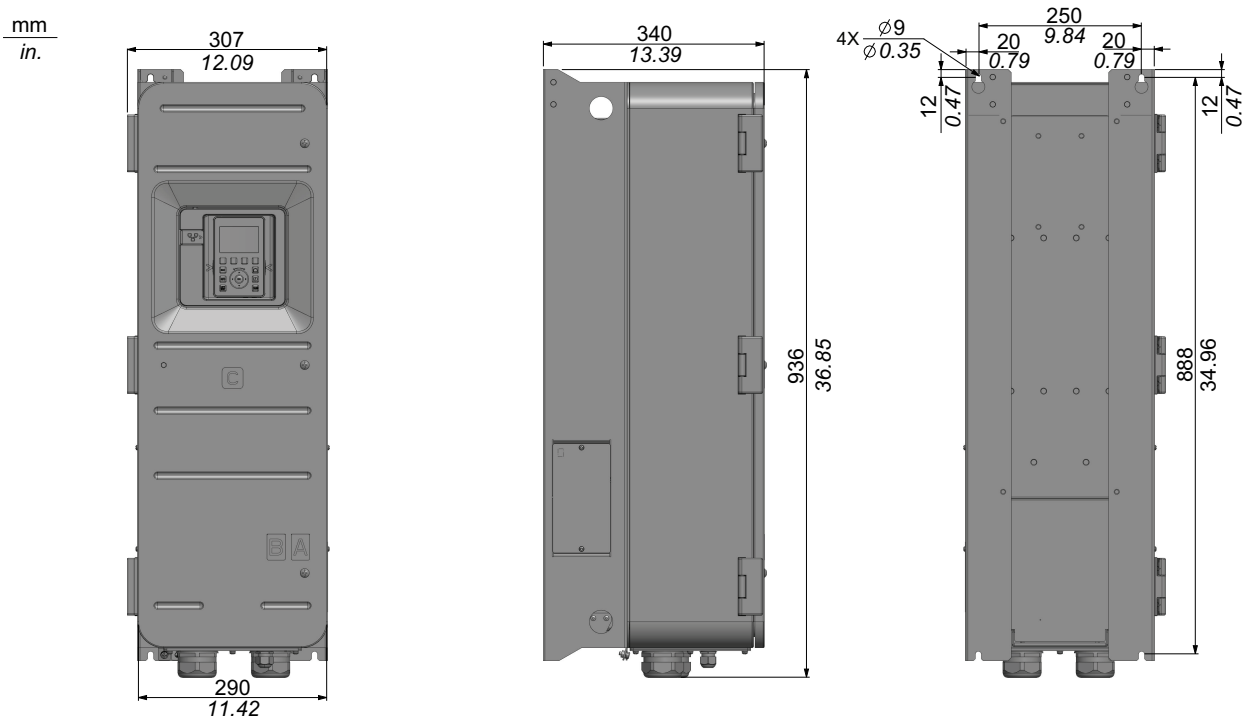


Weights

Catalog Number	Weight in kg (lb)
ATH650D22N4U	21.4 kg (47.18 lb)

Frame Size B

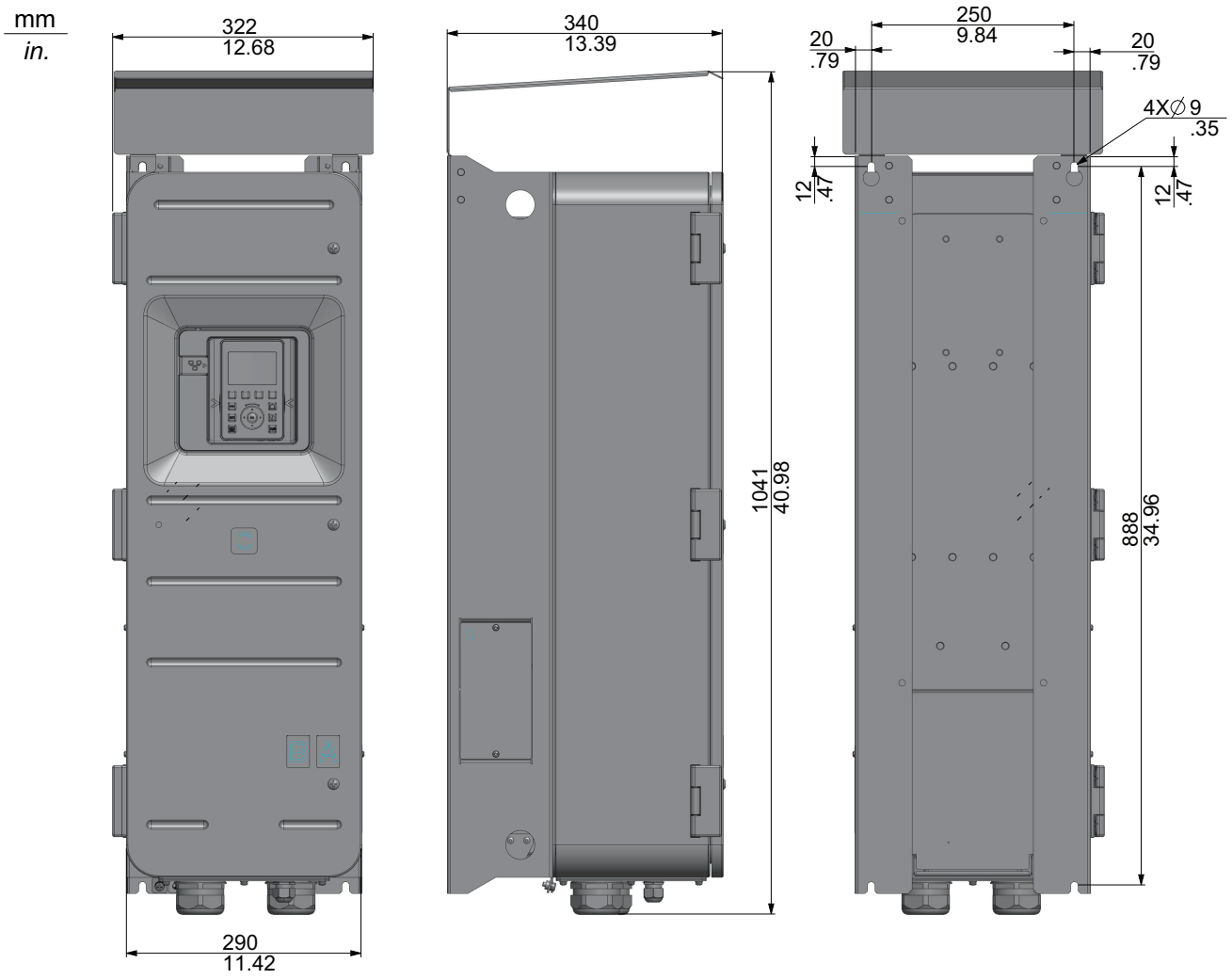
IP55 / UL Type 1 Drives Without Load Switch - Front, Side and Rear View



Weights

Catalog Number	Weight in kg (lb)
ATH650D30N4	50 kg (110.23 lb)
ATH650D37N4	50 kg (110.23 lb)
ATH650D45N4	50 kg (110.23 lb)

UL Type 12 Drives Without Load Switch - Front, Side and Rear View

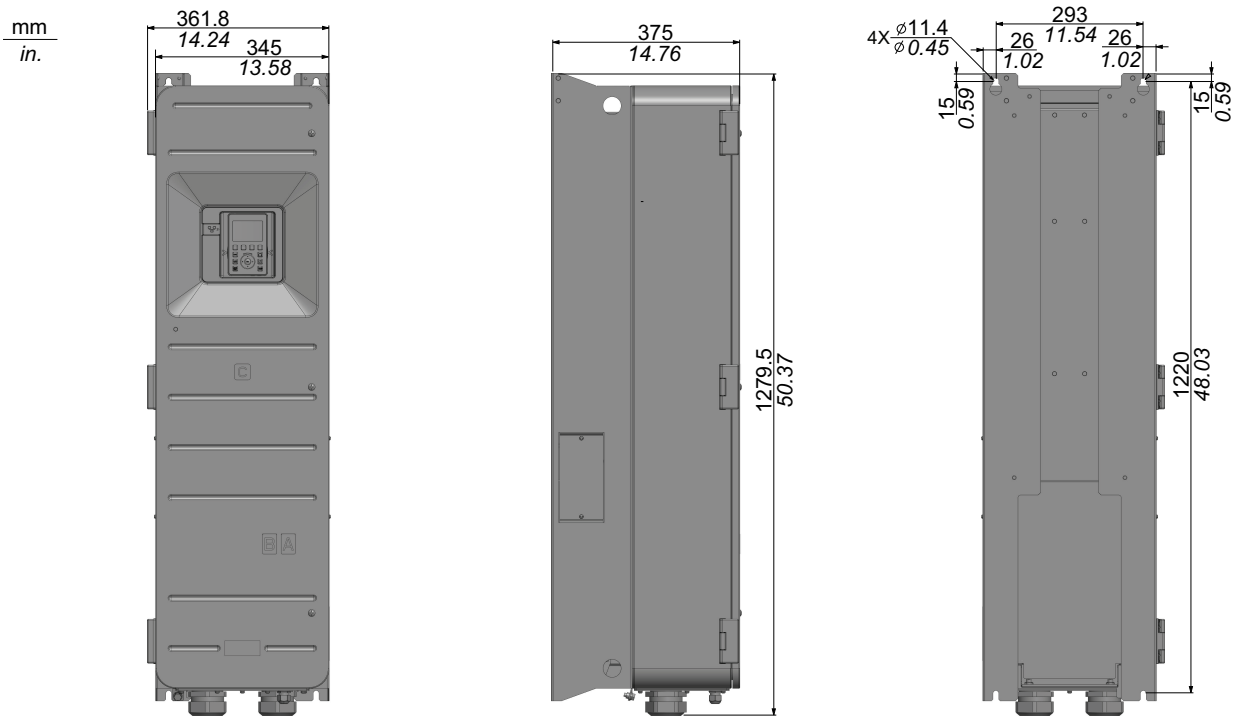


Weights

Catalog Number	Weight in kg (lb)
ATH650D30N4U	51.6 kg (113.76 lb)
ATH650D37N4U	51.6 kg (113.76 lb)
ATH650D45N4U	51.6 kg (113.76 lb)

Frame Size C

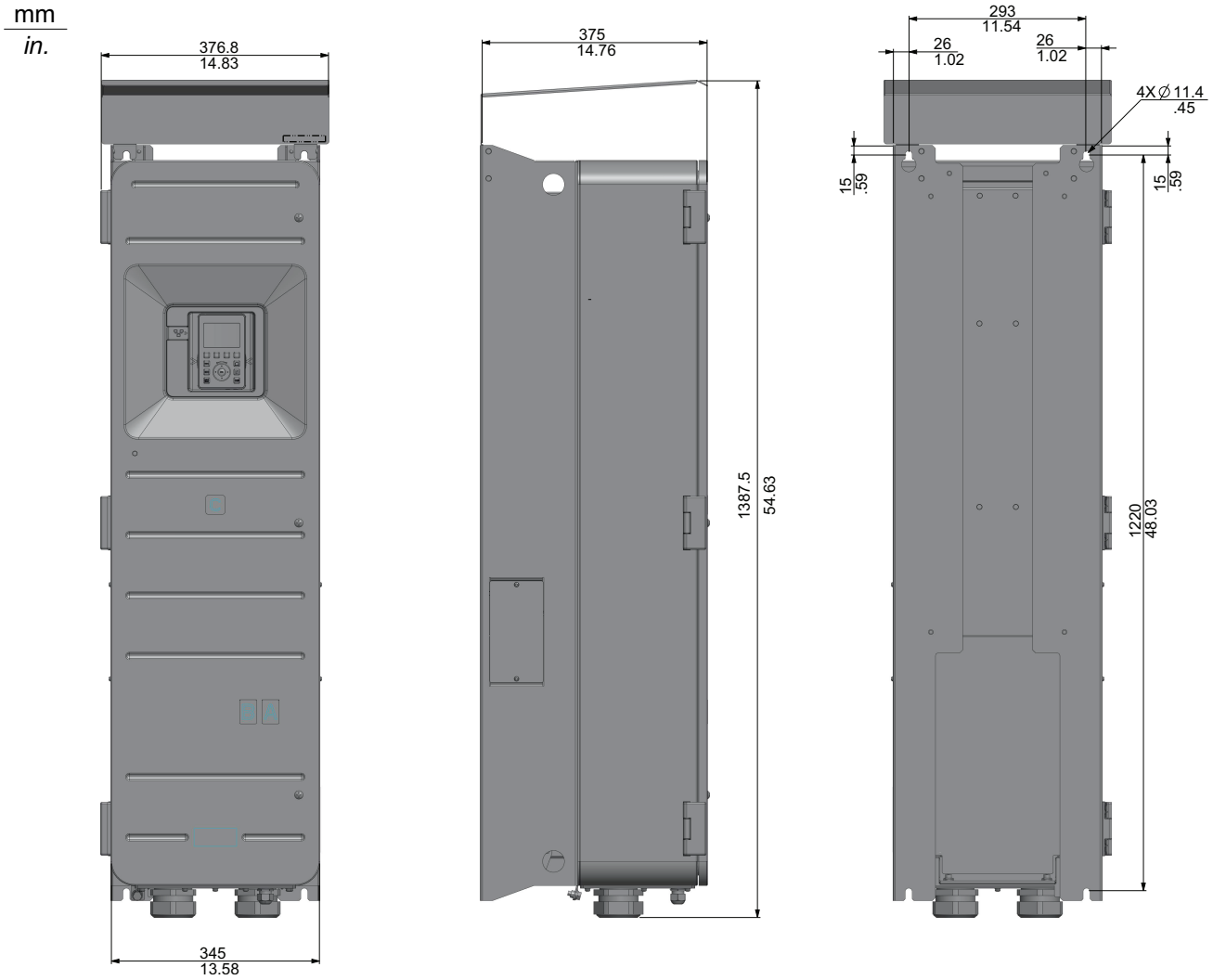
IP55 / UL Type 1 Drives Without Load Switch - Front, Side and Rear View



Weights

Catalog Number	Weight in kg (lb)
ATH650D55N4	87 kg (191.80 lb)
ATH650D75N4	87 kg (191.80 lb)
ATH650D90N4	87.7 kg (193.35 lb)

UL Type 12 Drives Without Load Switch - Front, Side and Rear View



Weights

Catalog Number	Weight in kg (lb)
ATH650D55N4U	89.3 kg (196.87 lb)
ATH650D75N4U	89.3 kg (196.87 lb)
ATH650D90N4U	90 kg (198.42 lb)

Electrical Data - Drive Ratings

What's in This Chapter

Drive Ratings In Normal Duty

Normal Duty

Normal duty values are given for applications requiring a slight overload (up to 110 %).

NOTE:

- For fuse and circuit-breaker ratings refer to the information provided in the Altivar HVAC ATH600 Getting Started Annex (SCCR), catalog number NAT16152 for UL/CSA compliance and also in the catalog DIA2ED2260301EN for IEC compliance.
- For motor overload and drive thermal monitoring functions, refer to the Altivar HVAC ATH600 Programming manual NAT19027.

IP20 on Upper Part, IP00 on Lower Part Products

3-Phase Power Part Supply 380 (–15%)…480 Vac (+10%) 50/60 Hz

Power and Current Ratings

Catalog Number	Nominal Power (1)		Power Part Supply					Drive (output)		
			Line Current		Max. prospective line Isc	Apparent Power	Max. Inrush Current (2)	Continuous current		Max. Transient current (1) (3)
			At 380 Vac	At 480 Vac				At 380 Vac	At 480 Vac	
	kW	HP	A	A	kA	kVA	A	A	A	A
ATH630U07N4Z	0.75	1	2.0	1.6	5	1.3	4	2.2	2.1	2.4
ATH630U15N4Z	1.5	2	3.5	2.7	5	2.2	6.4	3.7	3.4	4.1
ATH630U22N4Z	2.2	3	4.8	3.8	5	3.2	8.8	5.1	4.8	5.6
ATH630U30N4Z	3	3	5.4	4.6	5	3.8	9.6	7.2	6.2	7.9
ATH630U40N4Z	4	5	7.0	6	5	5.0	11.5	9.1	7.6	10.0
ATH630U55N4Z	5.5	7.5	9.3	8.1	5	6.7	14.2	12	11	13.2
ATH630U75N4Z	7.5	10	12.9	11	22	9.1	25.8	16	14	17.6
ATH630D11N4Z	11	15	18.5	15.8	22	13.1	30.6	22.5	21	24.8
ATH630D15N4Z	15	20	24.3	21	22	17.5	39	30.5	27	33.6
ATH630D18N4Z	18.5	25	29.6	25.5	22	21.2	46.5	37	34	40.7
ATH630D22N4Z	22	30	39.6	34.4	50	28.6	76	46.3	46.3	50.9
ATH630D30N4Z	30	40	53.3	45.9	50	38.2	82.6	61.5	61.5	67.7
ATH630D37N4Z	37	50	66.2	57.3	50	47.6	91.9	74.5	74.5	82.0
ATH630D45N4Z	45	60	79.8	69.1	50	57.4	109.7	88	88	96.8
ATH630D55N4Z	55	75	97.2	84.2	50	70.0	176	106	106	116.6
ATH630D75N4Z	75	100	131.3	113	50	93.7	187	145	145	159.5
ATH630D90N4Z	90	125	156.2	136	50	112.9	236	173	173	190.3
ATH630C11N4Z	110	150	201	165	50	137.2	324.8	211	211	232.1
ATH630C13N4Z	132	200	237	213	50	177.1	324.8	250	250	275.0
ATH630C16N4Z	160	250	284	262	50	217.8	324.8	302	302	332.2
ATH630C22N4Z	220	350	397	324	50	269.4	426.2	427	427	469.7
ATH630C25N4Z	250	400	451	366	50	304.3	450	481	481	529.1

(1) The switching frequency is adjustable:

- From 6...16 kHz for drive frame sizes 0 to 2, rated value: 6 kHz
- From 2...16 kHz for drive frame sizes 3 to 4, rated value: 4 kHz
- From 2...8 kHz for drive frame sizes 5 to 7, rated value: 2.5 kHz

For operation at switching frequencies higher than the rated value. Derating must be applied to the drive (output) current Derating Curves, page 108. In this case, switching frequency can be reduced if an excessive temperature rise occurs.

(2) Peak current when power is switched On, for the maximum supply mains voltage.

(3) The drive is designed to run up to 60 s at 110% of nominal current.

IP21 / UL Type 1 Products

3-Phase Power Part Supply 380 (–15%)…480 Vac (+10%) 50/60 Hz

Power and Current Ratings

Catalog Number	Nominal Power (1)		Power Part Supply					Drive (output)		
			Line Current		Max. prospective line Isc	Apparent Power	Max. Inrush Current (2)	Continuous current		Max. Transient current (1) (3)
			At 380 Vac	At 480 Vac				At 380 Vac	At 480 Vac	
	kW	HP	A	A	kA	kVA	A	A	A	A
ATH630U07N4	0.75	1	2.0	1.6	5	1.3	4	2.2	2.1	2.4
ATH630U15N4	1.5	2	3.5	2.7	5	2.2	6.4	3.7	3.4	4.1
ATH630U22N4	2.2	3	4.8	3.8	5	3.2	8.8	5.1	4.8	5.6
ATH630U30N4	3	3	5.4	4.6	5	3.8	9.6	7.2	6.2	7.9
ATH630U40N4	4	5	7.0	6	5	5.0	11.5	9.1	7.6	10.0
ATH630U55N4	5.5	7.5	9.3	8.1	5	6.7	14.2	12	11	13.2
ATH630U75N4	7.5	10	12.9	11	22	9.1	25.8	16	14	17.6
ATH630D11N4	11	15	18.5	15.8	22	13.1	30.6	22.5	21	24.8
ATH630D15N4	15	20	24.3	21	22	17.5	39	30.5	27	33.6
ATH630D18N4	18.5	25	29.6	25.5	22	21.2	46.5	37	34	40.7
ATH630D22N4	22	30	39.6	34.4	50	28.6	76	46.3	46.3	50.9
ATH630D30N4	30	40	53.3	45.9	50	38.2	82.6	61.5	61.5	67.7
ATH630D37N4	37	50	66.2	57.3	50	47.6	91.9	74.5	74.5	82.0
ATH630D45N4	45	60	79.8	69.1	50	57.4	109.7	88	88	96.8
ATH630D55N4	55	75	97.2	84.2	50	70.0	176	106	106	116.6
ATH630D75N4	75	100	131.3	113	50	93.7	187	145	145	159.5
ATH630D90N4	90	125	156.2	136	50	112.9	236	173	173	190.3

(1) The switching frequency is adjustable:

- From 6...16 kHz for drive frame sizes 0 to 2, rated value: 6 kHz
- From 2...12 kHz for drive frame sizes 3 to 4, rated value: 4 kHz
- From 2...8 kHz for drive frame sizes 5, rated value: 2.5 kHz

For operation at switching frequencies higher than the rated value. Derating must be applied to the drive (output) current Derating Curves, page 108. In this case, switching frequency can be reduced if an excessive temperature rise occurs.

(2) Peak current when power is switched On, for the maximum supply mains voltage.

(3) The drive is designed to run up to 60 s at 110% of nominal current.

IP55 / UL Type 12 Products

3-Phase Power Part Supply 380 (–15%)…480 Vac (+10%) 50/60 Hz

Power and Current Ratings

Catalog Number	Nominal Power (1)		Power Part Supply					Drive (output)		
			Line Current		Max. prospective line Isc	Apparent Power	Max. Inrush Current (2)	Continuous current		Max. Transient current (1) (3)
			At 380 Vac	At 480 Vac				At 380 Vac	At 480 Vac	
	kW	HP	A	A	kA	kVA	A	A	A	A
ATH650U07N4(C)	0.75	1	2.0	1.6	5	1.3	4	2.2	2.1	2.4
ATH650U15N4(C)	1.5	2	3.5	2.7	5	2.2	6.4	3.7	3.4	4.1
ATH650U22N4(C)	2.2	3	4.8	3.8	5	3.2	8.8	5.1	4.8	5.6
ATH650U30N4(C)	3	3	5.4	4.6	5	3.8	9.6	7.2	6.2	7.9
ATH650U40N4(C)	4	5	7.0	6	5	5.0	11.5	9.1	7.6	10.0
ATH650U55N4(C)	5.5	7.5	9.3	8.1	5	6.7	14.2	12	11	13.2
ATH650U75N4(C)	7.5	10	12.9	11	22	9.1	25.8	16	14	17.6
ATH650D11N4(C)	11	15	18.5	15.8	22	13.1	30.6	22.5	21	24.8
ATH650D15N4(C)	15	20	24.3	21	22	17.5	39	30.5	27	33.6
ATH650D18N4(C)	18.5	25	29.6	25.5	22	21.2	46.5	37	34	40.7
ATH650D22N4(U)	22	30	39.6	34.4	50	28.6	76	46.3	46.3	50.9
ATH650D30N4(U)	30	40	53.3	45.9	50	38.2	82.6	61.5	61.5	67.7
ATH650D37N4(U)	37	50	66.2	57.3	50	47.6	91.9	74.5	74.5	82.0
ATH650D45N4(U)	45	60	79.8	69.1	50	57.4	109.7	88	88	96.8
ATH650D55N4(U)	55	75	97.2	84.2	50	70.0	176	106	106	116.6
ATH650D75N4(U)	75	100	131.3	113	50	93.7	187	145	145	159.5
ATH650D90N4(U)	90	125	156.2	136	50	112.9	236	173	173	190.3

(1) The switching frequency is adjustable:

- From 6...16 kHz for drive frame sizes A0 to A2, rated value: 6 kHz
- From 2...12 kHz for drive frame sizes A3 to B, rated value: 4 kHz
- From 2...8 kHz for drive frame sizes C, rated value: 2.5 kHz

For operation at switching frequencies higher than the rated value. Derating must be applied to the drive (output) current Derating Curves, page 108. In this case, switching frequency can be reduced if an excessive temperature rise occurs.

(2) Peak current when power is switched On, for the maximum supply mains voltage.

(3) The drive is designed to run up to 60 s at 110% of nominal current.

Drive Ratings In Heavy Duty

Heavy Duty

Heavy-duty values are given for applications requiring a significant overload (up to 150 %).

NOTE:

- For fuse and circuit-breaker ratings refer to the information provided in the Altivar HVAC 600 Getting Started Annex (SCCR), catalog number NAT16152 for UL/CSA compliance and also in the catalog DIA2ED2260301EN for IEC compliance.
- For motor overload and drive thermal monitoring functions, refer to the ATH600 Programming manual NAT19027.

IP20 on Upper Part, IP00 on Lower Part Products

3-Phase Power Part Supply 380 (–15%)…480 Vac (+10%) 50/60 Hz

Power and Current Ratings

Catalog Number	Nominal Power (1)		Power Part Supply					Drive (output)		
			Line Current		Max. prospective line Isc	Apparent Power	Max. Inrush Current (2)	Continuous current		Max. Transient current (1) (3)
			At 380 Vac	At 480 Vac				At 380 Vac	At 480 Vac	
	kW	HP	A	A	kA	kVA	A	A	A	A
ATH630U07N4Z	0.37	1/2	1.2	1	5	0.8	2.8	1.2	1.1	1.8
ATH630U15N4Z	0.75	1	2	1.7	5	1.4	4.2	2.2	2.1	3.3
ATH630U22N4Z	1.5	2	3.5	2.8	5	2.3	6.7	3.7	3.4	5.6
ATH630U30N4Z	2.2	3	4.2	3.6	5	3.0	8	5.1	4.8	7.7
ATH630U40N4Z	3	3	5.4	4.7	5	3.9	9.5	7.2	6.2	10.8
ATH630U55N4Z	4	5	7	6	5	5.0	11.3	9.1	7.6	13.7
ATH630U75N4Z	5.5	7.5	9.7	8.3	22	6.9	17.1	12	11	18.0
ATH630D11N4Z	7.5	10	13	11	22	9.1	21.3	16	14	24.0
ATH630D15N4Z	11	15	18.3	15.7	22	13.1	31.2	22.5	21	33.8
ATH630D18N4Z	15	20	24.4	21.1	22	17.5	39.6	30.5	27	45.8
ATH630D22N4Z	18.5	25	34.1	29.9	50	24.9	76	39.2	39.2	58.8
ATH630D30N4Z	22	30	40.5	35.8	50	29.8	82.6	46.3	46.3	69.5
ATH630D37N4Z	30	40	54.8	48.3	50	40.2	91.9	61.5	61.5	92.3
ATH630D45N4Z	37	50	67.1	59	50	49.1	109.7	74.5	74.5	111.8
ATH630D55N4Z	45	60	81.4	71.8	50	59.7	176	88	88	132.0
ATH630D75N4Z	55	75	98.9	86.9	50	72.2	187	106	106	159.0
ATH630D90N4Z	75	100	134	118.1	50	98.2	236	145	145	217.5
ATH630C11N4Z	90	125	170	143	50	118.9	324.8	173	173	259.5
ATH630C13N4Z	110	150	201	165	50	137.2	324.8	211	211	316.5
ATH630C16N4Z	132	200	237	213	50	177.1	324.8	250	250	375.0
ATH630C22N4Z	160	250	296	246	50	204.5	426.2	302	302	453.0
ATH630C25N4Z	200	300	365	301	50	250.2	450	387	387	580.5

(1) The switching frequency is adjustable:

- From 6...16 kHz for drive frame sizes 0 to 2, rated value: 6 kHz
- From 2...16 kHz for drive frame sizes 3 to 4, rated value: 4 kHz
- From 2...8 kHz for drive frame sizes 5 to 7, rated value: 2.5 kHz

For operation at switching frequencies higher than the rated value. Derating must be applied to the drive (output) current Derating Curves, page 108. In this case, switching frequency can be reduced if an excessive temperature rise occurs.

(2) Peak current when power is switched On, for the maximum supply mains voltage.

(3) The drive is designed to run up to 60 s at 150% of nominal current.

IP21 / UL Type 1 Products

3-Phase Power Part Supply 380 (–15%)…480 Vac (+10%) 50/60 Hz

Power and Current Ratings

Catalog Number	Nominal Power (1)		Power Part Supply					Drive (output)		
			Line Current		Max. prospective line Isc	Apparent Power	Max. Inrush Current (2)	Continuous current		Max. Transient current (1) (3)
			At 380 Vac	At 480 Vac				At 380 Vac	At 480 Vac	
	kW	HP	A	A	kA	kVA	A	A	A	A
ATH630U07N4	0.37	1/2	1.2	1	5	0.8	2.8	1.5	1.5	2.3
ATH630U15N4	0.75	1	2	1.7	5	1.4	4.2	2.2	2.1	3.3
ATH630U22N4	1.5	2	3.5	2.8	5	2.3	6.7	3.7	3.4	5.6
ATH630U30N4	2.2	3	4.2	3.6	5	3.0	8	5.1	4.8	7.7
ATH630U40N4	3	3	5.4	4.7	5	3.9	9.5	7.2	6.2	10.8
ATH630U55N4	4	5	7	6	5	5.0	11.3	9.1	7.6	13.7
ATH630U75N4	5.5	7.5	9.7	8.3	22	6.9	17.1	12	11	18.0
ATH630D11N4	7.5	10	13	11	22	9.1	21.3	16	14	24.0
ATH630D15N4	11	15	18.3	15.7	22	13.1	31.2	22.5	21	33.8
ATH630D18N4	15	20	24.4	21.1	22	17.5	39.6	30.5	27	45.8
ATH630D22N4	18.5	25	34.1	29.9	50	24.9	76	39.2	39.2	58.8
ATH630D30N4	22	30	40.5	35.8	50	29.8	82.6	46.3	46.3	69.5
ATH630D37N4	30	40	54.8	48.3	50	40.2	91.9	61.5	61.5	92.3
ATH630D45N4	37	50	67.1	59	50	49.1	109.7	74.5	74.5	111.8
ATH630D55N4	45	60	81.4	71.8	50	59.7	176	88	88	132.0
ATH630D75N4	55	75	98.9	86.9	50	72.2	187	106	106	159.0
ATH630D90N4	75	100	134	118.1	50	98.2	236	145	145	217.5

(1) The switching frequency is adjustable:

- From 6...16 kHz for drive frame sizes 0 to 2, rated value: 6 kHz
- From 2...12 kHz for drive frame sizes 3 to 4, rated value: 4 kHz
- From 2...8 kHz for drive frame sizes 5, rated value: 2.5 kHz

For operation at switching frequencies higher than the rated value. Derating must be applied to the drive (output) current Derating Curves, page 108. In this case, switching frequency can be reduced if an excessive temperature rise occurs.

(2) Peak current when power is switched On, for the maximum supply mains voltage.

(3) The drive is designed to run up to 60 s at 150% of nominal current.

IP55 / UL Type 12 Products

3-Phase Power Part Supply 380 (–15%)…480 Vac (+10%) 50/60 Hz

Power and Current Ratings

Catalog Number	Nominal Power (1)		Power Part Supply					Drive (output)		
			Line Current		Max. prospective line Isc	Apparent Power	Max. Inrush Current (2)	Continuous current		Max. Transient current (1) (3)
			At 380 Vac	At 480 Vac				At 380 Vac	At 480 Vac	
	kW	HP	A	A	kA	kVA	A	A	A	A
ATH650U07N4(C)	0.37	1/2	1.2	1	5	0.8	2.8	1.5	1.5	2.3
ATH650U15N4(C)	0.75	1	2	1.7	5	1.4	4.2	2.2	2.1	3.3
ATH650U22N4(C)	1.5	2	3.5	2.8	5	2.3	6.7	3.7	3.4	5.6
ATH650U30N4(C)	2.2	3	4.2	3.6	5	3.0	8	5.1	4.8	7.7
ATH650U40N4(C)	3	3	5.4	4.7	5	3.9	9.5	7.2	6.2	10.8
ATH650U55N4(C)	4	5	7	6	5	5.0	11.3	9.1	7.6	13.7
ATH650U75N4(C)	5.5	7.5	9.7	8.3	22	6.9	17.1	12	11	18.0
ATH650D11N4(C)	7.5	10	13	11	22	9.1	21.3	16	14	24.0
ATH650D15N4(C)	11	15	18.3	15.7	22	13.1	31.2	22.5	21	33.8
ATH650D18N4(C)	15	20	24.4	21.1	22	17.5	39.6	30.5	27	45.8
ATH650D22N4(U)	18.5	25	34.1	29.9	50	24.9	76	39.2	39.2	58.8
ATH650D30N4(U)	22	30	40.5	35.8	50	29.8	82.6	46.3	46.3	69.5
ATH650D37N4(U)	30	40	54.8	48.3	50	40.2	91.9	61.5	61.5	92.3
ATH650D45N4(U)	37	50	67.1	59	50	49.1	109.7	74.5	74.5	111.8
ATH650D55N4(U)	45	60	81.4	71.8	50	59.7	176	88	88	132.0
ATH650D75N4(U)	55	75	98.9	86.9	50	72.2	187	106	106	159.0
ATH650D90N4(U)	75	100	134	118.1	50	98.2	236	145	145	217.5

(1) The switching frequency is adjustable:

- From 6...16 kHz for drive frame sizes A0 to A2, rated value: 6 kHz
- From 2...12 kHz for drive frame sizes A3 to B, rated value: 4 kHz
- From 2...8 kHz for drive frame sizes C, rated value: 2.5 kHz

For operation at switching frequencies higher than the rated value. Derating must be applied to the drive (output) current Derating Curves, page 108. In this case, switching frequency can be reduced if an excessive temperature rise occurs.

(2) Peak current when power is switched On, for the maximum supply mains voltage.

(3) The drive is designed to run up to 60 s at 150% of nominal current.

Electrical Data - Upstream Protective Device

What's in This Chapter

Upstream Protective Device – Introduction

Overview

⚠⚠DANGER

INSUFFICIENT PROTECTION AGAINST OVERCURRENTS CAN CAUSE FIRE OR EXPLOSION

- Use properly rated overcurrent protection devices.
- Use the fuses/circuit breakers specified.
- Do not connect the product to a supply mains whose prospective short circuit current rating (current that flows during a short circuit) exceeds the specified maximum permissible value.
- When rating the upstream mains fuses and the cross sections as well as the lengths of the mains cables, take into account the minimum required prospective short-circuit current (Isc). Refer to the Upstream Protection Device section.
- If the minimum required prospective short-circuit current (Isc) is not available, increase the power of the transformer or decrease the length of the cables.

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

The values and products for IEC compliance are specified in the present manual. Refer to the Prospective Short-Circuit Section, page 86

The values and products for UL/CSA compliance are specified in the ATH 600 Getting Started Annex (NAT16152) provided with the product.

General

- The Short Circuit Protective Device (SCPD) rated to the drive will help protect the upstream installation in case of a short-circuit internal to the drive and mitigate the damage to the drive and its surrounding area.
- The SCPD rated to the drive is mandatory to help ensuring the safety of the Power Drive System.

  It comes in addition to the upstream branch circuit protection which is in compliance with the local regulation for electrical installation.
- The SCPD shall mitigate the damage in case of detected error condition such as an internal short-circuit of the drive.
- The SCPD must take into account both following characteristics...
  - a maximum prospective short-circuit current
  - a minimum required prospective short-circuit current (Isc).

If the minimum required prospective short-circuit current (Isc) is not available, increase the power of the transformer or decrease the length of the cables

In other cases, contact your Schneider Electric Customer Care Center (CCC) www.se.com/CCC for specific selection of Short Circuit Protective Device (SCPD).

Note: The electronic power output short-circuit protection circuitry meets the requirements of IEC 60364-4-41:2005/AMD1 — Clause 411.

Protection Devices & Certified Associations

Using protection devices that are unsuitable, not certified, or not validated can lead to severe hazards such as **electric shock**, **explosion**, **arc flash**, or **fire**. These risks may occur when equipment is combined in configurations that have not been tested or certified according to the applicable standards.

The specified **short circuit protection devices and associations** are **not optional** – they are **mandatory**. Only these configurations have been tested and certified to ensure that applicable standards are fully covered.

Using alternative devices – such as a circuit breaker or fuses that differs from the specified model – may compromise:

- system selectivity,
- breaking capacity,
- thermal and mechanical withstand,
- overall system compliance,
- and ultimately, the safety of persons and equipment.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, ARC FLASH OR FIRE

Any association other than those provided, validated, or officially specified must undergo:

- complete normative testing,
- performed by a Certified Competent Body,
- confirming that 100% of the applicable standards remain fully covered.

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

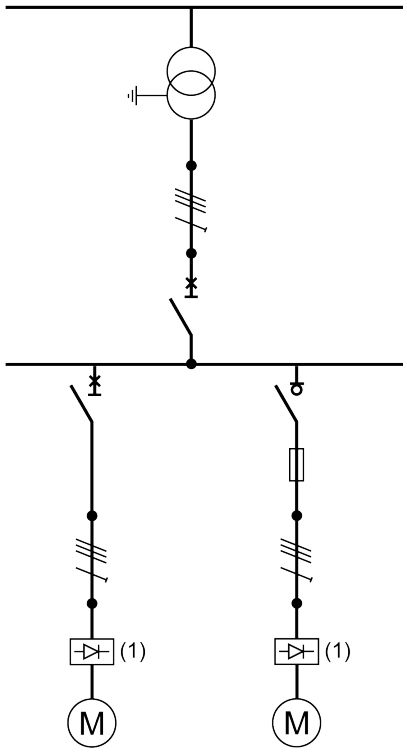
Without such testing and validation, system compliance can no longer be guaranteed, and Schneider Electric cannot be held responsible for any situation resulting from the customer's own choices or actions, including but not limited to:

- the use of protection devices or associations that are not validated,
- any substitution or modification involving components that are not certified,
- cases where normative testing has not been performed and approved by a recognized certified body.

It is the customer's responsibility to ensure that any alternative association is fully tested and certified in accordance with the applicable standards.

Wiring Diagram

This diagram shows an example of installation with both SCPD types, Circuit-breaker and Fuse link rated to the drive.



(1) Drive

Prospective Short-Circuit Current

Calculation

The prospective short-circuit current shall be computed at the drive connection points.

We recommend using the Schneider Electric tool Ecodial Advance Calculation

available on www.se.com/en/product-range-presentation/61013-ecodial-advance-calculation/

The following equations allow to estimate the value of the symmetrical three-phase prospective short-circuit current (Isc) at the drive connection points.

$$Xt = \frac{U^2}{Sn} \cdot usc$$

$$Zcc = \sqrt{\left(\rho \cdot \frac{l}{S} + Rf\right)^2 + \left(Xt + Xc.l + Xf\right)^2}$$

$$Isc = \frac{U}{\sqrt{3}} \cdot \frac{1}{Zcc}$$

Isc	Symmetrical three-phase prospective short-circuit current (kA)
Xt	Transformer reactance
U	No-load phase to phase voltage of the transformer (V)
Sn	Apparent transformer power (kVA)
usc	Short-circuit voltage, according to the transformer data sheet (%)
Zcc	Total short-circuit impedance (mΩ)
ρ	Conductor resistivity e.g. Cu: 0.01851 mΩ.mm
l	Conductor length (mm)
S	Conductor cross section (mm^2)
Xc	Conductor lineic reactance (0.0001 mΩ/mm)
Rf, Xf	Resistance and reactance of the line filter (mΩ) , page 88

Example of Calculation with Copper Cable (without line filter)

Transformer 50 Hz	U 400 Vac Usc	Cable Cross Section	Isc depending on cable length in m(ft)							
			10 (33)	20 (66)	40 (131)	80 (262)	100 (328)	160 (525)	200 (656)	320 (1,050)
kVA	%	mm² (AWG)	kA	kA	kA	kA	kA	kA	kA	kA
100	4	2.5 (14)	2.3	1.4	0.8	0.4	0.3	0.2	0.2	0.1
		4 (12)	2.9	2.0	1.2	0.6	0.5	0.3	0.2	0.2
		6 (10)	3.2	2.6	1.6	0.9	0.7	0.5	0.4	0.2
		10 (8)	3.4	3.1	2.3	1.4	1.2	0.8	0.6	0.4
		25 (4)	3.5	3.4	3.1	2.5	2.2	1.6	1.4	0.9
		50 (0)	3.5	3.5	3.3	3.0	2.8	2.3	2.1	1.5
		70 (00)	3.5	3.5	3.4	3.1	2.9	2.6	2.3	1.8
		120 (250 MCM)	3.6	3.5	3.4	3.2	3.1	2.8	2.6	2.1
250	4	6 (10)	5.7	3.4	1.8	0.9	0.7	0.5	0.4	0.2
		10 (8)	7.1	5.0	2.9	1.5	1.2	0.8	0.6	0.4
		25 (4)	8.4	7.4	5.5	3.4	2.8	1.8	1.5	0.9
		50 (0)	8.6	8.1	7.0	5.2	4.5	3.2	2.7	1.8
		70 (00)	8.6	8.2	7.3	5.8	5.2	3.9	3.3	2.3
		120 (250 MCM)	8.7	8.3	7.6	6.5	6.0	4.8	4.2	3.0
400	4	6 (10)	6.6	3.6	1.8	0.9	0.7	0.5	0.4	0.2
		10 (8)	9.2	5.6	3.0	1.5	1.2	0.8	0.6	0.4
		25 (4)	12	9.9	6.5	3.6	2.9	1.9	1.5	1.0
		50 (0)	13	12	9.3	6.1	5.1	3.4	2.8	1.8
		70 (00)	13	12	10	7.2	6.2	4.4	3.6	2.4
		120 (250 MCM)	13	13	11	8.6	7.6	5.7	4.9	3.4
800	6	6 (10)	6.9	3.7	1.9	0.9	0.7	0.5	0.4	0.2
		10 (8)	10	5.8	3.0	1.5	1.2	0.8	0.6	0.4
		25 (4)	15	11	6.9	3.7	3.0	1.9	1.5	1.0
		50 (0)	17	15	11	6.5	5.4	3.5	2.9	1.8
		70 (00)	17	15	12	7.9	6.7	4.6	3.7	2.4
		120 (250 MCM)	17	16	13	9.8	8.6	6.2	5.2	3.5
1,000	6	6 (10)	7.1	3.7	1.9	0.9	0.7	0.5	0.4	0.2
		10 (8)	11	6.0	3.1	1.5	1.2	0.8	0.6	0.4
		25 (4)	18	12	7.1	3.7	3.0	1.9	1.5	1.0
		50 (0)	21	17	12	6.7	5.5	3.6	2.9	1.8
		70 (00)	21	18	13	8.4	7.0	4.7	3.8	2.4
		120 (250 MCM)	22	19	16	11	9.3	6.5	5.4	3.6

Harmonic Passive Filters Resistance and Reactance Values

Catalog Number			Xf
Drive	Harmonic passive filter		
380...480 Vac	THDi < 5%		mΩ
ATH630D22N4Z,ATH630D22N4, ATH650D22N4,ATH650D22N4U	VW3A46126	VW3A46164	270
ATH630D30N4Z,ATH630D30N4, ATH650D30N4,ATH650D30N4U	VW3A46127	VW3A46165	180
ATH630D37N4Z,ATH630D37N4, ATH650D37N4,ATH650D37N4U	VW3A46128	VW3A46166	170
ATH630D45N4Z,ATH630D45N4, ATH650D45N4,ATH650D45N4U	VW3A46129	VW3A46167	130
ATH630D55N4Z,ATH630D55N4, ATH650D55N4,ATH650D55N4U	VW3A46130	VW3A46168	100
ATH630D75N4Z,ATH630D75N4, ATH650D75N4,ATH650D75N4U	VW3A46131	VW3A46169	70
ATH630D90N4Z,ATH630D90N4, ATH650D90N4,ATH650D90N4U	VW3A46132	VW3A46170	50
ATH630C11N4Z	VW3A46133	VW3A46171	40
ATH630C13N4Z	VW3A46134	VW3A46172	30
ATH630C16N4Z	VW3A46135	VW3A46173	30
ATH630C22N4Z	VW3A46137	VW3A46174	20
ATH630C25N4Z	VW3A46138	VW3A46176	20

IEC Type Circuit-Breaker — with enclosure

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR FIRE

The opening of the branch-circuit protective device is able to be an indication that a fault current has been interrupted.

- Current-carrying parts and other components of the controller should be examined and replaced if damaged.
- If burnout of the current element of an overload relay occurs, the complete overload relay must be replaced.

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

Function

The circuit-breaker offers enhanced features versus fuse-link since it cumulates 3 functionalities:

- insulation with lock,
- switch (full load interruption),
- downstream short-circuit protection without replacement.

Altivar HVAC Short Circuit Current Ratings: Selection Table

The amp rating of the short circuit protection devices in the table are maximum values **with Enclosure**, in **Normal Duty**.

Smaller amp sizes may be used; particularly for Heavy Duty ratings.

NOTE: Integral solid state short circuit protection in the drive does not provide branch circuit protection. Branch circuit protection must be provided in accordance with any local codes.

NOTE:

First, calculate prospective short-circuit current (ISC) in Calculation section, page 86.

Then, verify that ISC value is within the range of SCCR given in the following table.

480 Vac Three-phase (50/60 Hz)

Note: Suitable for use on a circuit capable of delivering not more than ***__X__*** rms symmetrical kiloAmperes, **480 Vac** Volts maximum, when protected by ***__Z1__*** with a maximum rating of ***__Z2__***.

Circuit breakers can be chosen as SCPD according to the following table:

Drive Catalog Number	Tesys GV / ComPact Catalog number (a) (*Z1, Z2*)	Rating	Irm	SCCR (*X*)		Minimum Enclosure Volume	
				Min.	Max.		
		A	A	A	kA	(L)	(in^3)
ATH630U07N4(Z)	GV2L07	2.5	33.5	100	5	25	1536
ATH630U15N4(Z)	GV2L08	4	51	100	5	25	1536
ATH630U22N4(Z)	GV2L10	6.3	78	200	5	25	1536
ATH630U30N4(Z)	GV2L10	6.3	78	200	5	25	1536
ATH630U40N4(Z)	GV2L14	10	138	300	5	25	1536
ATH630U55N4(Z)	GV2L14	10	138	300	5	25	1536
ATH630U75N4(Z)	GV3L25	25	350	700	22	25	1536
ATH630D11N4(Z)	GV3L25	25	350	700	22	25	1536
ATH630D15N4(Z)	GV3L25	25	350	700	22	25	1536
ATH630D18N4(Z)	GV3L32	32	448	700	22	25	1536
ATH630D22N4(Z)	GV3L50	50	700	1100	50	56	3390
ATH630D30N4(Z)	GV3L65	65	910	1800	50	115	7010
ATH630D37N4(Z)	GV4L/LE80	80	480	1800	50	115	7010
ATH630D45N4(Z)	GV4L/LE115	115	690	2500	50	115	7010
ATH630D55N4(Z)	GV4L/LE115	115	690	2500	50	132	12039
ATH630D75N4(Z)	NSX160-MA150	150	1350	3200	50	132	12039
ATH630D90N4(Z)	NSX250-MA220	220	1980	4700	50	132	12039
ATH630C11N4Z	NSX250-MA220	220	1980	4700	50	478	29160
ATH630C13N4Z	NSX400● Micrologic 1.3-M320	320	1600	6300	50	478	29160
ATH630C16N4Z	NSX400● Micrologic 1.3-M320	320	1600	6300	50	478	29160
ATH630C22N4Z	NSX630●1.3-M500	500	4500	9000	50	878	53550
ATH630C25N4Z	NSX630●1.3-M500	500	4500	9000	50	878	53550

NOTE: (a) about Tesys GV / ComPact Catalog number: For references to be completed, replace ● with the letter corresponding to the breaking performance of the circuit breaker:(F, N, H, S, or L). You can use the EcoStruxure™ Motor Control Configurator tool to support your customization.

IEC Fuses — with enclosure

Introduction

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR FIRE

The opening of the branch-circuit protective device is able to be an indication that a fault current has been interrupted.

- Current-carrying parts and other components of the controller should be examined and replaced if damaged.
- If burnout of the current element of an overload relay occurs, the complete overload relay must be replaced.

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

Altivar HVAC Short Circuit Current Ratings: Selection Table

The amp rating of the short circuit protection devices in the table are maximum values **with Enclosure**, in **Normal Duty**.

Smaller amp sizes may be used; particularly for Heavy Duty ratings.

NOTE: Integral solid state short circuit protection in the drive does not provide branch circuit protection. Branch circuit protection must be provided in accordance with any local codes.

NOTE:

First, calculate prospective short-circuit current (ISC) in Calculation section, page 86.

Then, verify that ISC value is within the range of SCCR given in the following table.

480 Vac Three-phase (50/60 Hz)

Note: Suitable for use on a circuit capable of delivering not more than ***__X__*** rms symmetrical kiloAmperes, **480 Vac** Volts maximum, when protected by ***__Z1__*** with a maximum rating of ***__Z2__***.

Current limiting fuses can be chosen as SCPD according to the following table:

IEC Fuses — with enclosure – ATH630U07N4(Z) to ATH630D90N4(Z)

Drive Catalog Number	gG (*Z1, Z2*)	SCCR (*X*)		gR-gS-aR (*Z1, Z2*)	SCCR (*X*)		Minimum Enclosure Volume	
	(A)	Min (A)	Max (kA)	(A)	Min (A)	Max (kA)	(L)	(in^3)
ATH630U07N4(Z)	4	200	5	4	100	5	25	1536
ATH630U15N4(Z)	6	200	5	6	100	5	25	1536
ATH630U22N4(Z)	8	200	5	8	100	5	25	1536
ATH630U30N4(Z)	10	300	5	12.5	200	5	25	1536
ATH630U40N4(Z)	12	300	5	16	200	5	25	1536
ATH630U55N4(Z)	16	400	5	20	200	5	25	1536
ATH630U75N4(Z)	25	1000	22	32	500	22	25	1536
ATH630D11N4(Z)	32	2000	22	40	500	22	25	1536
ATH630D15N4(Z)	40	2000	22	50	800	22	25	1536
ATH630D18N4(Z)	50	2500	22	63	1000	22	25	1536
ATH630D22N4(Z)	80	4000	50	80	1500	50	56	3390
ATH630D30N4(Z)	100	5500	50	100	1500	50	115	7010
ATH630D37N4(Z)	125	6500	50	125	2000	50	115	7010
ATH630D45N4(Z)	160	9000	50	160	2500	50	115	7010
ATH630D55N4(Z)	160	9000	50	160	2500	50	132	12039
ATH630D75N4(Z)	250	15000	50	250	5000	50	132	12039
ATH630D90N4(Z)	250	15000	50	250	5000	50	132	12039

IEC Fuses — with enclosure – ATH630C••N4Z

Drive Catalog Number	gR-gS-aR (*Z1, Z2*)	SCCR (*X*)		Line Reactor Min Value	Minimum Enclosure Volume	
	(A)	Min (A)	Max (kA)	(mH/ A)	(L)	(in^3)
ATH630C11N4Z	315	6000	50	N/A	478	29160
ATH630C13N4Z	350	7000	50		478	29160
ATH630C16N4Z	400	9000	50		478	29160
ATH630C22N4Z	630	10000	50	0,05mH/400A	878	53550
ATH630C25N4Z	700	10000	50	0,05mH/440A	878	53550

IEC Fuses — wall mounted

Introduction

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR FIRE

The opening of the branch-circuit protective device is able to be an indication that a fault current has been interrupted.

- Current-carrying parts and other components of the controller should be examined and replaced if damaged.
- If burnout of the current element of an overload relay occurs, the complete overload relay must be replaced.

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

Altivar HVAC Short Circuit Current Ratings: Selection Table

The amp rating of the short circuit protection devices in the table are maximum values **with conduit box (wall mounted)**, in **Normal Duty**.

Smaller amp sizes may be used; particularly for Heavy Duty ratings.

NOTE: Integral solid state short circuit protection in the drive does not provide branch circuit protection. Branch circuit protection must be provided in accordance with any local codes.

NOTE:

First, calculate prospective short-circuit current (ISC) in Calculation section, page 86.

Then, verify that ISC value is within the range of SCCR given in the following table.

480 Vac Three-phase (50/60 Hz)

Note: Suitable for use on a circuit capable of delivering not more than ***__X__*** rms symmetrical kiloAmperes, **480 Vac** Volts maximum, when protected by ***__Z1__*** with a maximum rating of ***__Z2__***.

Current limiting fuses can be chosen as SCPD according to the following table:

IEC Fuses — wall mounted – ATH630

Drive Catalog Number	gG (*Z1, Z2*)	SCCR (*X*)		gR-gS-aR (*Z1, Z2*)	SCCR (*X*)	
	(A)	Min (A)	Max (kA)	(A)	Min (A)	Max (kA)
ATH630U07N4	4	200	5	4	100	5
ATH630U15N4	6	200	5	6	100	5
ATH630U22N4	8	200	5	8	100	5
ATH630U30N4	10	300	5	12.5	200	5
ATH630U40N4	12	300	5	16	200	5
ATH630U55N4	16	400	5	20	200	5
ATH630U75N4	25	1000	22	32	500	22
ATH630D11N4	32	2000	22	40	500	22
ATH630D15N4	40	2000	22	50	800	22
ATH630D18N4	50	2500	22	63	1000	22
ATH630D22N4	80	4000	50	80	1500	50
ATH630D30N4	100	5500	50	100	1500	50
ATH630D37N4	125	6500	50	125	2000	50
ATH630D45N4	160	9000	50	160	2500	50
ATH630D55N4	160	9000	50	160	2500	50
ATH630D75N4	250	15000	50	250	5000	50
ATH630D90N4	250	15000	50	250	5000	50

IEC Fuses — wall mounted – ATH630C••N4Z with conduit box

Drive Catalog Number	Conduit box	gR-gS-aR (*Z1, Z2*)	SCCR (*X*)		Line Reactor Min Value
		(A)	Min (A)	Max (kA)	(mH/ A)
ATH630C11N4Z	VW3A9704	315	6000	50	N/A
ATH630C13N4Z	VW3A9704	350	7000	50	
ATH630C16N4Z	VW3A9704	400	9000	50	
ATH630C22N4Z	VW3A9212	630	10000	50	0,05mH/400A
ATH630C25N4Z	VW3A9213	700	10000	50	0,05mH/440A

IEC Fuses – ATH650

Drive Catalog Number	gG (*Z1, Z2*)	SCCR (*X*)		gR-gS-aR (*Z1, Z2*)	SCCR (*X*)	
	(A)	Min (A)	Max (kA)	(A)	Min (A)	Max (kA)
ATH650U07N4(C)	4	200	5	4	100	5
ATH650U15N4(C)	6	200	5	6	100	5
ATH650U22N4(C)	8	200	5	8	100	5
ATH650U30N4(C)	10	300	5	12.5	200	5
ATH650U40N4(C)	12	300	5	16	200	5
ATH650U55N4(C)	16	400	5	20	200	5
ATH650U75N4(C)	25	1000	22	32	500	22
ATH650D11N4(C)	32	2000	22	40	500	22
ATH650D15N4(C)	40	2000	22	50	800	22
ATH650D18N4(C)	50	2500	22	63	1000	22
ATH650D22N4(U)	80	4000	50	80	1500	50
ATH650D30N4(U)	100	5500	50	100	1500	50
ATH650D37N4(U)	125	6500	50	125	2000	50
ATH650D45N4(U)	160	9000	50	160	2500	50
ATH650D55N4(U)	160	9000	50	160	2500	50
ATH650D75N4(U)	250	15000	50	250	5000	50
ATH650D90N4(U)	250	15000	50	250	5000	50

UL Circuit-Breakers and Fuses

Reference Document

UL Fuse and circuit-breaker information is provided in the Annex for ATH600 Getting Started (NAT16143).

Complementary Information — Circuit Breakers

The following table shows the minimum required prospective short-circuit current (Isc) depending on the drive and **associated circuit-breaker**.

Catalog Number	Circuit Breakers			
	PowerPact	Min. Isc	GV•P	Min. Isc
380...480 Vac		(A)		(A)
ATH630U07N4Z	H●L36015	1500	GV2P07	100
ATH630U15N4Z	H●L36015	1500	GV2P08	100
ATH630U22N4Z	H●L36015	1500	GV2P10	200
ATH630U30N4Z	H●L36015	1500	GV2P10	200
ATH630U40N4Z	H●L36015	1500	GV2P14	300
ATH630U55N4Z	H●L36015	1500	GV3P13	300
ATH630U75N4Z	H●L36020	1500	GV3P18	400
ATH630D11N4Z	H●L36030	1500	GV3P25	700
ATH630D15N4Z	H●L36040	1700	GV3P32	700
ATH630D18N4Z	H●L36050	1700	GV3P40	900
ATH630D22N4Z	H●L36080	3000	GV3P40	900
ATH630D30N4Z	H●L36100	3500	GV3P50	1100
ATH630D37N4Z	H●L36125	3500	GV3P65	1800
ATH630D45N4Z	H●L36150	3500	GV4PB80S	6000
ATH630D55N4Z	J●L36175	3500	GV4PB115S	6000
ATH630D75N4Z	J●L36200	4000	GV4PB115S	6000
ATH630D90N4Z	J●L36250	5000	GV5PB250S	8500
ATH630C11N4Z	L●L36400	7500	GV5PB250S	9500
ATH630C13N4Z	L●L36600	10000	GV6PB400S	9500
ATH630C16N4Z	L●L36600	10000	GV6PB400S	18000
ATH630U07N4Z	H●L36015	1500	GV2P07	100
ATH630U15N4Z	H●L36015	1500	GV2P08	100
ATH630U22N4Z	H●L36015	1500	GV2P10	200
ATH630U30N4Z	H●L36015	1500	GV2P10	200
ATH630U40N4Z	H●L36015	1500	GV2P14	300
ATH630U55N4Z	H●L36015	1500	GV3P13	300
ATH630U75N4Z	H●L36020	1500	GV3P18	400
ATH630D11N4Z	H●L36030	1500	GV3P25	700
ATH630D15N4Z	H●L36040	1700	GV3P32	700
ATH630D18N4Z	H●L36050	1700	GV3P40	900

Complementary Information — Fuses

The following table shows the minimum required prospective short-circuit current (Isc) depending on the drive and **associated class J fuse**, according to UL248-8.

Catalog Number	Class J Fuse	Minimum Isc
380...480 Vac	**(A)**	**(A)**
ATH630U07N4(Z), ATH650U07N4(C)	6	300
ATH630U15N4(Z), ATH650U15N4(C)	10	500
ATH630U22N4(Z), ATH650U22N4(C)	10	500
ATH630U30N4(Z), ATH650U30N4(C)	12	500
ATH630U40N4(Z), ATH650U40N4(C)	15	500
ATH630U55N4(Z), ATH650U55N4(C)	17.5	500
ATH630U75N4(Z), ATH650U75N4(C)	25	1000
ATH630D11N4(Z), ATH650D11N4(C)	30	1000
ATH630D15N4(Z), ATH650D15N4(C)	40	1500
ATH630D18N4(Z), ATH650D18N4(C)	50	2000
ATH630D22N4Z ATH630D22N4 **without line reactor only** ATH650D22N4(U)	60	2000
ATH630D30N4Z ATH630D30N4 **without line reactor only** ATH650D30N4(U)	80	2000
ATH630D37N4Z ATH630D37N4 **without line reactor only** ATH650D37N4(U)	90	2500
ATH630D45N4Z ATH630D45N4 **without line reactor only** ATH650D45N(U)	100	2500
ATH630D55N4Z ATH630D55N4 **without line reactor only** ATH650D55N4(U)	150	3500
ATH630D75N4Z ATH630D75N4 **without line reactor only** ATH650D75N4(U)	200	5000
ATH630D90N4Z ATH630D90N4 **without line reactor only** ATH650D90N4(U)	200	5000
ATH630C11N4Z	300	8000
ATH630C13N4Z	400	10000
ATH630C16N4Z	500	12000
ATH630C22N4Z **with line reactor**	500	12000
ATH630C25N4Z **with line reactor**	600	15000

Drive Mounting

What's in This Part

Mounting Conditions

Before You Begin

⚠⚠DANGER

HAZARD OF FIRE OR ELECTRIC SHOCK

- The open type product does not provide comprehensive mitigation for fire hazards and protection against direct contact to hazardous live parts.
- Install the product inside a supplementary enclosure which provides appropriate protection against spread of fire and electric shock.

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

⚠DANGER

RISK OF FIRE

The device is suitable for mounting on concrete or other non-combustible surfaces only.

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

Conductive foreign objects may cause parasitic voltage.

⚠⚠DANGER

ELECTRIC SHOCK AND/OR UNANTICIPATED EQUIPMENT OPERATION

- Keep foreign objects such as chips, screws or wire clippings from getting into the product.
- Verify correct seat of seals and cable entries in order to avoid deposits and humidity.

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

The temperature of the products described in this manual may exceed 80 °C (176 °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.

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.

Attaching a label with safety instructions

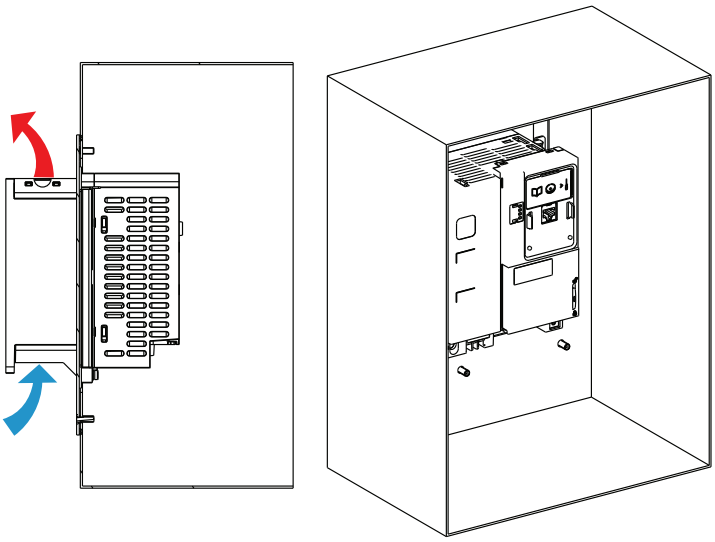
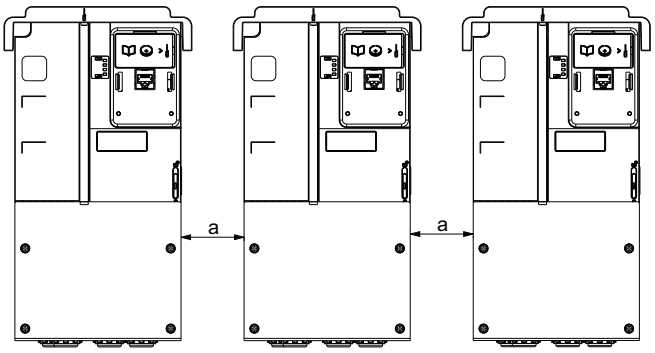
A label kit is provided with the drive.

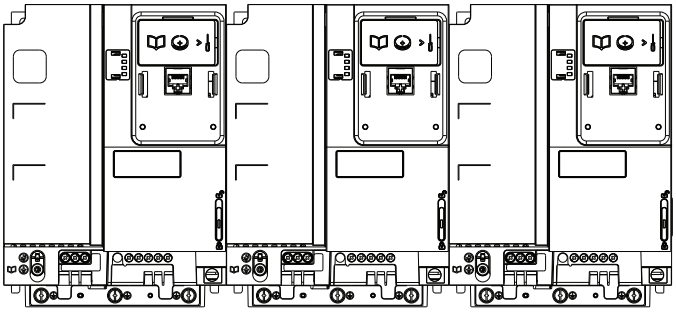
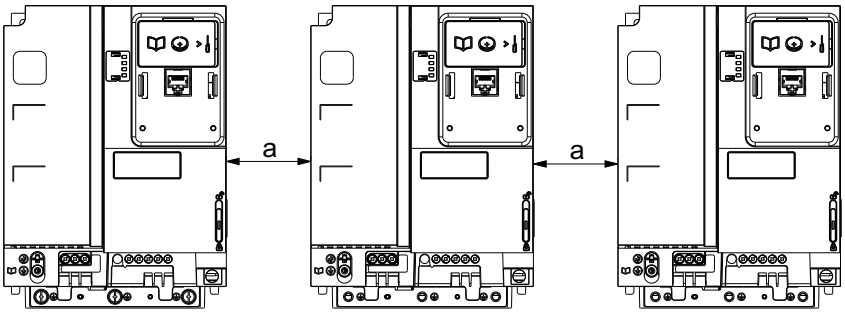
Step	Action
1	Observe the safety regulations in the target country
2	Select the label suitable for the target country
3	Attach the label to the front of the device so that it is clearly visible. Below is the English version. The label can vary depending on the frame size of the product.  **NOTE: Products used in Canada** according to CSA C22.2 no.274 must comply with the requirement defined by the Canadian Advisory council of Electrical Safety (CACES). It defines that dual language (French and English) safety labeling is required on all products for use in Canada. To fulfill this requirement, add the French language safety label on the front panel of the product.

Mounting Types

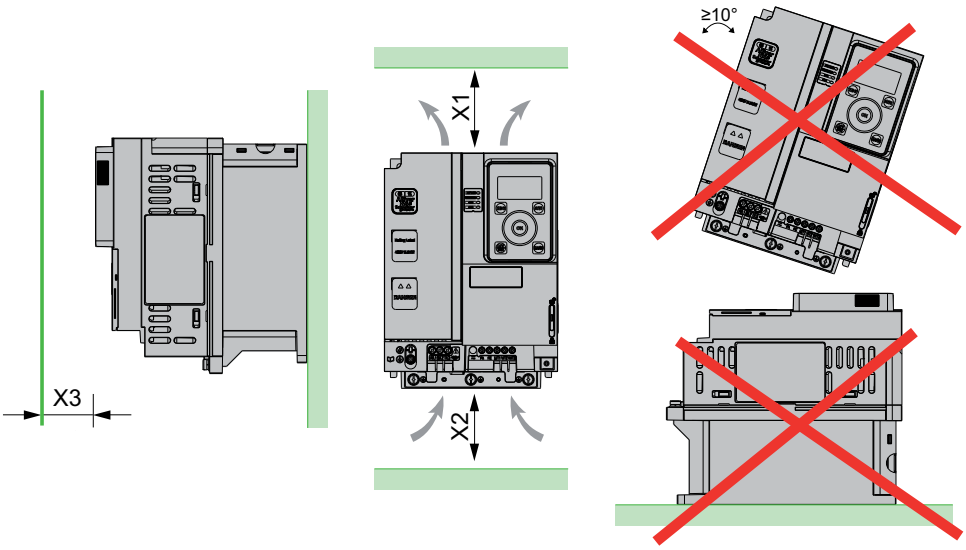
This table shows the possible mounting types and the resulting IP degree of protection.

Possible Mounting Types

Mounting		Figure
Type	**Description**	
–	Enclosed with flange-mounting kit	This mounting is used to reduce the power dissipated in the enclosure by locating the power section outside the enclosure.  This mounting type requires the dedicated flange-mounting kit. **NOTE:** Use ProClima software available on www.se.com to support you to integrate Altivar HVAC in an enclosure.
A	Individual IP21 and IP55	 Frame sizes 0, 1, 2A and 2B: a ≥ 50 mm (2 in.) Frame sizes 3: a ≥ 100 mm (3.9 in.) Frame sizes 4 and 5: a ≥ 110 mm (4.33 in.) **Frame size A, B and C: no restriction of clearance**

Mounting		Figure
Type	Description	
B	Side by side IP20	 Frame sizes 0, 1, 2A, 2B, 3, 7A and 7B: possible, regardless of the number of drives installed side by side Frame sizes 4 and 5: possible, 2 drives only Frame size 6: only at ambient temperature lower than 40 °C (104 °F)
C	Individual IP20	 Frame sizes 0, 1, 2A, 2B, 3, 7A and 7B: no restriction of clearance Frame sizes 4, 5 and 6: a ≥ 110 mm (4.33 in.)

Clearances and Mounting Position - Wall Mounting



Minimum clearance regarding the drive frame size

Frame Size	X1	X2	X3
0...5 A...C	≥ 100 mm (3.94 in.)	≥ 100 mm (3.94 in.)	≥ 10 mm (0.39 in.)
6	≥ 250 mm (10 in.)	≥ 250 mm (10 in.)	≥ 100 mm (3.94 in.)
7A, 7B	≥ 200 mm (7.87 in.)	≥ 150 mm (5.90 in.)	≥ 10 mm (0.39 in.)

X1: free space in top of the drive

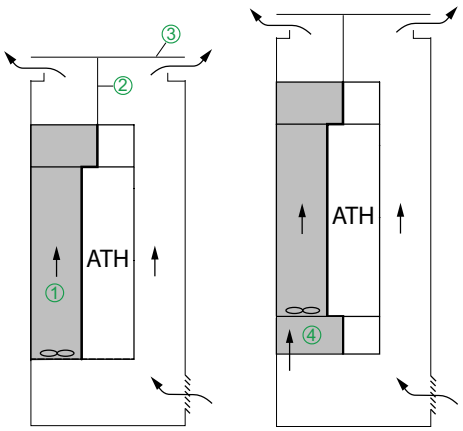
X2: free space in lower part of the drive

X3: free space in front of the drive. 50 mm (2 in.) for option module and display terminal.

Frame Size 7 Drive - IP23 Mounting in Enclosure

Install the drive as described below:

Installation Procedure

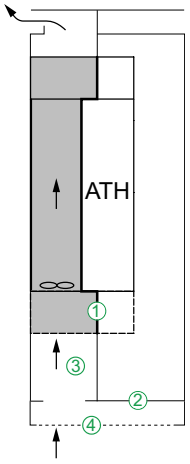
Step	Action	Drawing and Comments
1	Install the drive on an enclosure baseplate	
2	Install the DC choke in accordance with the mounting instruction, page 121.	
3	Install the UL Type 1, IP21 kit ④ for attaching the power cables, in accordance with the mounting instructions supplied with the kit	
4	Extend the IP54 duct ① between the upper outlet of the DC choke and the top of the enclosure ②. Fixing points are provided for this purpose on the top of the DC choke.	
5	Add a plate ③ approximately 150 mm (6 in.) from the top of the enclosure over the air outlet opening to prevent foreign bodies falling into the drive cooling duct.	The air inlet can be via a grille on the lower part of front panel of the enclosure door, in accordance with the required flow rates given in the above table.

NOTE:

- If the air in the power circuit is totally evacuated to the outside, very few power is dissipated inside the enclosure.
- Connect all the additional metal parts to ground using the strips.
- The design of the UL Type 1, IP21 kit ④ (to be ordered as an option) is based on the same principle as the DC choke, and has an IP54 duct to help guide the incoming air.

Frame Size 7 Drive - IP54 Mounting in Enclosure

Install the drive as described in the IP23 mounting section with the following additional points to obtain an IP54 enclosure:

Step	Action	Drawing and Comments
1	Do not make an air outlet hole for the control section. Do not make an air inlet hole in the enclosure door. In the power section, the air will enter through the lower part of the enclosure via a plinth added for this purpose.	
2	Install the IP21 UL Type 1 kit ①, if required in accordance with the mounting instructions supplied with the kit	
3	Add an enclosure baseplate ② designed to provide IP54 protection around the power cables.	
4	Add an air evacuation duct ③ between the baseplate and the duct of the UL type 1 conformity kit. The conformity kit enables an extension duct to be mounted. Drill a hole in the base of the enclosure to allow air to enter. Place seals around the duct that has been added to maintain IP54 protection.	
5	Add a 200 mm plinth ④ at the lower part of the enclosure with grilles to allow air to enter.	
6	Use the dissipated power table below to calculate the enclosure dimensions.	

NOTE:

- Connect all the additional metal parts to ground using the strips.

General Mounting Instructions

- Mount the device in a vertical position. This is required for cooling the device.
- Attach it on the mounting surface in compliance with standards, using 4 screws with captive washer according to the table given in Mounting Procedures, page 118.
- The use of washers is required with all mounting screws.
- Tighten the fixation screws.
- Do not mount the device close to heat sources.
- Avoid environmental effects like high temperatures and high humidity as well as dust, dirt and conductive gases.
- Adhere to the minimum installation distances for required cooling.
- Do not mount the device on flammable materials.

Power Dissipated For Enclosed Drives and Required Air Flow - Wall Mounting

Catalog Number	Power dissipated at Ready state	Power Dissipated at Nominal Load in Normal Duty (1)			Power Dissipated at Nominal Load in Heavy Duty (1)			Minimum air flow rate required	
	Total	Forced Cooled Area	Natural Cooled Area	Total	Forced Cooled Area	Natural Cooled Area	Total		
	(W)	(W)	(W)	(W)	(W)	(W)	(W)	(m^3/hour)	(ft^3/min)
ATH630U07N4(Z)	22	25	24	49	17	23	40	24	14
ATH630U15N4(Z)	22	39	26	65	25	24	49	24	14
ATH630U22N4(Z)	22	54	28	82	39	26	65	24	14
ATH630U30N4(Z)	22	74	29	103	56	27	83	41	24
ATH630U40N4(Z)	22	92	31	123	74	29	103	41	24
ATH630U55N4(Z)	22	121	34	155	92	31	123	41	24
ATH630U75N4(Z)	26	174	41	215	134	37	171	71	42
ATH630D11N4(Z)	26	244	50	294	174	41	215	71	42
ATH630D15N4(Z)	27	315	57	372	230	48	278	110	65
ATH630D18N4(Z)	27	391	64	455	315	56	371	110	65
ATH630D22N4(Z)	23	583	87	670	451	82	533	215	127
ATH630D30N4(Z)	31	730	113	843	485	101	586	240	141
ATH630D37N4(Z)	31	908	122	1030	661	113	774	240	141
ATH630D45N4(Z)	31	1078	132	1210	780	123	903	240	141
ATH630D55N4(Z)	32	1073	155	1228	776	143	919	295	174
ATH630D75N4(Z)	32	1601	184	1785	987	156	1143	295	174
ATH630D90N4(Z)	32	1899	205	2104	1364	185	1549	295	174
ATH630C11N4Z	67	2318	320	2638	1795	292	2087	600	353
ATH630C13N4Z	67	2638	349	2987	2116	320	2436	600	353
ATH630C16N4Z	67	3424	388	3812	2651	350	3001	600	353
ATH630C22N4Z	165	4508	706	5214	3120	615	3735	860	506
ATH630C25N4Z	202	5063	920	5983	3643	850	4493	1260	742

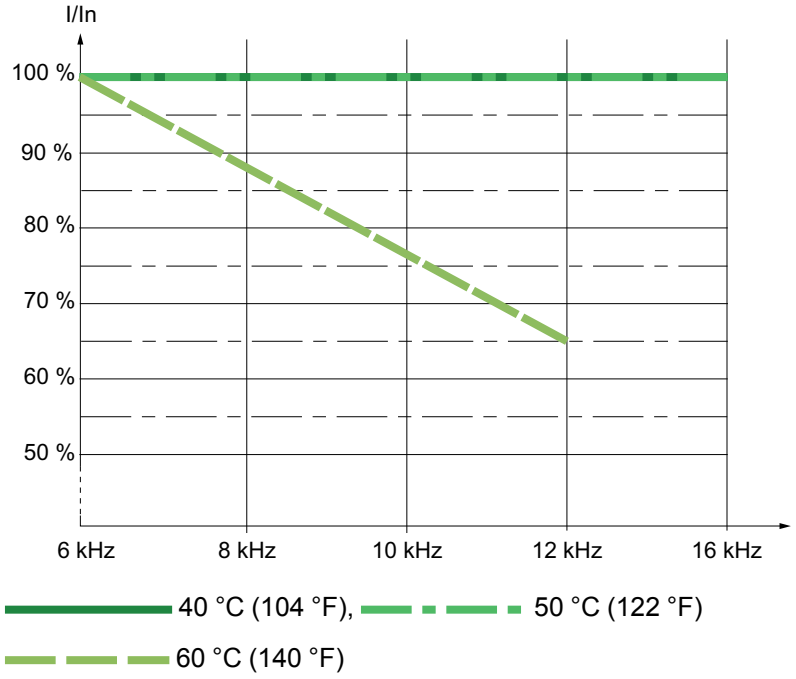
(1) First value is the power dissipated at nominal current in the forced cooled area of the drive. The second value is the power dissipated at nominal current in the natural cooled area, value used in case of installation using the flange-mounting kit, separate hot and control part in a cabinet. If the drive is installed in a standard cabinet, the sum of both values is to be taken into account.

Derating Curves

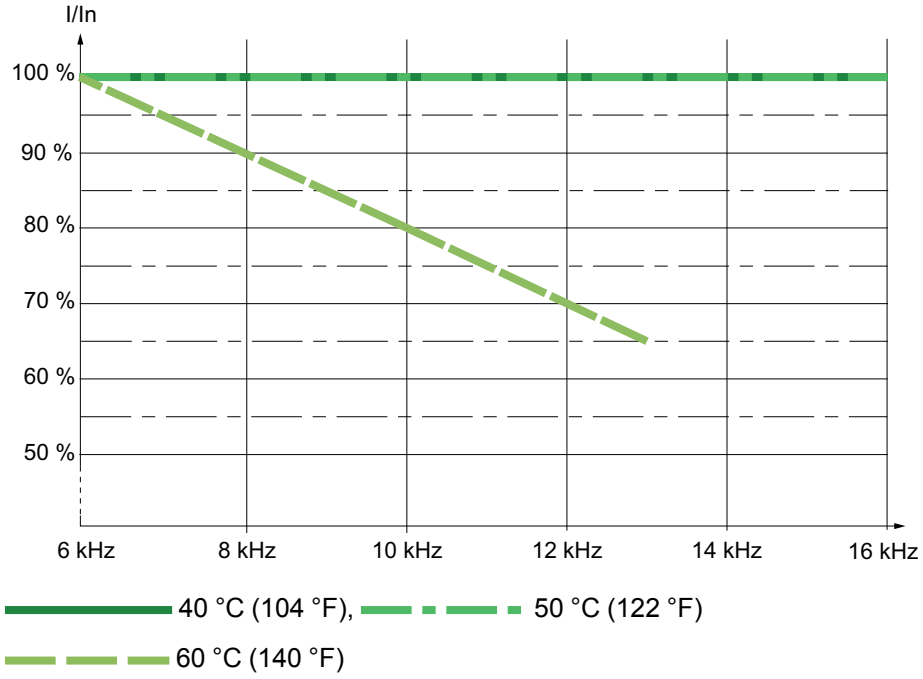
Description

Derating curves for the nominal drive current (In) as a function of temperature and switching frequency. Refer to the Mounting Conditions chapter, page 102 for the mounting types description.

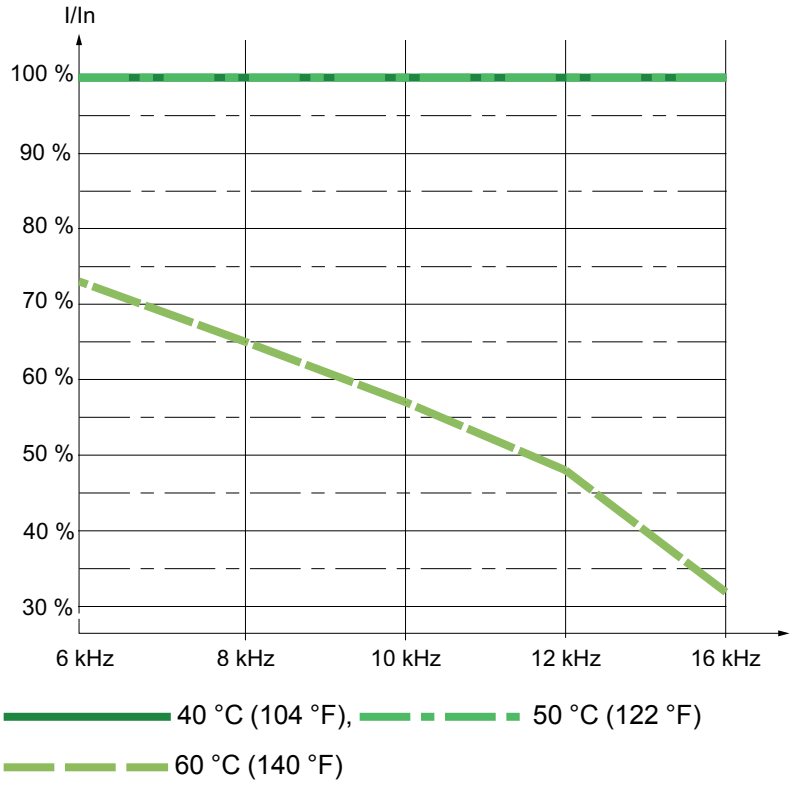
Frame Size 0, Size 1 - Mounting type A IP21



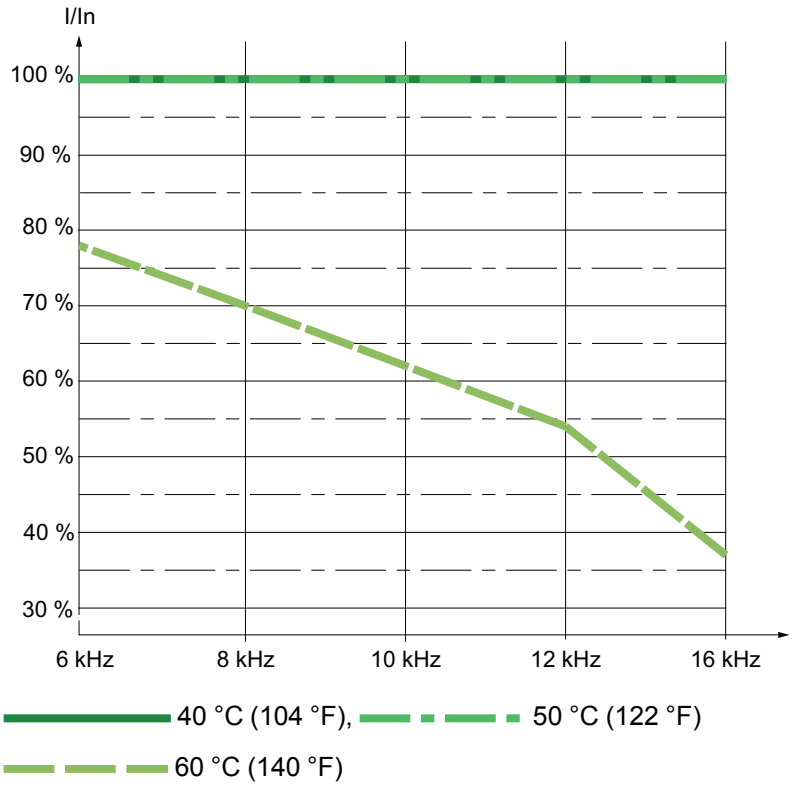
Frame Size 0, Size 1 - Mounting type B and C



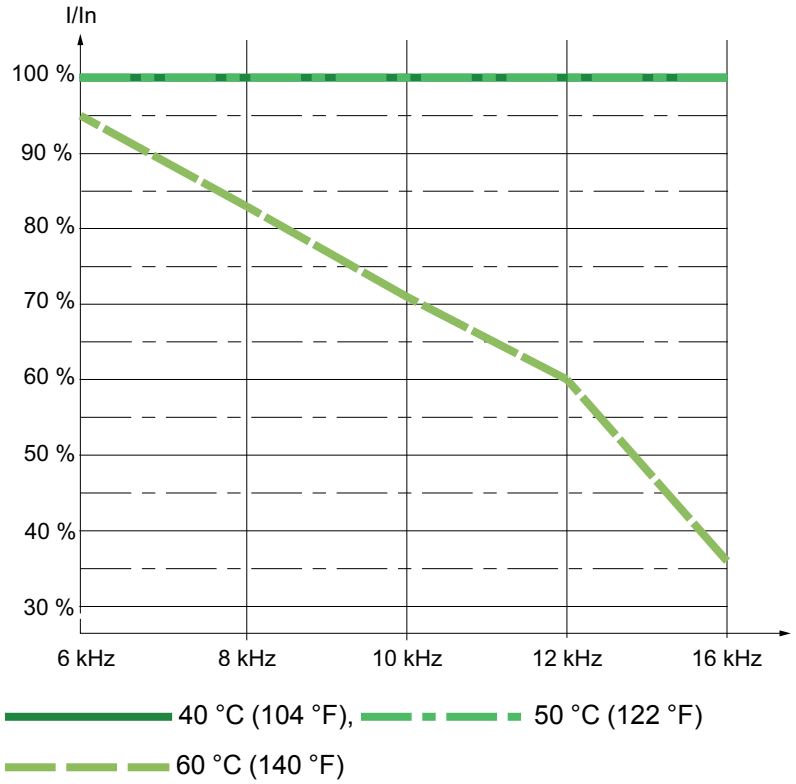
Frame Size 2A- Mounting type A IP21



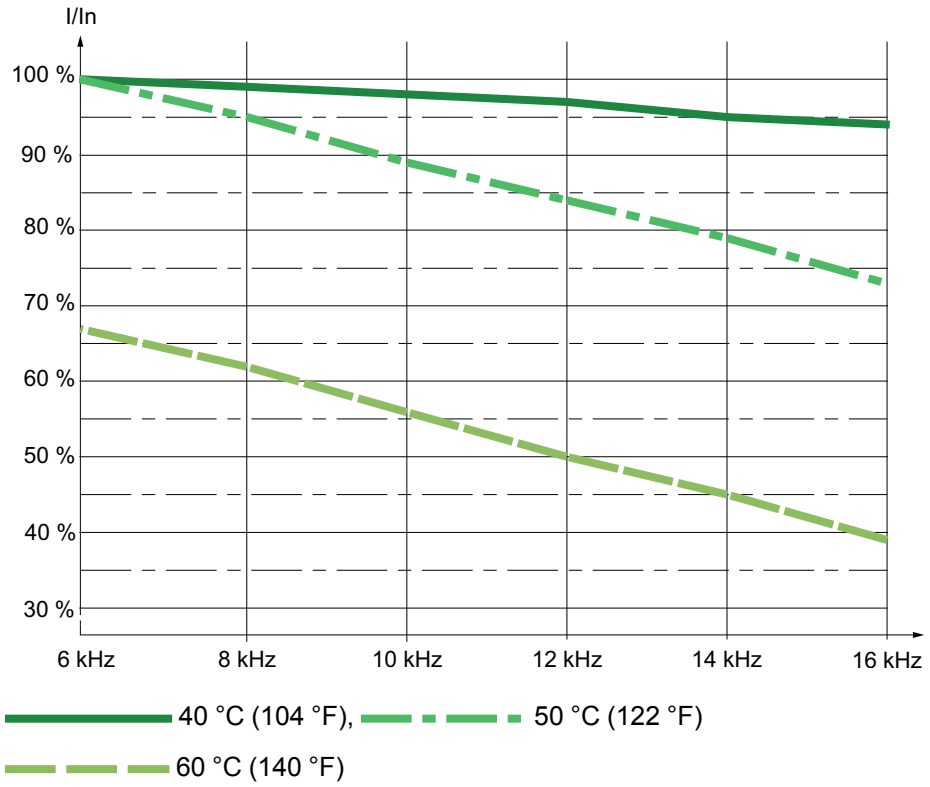
Frame Size 2A- Mounting type B



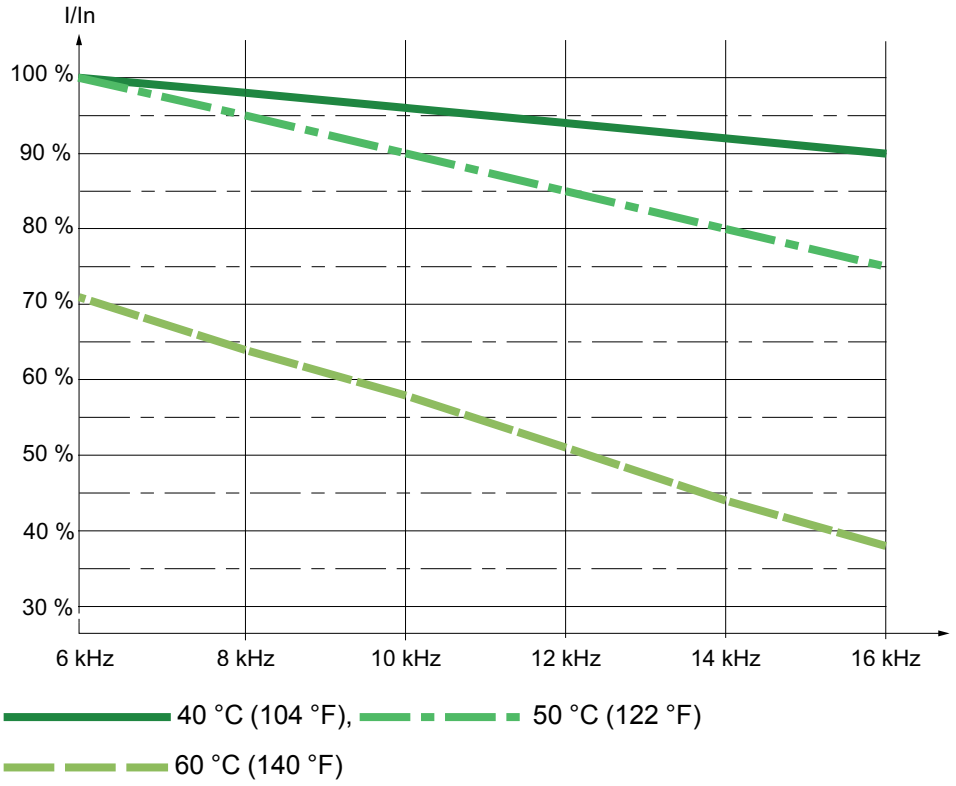
Frame Size 2A- Mounting type C



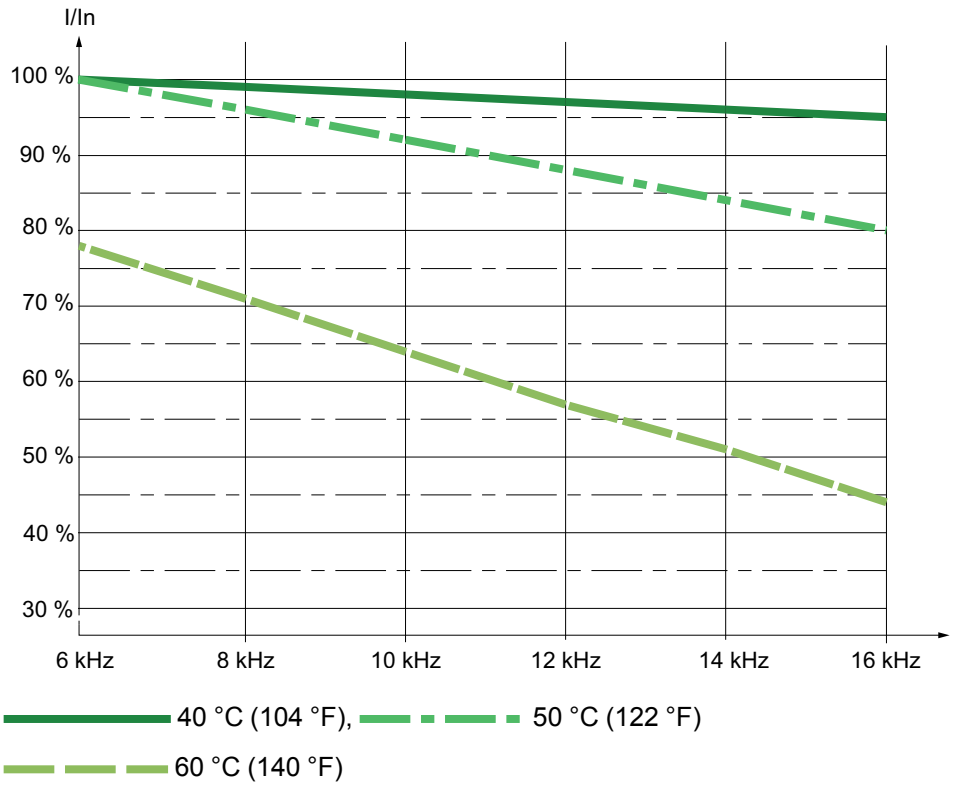
Frame Size 2B- Mounting type A



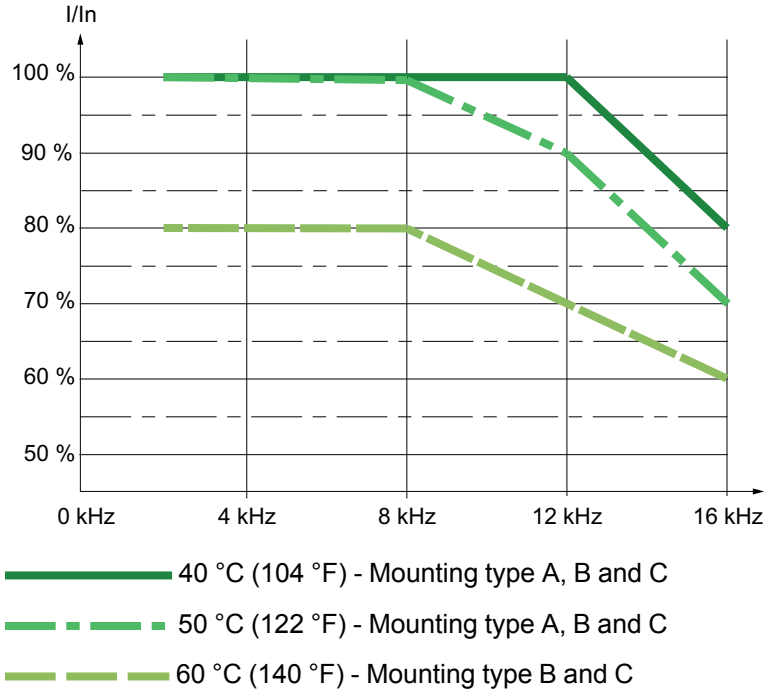
Frame Size 2B- Mounting type B



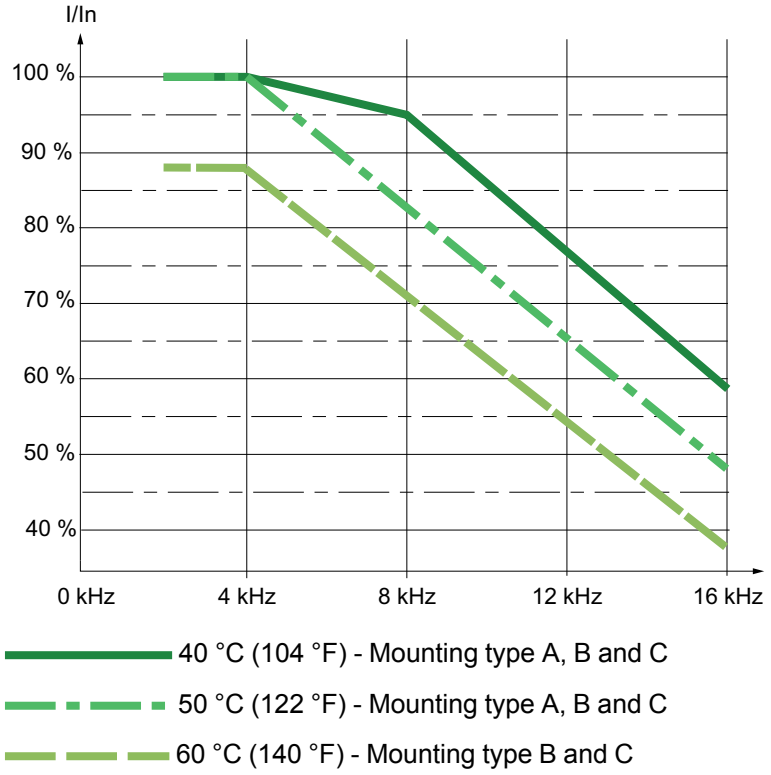
Frame Size 2B- Mounting type C



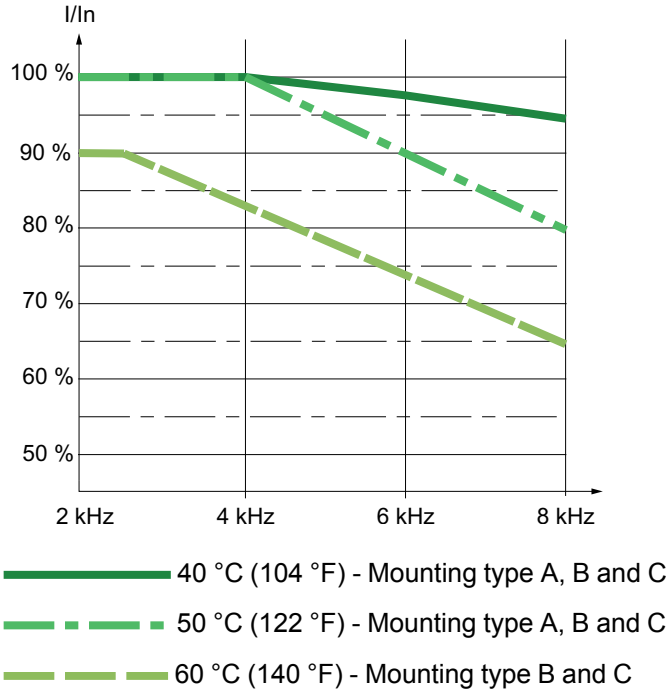
Frame Size 3



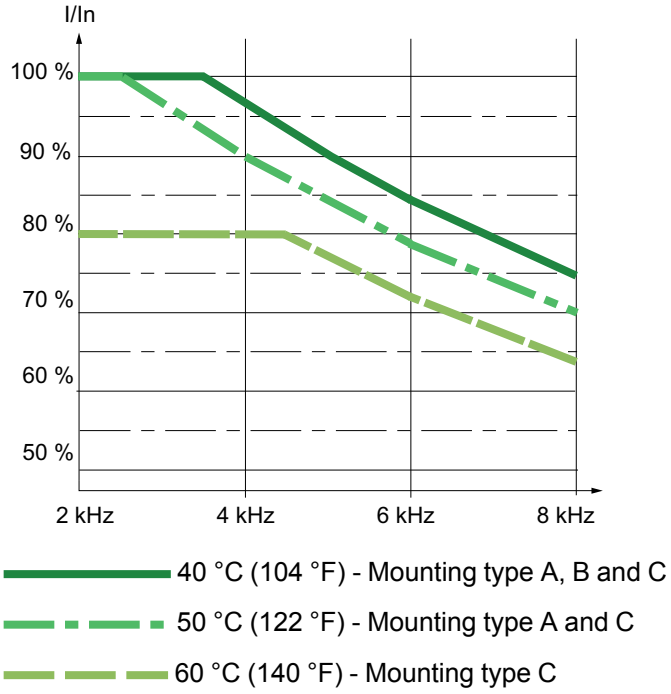
Frame Size 4



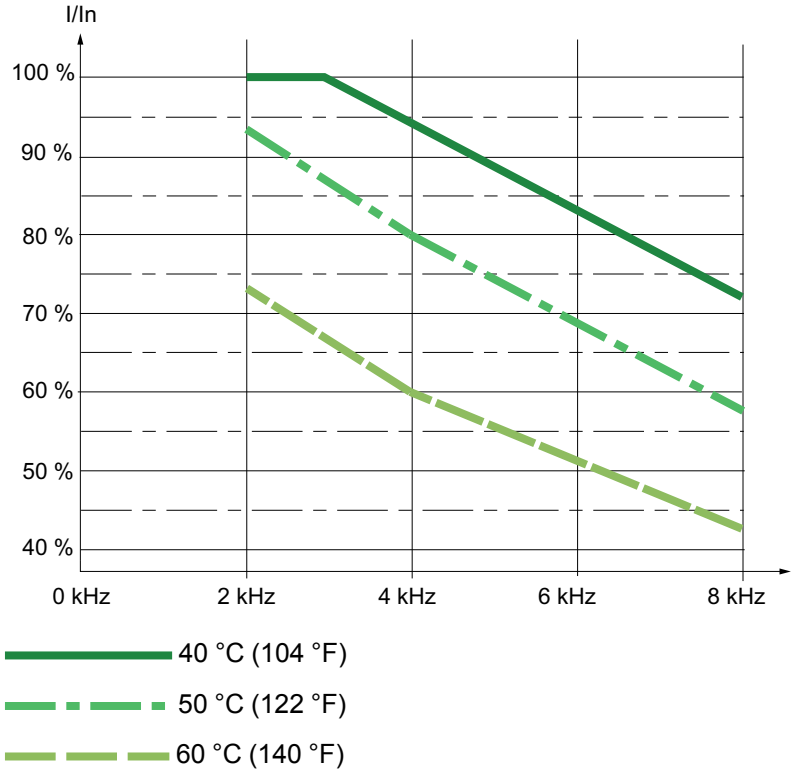
Frame Size 5



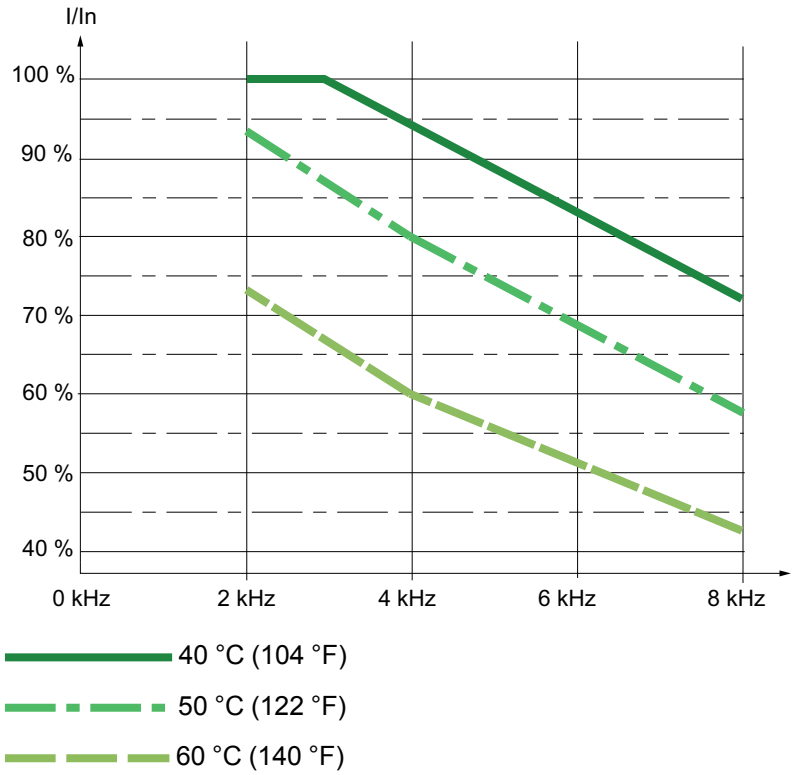
Frame Size 6



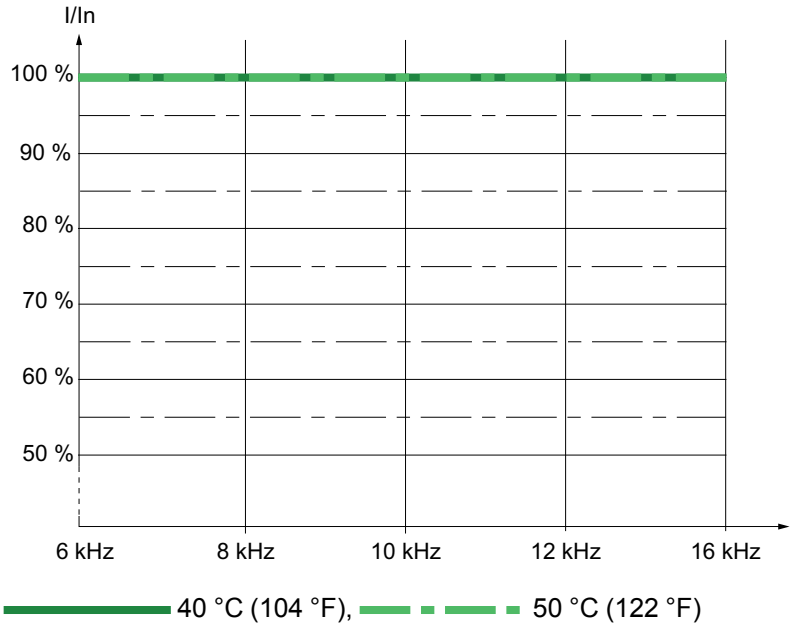
Frame Size 7A



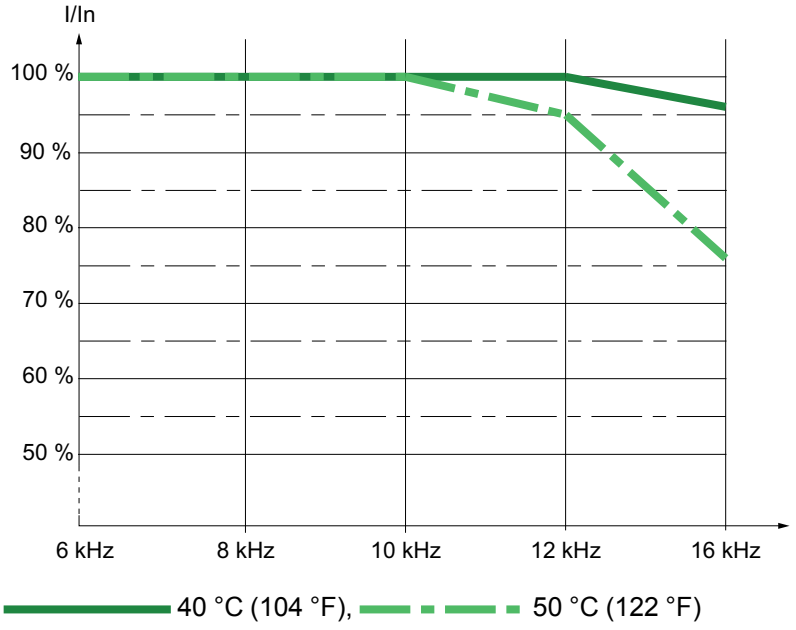
Frame Size 7B



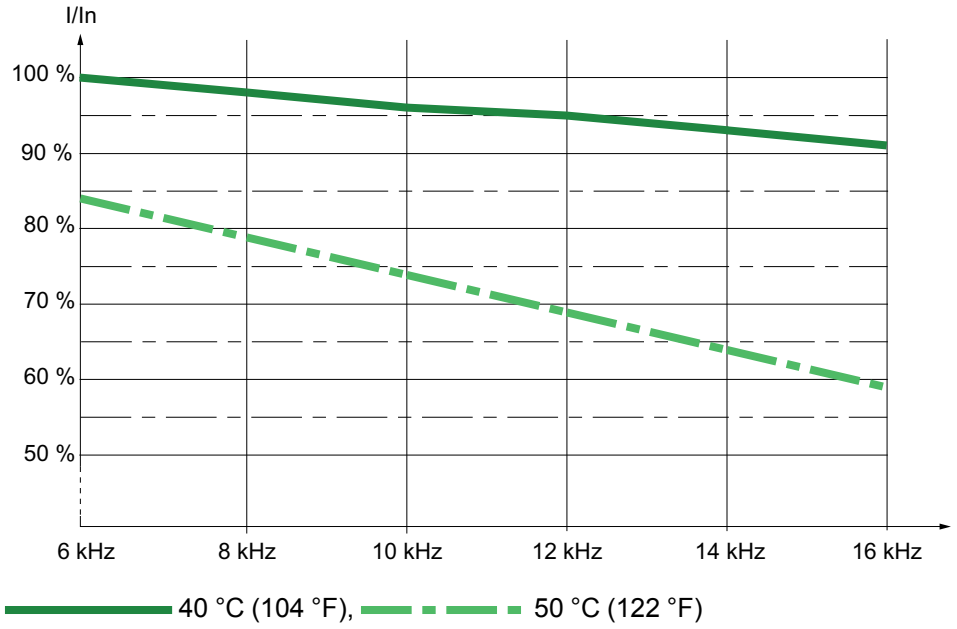
Frame Size A0 - Mounting type A



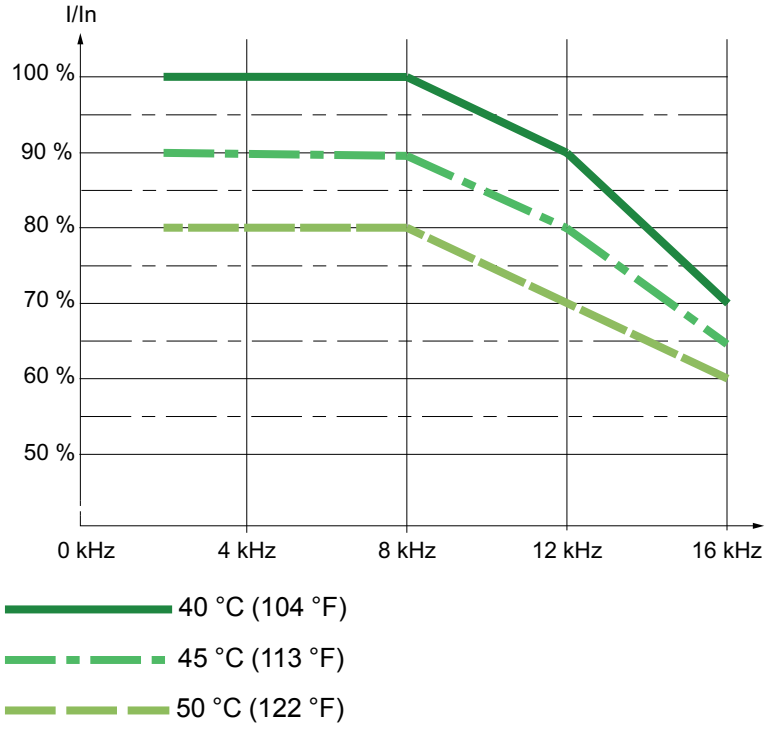
Frame Size A1 - Mounting type A



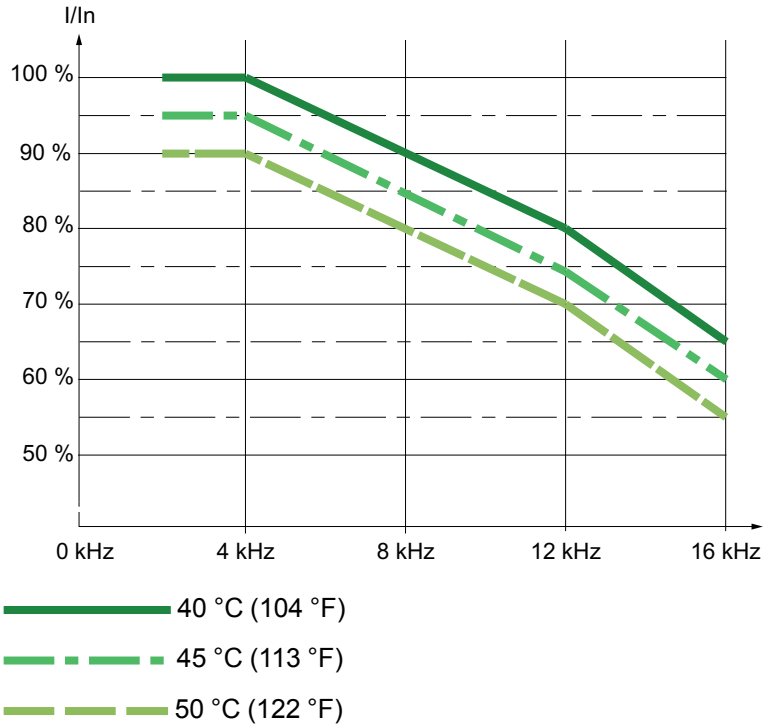
Frame Size A2- Mounting type A



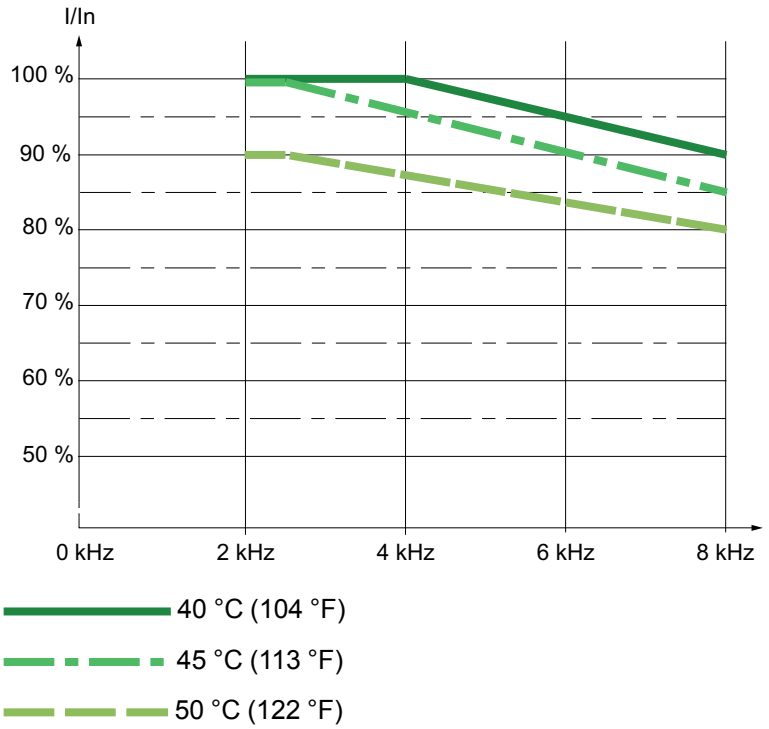
Frame Size A3- Mounting type A



Frame Size B- Mounting type A



Frame Size C- Mounting type A



Mounting Procedures

Mounting Screws

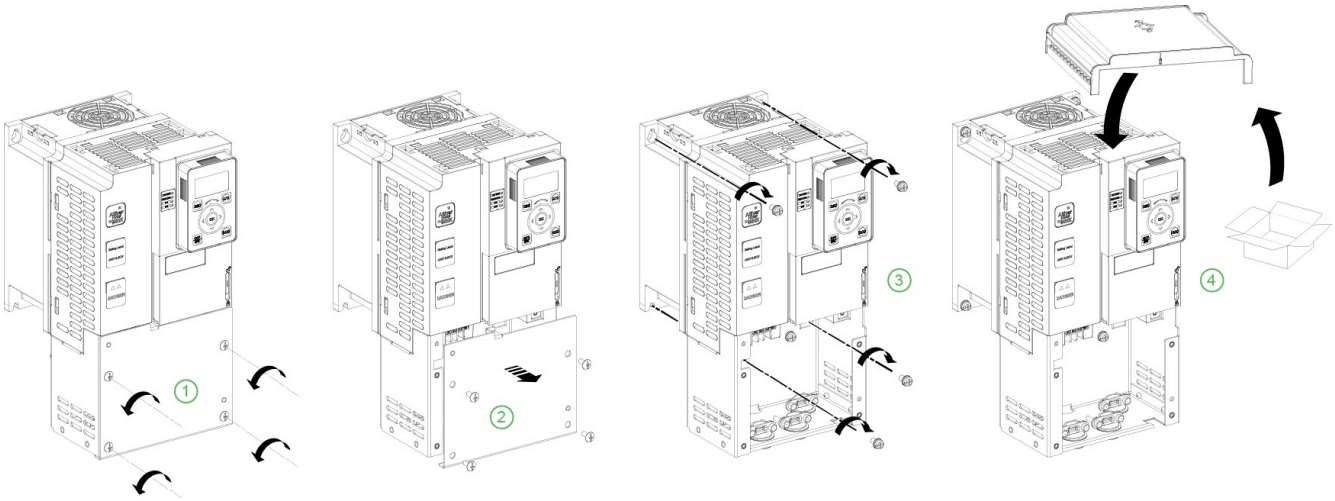
Frame Size	Screw type	Screw diameter	Hole diameter
0, 1	M4	4 mm (0.16 in)	5 mm (0.20 in)
2A	M5	5 mm (0.2 in)	5.5 mm (0.21 in)
2B, 3	M5	5 mm (0.2 in)	6 mm (0.24 in)
4	M6	6 mm (0.24 in)	7 mm (0.28 in)
5	M8	8 mm (0.31 in)	9 mm (0.35 in)
6, 7A, 7B	M10	10 mm (0.4 in)	11.6 mm (0.45 in)
A0, A1, A2, A3	M5	5 mm (0.2 in)	6 mm (0.24 in)
B	M8	8 mm (0.31 in)	9 mm (0.35 in)
C	M10	10 mm (0.4 in)	11.6 mm (0.45 in)

Mounting Procedure for IP20 Drives Frame Sizes 0...5 for cabinet integration (ATH630•••N4Z) and Frame Sizes 6 and 7

NOTE: Due to accessible live parts on their lower part, these drives must be installed in enclosures or located behind enclosures or barriers, which comply at least with the requirements of IP2•, as per IEC61800-5-1.

Mounting the drive does not require preliminary dismantling operation. Simply mount the drive to its support using the 4 screws with captive washer, according to the table above, page 118.

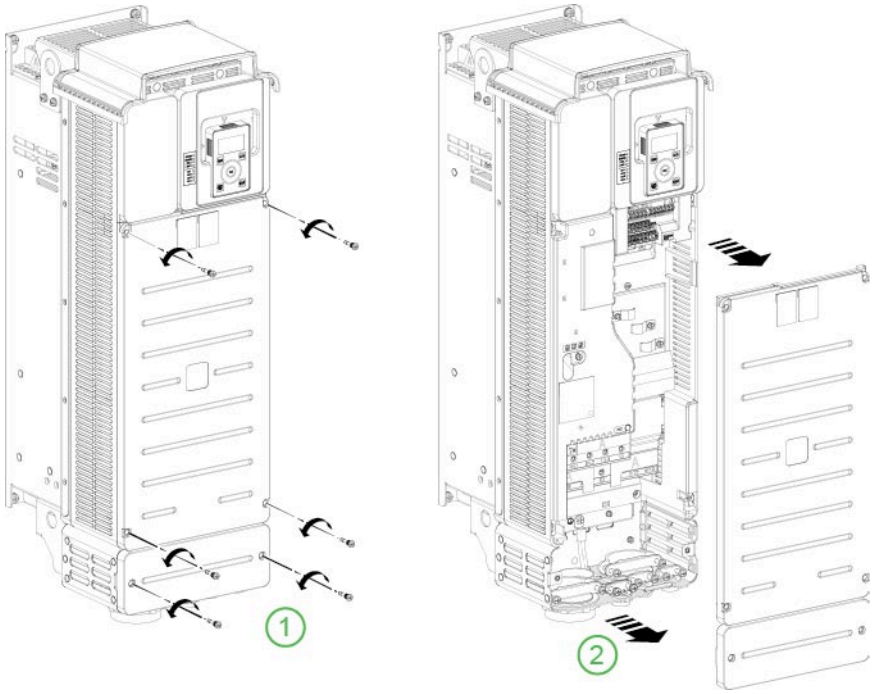
Mounting Procedure For Frame Sizes 0 to 2B, IP21 Drives



Perform the following instructions:

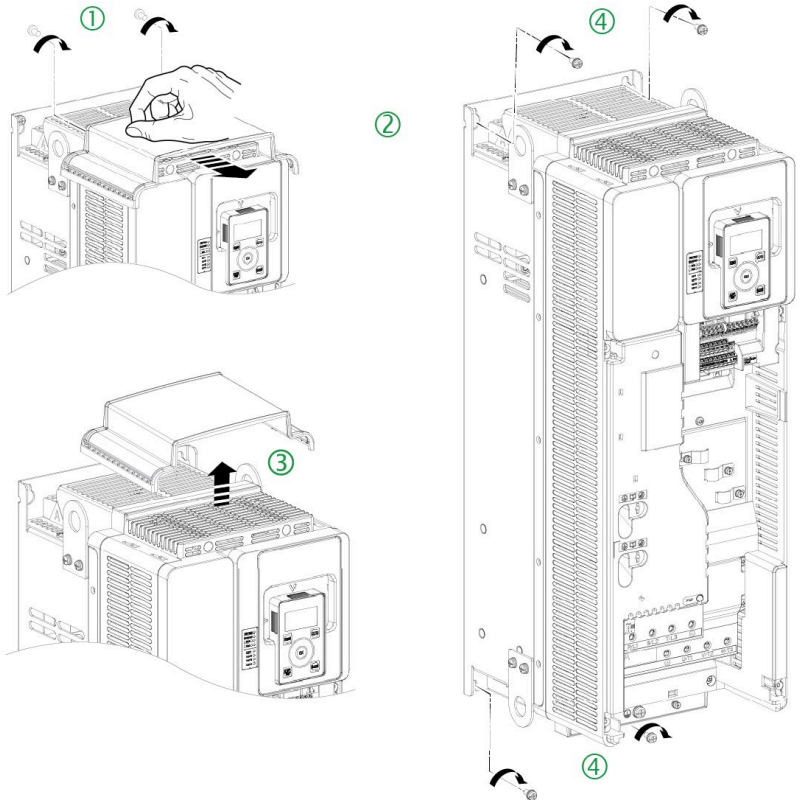
Step	Action
1	Unscrew the 4 screws attaching the front cover
2	Slide down the front cover
3	Attach the drive on the mounting surface using the screws with captive washer, according to the table above, page 118.
4	Fit the top cover to help prevent extra parts to fall into the drive during wiring operation or if IP21 degree of protection is requested.

Mounting Procedure For Frame Sizes 3 to 5 IP21 Drives



Perform the following instructions:

Step	Action
1	Unscrew the screws attaching the front and bottom covers
2	Remove the covers



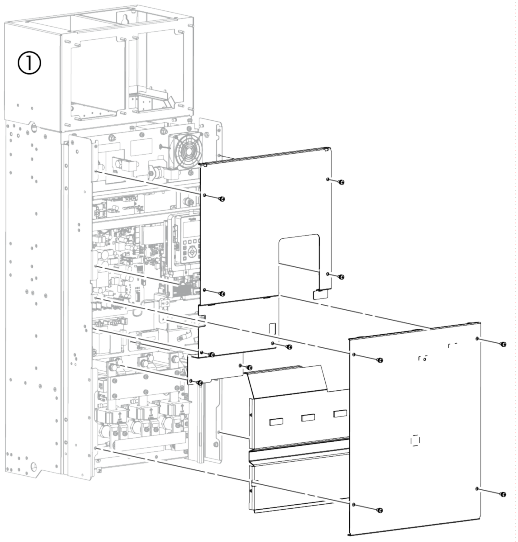
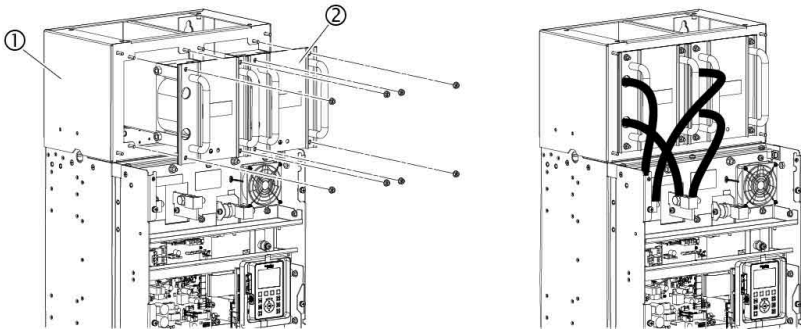
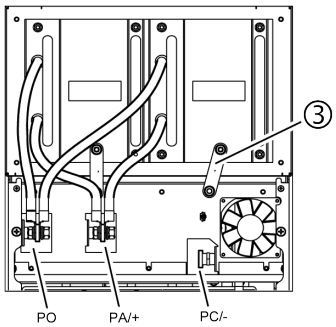
Perform the following instructions:

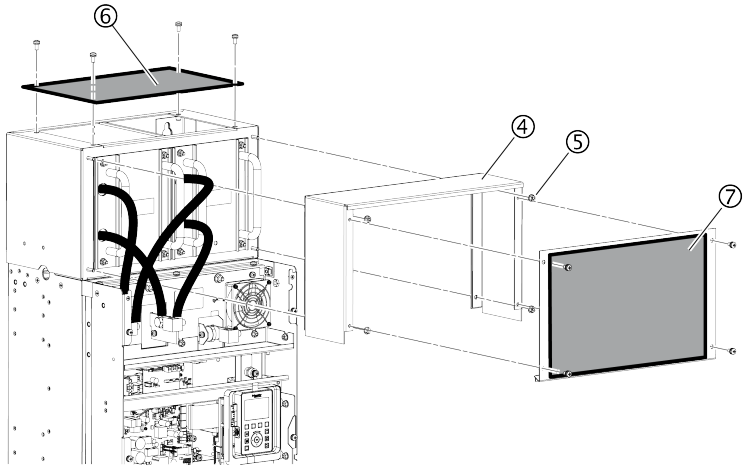
Step	Action
1	For Size 5 products, unscrew the 2 screws underneath the top cover
2	Slide the top cover from back to front
3	Remove the top cover
4	Screw the drive on the mounting surface using 4 screws with captive washer, according to the table above, page 118.
5	Refit the top cover on the drive.

Installing the DC choke on Frame Sizes 7 Drives

This must be performed after mounting the drive and before wiring it. If a braking module is being used, install the module on the drive before mounting the DC choke. During installation, ensure that no liquid, dust or conductive objects fall into the drive.

Perform the following instructions to install the DC chokes:

Step	Action
1	Mount the DC choke housing ① on the wall, on top of the drive, using the 4 screws with captive washer, according to the table above. Ensure that the housing is tightly secured to the drive to maintain the IP54 seal of the ventilation duct.
2	Remove the front covers 
3	Install the DC choke ② on the housing ① using the 4 x M6 nuts provided. Tighten the nuts to 5.5 N·m (48.7 lbf.in) 
4	Connect the choke between the PO and PA/+ terminals on the drive using M12 screws. Tighten the screws to 45 N·m (398 lbf.in)  Connect the grounding strips ③ between the DC choke housing ① and the drive using M8 nuts. Tighten the nuts to 13.5 N·m (119.5 lbf.in).

Step	Action
5	Mount the cover ④ on the housing and secure it with the nuts ⑤ provided.  Mount panels ⑥ and ⑦ using the screws provided. Tighten the M6 nuts to 5.5 N·m (48.7 lbf.in).
6	Refit all the drive covers. Tighten the M5 nuts to 3.5 N·m (30.9 lbf.in).

NOTE:

Once the choke has been installed, the degree of protection of the top of the drive is IP31.

Drive wiring

What's in This Part

Wiring Instructions

General Instructions

The entire installation procedure must be performed without voltage present.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Product Related Information** chapter before performing any procedure in this chapter.

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.

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 installation.

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

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

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

- Follow all applicable standards and directives such as NFPA 79 and EN 60204 for proper control circuit grounding practices.
- 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.

Cable Characteristics

Only use cables with insulator heat resistance of 75°C (167°F) min.

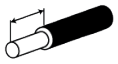
If you are using cables longer than 150 m (492 ft) between the drive and the motor, add output filters (for more details refer to the catalog).

Use a shielded cable to meet the requirements of Category C2 or C3 according to the standard IEC 61800-3, except when using a sinus filter. In this case, the use of a non-shielded motor cable is possible.

To limit the currents in common mode, use common mode output filters (ferrite) in order to reduce the circulating currents in the motor windings.

Standard linear capacity cables can be used with Altivar HVAC. Use of cables with lower linear capacity could increase cable length performances.

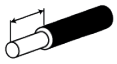
The overvoltage limitation function **[Motor surge limit.]** SVL enables you to increase the cable length while decreasing the torque performances (refer to Programming manual).

Power Part Cables Stripping lengths 

Catalog Number	Cable Stripping Length	
	Input (Supply Mains)	Output (Motor)
	mm (in.)	mm (in.)
ATH630U07N4(Z)	9 ± 1 (0.35 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH630U15N4(Z)	9 ± 1 (0.35 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH630U22N4(Z)	9 ± 1 (0.35 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH630U30N4(Z)	9 ± 1 (0.35 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH630U40N4(Z)	9 ± 1 (0.35 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH630U55N4(Z)	9 ± 1 (0.35 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH630U75N4(Z)	12± 1 (0.47 ± 0.04)	12± 1 (0.47 ± 0.04)
ATH630D11N4(Z)	12± 1 (0.47 ± 0.04)	12± 1 (0.47 ± 0.04)
ATH630D15N4(Z)	12± 1 (0.47 ± 0.04)	12± 1 (0.47 ± 0.04)
ATH630D18N4(Z)	12± 1 (0.47 ± 0.04)	12± 1 (0.47 ± 0.04)
ATH630D22N4(Z)	20 ± 2 (0.79 ± 0.08)	20 ± 2 (0.79 ± 0.08)
ATH630D30N4(Z)	26 ± 2 (1.02 ± 0.08)	26 ± 2 (1.02 ± 0.08)
ATH630D37N4(Z)	26 ± 2 (1.02 ± 0.08)	26 ± 2 (1.02 ± 0.08)
ATH630D45N4(Z)	26 ± 2 (1.02 ± 0.08)	26 ± 2 (1.02 ± 0.08)
ATH630D55N4(Z)	32 ± 3 (1.26 ± 0.12)	32 ± 3 (1.26 ± 0.12)
ATH630D75N4(Z)	32 ± 3 (1.26 ± 0.12)	32 ± 3 (1.26 ± 0.12)
ATH630D90N4(Z)	32 ± 3 (1.26 ± 0.12)	32 ± 3 (1.26 ± 0.12)

Catalog Number	Cable Stripping Length	
	Input (Supply Mains)	Output (Motor)
	mm (in.)	mm (in.)
ATH650U07N4	9 ± 1 (0.35 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH650U15N4	9 ± 1 (0.35 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH650U22N4	9 ± 1 (0.35 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH650U30N4	9 ± 1 (0.35 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH650U40N4	9 ± 1 (0.35 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH650U55N4	9 ± 1 (0.35 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH650U75N4	12± 1 (0.47 ± 0.04)	12± 1 (0.47 ± 0.04)
ATH650D11N4	12± 1 (0.47 ± 0.04)	12± 1 (0.47 ± 0.04)
ATH650D15N4	12± 1 (0.47 ± 0.04)	12± 1 (0.47 ± 0.04)
ATH650D18N4	12± 1 (0.47 ± 0.04)	12± 1 (0.47 ± 0.04)
ATH650D22N4	20 ± 2 (0.79 ± 0.08)	20 ± 2 (0.79 ± 0.08)
ATH650D30N4	26.2 ± 2 (1.03 ± 0.08)	26.2 ± 2 (1.03 ± 0.08)
ATH650D37N4	26.2 ± 2 (1.03 ± 0.08)	26.2 ± 2 (1.03 ± 0.08)
ATH650D45N4	26.2 ± 2 (1.03 ± 0.08)	26.2 ± 2 (1.03 ± 0.08)
ATH650D55N4	32 ± 3 (1.26 ± 0.12)	32 ± 3 (1.26 ± 0.12)
ATH650D75N4	32 ± 3 (1.26 ± 0.12)	32 ± 3 (1.26 ± 0.12)
ATH650D90N4	32 ± 3 (1.26 ± 0.12)	32 ± 3 (1.26 ± 0.12)

Catalog Number	Cable Stripping Length	
	Input (Supply Mains)	Output (Motor)
	mm (in.)	mm (in.)
ATH650U07N4C	13 ± 1 (0.51 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH650U15N4C	13 ± 1 (0.51 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH650U22N4C	13 ± 1 (0.51 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH650U30N4C	13 ± 1 (0.51 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH650U40N4C	13 ± 1 (0.51 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH650U55N4C	13 ± 1 (0.51 ± 0.04)	9 ± 1 (0.35 ± 0.04)
ATH650U75N4C	13 ± 1 (0.51 ± 0.04)	12± 1 (0.47 ± 0.04)
ATH650D11N4C	13 ± 1 (0.51 ± 0.04)	12± 1 (0.47 ± 0.04)
ATH650D15N4C	13 ± 1 (0.51 ± 0.04)	12± 1 (0.47 ± 0.04)
ATH650D18N4C	13 ± 1 (0.51 ± 0.04)	12± 1 (0.47 ± 0.04)
ATH650D22N4U	20 ± 2 (0.79 ± 0.08)	20 ± 2 (0.79 ± 0.08)
ATH650D30N4U	26.2 ± 2 (1.03 ± 0.08)	26.2 ± 2 (1.03 ± 0.08)
ATH650D37N4U	26.2 ± 2 (1.03 ± 0.08)	26.2 ± 2 (1.03 ± 0.08)
ATH650D45N4U	26.2 ± 2 (1.03 ± 0.08)	26.2 ± 2 (1.03 ± 0.08)
ATH650D55N4U	32 ± 3 (1.26 ± 0.12)	32 ± 3 (1.26 ± 0.12)
ATH650D75N4U	32 ± 3 (1.26 ± 0.12)	32 ± 3 (1.26 ± 0.12)
ATH650D90N4U	32 ± 3 (1.26 ± 0.12)	32 ± 3 (1.26 ± 0.12)

Control Part Cables Stripping lengths 

IO terminal	Cable Stripping Length in mm (in.)
R1A, R1B, R1C	6.5 ± 0.5 (0.26 ± 0.02)
R2A, R2C	
R3A, R3C	
P24, /STOA, /STOB, COM, AQ1, AQ2	
B, A, GND	
24V, DI1, DI2, DI3, DI4, DI5, DI6	
10V, AI1, COM, AI2, AI3	

For more information about the control block, refer to Arrangement and Characteristics of Control Block Terminals and Communication and I/O Ports, page 183.

Control Part

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

Verify that the digital and analog inputs and outputs are wired with the shielded, twisted pair cables specified in the present manual.

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

- Keep the control circuits away from the power cables. For digital and analog inputs/outputs, use shielded twisted cables with a pitch of 25...50 mm (1 in. and 2 in.)
- It is advisable to use cable ends, available on www.se.com.

  NOTE:
  - Analog inputs and outputs AIx, AQx, COM use shielded cable and each analog input and output has its own COM line.
  - Each PTC input has its own COM line, not shared with other Inputs/Outputs.
  - All digital inputs DIx use one common 24V line in source mode or one common COM line in sink mode. This 24V or COM line is used only for DIx.
  - Safe torque off inputs $\overline{\text{STOA}}$ / $\overline{\text{STOB}}$ use shielded cables and one common P24 line. This P24 line is used only for $\overline{\text{STOA}}$ / $\overline{\text{STOB}}$.

Residual Current Device

Direct current can be introduced in the protective ground conductor of this device. If a residual current device (RCD / GFCI) or a residual current monitor (RCM) is used for additional protection against direct or indirect contact, the following specific types must be used:

⚠WARNING

DIRECT CURRENT CAN BE INTRODUCED INTO THE PROTECTIVE GROUND CONDUCTOR

- Use a Type A or Type F Residual Current Device (RCD / GFCI) or a Residual Current Monitor (RCM) for single-phase devices connected to a phase and to the neutral conductor.
- Use a Type B Residual Current Device (RCD / GFCI) or a Residual Current Monitor (RCM) that has approval for use with variable speed drives and is sensitive to all types of current for three-phase devices and for single-phase devices not connected to a phase and the neutral conductor.

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

Further conditions for use of a residual current device:

- The device has an increased leakage current at the moment power is applied. Use a residual current device (RCD / GFCI) or a residual current monitor (RCM) with a response delay.
- High-frequency currents must be filtered.

Due to high leakage current in standard operation, it is advisable to choose at least a 300 mA device.

If the installation requires a residual current device less than 300 mA, it can be possible to use a device lower than 300 mA by removing the screws according to the instructions given in the Operation on an IT or Corner Grounded System, page 175.

If the installation includes several drives, provide one residual current device per drive.

Equipment Grounding

⚠⚠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 device.
- Ground the device 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.

Tighten the grounding screws according to the instructions given in the Ground Cables section, page 143.

Connection Instructions

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.

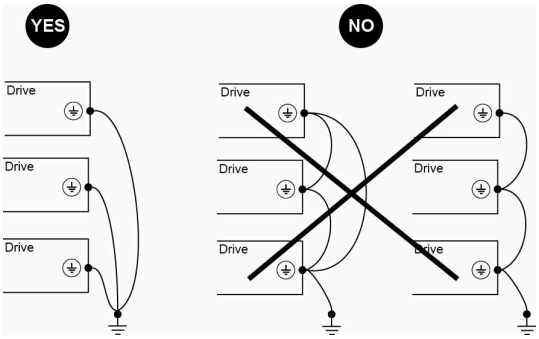
⚠⚠DANGER

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 installation.

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

- Ensure that the resistance to Ground is 1 Ohm or less.
- When grounding several drives, you must connect each one directly, as shown in the above figure.
- Do not loop Ground cables or connect them in series.



Cable Length Instructions

Long Cable Lengths Consequences

When drives are used with motors, a combination of fast switching transistors and long motor cables can even cause peak voltages up to twice the DC link voltage. This high peak voltage can cause premature aging of motor winding insulation which leads to motor breakdown.

The overvoltage limitation function will enable to increase the cable length while decreasing the torque performances.

Length Of Motor Cables

Because of the permitted mains disturbances, the allowed overvoltages at the motor, the occurring bearing currents and the permitted heat losses the distance between inverter and motor(s) is limited.

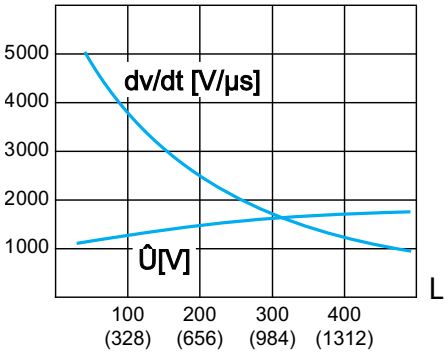
The maximum distance heavily depends on the used motors (insulation material), the type of motor cable used (shielded / unshielded), the cable laying (cable channel, underground installation...) as well as from the used options.

Dynamic Voltage Load Of The Motor

Overvoltages at the motor terminals result from reflection in the motor cable. Basically the motors are stressed with measurable higher voltage peaks from a motor cable length of 10 m. With the length of the motor cable also the value of overvoltage increases.

The steep edges of the switching impulses at the output side of the frequency inverter lead to a further load of the motors. The slew rate of the voltage is typically over 5 kV/µs but it decreases with the length of the motor cable

Load of the motor with overvoltage and slew rate when using conventional drive



L Length of motor cables in meters (feet)

Corrective Actions Overview

A number of simple measures can be taken to help enhance the motor life time:

- Specification of a motor designed for speed drive applications (IEC60034-25 B or NEMA MG1 Part 31 should be prescribed).
- Specification of drives that integrate voltage reflection superimposition software suppression.

  Refer to **[Volt surge limit. opt]**`SOP` parameter in the Programming manual.
- Reduce to a minimum the distance between motor and drive.
- Use unshielded cables.
- Reduce the switching frequency to the minimum allowed value.

Preventive Measures According to IEC60034-25

The preventive measures will depend on motor characteristics and cable length.

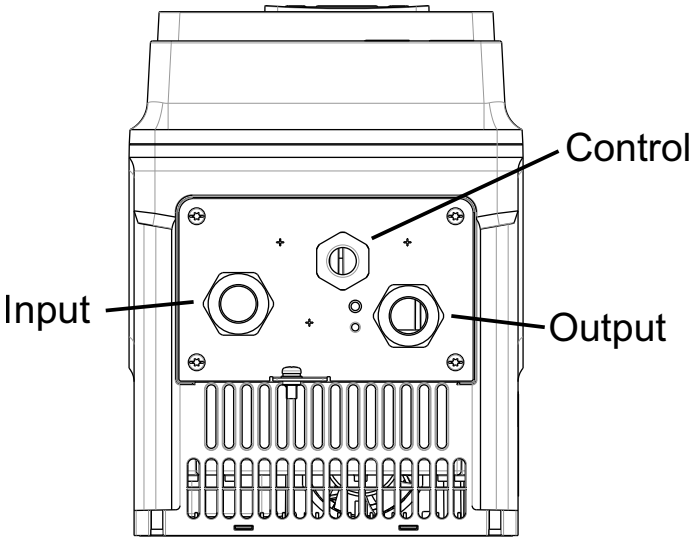
Motor cable length (unshielded cable)	Motor conforming to IEC60034-25	Motor NOT-conforming to IEC60034-25
1 m (3 ft) < L < 50 m (164 ft)	Filter not required	dV/dt filter
50 m (164 ft) < L < 200 m (656 ft)	Filter not required	**Not possible**

NOTE: When calculating cable lengths for the purpose of guarding against these overvoltage situations, a shielded cable should count as twice the length of an unshielded cable. For example, if a shielded cable is 100 m (328 ft) in actual length, it should be considered to be equal to a 200 m (656 ft) length unshielded cable in the calculation.

Additional Information

Further detailed technical information is available in the following white paper *An Improved Approach for Connecting VSD and Electric Motors* (998-2095-10-17-13AR0_EN) available on www.se.com.

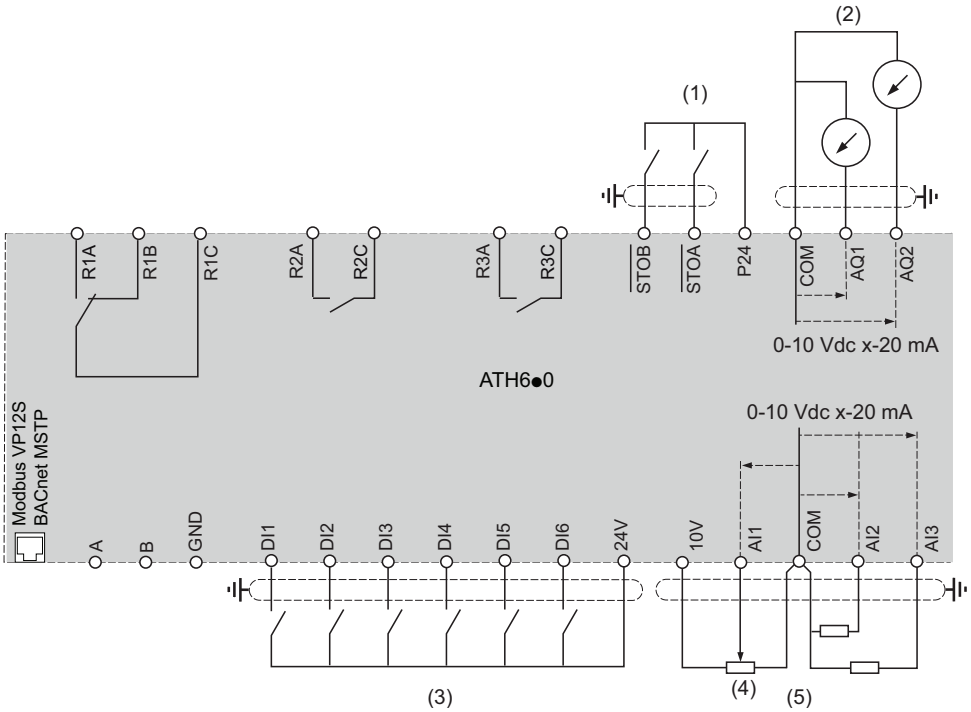
Gland Diameter



Frame Size	Range	Position	Cable diameter (mm)
SA0~SA2	0.75-18.5KW	Control	6-13
SA3-SC	22~90KW	Control	7-13
SA0-SA1	0.75-5.5KW	INPUT/OUTPUT	8-17
SA2	7.5-18.5KW	INPUT/OUTPUT	9-21
SA3	22KW	INPUT	15-25
SA3	22KW	OUTPUT	21-32
SB	30KW	INPUT/OUTPUT	21-32
SB	37KW	INPUT/OUTPUT	21-32
SB	45KW	INPUT/OUTPUT	26-38
SC	55KW	INPUT/OUTPUT	31-44
SC	75KW	INPUT/OUTPUT	31-44
SC	90KW	INPUT/OUTPUT	46-52

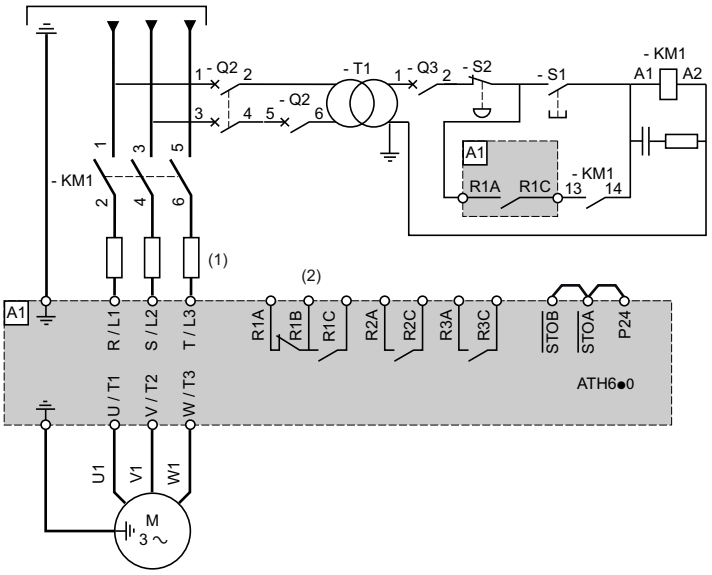
General Wiring Diagrams

Control Block Wiring Diagram



(1) STO Safe Torque Off, (2) Analog Output, (3) Digital Input, (4) reference potentiometer (ex. SZ1RV1002), (5) Analog Input

Three-phase Power Supply - Diagram With Line Contactor Without Safety Function STO



(1) Line choke, if used.

(2) Use relay output R1 set to operating state Fault to switch Off the product once an error is detected.

Three-phase Power Supply - Diagram With Downstream Contactor

If a Run command is executed while the downstream contactor between the drive and the motor is still open, there may be residual voltage at the output of the drive. This can cause an incorrect estimation of the motor speed when the contacts of the downstream contactor are closed. This incorrect estimation of the motor speed can lead to unanticipated equipment operation or to equipment damage.

In addition, there may be overvoltage at the output of the drive if the power stage is still enabled when the downstream contactor between the drive and the motor opens.

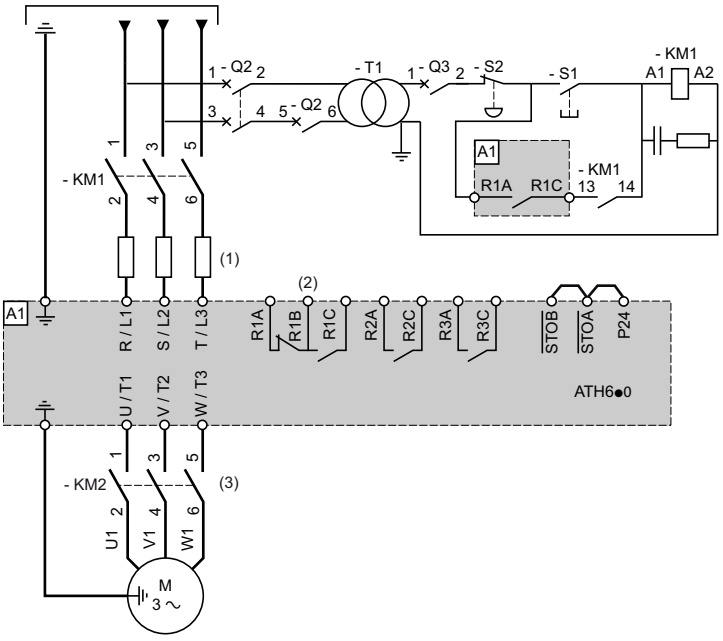
⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION OR EQUIPMENT DAMAGE

If a downstream contactor is used between the drive and the motor, verify the following:

- The contacts between the motor and the drive must be closed before a Run command is executed.
- The power stage must not be enabled when the contacts between the motor and the drive open.

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



(1) Line choke, if used.

(2) Use relay output R1 set to operating state Fault to switch Off the product once an error is detected.

(3) Command of KM2 can be done by using the **[Output contactor cmd]** occ function. For more information, refer to the Programming manual.

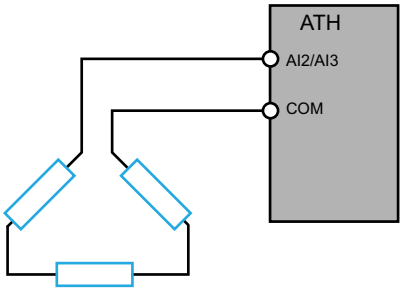
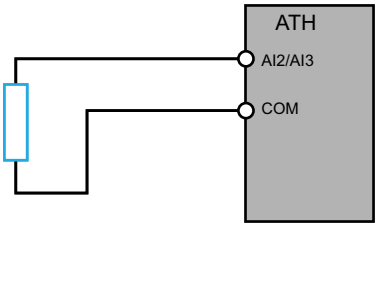
Safety Function STO(Safe Torque Off)

All details related to the STO safety function activation are given in the ATH600 Embedded Safety Function Manual JPS89266.

Sensor connections and configuration

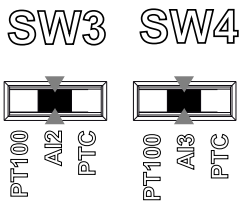
Sensor Connection

It is possible to connect 1 sensor on terminals AI2 or AI3.

PTC	PT100, PT1000 or KTY
	

Sensor switches configuration

The sensor switches SW3 and SW4 are located below the control terminals Terminal Arrangement, page 183.



NOTE: Only operate these switches when the product is power-off.

AIxT	Type	SWx position
AI1T	0...+10V or 0...20mA	NA
AI2T	0...+10V or 0...20mA	SW3 on middle position
	PT100 2 wires	SW3 on left position
	PTC	SW3 on right position
	KTY84	
	PT1000 2 wires	
	Water Probe	
AI3T	0...+10V or 0...20mA	SW4 on middle position
	PT100 2 wires	SW4 on left position
	PTC	SW4 on right position
	KTY84	
	PT1000 2 wires	
	Water Probe	

Relay Contacts Wiring

What's in This Chapter

Output Relay with Inductive AC Loads

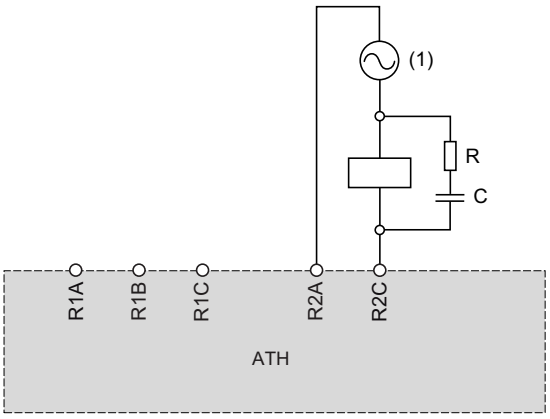
General

The AC voltage source must be of overvoltage category II (OVC II) according to IEC 61800-5-1.

If it is not the case, an isolation transformer must be used.

Contactors with AC Coil

If controlled by a relay, a resistor-capacitor (RC) circuit must be connected in parallel to the coil of the contactor as shown on the diagram below:



(1) AC 250 Vac maximum. For more information, refer to Control Terminals Electrical Data, page 188.

Schneider Electric AC contactors have a dedicated area on the housing to plug easily the RC device. Refer to the Motor control and protection components catalog MKTED210011EN available on se.com to find the RC device to be associated with the contactor used.

Example: With a 48 Vac source, contactors LC1D09E7 or LC1DT20E7 have to be used with LAD4RCE voltage suppression device.

Other Inductive AC Loads

For other inductive AC loads:

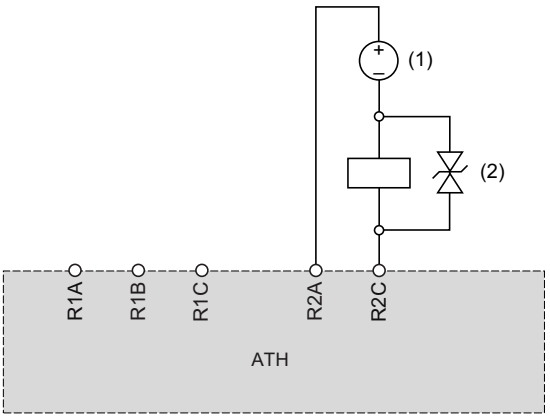
- Use an auxiliary contactor connected on the product to control the load.

  Example: with a 48 Vac source, auxiliary contactors CAD32E7 or CAD50E7 with LAD4RCE voltage suppression device.
- When using a third party inductive AC load, request the supplier to provide information on the voltage suppression device, in order to avoid overvoltage above 375 V during relay opening.

Output Relay with Inductive DC loads

Contactors with DC Coil

If controlled by a relay, a bidirectional transient voltage suppression (TVS) diode, also called transil, must be connected in parallel to the coil of the contactor as shown on the diagram below:



(1) DC 30 Vdc maximum. For more information, refer to Control Terminals Electrical Data, page 188.

(2) TVS diode

Schneider Electric contactors with DC coil include the TVS diode. No additional device is required.

Refer to the Motor control and protection components catalog MKTED210011EN available on se.com for more information.

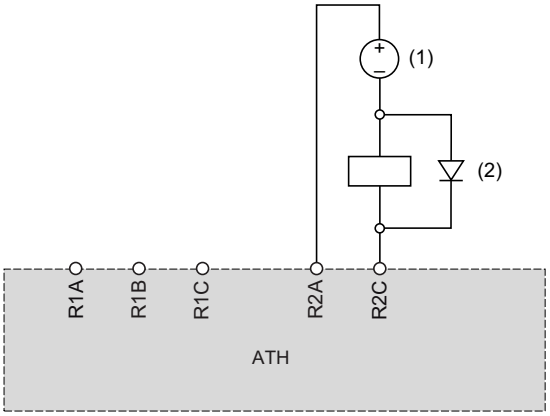
Other Inductive DC Loads

Other inductive DC loads without embedded TVS diode must use one of the following voltage suppression device:

- A bidirectional TVS device as shown on the diagram above, defined by:
  - TVS break-down voltage greater than 35 Vdc,
  - TVS clamping voltage V(TVS) less than 50 Vdc
  - TVS peak power dissipation greater than load rated current, I(load) x V (TVS).

    Example: with I(load) = 0.9 A and V(TVS) = 50 Vdc, TVS peak power must be greater than 45 W
  - TVS average power dissipation greater than the value calculated by the following 0.5 x I(load) x V(TVS) x load time constant x number of operation per second.

    Example: with I(load) = 0.9 A and V(TVS) = 50 Vdc, load time constant = 40 ms (load inductance divided by load resistance) and 1 operation every 3 s, the TVS average power dissipation must be greater than 0.5 x 0.9 x 50 x 0.04 x 0.33 = 0.3 W.
- A fly-back diode as shown in the diagram below:



(1) DC 30 Vdc maxi. For more information, refer to Control Terminals Electrical Data, page 188.

(2) Flyback diode

The diode is a polarized device. The fly-back diode must be defined by:

- a reverse voltage greater than 100 Vdc,
- a rated current greater than two times the load rated current,
- a thermal resistance: junction to ambient temperature (in K/W) less than 90 / (1.1 x I(load)) to operate at maximum 60°C (140°F) ambient temperature.

  Example: with I(load) = 1.5 A, select a 100 V, 3 A rated current diode with a thermal resistance from junction to ambient less than 90 / (1.1 x 1.5) = 54.5 K/W.

Using a flyback diode, the relay opening time will be longer than with a TVS diode.

NOTE: Use diodes with leads for easy wiring and keep at least 1 cm (0.39 in.) of leads on each side of the case of the diode for a correct cooling.

Digital Inputs Wiring Depending on Sink / Source Switch Configuration

About the Switch

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

- If the device is set to **SK** or **EXT**, do not connect the **0 V** terminal to ground or to protective ground.
- Verify that accidental grounding of digital inputs configured for sink logic, caused, for example, by damage to the signal cables, cannot occur.
- Follow all applicable standards and directives such as NFPA 79 and EN 60204 for proper control circuit grounding practices.

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

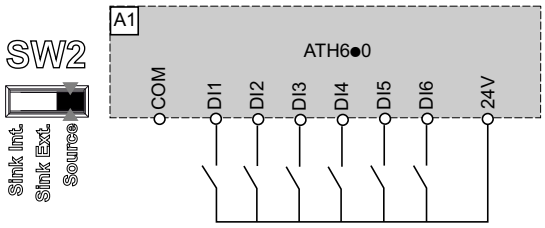
The switch SW2 is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs. To access the switch, follow the Access to control Terminals procedure Wiring The Power Part, page 153.

The switch SW2 is located below the control terminals Terminal Arrangement, page 183.

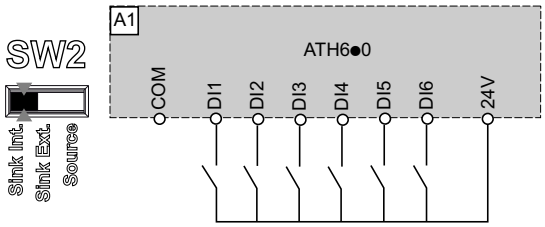
- Set the switch to Source (factory setting) if using PLC outputs with PNP transistors.
- Set the switch to Ext if using PLC outputs with NPN transistors.

Wiring With Use of the Output Power Supply for the Digital Inputs

SW2 set to **Source** position



SW2 set to **Sink Int.** (Sink Internal) position



Wiring With Use of an External Power Supply for the Digital Inputs

⚠⚠DANGER

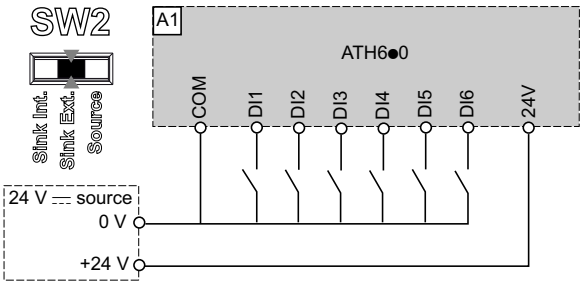
ELECTRIC SHOCK CAUSED BY INCORRECT POWER SUPPLY UNIT

The +24 Vdc supply voltage is connected with many exposed signal connections in the drive system.

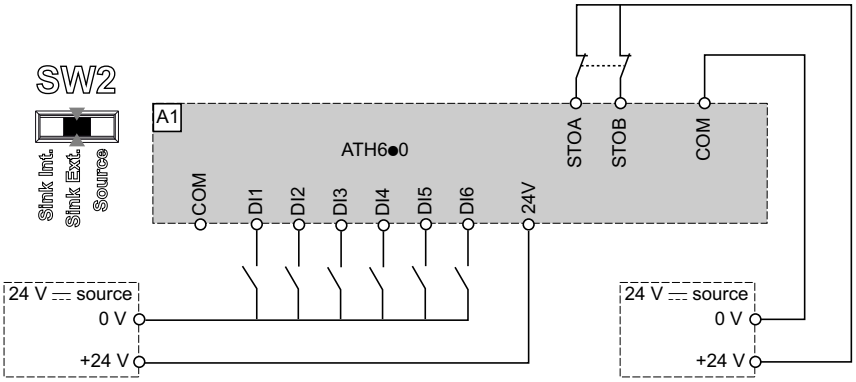
- Use a power supply unit that meets the PELV (Protective Extra Low Voltage) requirements.

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

SW2 set to **Sink Ext.** (Sink External) position **without functional isolation** on digital inputs



SW2 set to **Sink Ext.** (Sink External) position **with functional isolation** on digital inputs. This configuration requires the use of 2 external supply units.



NOTE:

- STO inputs are also connected by default on a 24 Vdc terminal. If the external power supply is switched off, the function STO will be triggered.
- To avoid to trigger the STO function when switching-on the product, the external power supply must be previously switched on.

Characteristics of the Power Part Terminals

⚠⚠DANGER

HAZARD OF FIRE OR ELECTRIC SHOCK

- Wire cross sections and tightening torques must comply with the specifications provided in this document.
- If you use flexible multi-wire cables for a connection with a voltage higher than 25 Vac, you must use ring type cable lugs or wire ferrules, depending on the wire gauge and the specified stripping length of the cable.

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

Impact wrench cannot be used to ensure correct tightening torque and can cause damage to the fastener and/or equipment.

Description of the Power Terminals

Terminal	Function
PE or ⏚	Ground connection terminal
R/L1 S/L2 T/L3	AC supply mains
U/T1 V/T2 W/T3	Outputs to the motor

Protective earth ground cables

⚠⚠DANGER

ELECTRIC SHOCK CAUSED BY INSUFFICIENT GROUNDING

- For the protective earth conductor connected to the grounding screw, verify that the minimum cross section is compliant with the next table.
- 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.

Cross-sectional area of phase conductors of the product S (mm^2) (for copper cables)	Minimum cross-sectional area of the corresponding protective earthing conductor Sp (mm^2) (for copper cables)
$S \leq 10$	10
$10 < S \leq 16$	S
$16 < S \leq 35$	16
$35 < S$	S/2

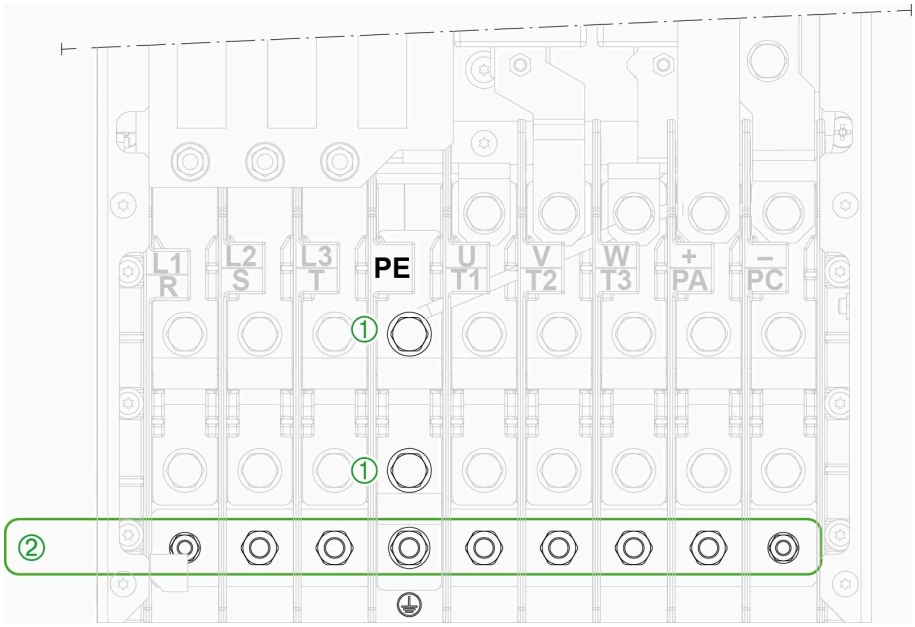
NOTE: About Cross-sectional area of phase conductors of the product S, refer to Cross Section: Electrical and Mechanical characteristics, page 143.

Ground Cables

Ground cable cross sections of input and output ground cables are the same as those given for the input and output cables.

Tightening torques according to frame size

- Frame sizes 0...3: 2.5 N·m (22.1 lbf.in)
- Frame size 4: 5 N·m (44.2 lbf.in)
- Frame size 5: 25 N·m (221.3 lbf.in)
- Frame size 6:
  - ①: 27 N·m (239 lbf.in)
  - ②:13.5 N·m (119.5 lbf.in)



- Frame size 7: 37.5...50.8 N·m (332...449 lbf.in)

Cross Section: Electrical and Mechanical characteristics

⚠⚠DANGER

HAZARD OF FIRE OR ELECTRIC SHOCK

If the product is used below its rated power and you choose to reduce the wire cross section compared to the specified minimum wire cross section given at rated condition, ensure that the selected wire cross section is compliant with the duty cycle and current load of the application.

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

Frame Size 0

Electrical characteristics (*)

ATH630	Minimum Wire Cross Section at rated condition	
	Supply Terminals (L1, L2, L3)	Output Terminals (U, V, W)
	mm² (AWG)	mm² (AWG)
U07N4(Z), U15N4(Z), U22N4(Z)	1.5 (14)	1.5 (14)
(*) Minimum wire cross section to be applied when the product is used at rated power.		

Mechanical characteristics

ATH630	Supply Terminals (L1, L2, L3) Output Terminals (U, V, W)			
	Minimum (*)		Maximum	
	Permissible Cross Section (**)	Rated Tightening Torque	Permissible Cross Section	Rated Tightening Torque
	mm² (AWG)	N·m (lbf.in)	mm² (AWG)	N·m (lbf.in)
U07N4(Z), U15N4(Z), U22N4(Z)	0.5 (20)	0.6 (5.3)	6 (10)	0.6 (5.3)
(*) The mechanical characteristics concern power terminal only and do not take into account the cabling equipment (cable clamp, cable gland, cable ferrule...) that are designed for the rated conditions. **(**)** Minimum permissible cross sections are provided, if the product is used below its rated power. In this case, ensure that the wire cross section is compliant with the duty cycle and current load.				

NOTE: Only use cables with solid wires or rigid stranded wires.

Frame Size 1

Electrical characteristics (*)

ATH630	Minimum Wire Cross Section at rated condition	
	Supply Terminals (L1, L2, L3)	Output Terminals (U, V, W)
	mm² (AWG)	mm² (AWG)
U30N4(Z), U40N4(Z)	1.5 (14)	1.5 (14)
U55N4(Z)	1.5 (14)	1.5 (12)
(*) Minimum wire cross section to be applied when the product is used at rated power.		

Mechanical characteristics

ATH630	Supply Terminals (L1, L2, L3) Output Terminals (U, V, W)			
	Minimum (*)		Maximum	
	Permissible Cross Section (**)	Rated Tightening Torque	Permissible Cross Section	Rated Tightening Torque
	mm² (AWG)	N·m (lbf.in)	mm² (AWG)	N·m (lbf.in)
U30N4(Z), U40N4(Z), U55N4(Z)	0.5 (20)	0.6 (5.3)	6 (10)	0.6 (5.3)

(*) The mechanical characteristics concern power terminal only and do not take into account the cabling equipment (cable clamp, cable gland, cable ferrule...) that are designed for the rated conditions.

(**) Minimum permissible cross sections are provided, if the product is used below its rated power. In this case, ensure that the wire cross section is compliant with the duty cycle and current load.

NOTE: Only use cables with solid wires or rigid stranded wires.

Frame Size 2A and 2B

Electrical characteristics (*)

ATH630	Minimum Wire Cross Section at rated condition	
	Supply Terminals (L1, L2, L3)	Output Terminals (U, V, W)
	mm² (AWG)	mm² (AWG)
U75N4(Z)	1.5(12)	2.5 (10)
D11N4(Z)	4 (10)	4 (10)
D15N4(Z)	6 (8)	6 (8)
D18N4(Z)	6 (8)	10 (8)

(*) Minimum wire cross section to be applied when the product is used at rated power.

Mechanical characteristics

ATH630	Supply Terminals (L1, L2, L3) Output Terminals (U, V, W)			
	Minimum (*)		Maximum	
	Permissible Cross Section (**)	Rated Tightening Torque	Permissible Cross Section	Rated Tightening Torque
	mm² (AWG)	N·m (lbf.in)	mm² (AWG)	N·m (lbf.in)
U75N4(Z), D11N4(Z), D15N4(Z), D18N4(Z)	0.5 (20)	1.4 (12.4)	16 (6)	1.4 (12.4)

(*) The mechanical characteristics concern power terminal only and do not take into account the cabling equipment (cable clamp, cable gland, cable ferrule...) that are designed for the rated conditions.

(**) Minimum permissible cross sections are provided, if the product is used below its rated power. In this case, ensure that the wire cross section is compliant with the duty cycle and current load.

NOTE: Only use cables with solid wires or rigid stranded wires.

Frame Size 3

Electrical characteristics (*)

ATH630	Minimum Wire Cross Section at rated condition	
	Supply Terminals (L1, L2, L3)	Output Terminals (U, V, W)
	mm² (AWG)	mm² (AWG)
D22N4(Z)	10 (8)	16 (6)
(*) Minimum wire cross section to be applied when the product is used at rated power.		

Mechanical characteristics

ATH630	Supply Terminals (L1, L2, L3) Output Terminals (U, V, W)			
	Minimum (*)		Maximum	
	Permissible Cross Section (**)	Rated Tightening Torque	Permissible Cross Section	Rated Tightening Torque
	mm² (AWG)	N·m (lbf.in)	mm² (AWG)	N·m (lbf.in)
D22N4(Z)	0.5 (20)	3.5 (30.4)	16 (6)	3.5 (30.4)
(*) The mechanical characteristics concern power terminal only and do not take into account the cabling equipment (cable clamp, cable gland, cable ferrule...) that are designed for the rated conditions. **(**)** Minimum permissible cross sections are provided, if the product is used below its rated power. In this case, ensure that the wire cross section is compliant with the duty cycle and current load.				

NOTE: Only use cables with solid wires or rigid stranded wires.

Frame Size 4

Electrical characteristics (*)

ATH630	Minimum Wire Cross Section at rated condition	
	Supply Terminals (L1, L2, L3)	Output Terminals (U, V, W)
	mm² (AWG)	mm² (AWG)
D30N4(Z)	25 (4)	25 (4)
D37N4(Z)	35 (3)	35 (3)
D45N4(Z)	35 (2)	50 (1)
(*) Minimum wire cross section to be applied when the product is used at rated power.		

Mechanical characteristics

ATH630	Supply Terminals (L1, L2, L3) Output Terminals (U, V, W)			
	Minimum (*)		Maximum	
	Permissible Cross Section (**)	Rated Tightening Torque	Permissible Cross Section	Rated Tightening Torque
	mm² (AWG)	N·m (lbf.in)	mm² (AWG)	N·m (lbf.in)
D30N4(Z), D37N4(Z), D45N4(Z)	16 (6)	12 (106.2)	50 (1)	12 (106.2)

(*) The mechanical characteristics concern power terminal only and do not take into account the cabling equipment (cable clamp, cable gland, cable ferrule...) that are designed for the rated conditions.

(**) Minimum permissible cross sections are provided, if the product is used below its rated power. In this case, ensure that the wire cross section is compliant with the duty cycle and current load.

NOTE: Only use cables with solid wires or rigid stranded wires.

Frame Size 5

Electrical characteristics (*)

ATH630	Minimum Wire Cross Section at rated condition	
	Supply Terminals (L1, L2, L3)	Output Terminals (U, V, W)
	mm² (AWG)	mm² (AWG)
D55N4(Z)	70 (1/0)	70 (1/0)
D75N4(Z)	95 (3/0)	95 (3/0)
D90N4(Z)	120 (4/0)	120 (250MCM)

(*) Minimum wire cross section to be applied when the product is used at rated power.

Mechanical characteristics

ATH630	Supply Terminals (L1, L2, L3) Output Terminals (U, V, W)			
	Minimum (*)		Maximum	
	Permissible Cross Section (**)	Rated Tightening Torque	Permissible Cross Section	Rated Tightening Torque
	mm² (AWG)	N·m (lbf.in)	mm² (AWG)	N·m (lbf.in)
D55N4(Z),D75N4(Z), D90N4(Z)	16 (4)	25 (221.3)	120 (250MCM)	25 (221.3)

(*) The mechanical characteristics concern power terminal only and do not take into account the cabling equipment (cable clamp, cable gland, cable ferrule...) that are designed for the rated conditions.

(**) Minimum permissible cross sections are provided, if the product is used below its rated power. In this case, ensure that the wire cross section is compliant with the duty cycle and current load.

NOTE: Only use cables with solid wires or rigid stranded wires.

Frame Size 6

NOTE:

- If used with ring tongue: selection criteria are compatible with screw M10, width 24 mm (0.94 in.), following DIN 46234.
- If used with lugs: selection criteria are compatible with standard cable lug according to DIN 46234. You may also use lug kit DZ2FH6 and DZ2FH1 available on se.com.

Electrical characteristics (*)

ATH630	Supply Terminals (L1, L2, L3) Output Terminals (U, V, W)
	Minimum Wire Cross Section at rated condition
	mm² (AWG)
C11N4Z	2 x 50 (2 x 1/0)
C13N4Z	2 x 70 (2 x 2/0)
C16N4Z	2 x 95 (2 x 3/0)
(*) Minimum wire cross section to be applied when the product is used at rated power.	

Mechanical characteristics

ATH630	Rated Tightening Torque (with Screw size M10)
	Supply Terminals (L1, L2, L3) Output Terminals (U, V, W)
	N·m (lbf.in)
C11N4Z, C13N4Z, C16N4Z	27 (239)

Frame Size 7A and 7B

Electrical characteristics (*)

ATH630	Minimum Wire Cross Section at rated condition
	Supply Terminals (L1, L2, L3) Output Terminals (U, V, W)
	mm² (AWG)
C22N4Z	2 x 150 (2 x 350MCM)
C25N4Z	4 x 185 (3 x 350MCM)
(*) Minimum wire cross section to be applied when the product is used at rated power.	

Mechanical characteristics

ATH630	Rated Tightening Torque (with Screw size M12)
	Supply Terminals (L1, L2, L3) Output Terminals (U, V, W)
	N·m (lbf.in)
C22N4Z, C25N4Z	41 (360)

Frame Size A0 to A3

Electrical characteristics (*)

ATH650	Minimum Wire Cross Section at rated condition	
	Supply Terminals (L1, L2, L3)	Output Terminals (U, V, W)
	mm² (AWG)	mm² (AWG)
U07N4(C), U15N4(C), U22N4(C), U30N4(C), U40N4(C)	1.5 (14)	1.5 (14)
U55N4(C)	1.5 (14)	1.5 (12)
U75N4	1.5 (12)	2.5 (10)
U75N4C	1.5 (12)	2.5 (12)
D11N4(C)	4 (10)	4 (10)
D15N4(C)	6 (8)	6 (8)
D18N4(C)	6 (8)	10 (8)
D22N4(U)	10 (8)	16 (6)
(*) Minimum wire cross section to be applied when the product is used at rated power.		

Mechanical characteristics Supply Terminals (L1, L2, L3)

ATH650	Minimum (*)		Maximum	
	Permissible Cross Section (**)	Rated Tightening Torque	Permissible Cross Section	Rated Tightening Torque
	mm² (AWG)	N·m (lbf.in)	mm² (AWG)	N·m (lbf.in)
U07N4, U15N4, U22N4, U30N4, U40N4, U55N4	0.5 (20)	0.6 (5.3)	6 (10)	0.6 (5.3)
U75N4, D11N4, D15N4, D18N4	0.5 (20)	1.4 (12.4)	16 (6)	1.4 (12.4)
D22N4	0.5 (20)	3.5 (30.4)	16 (6)	3.5 (30.4)
U07N4C, U15N4C, U22N4C, U30N4C, U40N4C, U55N4C	0.5 (20)	1.2 (10.6)	10 (8)	1.2 (10.6)
U75N4C, D11N4C, D15N4C, D18N4C	0.5 (20)	1.2 (10.6)	10 (8)	1.2 (10.6)
D22N4U	0.5 (20)	3.5 (30.4)	16 (6)	3.5 (30.4)
(*) The mechanical characteristics concern power terminal only and do not take into account the cabling equipment (cable clamp, cable gland, cable ferrule...) that are designed for the rated conditions. **(**)** Minimum permissible cross sections are provided, if the product is used below its rated power. In this case, ensure that the wire cross section is compliant with the duty cycle and current load.				

NOTE: Only use cables with solid wires or rigid stranded wires.

Mechanical characteristics Output Terminals (U, V, W)

ATH650	Minimum (*)		Maximum	
	Permissible Cross Section (**)	Rated Tightening Torque	Permissible Cross Section	Rated Tightening Torque
	mm² (AWG)	N·m (lbf.in)	mm² (AWG)	N·m (lbf.in)
U07N4(C), U15N4(C), U22N4(C), U30N4(C), U40N4(C), U55N4(C)	0.2 (18)	0.6 (5.3)	6 (10)	0.6 (5.3)
U75N4(C), D11N4(C), D15N4(C), D18N4(C)	0.5 (20)	1.4 (12.4)	16 (6)	1.4 (12.4)
D22N4(U)	0.5 (20)	3.5 (30.4)	16 (6)	3.5 (30.4)

(*) The mechanical characteristics concern power terminal only and do not take into account the cabling equipment (cable clamp, cable gland, cable ferrule...) that are designed for the rated conditions.

(**) Minimum permissible cross sections are provided, if the product is used below its rated power. In this case, ensure that the wire cross section is compliant with the duty cycle and current load.

NOTE: Only use cables with solid wires or rigid stranded wires.

Frame Size B

Electrical characteristics (*)

ATH650	Minimum Wire Cross Section at rated condition	
	Supply Terminals (L1, L2, L3)	Output Terminals (U, V, W)
	mm² (AWG)	mm² (AWG)
D30N4(U)	25 (4)	25 (4)
D37N4(U)	25 (4)	35 (3)
D45N4(U)	35 (3)	35 (2)

(*) Minimum wire cross section to be applied when the product is used at rated power.

Mechanical characteristics Supply Terminals (L1, L2, L3)

ATH650	Minimum (*)		Maximum	
	Permissible Cross Section (**)	Rated Tightening Torque	Permissible Cross Section	Rated Tightening Torque
	mm² (AWG)	N·m (lbf.in)	mm² (AWG)	N·m (lbf.in)
D30N4(U), D37N4(U), D45N4(U)	16 (6)	12 (106.2)	50 (1)	12 (106.2)

(*) The mechanical characteristics concern power terminal only and do not take into account the cabling equipment (cable clamp, cable gland, cable ferrule...) that are designed for the rated conditions.

(**) Minimum permissible cross sections are provided, if the product is used below its rated power. In this case, ensure that the wire cross section is compliant with the duty cycle and current load.

NOTE: Only use cables with solid wires or rigid stranded wires.

Mechanical characteristics Output Terminals (U, V, W)

ATH650	Minimum (*)		Maximum	
	Permissible Cross Section (**)	Rated Tightening Torque	Permissible Cross Section	Rated Tightening Torque
	mm² (AWG)	N·m (lbf.in)	mm² (AWG)	N·m (lbf.in)
D30N4(U), D37N4(U), D45N4(U)	16 (6)	12 (106.2)	50 (1)	12 (106.2)
(*) The mechanical characteristics concern power terminal only and do not take into account the cabling equipment (cable clamp, cable gland, cable ferrule...) that are designed for the rated conditions. **(**)** Minimum permissible cross sections are provided, if the product is used below its rated power. In this case, ensure that the wire cross section is compliant with the duty cycle and current load.				

NOTE: Only use cables with solid wires or rigid stranded wires.

Frame Size C

Electrical characteristics (*)

ATH650	Minimum Wire Cross Section at rated condition	
	Supply Terminals (L1, L2, L3)	Output Terminals (U, V, W)
	mm² (AWG)	mm² (AWG)
D55N4(U)	50 (1)	70 (1/0)
D75N4(U)	70 (2/0)	95 (3/0)
D90N4(U)	95 (3/0)	120 (4/0)
(*) Minimum wire cross section to be applied when the product is used at rated power.		

Mechanical characteristics Supply Terminals (L1, L2, L3)

ATH650	Minimum (*)		Maximum	
	Permissible Cross Section (**)	Rated Tightening Torque	Permissible Cross Section	Rated Tightening Torque
	mm² (AWG)	N·m (lbf.in)	mm² (AWG)	N·m (lbf.in)
D55N4(U), D75N4(U), D90N4(U)	16 (4)	25 (221.3)	120 (250MCM)	25 (221.3)
(*) The mechanical characteristics concern power terminal only and do not take into account the cabling equipment (cable clamp, cable gland, cable ferrule...) that are designed for the rated conditions. **(**)** Minimum permissible cross sections are provided, if the product is used below its rated power. In this case, ensure that the wire cross section is compliant with the duty cycle and current load.				

NOTE: Only use cables with solid wires or rigid stranded wires.

Mechanical characteristics Output Terminals (U, V, W)

ATH650	Minimum (*)		Maximum	
	Permissible Cross Section (**)	Rated Tightening Torque	Permissible Cross Section	Rated Tightening Torque
	mm² (AWG)	N·m (lbf.in)	mm² (AWG)	N·m (lbf.in)
D55N4(U), D75N4(U), D90N4(U)	16 (4)	25 (221.3)	120 (250MCM)	25 (221.3)

(*) The mechanical characteristics concern power terminal only and do not take into account the cabling equipment (cable clamp, cable gland, cable ferrule...) that are designed for the rated conditions.

(**) Minimum permissible cross sections are provided, if the product is used below its rated power. In this case, ensure that the wire cross section is compliant with the duty cycle and current load.

NOTE: Only use cables with solid wires or rigid stranded wires.

Wiring The Power Part

What's in This Chapter

Access to the Terminals

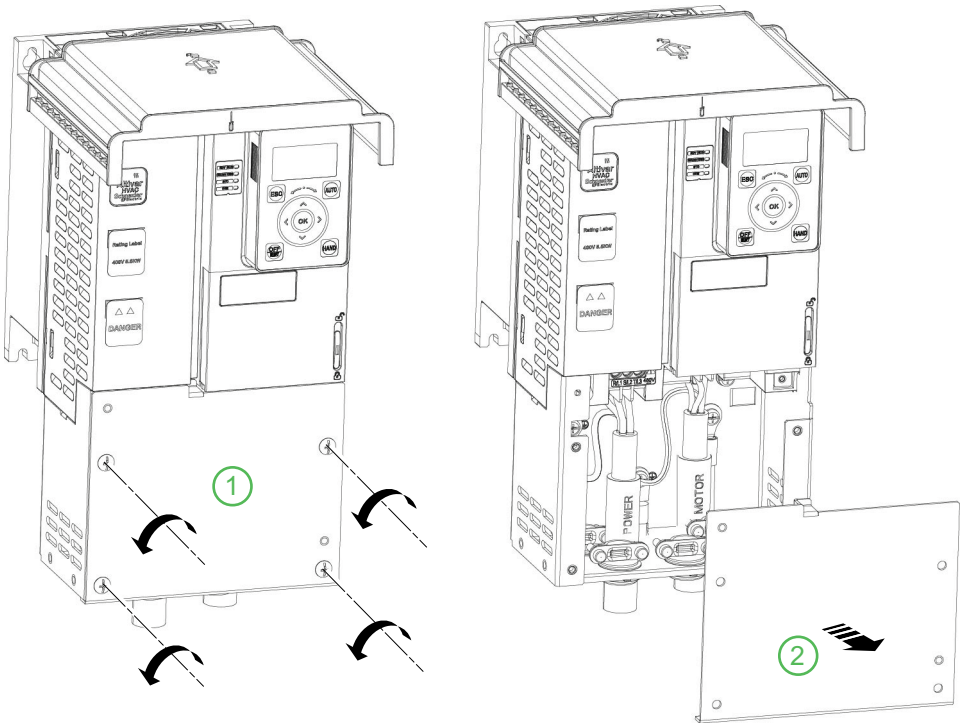
Access to the Terminals for Frame Sizes 0 to 2B, IP21 Drives for 380...480 V Supply Mains

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Product Related Information** chapter before performing any procedure in this chapter.

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



Apply the following instructions to access the terminals on **frame sizes 0 to 2B** drives

Step	Action
1	Unscrew the 4 screws attaching the housing.
2	Remove the front cover.
3	Refit the front cover on completion of wiring. Tighten the screws to 1.5 N•m / 13.3 lb-in.

NOTE: for the frame sizes 0 to 2B of IP20 drives, connect the wires directly.

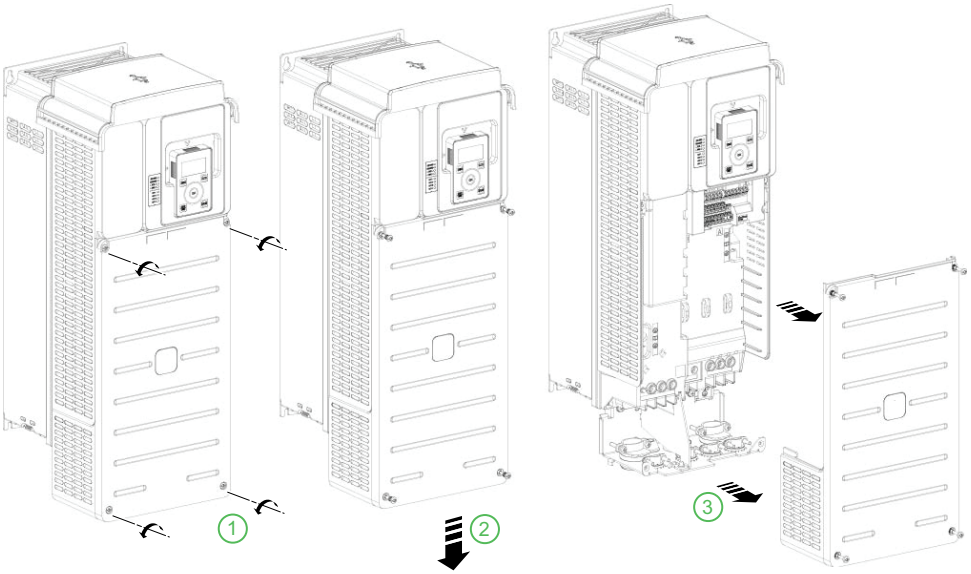
Access to the Terminals for Frame Size 3, IP21 Drives for 380...480 V Supply Mains

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Product Related Information** chapter before performing any procedure in this chapter.

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



Apply the following instructions to access the terminals on **frame sizes 3** drives

Step	Action
1	Unscrew the 4 screws attaching the housing.
2	Slide down the front cover.
3	Remove the front cover.
4	Refit the front cover on completion of wiring. Tighten the screws to 1.5 N•m / 13.3 lb-in.

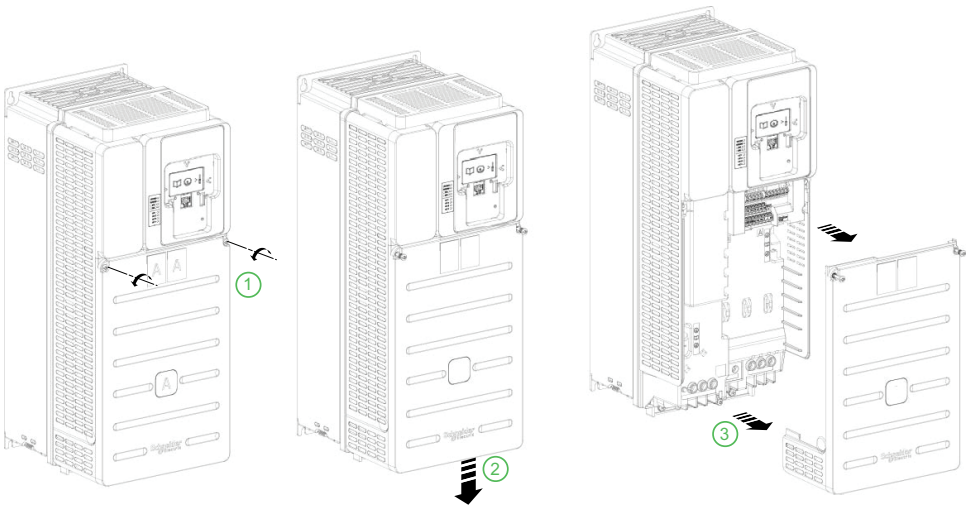
Access to the Terminals for Frame Size 3, IP20 Drives for Cabinet Integration, 380...480 V Supply Mains

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Product Related Information** chapter before performing any procedure in this chapter.

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



Apply the following instructions to access the terminals on **frame sizes 3** IP20 drives

Step	Action
1	Unscrew the 2 screws attaching the housing.
2	Slide down the front cover.
3	Remove the front cover.
4	Refit the front cover on completion of wiring. Tighten the screws to 1.5 N•m / 13.3 lb-in.

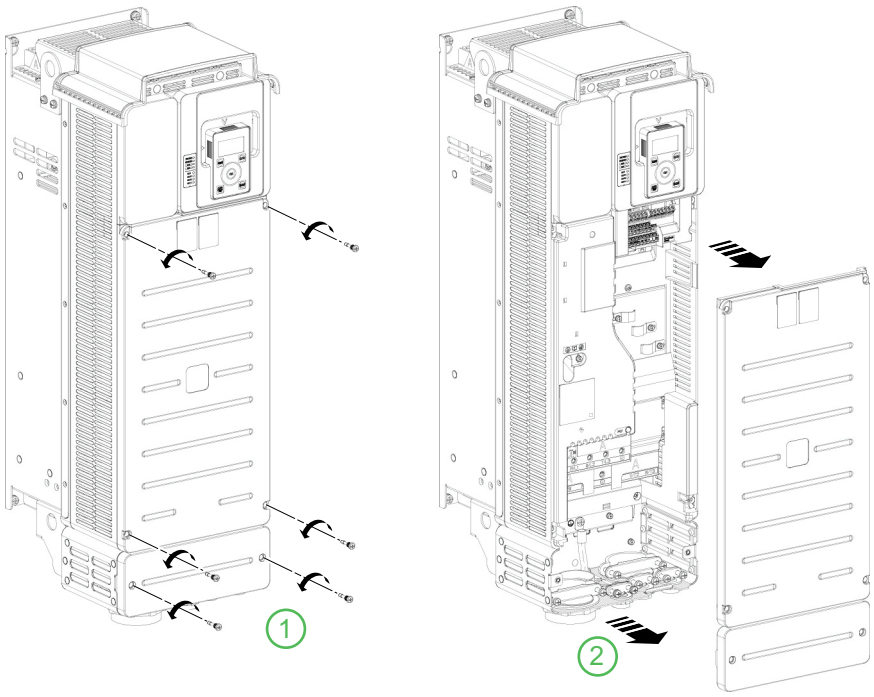
Access to the Terminals for Frame Sizes 4 and 5, IP21 Drives for 380...480 V Supply Mains

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Product Related Information** chapter before performing any procedure in this chapter.

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



Apply the following instructions to access the terminals on **frame sizes 4 and 5** drives

Step	Action
1	Unscrew the 6 screws (frame size 4) ot the 8 screws (frame size 5) attaching the front and bottom covers.
2	Remove the covers.
3	On completion of wiring... • Refit the power terminal cover • Refit the front cover Tighten the front cover screws to... • 1.1 N•m / 9.7 lb-in for frame size 4 • 2.6 N•m / 23 lb-in for frame size 5

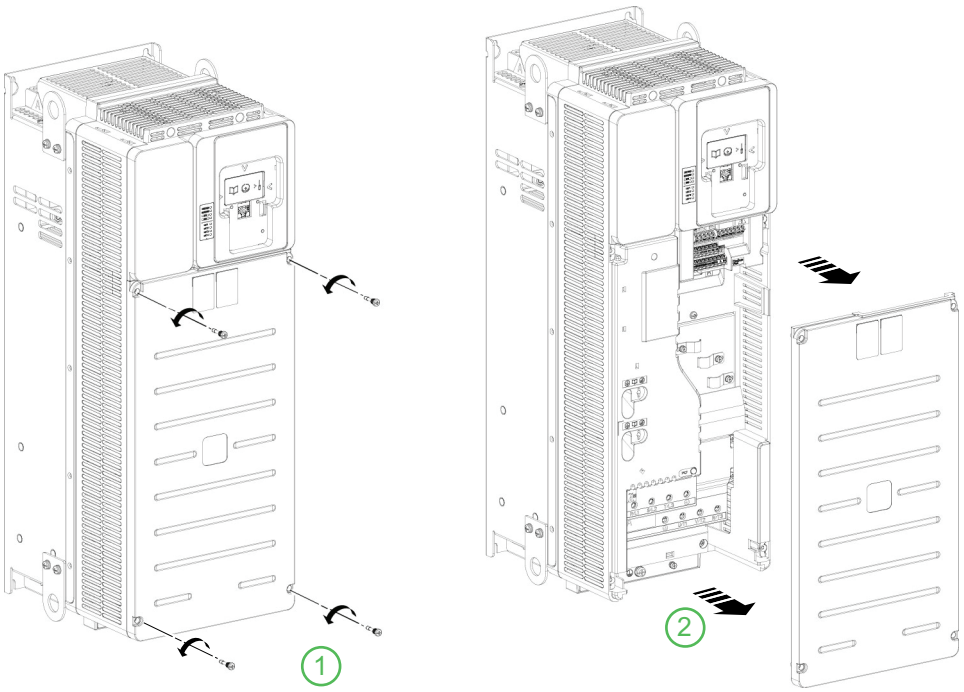
Access to the Terminals for Frame Sizes 4 and 5, IP00 Drives for Cabinet Integration, 380...480 V Supply Mains

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Product Related Information** chapter before performing any procedure in this chapter.

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



Apply the following instructions to access the terminals on **frame sizes 4 and 5** drives

Step	Action
1	Unscrew the 4 screws attaching the front cover.
2	Remove the cover.
3	On completion of wiring refit the front cover. Tighten the front cover screws to... • 1.1 N•m / 9.7 lb-in for frame size 4 • 2.6 N•m / 23 lb-in for frame size 5

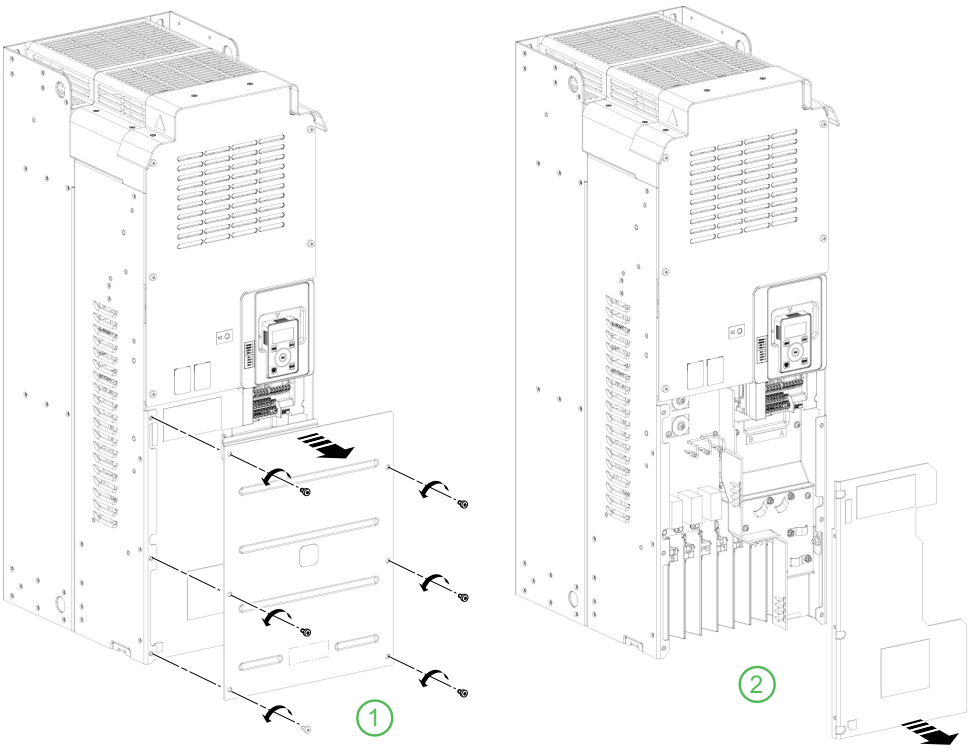
Access to the Terminals for Frame Size 6, IP00 Drives for Cabinet Integration, 380...480 V Supply Mains

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Product Related Information** chapter before performing any procedure in this chapter.

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



Apply the following instructions to access the terminals on **frame size 6** drives

Step	Action
1	Unscrew the 6 screws attaching the bottom front cover and remove it.
2	Remove the terminal cover.
3	Refit the front cover on completion of wiring. Tighten the screws to 3.3 N•m / 29.3 lb-in.

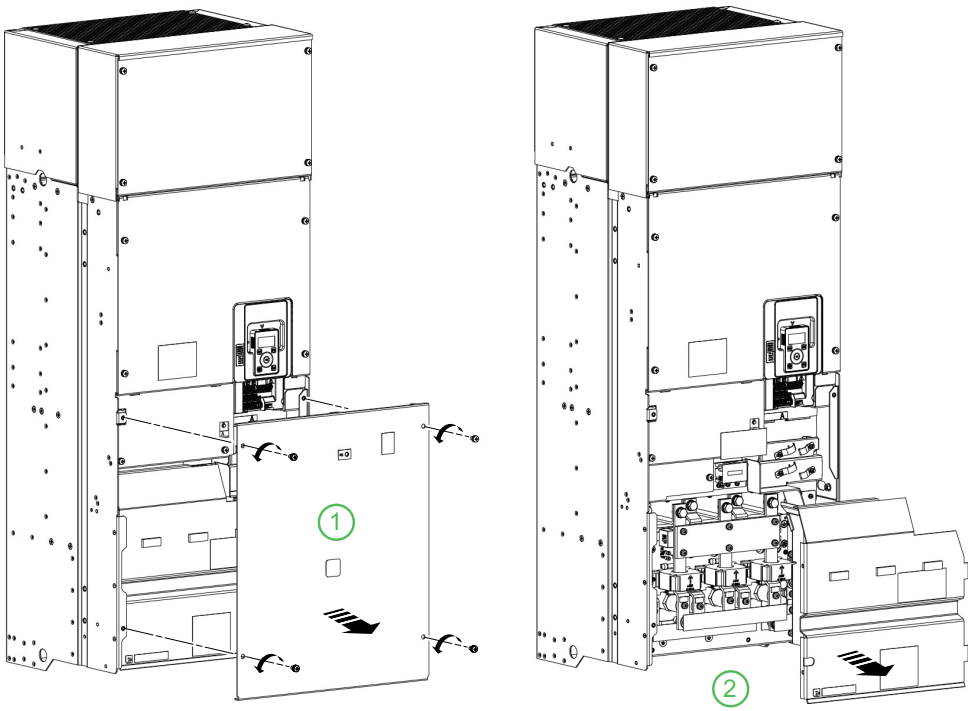
Access to the Terminals for Frame Size 7, IP00 Drives for Cabinet Integration, 380...480 V Supply Mains

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Product Related Information** chapter before performing any procedure in this chapter.

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



Apply the following instructions to access the terminals on **frame size 7** drives

Step	Action
1	Unscrew the 4 screws attaching the bottom front cover and remove it.
2	Remove the terminal cover.
3	Refit the front cover on completion of wiring. Tighten the screws to 4.2 N•m / 37.17 lb-in.

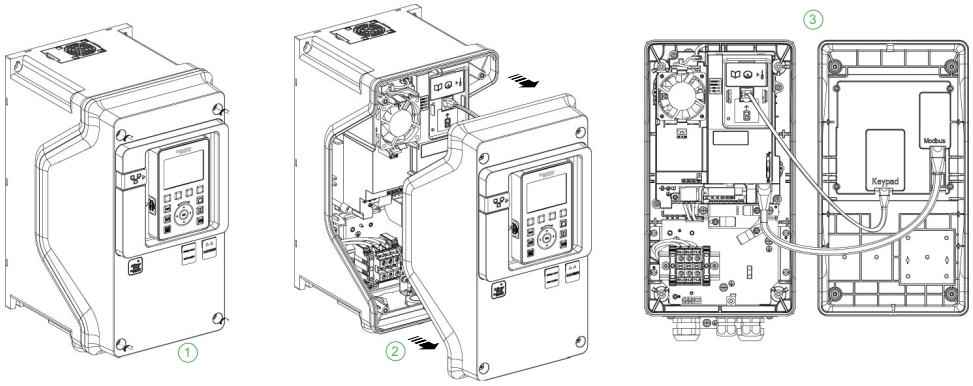
Access to the Terminals for Frame Sizes A0 to A2

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Product Related Information** chapter before performing any procedure in this chapter.

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



Apply the following instructions to access the terminals on **frame size A0 to A2** drives

Step	Action
1	Unscrew the 4 captive screws attaching the housing.
2	Remove the front cover.
3	Refit the front cover on completion of wiring. Tighten the screws to 1.5 N•m / 13.3 lb-in.

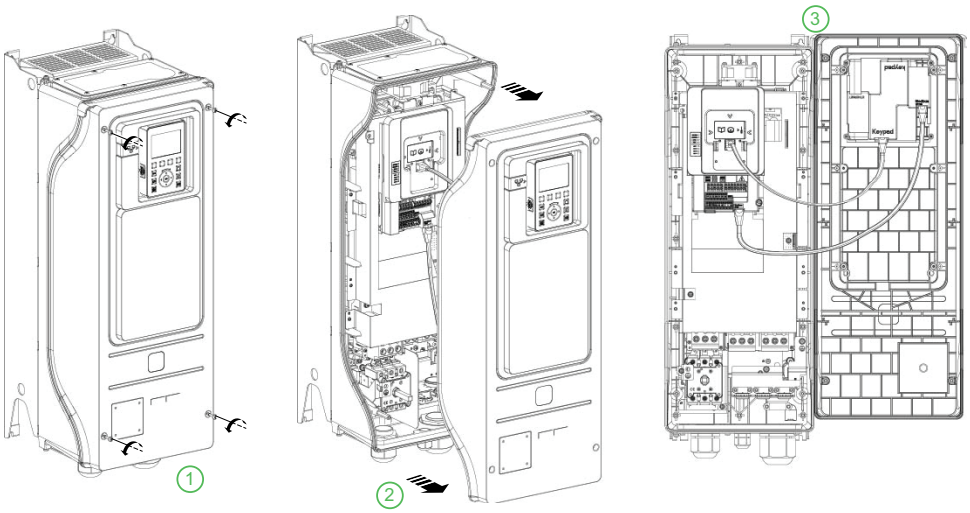
Access to the Terminals for Frame Size A3

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Product Related Information** chapter before performing any procedure in this chapter.

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



Apply the following instructions to access the terminals on **frame size A3** drives

Step	Action
1	Unscrew the 4 captive screws attaching the housing.
2	Remove the front cover.
3	Attach it on the left or right side of the housing.
4	Refit the front cover on completion of wiring. Tighten the screws to 1.5 N•m / 13.3 lb-in.

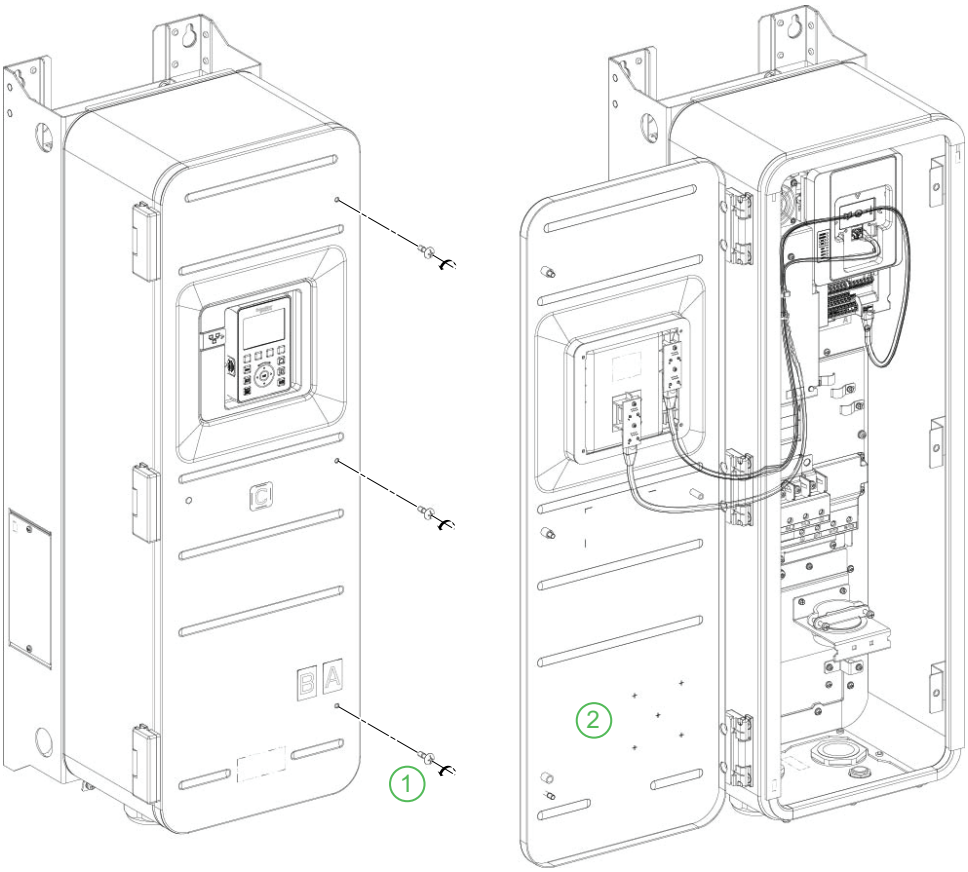
Access to the Terminals for Frame Sizes B and C

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Product Related Information** chapter before performing any procedure in this chapter.

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



Apply the following instructions to access the terminals on **frame sizes B and C** drives

Step	Action
1	Unscrew the 3 screws attaching the housing.
2	Open the front cover.
3	Refit the front cover on completion of wiring. Tighten the screws to 1.5 N•m / 13.3 lb-in.

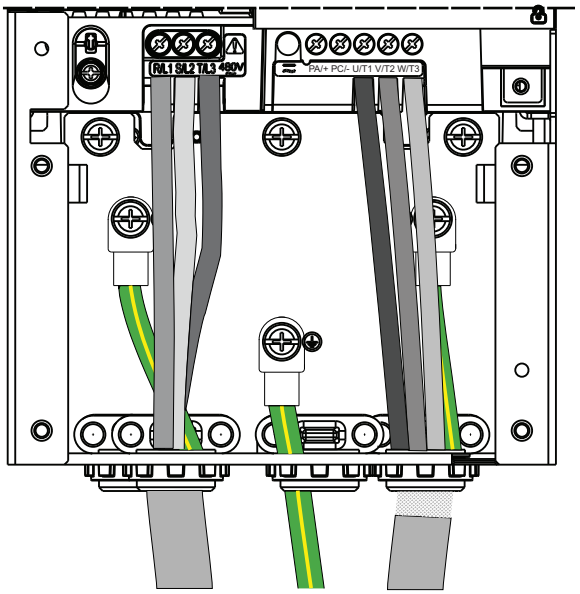
Power part – cable path

Frame Size 0 to Size 2B Cable Path

Correspondence Table From Frame Size 0 to Size 2B

Power Rating		Frame Size 0 to Size 2B Drives
kW	**HP**	**Catalog Number**
0.75	1	ATH630U07N4(Z)
1.5	2	ATH630U15N4(Z)
2.2	3	ATH630U22N4(Z)
3	4	ATH630U30N4(Z)
4	5	ATH630U40N4(Z)
5.5	7.5	ATH630U55N4(Z)
7.5	10	ATH630U75N4(Z)
11	15	ATH630D11N4(Z)
15	20	ATH630D15N4(Z)
18	25	ATH630D18N4(Z)

Wire the power cables as shown below (example for wall mounting drives).



NOTE: PA/+ and PC/- terminals are used only to measure the DC Bus voltage and are not intended to be wired for an external use.

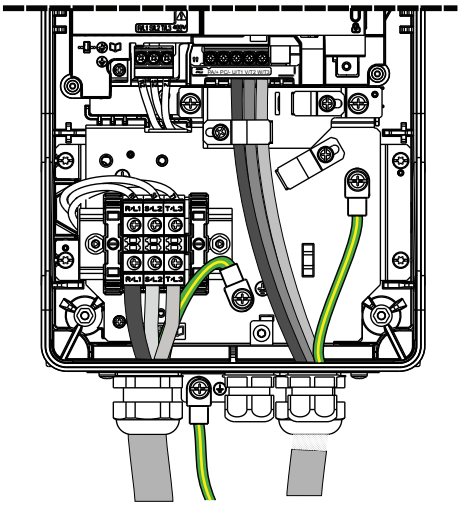
Frame Size A0 to Size A2 Cable Path

Correspondence Table From Frame Size A0 to Size A2

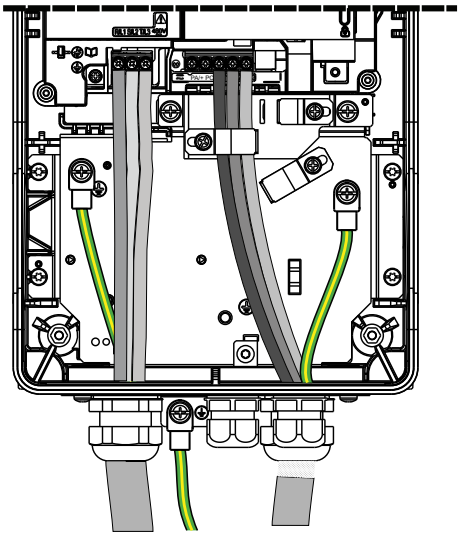
Power Rating		Frame Size A0 to Size A2 Drives
kW	HP	Catalog Number
0.75	1	ATH650U07N4(C)
1.5	2	ATH650U15N4(C)
2.2	3	ATH650U22N4(C)
3	3	ATH650U30N4(C)
4	5	ATH650U40N4(C)
5.5	7.5	ATH650U55N4(C)
7.5	10	ATH650U75N4(C)
11	15	ATH650D11N4(C)
15	20	ATH650D15N4(C)
18	25	ATH650D18N4(C)

Wire the power cables as shown below (example for wall mounting drives).

EMC C1



EMC C2



Cable wiring:

Step	Action
1	Release the control EMC plate below the power terminal.
2	Release the clamp in the power cable route.
3	Connect the power cable on the corresponding terminal.
4	Install the clamp if need.
5	Install the control EMC plate.

NOTE: PA/+ and PC/- terminals are used only to measure the DC Bus voltage and are not intended to be wired for an external use.

EMC C1 version: ATH650U07N4C...D18N4C

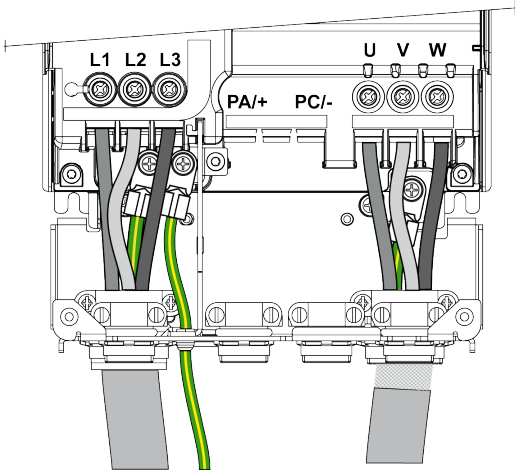
EMC C2 version: ATH650U07N4...D90N4, ATH650D22N4U...D90N4U

Frame Size 3 and Frame Size A3 Cable Path

Correspondence Table Between Frame Size A3 and Frame Size 3

Power Rating		Frame Size A3 Drives	Frame Size 3 Drives
kW	HP	Catalog Number	Catalog Number
22	30	ATH650D22N4(U)	ATH630D22N4(Z)

Wire the power cables as shown below (example for wall mounting drives).



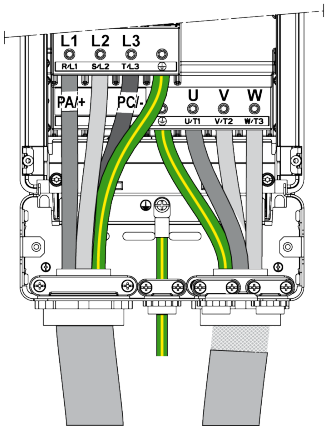
NOTE: PA/+ and PC/- terminals are used only to measure the DC Bus voltage and are not intended to be wired for an external use.

Frame Size 4 and Frame Size B Cable Path

Correspondence Table Between Frame Size B and Frame Size 4

Power Rating		Frame Size B Drives	Frame Size 4 Drives
kW	HP	Catalog Number	Catalog Number
30	40	ATH650D30N4(U)	ATH630D30N4(Z)
37	50	ATH650D37N4(U)	ATH630D37N4(Z)
45	60	ATH650D45N4(U)	ATH630D45N4(Z)

Wire the power cables as shown below (example for wall mounting drives).



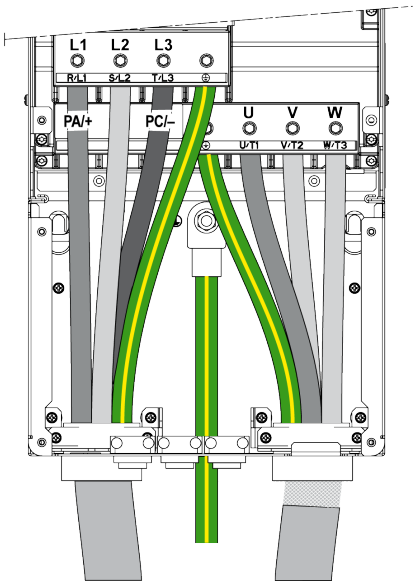
NOTE: PA/+ and PC/- terminals are used only to measure the DC Bus voltage and are not intended to be wired for an external use.

Frame Size 5 and Frame Size C Cable Path

Correspondence Table Between Frame Size C and Frame Size 5

Power Rating		Frame Size C Drives	Frame Size 5 Drives
kW	HP	Catalog Number	Catalog Number
55	75	ATH650D55N4(U)	ATH630D55N4(Z)
75	100	ATH650D75N4(U)	ATH630D75N4(Z)
90	125	ATH650D90N4(U)	ATH630D90N4(Z)

Wire the power cables as shown below (example for wall mounting drives).



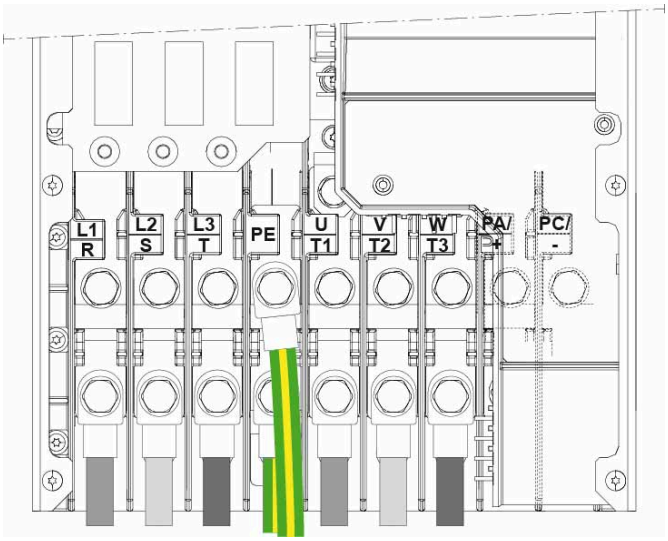
NOTE: PA/+ and PC/- terminals are used only to measure the DC Bus voltage and are not intended to be wired for an external use.

Frame Size 6 Cable Path

NOTE: Due to accessible live parts on their lower part, these drives should be installed in enclosures or located behind enclosures or barriers, which comply at least with the requirements of IP2•, as per IEC61800-5-1.

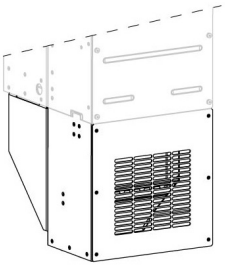
Use 1 or 2 connection cables per terminal, depending on the cable characteristics. Refer to standard IEC 60364-5-52 for cable selection. Permissible cable cross sections are given in the Power Terminals section, page 142.

For 1 cable connection, wire the power cables as shown below.



NOTE: PA/+ and PC/- terminals are used only to measure the DC Bus voltage and are not intended to be wired for an external use.

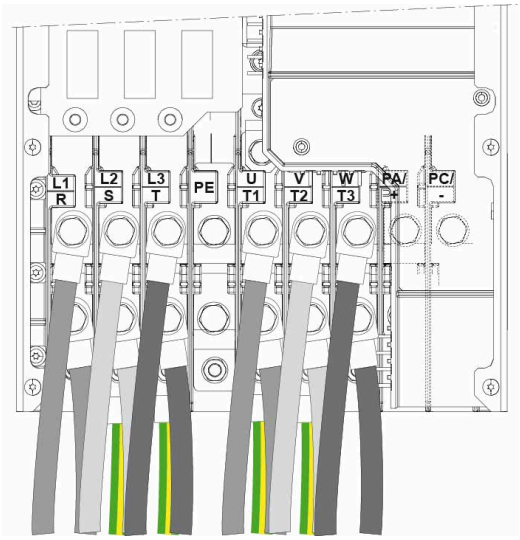
NOTE: A conduit box is available as an option. It enables an IP21 degree of protection at the bottom side of the drive. See NHA52502 available on www.se.com.



For 2 connection cable wiring:

Step	Action
1	Connect the first cable on the lower terminal
2	Connect the other cable on the upper terminal

Wire the power cables as shown below.

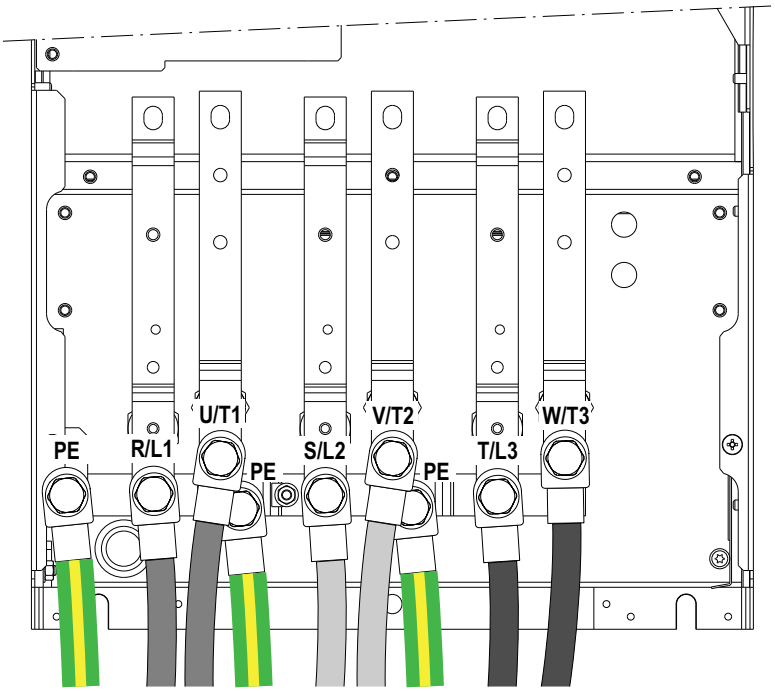


Frame Size 7A Cable Path

NOTE: Due to accessible live parts on their lower part, these drives should be installed in enclosures or located behind enclosures or barriers, which comply at least with the requirements of IP2•, as per IEC61800-5-1.

Refer to standard IEC 60364-5-52 for cable selection. Permissible cable cross sections are given in the Power Terminals section, page 142.

Wire the power cables as shown below.



Cable wiring:

Step	Action
1	Connect the first cable on the lower terminal
2	Connect the other cable on the upper terminal

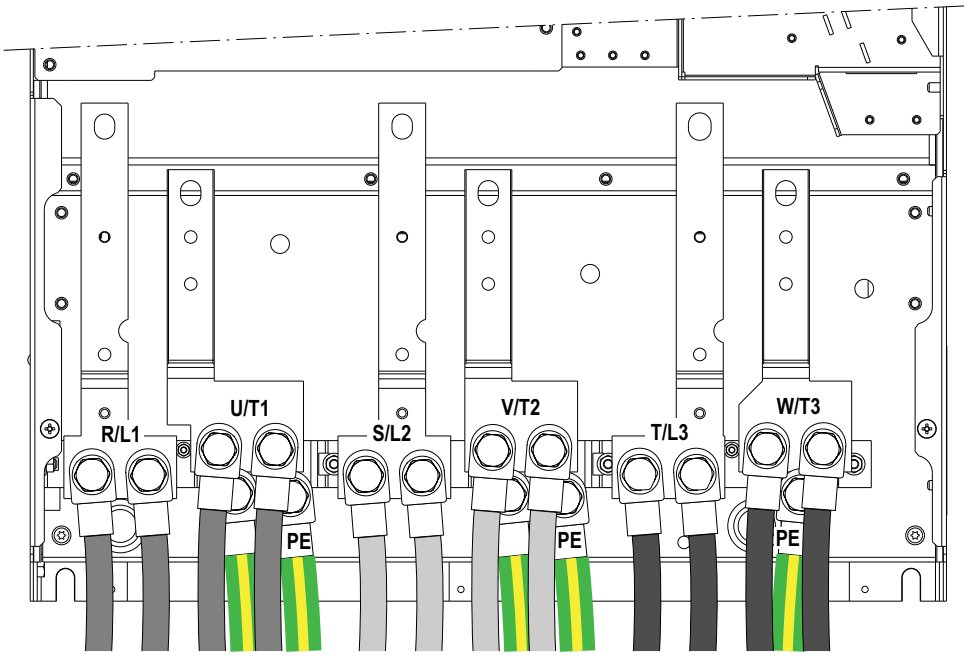
NOTE: Wiring of the DC chokes is described in the Installing the DC Choke section, page 121.

Frame Size 7B Cable Path

NOTE: Due to accessible live parts on their lower part, these drives should be installed in enclosures or located behind enclosures or barriers, which comply at least with the requirements of IP2•, as per IEC61800-5-1.

Refer to standard IEC 60364-5-52 for cable selection. Permissible cable cross sections are given in the Power Terminals section, page 142.

Wire the power cables as shown below.



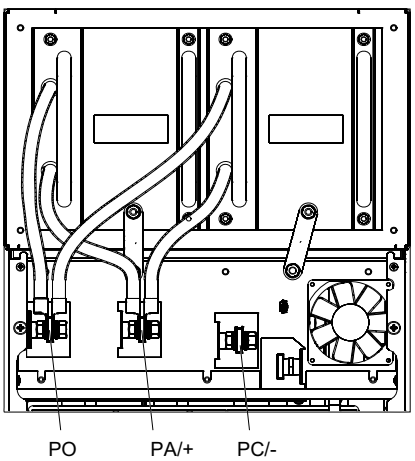
Cable wiring:

Step	Action
1	Connect the first cable on the lower terminal
2	Connect the other cable on the upper terminal

NOTE: Wiring of the DC chokes is described in the Installing the DC Choke section, page 121.

Frame Size 7A and 7B DC Bus terminals

The figure below shows where to find DC Bus terminals (PA/+, PC/-).



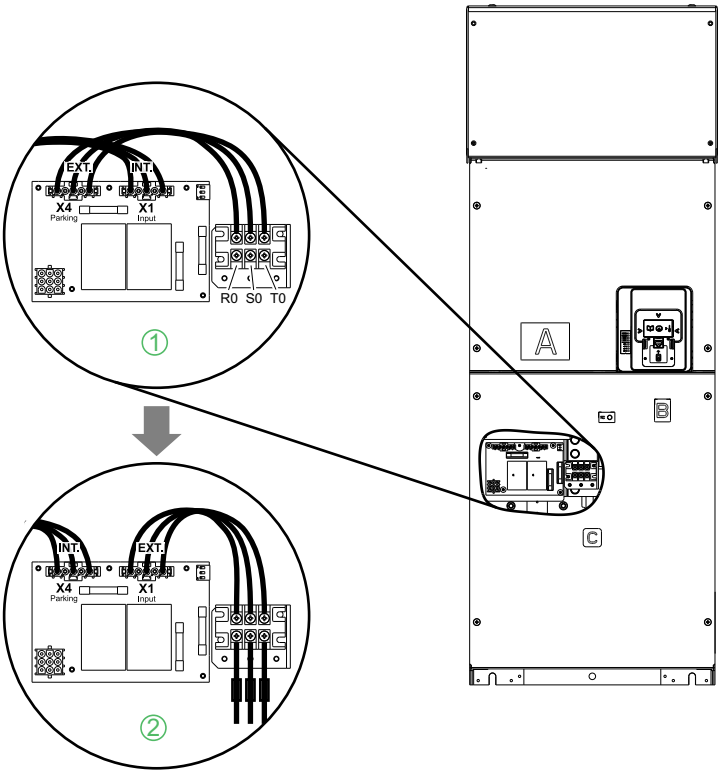
NOTE: PA/+ and PC/- terminals are used only to measure the DC Bus voltage and are not intended to be wired for an external use.

Connecting Fans For a Separate Power Supply on Frame Sizes 7A and 7B

Power consumed by the fans

ATH630 drive	Power consumed by the fans (VA)
C22N4Z, C25N4Z	1100

In order to remove the link between the fans and power supply terminals R/L1, S/L2, T/L3 and relocate it at terminals R0, S0, T0. Cross the connectors X1 and X4 as indicated on the diagram below:



① Factory wiring: Fans powered internally by R/L1, S/L2, T/L3.

② Modification for fans powered externally by R0, S0, T0.

NOTE: The rated tightening torque on R0, S0, T0 terminals is 1.4N.m / 12.4 lbf.in.

Electromagnetic Compatibility

Limit Values

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.

EMC requirements for the control cabinet

EMC measures	Objective
Use mounting plates with good electrical conductivity, connect large surface areas of metal parts, remove paint from contact areas.	Good conductivity due to large surface contact.
Ground the control cabinet, the control cabinet door and the mounting plate with ground straps or ground wires. The conductor cross section must be at least 10 mm^2 (AWG 8).	Reduces emissions.
Fit switching devices such as power contactors, relays or solenoid valves with interference suppression units or arc suppressors (for example, diodes, varistors, RC circuits).	Reduces mutual interference.
Install power components and control components separately.	
Install frame size 1 and 2 drives on grounded metal back plane.	Reduces emissions.

Shielded cables

EMC measures	Objective
Connect large surface areas of cable shields, use cable clamps and ground straps.	Reduces emissions.
Use cable clamps to connect a large surface area of the shields of all shielded cables to the mounting plate at the control cabinet entry.	
Ground shields of digital signal wires at both ends by connecting them to a large surface area or via conductive connector housings	Reduces interference affecting the signal wires, reduces emissions
Ground the shields of analog signal wires directly at the device (signal input); insulate the shield at the other cable end or ground it via a capacitor (for example, 10 nF, 100 V or higher.	Reduces ground loops due to low-frequency interference.
Use only shielded motor cables with copper braid and a coverage of at least 85%, ground a large surface area of the shield at both ends.	Diverts interference currents in a controlled way, reduces emissions.

Cable Installation

EMC measures	Objective
Do not route fieldbus cables and signal wires in a single cable duct together with lines with DC and AC voltages of more than 60 V. (Fieldbus cables, signal lines and analog lines may be in the same cable duct) Recommendation: Use separate cable ducts at least 20 cm (8 in.) apart.	Reduces mutual interference.
Keep cables as short as possible. Do not install unnecessary cable loops, use short cables from the central grounding point in the control cabinet to the external ground connection.	Reduces capacitive and inductive interference.
Use equipotential bonding conductors in the following cases: wide-area installations, different voltage supplies and installation across several buildings.	Reduces current in the cable shield, reduces emissions.
Use fine stranded equipotential bonding conductors.	Diverts high-frequency interference currents
If motor and machine are not conductively connected, for example by an insulated flange or a connection without surface contact, you must ground the motor with a ground strap or a ground wire. The conductor cross section must be at least 10 mm^2 (AWG 8).	Reduces emissions, increases immunity.
Use twisted pair for the DC supply. For digital and analog inputs use shielded twisted cables with a pitch of between 25...50 mm (1...2 in).	Reduces interference affecting the signal cables, reduces emissions.

Power Supply

EMC measures	Objective
Operate product on mains with grounded neutral point.	Enables effectiveness of mains filter.
Surge arrester if there is a risk of overvoltage.	Reduces the risk of damage caused by overvoltage.

Additional measures for EMC improvement

Depending on the application, the following measures can improve the EMC-dependent values:

EMC measures	Objective
Use passive filters	Reduces mains harmonics, prolongs product service life.
Use external EMC filters	Improves the EMC limit values.
Additional EMC measures, for example mounting in a closed control cabinet with 15 dB shielding attenuation of radiated interference	

NOTE: If using an additional input filter, it should be mounted as close as possible to the drive and connected directly to the supply mains via an unshielded cable.

Operation on an IT or Corner Grounded System

Definition

IT system: Isolated or impedance grounded neutral. Use a permanent insulation monitoring device compatible with nonlinear loads, such as an XM200 type or equivalent.

Corner grounded system: System with one phase grounded.

Operation

NOTICE
OVERVOLTAGE OR OVERHEATING If the drive is operated via an IT or corner grounded system, the integrated EMC filter must be disconnected as described in the present manual. **Failure to follow these instructions can result in equipment damage.**

Disconnecting The Built-in EMC Filter

Filter Disconnection

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Product Related Information** chapter before performing any procedure in this chapter.

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

The drives have a built-in EMC filter. As a result they exhibit leakage current to ground. If the leakage current creates compatibility problems with your installation (residual current device or other), then you can reduce the leakage current by disconnecting the built-in filter as shown below. In this configuration the product does not meet the EMC requirements according to the standard IEC 61800-3.

Setting

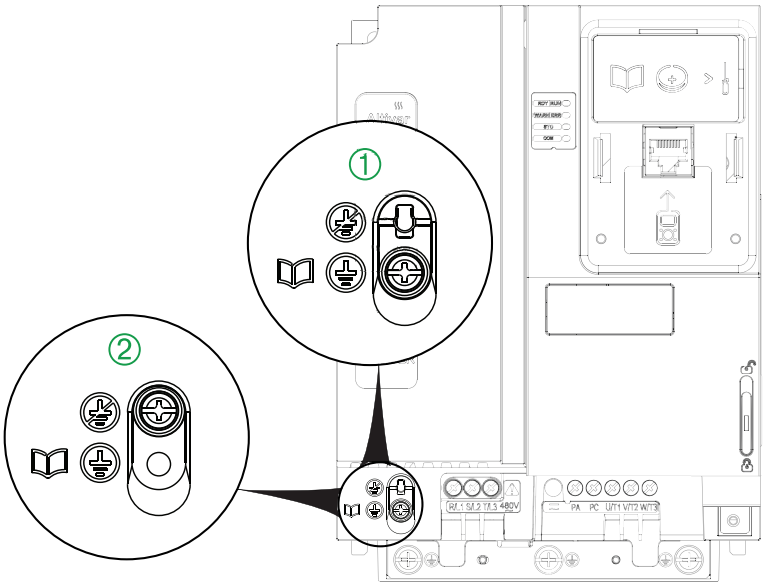
Apply the following instructions to disconnect the built-in EMC filter.

Step	Action
1	Remove the front cover(s) , page 153
2	The screw(s) or switch is/are factory set to the position, as shown on detail ①
3	For operation without the built-in EMC filter, remove the screw(s) from its/ their location or move the switch from its position and set it/them to the position, as shown on detail ②
4	Refit the front cover(s)

NOTE:

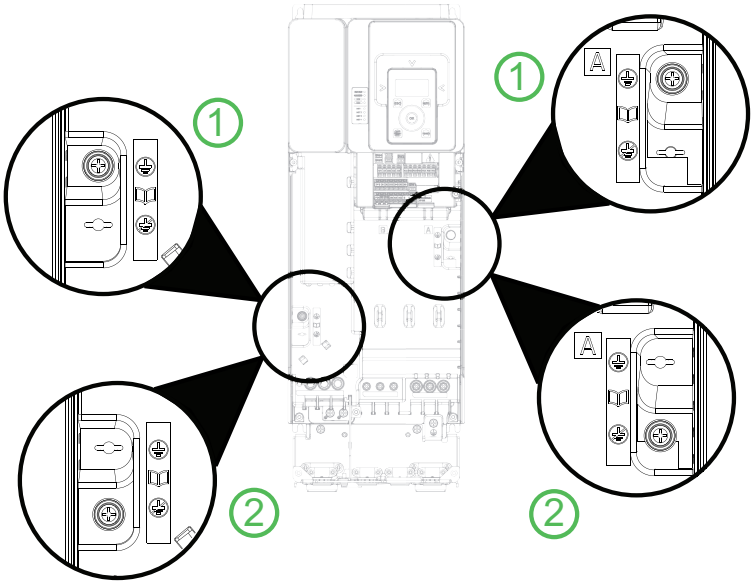
- Use only the screw(s) supplied.
- Do not operate the drive with setting screw(s) removed.

Setting For Frame Size 0 to Size 2B Products



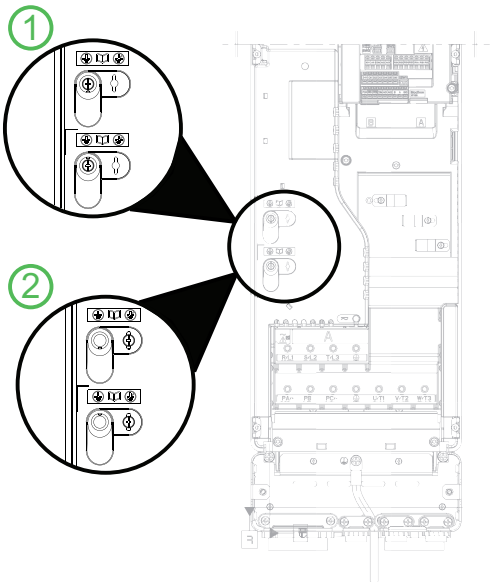
: 1.5 N.m

Setting For Frame Size 3 Products



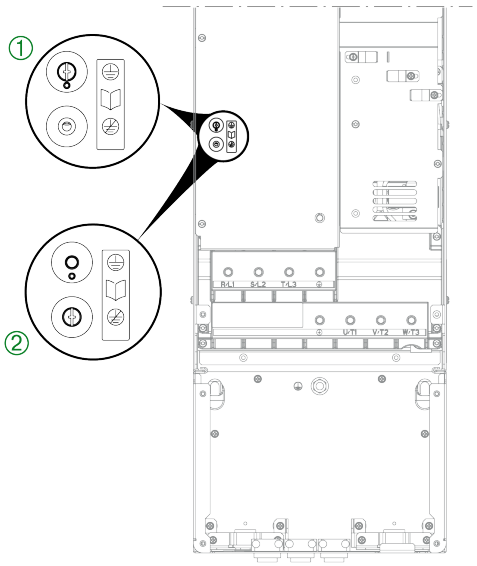
: 1.5 N.m

Setting For Frame Size 4 Products



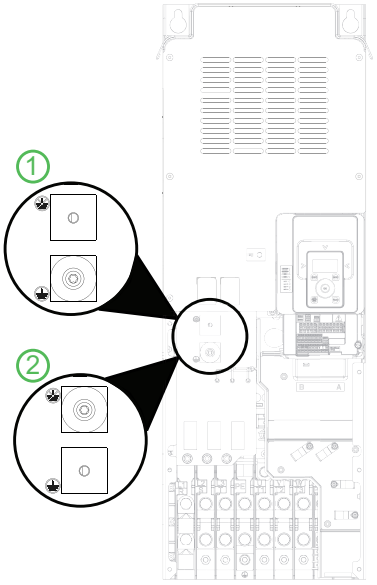
: 1.5 N.m

Setting For Frame Size 5 Products



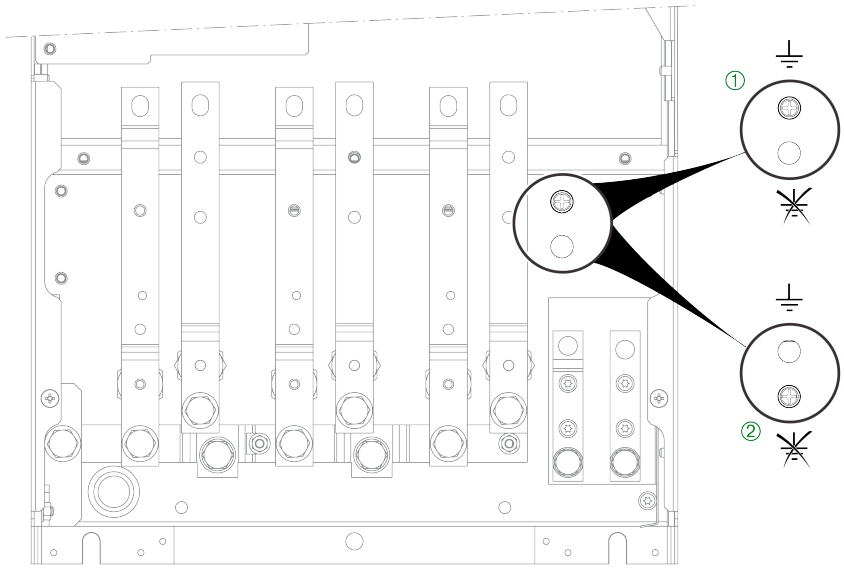
: 1.5 N.m

Setting For Frame Size 6 Products



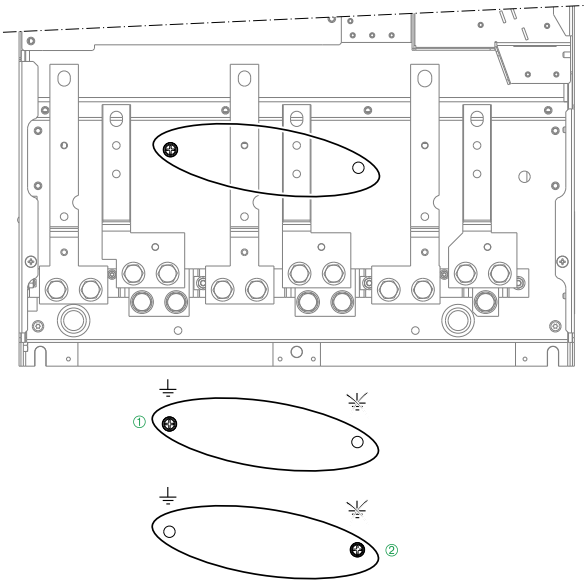
: 5.5 N.m

Setting For Frame Size 7A Products



: 12 N.m

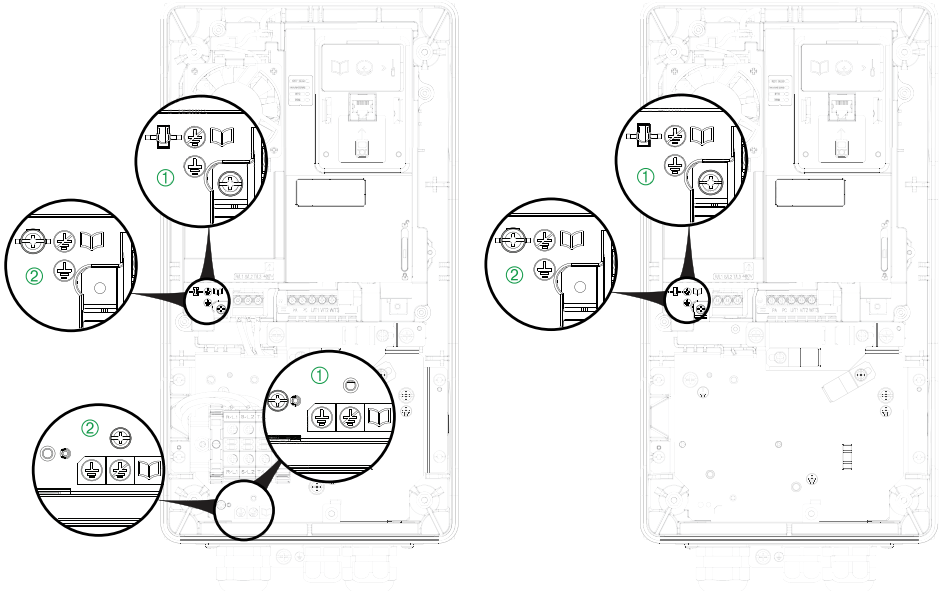
Setting For Frame Size 7B Products



: 12 N.m

Setting For IP55 Frame Size A0 to A2 Products

EMC C1 **EMC C2**



EMC C1 version: ATH650U07N4C...D18N4C

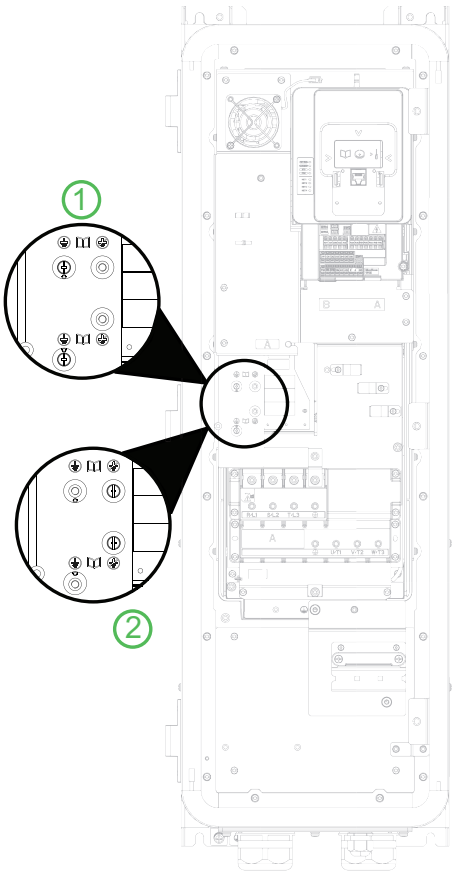
EMC C2 version: ATH650U07N4...D90N4, ATH650D22N4U...D90N4U

: 1.5 N.m

Setting For IP55 Frame Size A3 Products

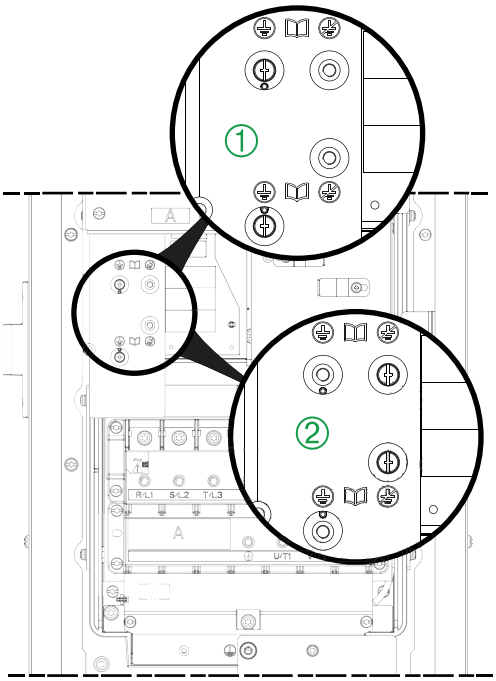
: 1.5 N.m

Setting For IP55 Frame Size B Products



: 1.5 N.m

Setting For IP55 Frame Size C Products

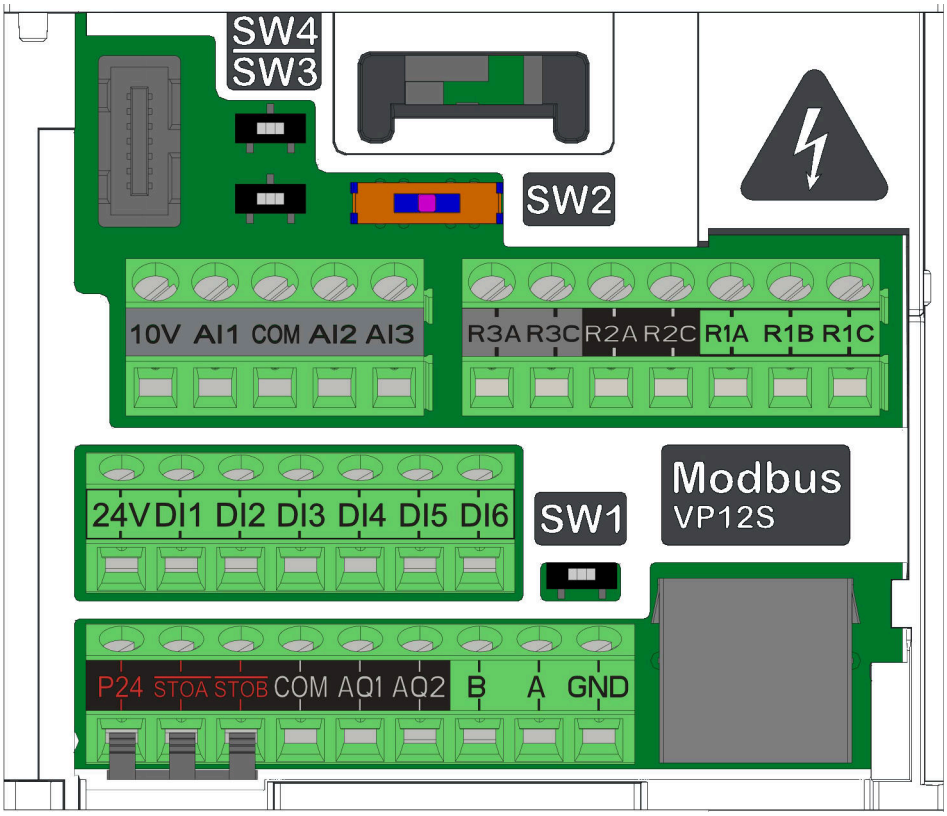


: 1.5 N.m

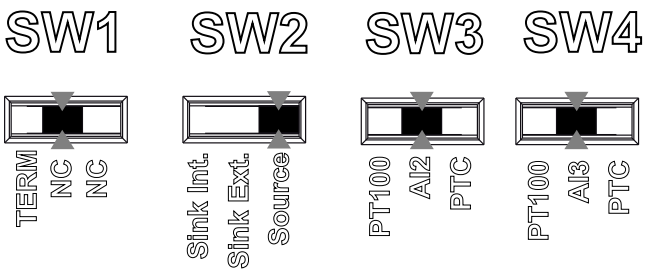
Arrangement and Characteristics of Control Block Terminals and Communication and I/O Ports

Terminal Arrangement

The control block terminals are the same for all drive frame sizes.



Information on the use of switches



NOTE: To make it easier to use, a tool can be used.

SW1	SW2	SW3	SW4
• TERM = 120Ω termination enabled • NC = No termination	Digital Inputs Wiring Depending on Sink / Source Switch Configuration, page 140	Sensor connections and configuration, page 135	

Wiring Characteristics

⚠⚠DANGER

HAZARD OF FIRE OR ELECTRIC SHOCK

- Wire cross sections and tightening torques must comply with the specifications provided in this document.
- If you use flexible multi-wire cables for a connection with a voltage higher than 25 Vac, you must use ring type cable lugs or wire ferrules, depending on the wire gauge and the specified stripping length of the cable.

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

NOTE: Control terminals can accept 1 or 2 wires.

Wire cross sections and tightening torques

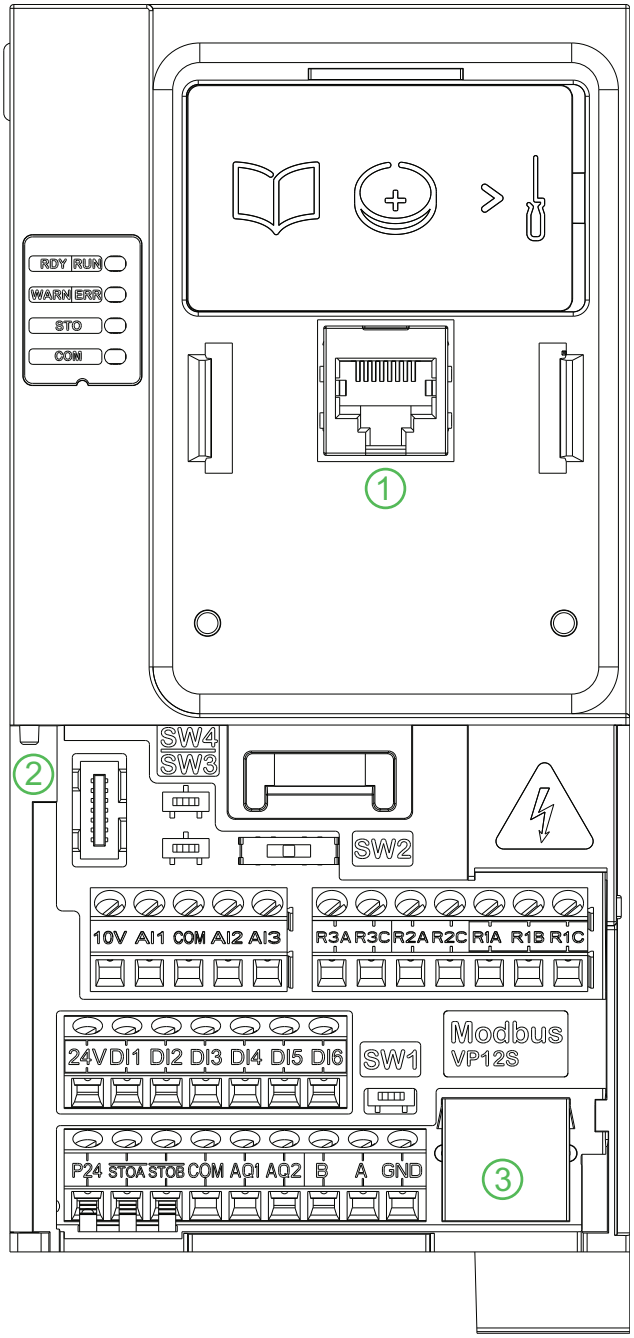
Control Terminals	Relay Output Wire Cross Section		Other Wire Cross Section		Tightening Torque
	Minimum (1)	Maximum	Minimum (1)	Maximum	
	mm² (AWG)	mm² (AWG)	mm² (AWG)	mm² (AWG)	N•m (lbf. in)
All terminals	0.75 (18)	1.5 (16)	0.5 (20)	1.5 (16)	0.5 (4.4)

(1) The value corresponds to the minimum permissible cross section of the terminal.

NOTE: Also refer to Control Terminal Electrical data, page 188.

Control Block Ports

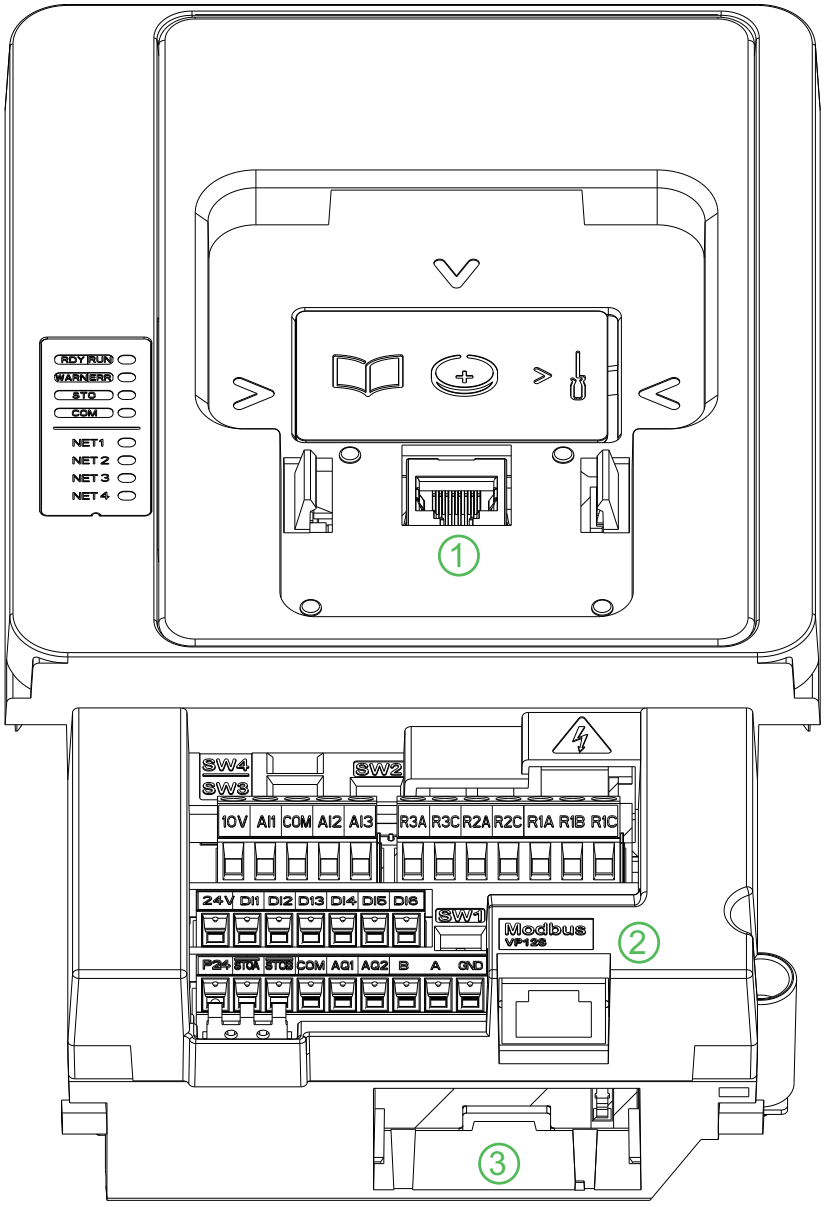
Frame Size 0 to Frame Size 2B



Legend:

- ① RJ45 port for graphic display terminal
- ② Option adaptor terminal
- ③ RJ45 port for Modbus RTU and BACnet MS /TP

**Frame Size 3 to Frame Size 7B,
Frame Size A0 to Frame Size C**



Legend:

- ① RJ45 port for graphic display terminal
- ② RJ45 port for Modbus RTU and BACnet MS /TP
- ③ Slot A, for fieldbus and I/O modules

RJ45 Communication ports

The control block includes two RJ45 ports.

They allow to connect:

- A PC
  - Using a commissioning software (SoMove, SoMachine...), to configure and monitor the drive
- A SCADA system
- A PLC system
- A graphic display terminal
- A BACnet MS/TP fieldbus

  NOTE: Verify that RJ45 cable is not damaged prior to connect it to the product otherwise the power supply of the control could be lost.

Control Terminals Electrical Data

Characteristics of Terminals

NOTE:

- For a description of the terminal arrangement, refer to Arrangement and Characteristics of Control Terminals and Communication And I/O Ports, page 183
- For factory setting I/O assignment, refer to the Programming manual.
- For cable lengths, refer to the table given in the Wiring The control Part section , page 191.

Terminal	Description	I/O Type	Electrical characteristics
R1A	NO contact of relay R1	O	**Output relay 1** • Minimum switching capacity: 5 mA for 24 Vdc • Maximum switching current on resistive load: 3 A for 250 Vac (OVC II) and 30 Vdc. • Maximum switching current on inductive load: (cos ϕ ≥0.4 and L/R ≤ 7 ms): 2 A for 250 Vac (OVC II) and 30 Vdc. Inductive load must be equipped with a voltage surge limitation device according to AC or DC operation with total energy dissipation greater than the inductive energy stored in the load. • Refresh time: 5 ms +/- 0.5 ms • Service life: 100,000 operations at maximum switching current
R1B	NC contact of relay R1	O	
R1C	Common point contact of relay R1	O	
R2A	NO contact of relay R2	O	**Output relay 2** • Minimum switching capacity: 10 mA for 24 Vdc • Maximum switching current on resistive load: 3 A for 250 Vac (OVC II) and for 30 Vdc • Maximum switching current on inductive load: (cos ϕ ≥0.4 and L/R ≤ 7 ms): 2 A for 250 Vac (OVC II) and 30 Vdc. Inductive load must be equipped with a voltage surge limitation device according to AC or DC operation with total energy dissipation greater than the inductive energy stored in the load. • Refresh time: 5 ms +/- 0.5 ms • Service life: 100,000 operations at maximum switching current , 1,000,000 operations at 0.5 A
R2C	Common point contact of relay R2	O	
R3A	NO contact of relay R3	O	**Output relay 3** • Minimum switching capacity: 10 mA for 24 Vdc • Maximum switching current on resistive load: 3 A for 250 Vac (OVC II) and for 30 Vdc • Maximum switching current on inductive load: (cos ϕ ≥0.4 and L/R ≤ 7 ms): 2 A for 250 Vac (OVC II) and 30 Vdc. Inductive load must be equipped with a voltage surge limitation device according to AC or DC operation with total energy dissipation greater than the inductive energy stored in the load. • Refresh: 5 ms +/- 0.5 ms • Service life: 100,000 operations at maximum switching current, 1,000,000 operations at 0.5 A
R3C	Common point contact of relay R3	O	
$\overline{\text{STOA}}$ $\overline{\text{STOB}}$	STO inputs	I	Safety function STO inputs Refer to the Safety Function Manual (JPS89266) available on www.se.com.
P24	Output supply for digital inputs	O	**Output supply reserved for STO channels**
	External input supply	I	**External input supply +24 Vdc (i.e. PLC)** • Tolerance : minimum 19 Vdc, maximum 30 Vdc • Current : maximum 0.8A
	Safety function STO supply	O	Terminal protected against overload and short-circuit.
COM	Analog I/O Common	I/O	0V reference for analog output

Terminal	Description	I/O Type	Electrical characteristics
AQ1 - AQ2	Analog output	O	**Analog output software-configurable for voltage or current** • Voltage analog output 0...10 Vdc. Minimum load impedance 470 Ω • Current analog output X-Y mA by programming X and Y from 0 to 20, maximum load impedance 500 Ω • Sampling time: 10 ms + 1 ms maximum • Resolution: 10 bits • Accuracy: ± 1% for a temperature variation of 60°C • Linearity: ± 0.2%
24V			**Equipped supply reserved for digital input channels**
	External input supply	I	External input supply +24 Vdc • Tolerance : minimum 19 Vdc, maximum 30 Vdc • Current : maximum 0.8A • In Sink or Ext position, this supply is powered by external PLC supply
	Output supply for digital inputs	O	• +24 Vdc • Tolerance : minimum 20.4 Vdc, maximum 27 Vdc • Current : maximum 200 mA • Terminal protected against overload and short-circuit
COM	0V	I/O	0V of P24, 24V, digital inputs and STO channels
DI1-DI6	Digital inputs	I	6 programmable logic inputs (24 Vdc): • Comply with IEC/EN 61131-2 logic type 1: ◦ Positive logic (Source): State 0 if ≤5 Vdc or logic input not wired, state 1 if ≥ 11 Vdc ◦ Negative logic (Sink):State 0 if ≥ 16 Vdc or logic input not wired, state 1 if ≤ 10 Vdc • Impedance: 4.4 kΩ • Maximum voltage: 30 Vdc • Sampling time: 2 ms + 0.5 ms maximum Multiple assignment makes it possible to configure several functions on one input (example: DI1 assigned to forward and preset speed 2, DI3 assigned to reverse and preset speed 3)
10V	Output supply for Analog input	O	**Internal supply for the analog inputs** • 10.5 Vdc • Tolerance : ± 5% • Current : maximum 10 mA • Short circuit protected
AI1-AI2-AI3	Analog inputs	I	**Software-configurable V/A : voltage or current analog input** • Voltage analog input 0...10 Vdc, impedance 30 kΩ • Current analog input X-Y mA by programming X and Y from 0 to 20, with impedance 250 Ω • Sampling time: 5 ms + 1 ms maximum • Resolution: 12 bits • Accuracy: ± 1,5% for a temperature variation of 60°C • Linearity: ± 0.15% of maximum value
AI2-AI3	Sensor inputs	I	Software-configurable PT100,PT1000 or KTY84 or PTC or Water level sensor manual change on switch for AI2 and AI3 depending on temperature sensor
			PT100 • 1 thermal sensor • Sensor curent: 5 mA max • Range -20/200°C • Accuracy +/- 4°C for a temperature variation of 60°C **PT1000** • 1 thermal sensor • Sensor curent: 1 mA • Range -20/200°C • Accuracy +/- 4°C for a temperature variation of 60°C

Terminal	Description	I/O Type	Electrical characteristics
			KTY84 • 1 thermal sensor • Sensor curent: 1 mA • Range -20/200°C • Accuracy +/- 4°C for a temperature variation of 60°C **PTC** • 6 sensors maximum mounted in series • Sensor curent: 1mA • Nominal value < 1.5 kΩ • Overheat trigger threshold : 2.9 kΩ ± 0.2kΩ • Overheat reset threshold : 1.575 kΩ ± 75Ω • Low impedance detection threshold : 50 Ω ±10 Ω • Open circuit threshold : 100 kΩ ± 10kΩ **Water Level Sensor** • Sensitivity: 0...1MΩ, adjustable by software • Water level sensor current: 0.3mA...1mA maximum • Adjustable delay: 0...10s
B, A	Data lines	I	BACnet MS/TP RS-485 differential pair **NOTE:** A and B are the two data lines carrying the differential voltage.
GND	Common reference reserved for BACnet MS/TP application	I/O	0V of the three-wire RS-485 recommended practice. **NOTE:** RS-485 GND is not the same as protective earth ground and should not be tied to earth ground except at one point in the network.

Wiring The Control Part

What's in This Chapter

Preliminary Instructions

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Product Related Information** chapter before performing any procedure in this chapter.

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

⚠⚠DANGER

ELECTRIC SHOCK CAUSED BY INCORRECT POWER SUPPLY UNIT

The +24VDC supply voltage is connected with many exposed signal connections in the device.

- Use a power supply unit that meets the PELV (Protective Extra Low Voltage) requirements.

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

⚠WARNING

INCORRECT WIRING

- Only PELV circuits are allowed to be connected on the control part (except relays R1, R2 and R3).

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

NOTICE

INCORRECT VOLTAGE

Supply the digital inputs with 24 Vdc only.

Failure to follow these instructions can result in equipment damage.

NOTICE

INCORRECT WIRING

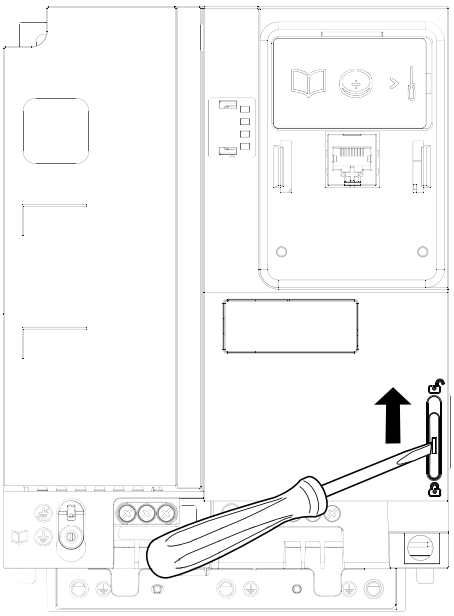
- Do not connect an external supply to the terminal output **10V**.
- Only use the terminal output **10V** to supply the analog inputs.

Failure to follow these instructions can result in equipment damage.

Access to the Control Terminals

Frame Size 0 to 2B

Access to the Control Terminals by opening the cover:



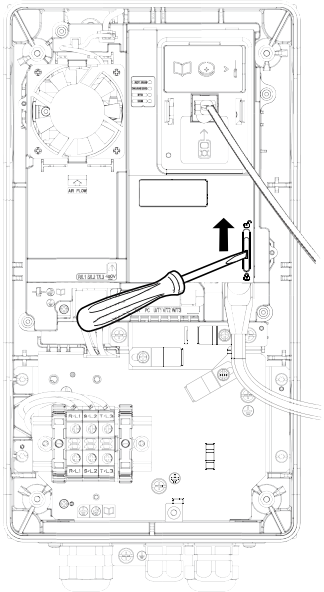
Frame Size 3 to 7B

Access to the control terminal is the same as access to the power supply section. For more informations, refer to Access to the Terminals, page 154.

Frame Size A0 to A2

Access to the control terminal is the same as access to the power supply section. For more informations, refer to Access to the Terminals, page 154.

Then access to the Control Terminals by opening the cover:



Frame Size A3 to C

Access to the control terminal is the same as access to the power supply section. For more informations, refer to Access to the Terminals, page 154.

Control Cable Lengths

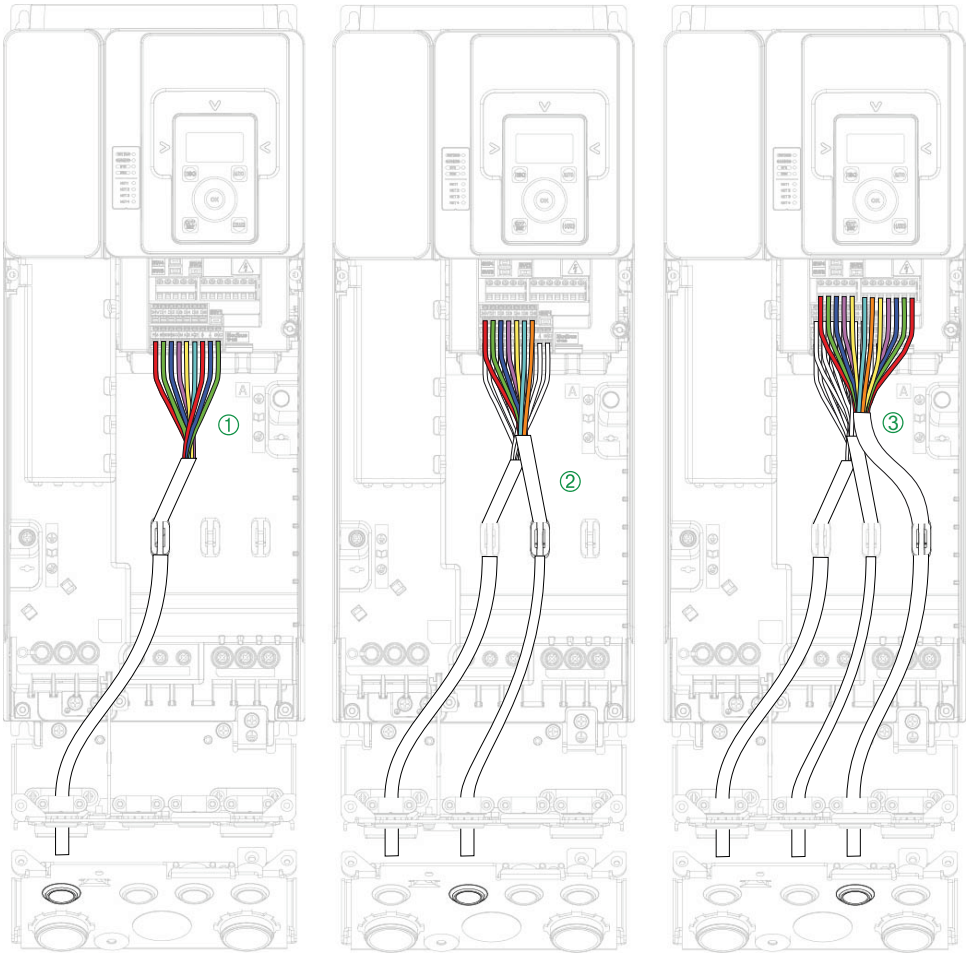
Control terminal Input/Output Cables		Maximum wires length depending on cable cross section (*)	
		1.5 mm² / AWG16	**0.5 mm² / AWG20**
Analog inputs AI1, AI2, AI3	voltage: 0 - 10 V	30 m / 98 ft	30 m / 98 ft
	current: 0 - 20 mA	3000 m / 9840 ft	1000 m / 3280 ft
Analog inputs AI2, AI3	PT100	30 m / 98 ft	10 m / 32 ft
	PT1000	300 m / 984 ft	100 m / 328 ft
	KTY84	300 m / 984 ft	100 m / 328 ft
	PTC	300 m / 984 ft	100 m / 328 ft
	Water level	3000 m / 9840 ft	1000 m / 3280 ft
Output supply 10V		30 m / 98 ft	30 m / 98 ft
Analog outputs AQ1, AQ2	voltage: 0 - 10 V	30 m / 98 ft	10 m / 32 ft
	current: 0 - 20 mA	3000 m / 9840 ft	1000 m / 3280 ft
Output power supply 24V	200 mA max.	300 m / 984 ft	100 m / 328 ft
Digital inputs DI1...DI6		3000 m / 9840 ft	1000 m / 3280 ft
Safe Torque Off inputs STOA, STOB		3000 m / 9840 ft	1000 m / 3280 ft
Control power supply input P24	24 V input	120 m / 390 ft	40 m / 130 ft

(*) Shorter cable lengths or smaller cable cross sections can be adjusted using linear interpolation with the values listed in the table.For example: maximum 10 m / 32 ft with 0.5 mm² / AWG20 and maximum 30 m with 1.5 mm² / AWG16 listed in the table, is equivalent to maximum 20 m / 65 ft with 1 mm² / AWG17.

Control Cables Path

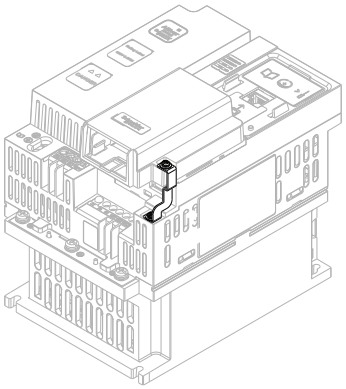
To help ensure correct wiring of the control part, apply the following instructions to wire the control block terminals

Step	Action
1	Wire the safety inputs STOA, STOB, the P24, the COM, the A, the B, the GND and the analog outputs (AQ1, AQ2) terminals.
2	Wire the 24V and the digital inputs (DI1...DI6).
3	Wire the Relay outputs, wire the 10V, the analog inputs (AI1...AI3) and COM terminals



NOTE: Cabling plate shown is for frame size 3 with conduit box. Other cabling plates look slightly different from this one.

Optional Module – I/O Relay Module – Installation and Wiring Size 0 to 2B - A0 to A2



NOTE:

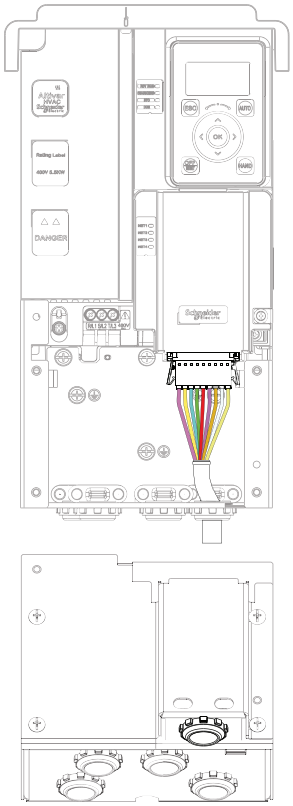
- For possible optional fieldbus module list, refer to the Catalog, page 13.
- For fieldbus module adapter information, refer to the instruction sheet JPS84158 available on www.se.com

NOTE: to use an Optional Fieldbus Module, use the module adapter VW3A36001. Before installing this module adapter, ensure to wire the power and control parts first. **Make sure the grounding plate is securely fastened.**

To help ensure correct wiring of the control part, apply the following instructions to install and connect a module to be wired.

Step	Action
1	Insert the module in the module adapter.
2	Insert the cable in the cabling plate, according to the outlined locations. The breakable cut out is used for fieldbus cables.
3	Connect the cable to the module.

Procedure applicable for wall mounting product



NOTE: Cabling plate shown is for frame size 1. Other cabling plates look slightly different from this one.

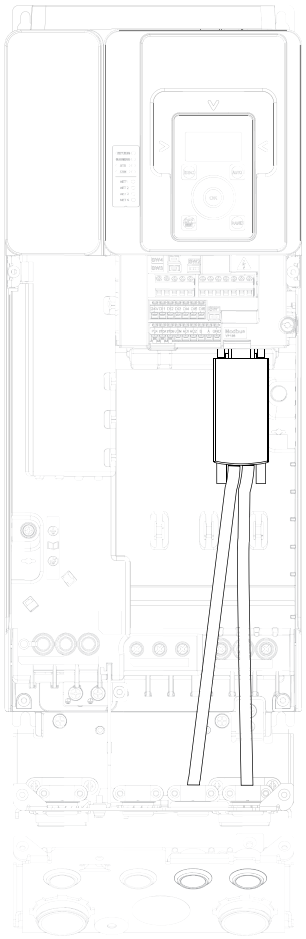
Optional Module Installation and Wiring – Size 3 to 7B – A3 to C

NOTE: For possible fieldbus module list, refer to the Catalog, page 13.

To help ensure correct wiring of the control part, apply the following instructions to install and connect a module to be wired.

Step	Action
1	Insert the module in the slot A, page 185.
2	Insert the cable in the cabling plate, according to the outlined locations. The breakable cut out is used for fieldbus cables.
3	Connect the cable to the module.

Procedure applicable for wall mounting product

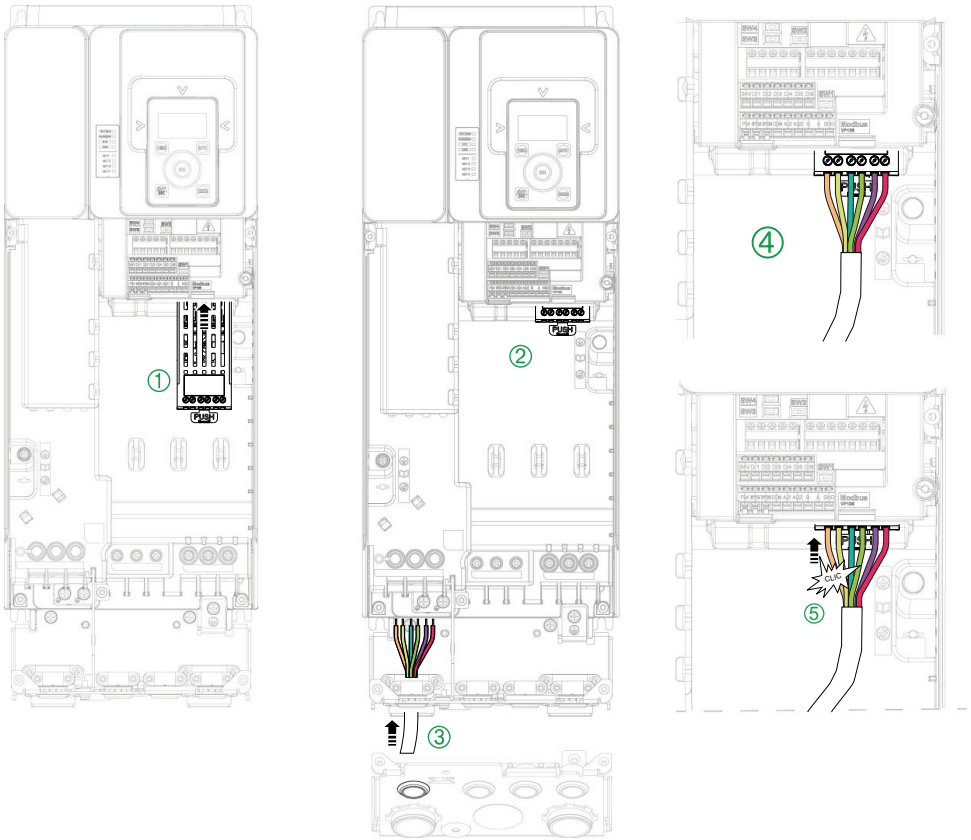


NOTE: Cabling plate shown is for frame size 3. Other cabling plates look slightly different from this one.

I/O Relay Module Installation and Wiring – Size 3 to 7B

To help ensure correct wiring of the control part, apply the following instructions to install and connect an I/O relay module.

Step	Action
1	Insert the I/O relay module in the slot A.
2	Push the module into its location and keep access to the module terminal screws.
3	Insert the I/O cable in the cabling plate, according to the outlined location.
4	Wire the I/O relay module.
5	Push again the module to its final position.



(Procedure applicable for wall mounting product)

Modbus VP12S / BACnet MSTP Network Configurations

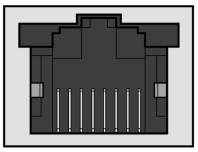
Modbus/ BACnet MSTP Port usage

To use the port with the BACnet MSTP configuration, use the parameter **[Embedded Protocol]** COM (**[Communication]** COM– ➡ **[Comm parameters]** CMP– ➡ **[Emb Serial Line]** SPC–) and select **[Bacnet MS/TP]** EBM, then reboot the product.

NOTE: The product needs to be rebooted to take the modification into account.

RJ45 connector

The table describes the pin out of the RJ45 connector of the device:



8 7 6 5 4 3 2 1

Pin	Signal
1	Reserved
2	
3	
4	D1 (Modbus signals)
5	D0 (Modbus signals)
6	Reserved
7	VP, 12 Vdc **NOTE:** Supply for RS232 / RS485 converter or a remote terminal.
8	Common (Modbus signals)

Open Style Modbus/BACnet MSTP Connection

NOTE: The two physical connectors, Modbus VP12S and Open Style, correspond to a single logical port. **Internally they are connected to the same RS-485 interface**.

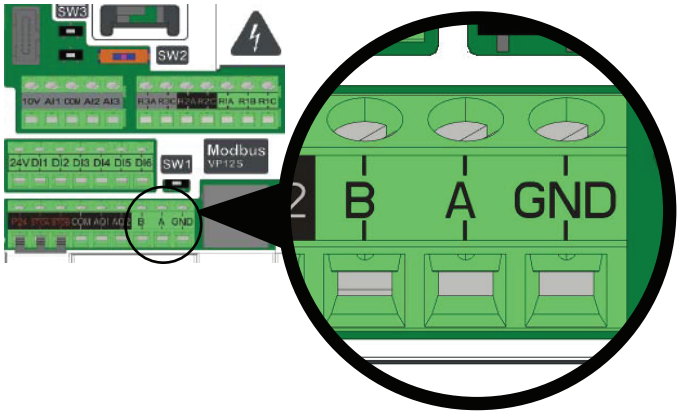
Only one port should be used at the same time to communicate with an external device. But a display terminal and a communication with an external device can be connected at the same time (one on each port).

⚠WARNING

LOSS OF CONTROL

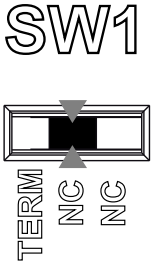
- Never use the two available communication ports at the same time when they are connected to different PLC, otherwise any communication interruption cannot be detected.

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



Pin	Signal
B	BACnet MS/TP RS-485 differential data line (+)
A	BACnet MS/TP RS-485 differential data line (-)
GND	Common reference reserved for BACnet MS/TP application. **NOTE:** GND is not the same as protective earth ground and should not be tied to earth ground except at one point in the network.

Information on the use of switch SW1



- TERM = 120Ω termination enabled
- NC = No termination

NOTE: To make it easier to use, a tool can be used.

RS485 Bus Schematic

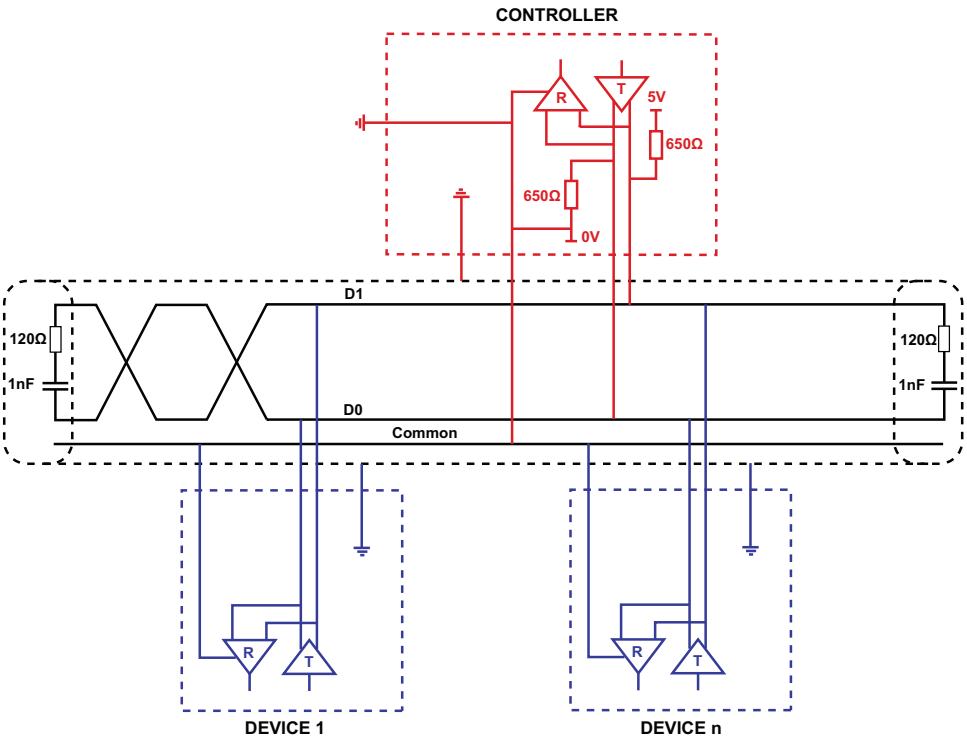
The RS485 standard allows variants of different characteristics:

- Polarization
- Line terminator
- Distribution of a reference potential
- Number of devices
- Length of bus

The Modbus specification published on the Modbus.org site contains precise details of all these characteristics. They are also summarized in standard schematic section. The new Schneider Electric devices conform to this specification.

Schematic Diagram

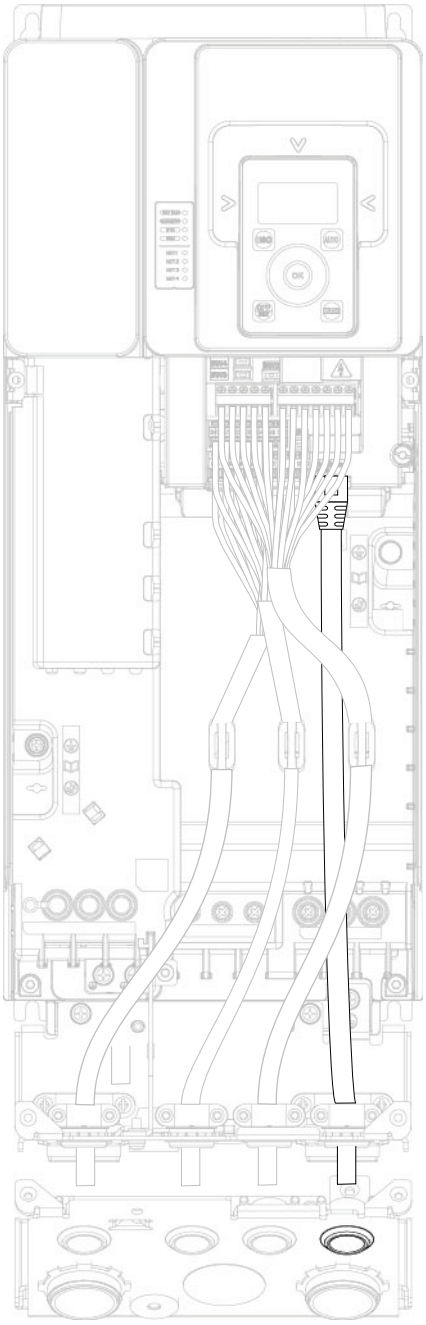
The following is the RS485 bus schematic diagram:



Characteristic	Definition
Type of cable	Twisted-pair, copper wire, tinned
Shield	Braid
Maximum length of bus	1000 m at 19200 bps
Maximum number of stations (without repeater)	32 stations that are 31 devices
Maximum length of tap links	• 20 m for 1 tape link • 40 m divided by the number of tape links on a multiple junction box
Bus polarization	• One 450...650 Ω pull-up resistor at 5 V (650 Ω recommended) • One 450...650 Ω pull-down resistor at the common (650 Ω recommended) This polarization is recommended for the controller.
Velocity of propagation	78%
Capacitance	< 41.0105 pF/m (12.5 pF/ft) between conductors
	< 72.1784 pF/m (22 pF/ft) between the conductor connected to ground and the next conductor
Line termination	Two polarization of the pair are available with a R or RC circuit as line termination: • R circuit: One 150Ω resistor. • RC circuit: One 120Ω 0.25W resistor in series with 1nF 10V capacitor. **NOTE:** An analysis is to be carried out to determine which solution is best suited for the network topology.
Common polarity	The Common circuit (Signal and optional Power Supply Common) must be connected directly to protective ground, at **one point only** for the entire bus on the controller side.

Modbus VP12S port cable path

(Wiring applicable for wall mounting product)



NOTE: Cabling plate shown is for frame size 3. Other cabling plates look slightly different from this one.

Checking Installation

What’s in This Part

Check List Before Switching On

The safety function STO (Safe Torque Off) does not remove power from the DC bus. The safety function STO only removes power to the motor. The DC bus voltage and the mains voltage to the drive are still present.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK

- Do not use the safety function STO for any other purposes than its intended function.
- Use an appropriate switch, that is not part of the circuit of the safety function STO, to disconnect the product from the mains power.

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

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 product 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 modification.
- 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.

If the power stage is disabled unintentionally, for example as a result of power outage, errors or functions, there is a possibility that the motor is no longer decelerated in a controlled way.

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

Verify that movements without braking effect does not result in unsafe conditions.

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

Mechanical Installation

Verify the mechanical installation of the entire drive system:

Step	Action	✓
1	Does the installation meet the specified distance requirements?	
2	Did you tighten all fastening screws to the specified tightening torque?	

Electrical installation

Verify the electrical connections and the cabling:

Step	Action	✓
1	Did you connect all protective ground conductors?	
2	The correct tightening of the screws may be altered during assembly and wiring phases of the drive. Verify and adjust the tightening of all terminal screws to the specified nominal torque.	
3	Do all fuses and circuit breaker have the correct rating; are the fuses of the specified type? Refer to the information provided in the Altivar Building ATH600 Getting Started Annex (SCCR), catalog number NAT16152 for UL/CSA compliance and also in the catalog DIA2ED2260301EN for IEC compliance.	
4	Did you connect or insulate all wires at the cable ends?	
5	Did you properly separate and insulate the control and power wiring?	
6	Did you properly connect and install all cables and connectors?	
7	Do all plug-in terminals colors and markings correspond to the colors and marking of the control block?	
8	Did you properly connect the signal wires?	
9	Are the required shield connections EMC-compliant?	
10	Did you take all measures for EMC compliance?	

Covers And Seals

Verify that all devices, doors and covers of cabinet are properly installed to meet the required degree of protection.

Maintenance

What's in This Part

Scheduled Servicing

Serviceable Products

The drives of frame sizes 0...2B are not serviceable products.

For drives of frame sizes 3...5 servicing, please refer to your Customer Care Center www.se.com/CCC.

Servicing

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Product Related Information** chapter before performing any procedure in this chapter.

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

The temperature of the products described in this manual may exceed 80 °C (176 °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.

⚠WARNING

INSUFFICIENT MAINTENANCE

Verify that the maintenance activities described below are performed at the specified intervals.

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

Adherence to the environmental conditions must be ensured during operation of the device. In addition, during maintenance, verify and, if appropriate, correct all factors that may have an impact on the environmental conditions.

Maintenance Activities

	Part concerned	Activity	Interval (1)
Overall condition	All parts such as housing, HMI, control block, connections, etc.	Perform a visual inspection	At least every year
Corrosion	Terminals, connectors, screws, EMC plate	Inspect and clean if required	
Dust	Terminals, fans, cabinet air inlets and air outlets, air filters of cabinet	Inspect and clean if required	
Cooling	Fan	Verify the fan operation	At least every year
Fastening	All screws for electrical and mechanical connections	Verify tightening torques	At least every year
(1) Maximum maintenance intervals from the date of commissioning. Reduce the intervals between maintenance to adapt maintenance to the environmental conditions, the operating conditions of the drive, and to any other factor that may influence the operation and/ or maintenance requirements of the drive.			

NOTE: The fan operation depends on the drive thermal state. The drive may be running and the fan not.

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.

Diagnostic and Troubleshooting

Refer to the ATH600 Programming manual available on www.se.com.

Spares and Repairs

Serviceable products:

Please refer to your Customer Care Center on www.se.com/CCC.

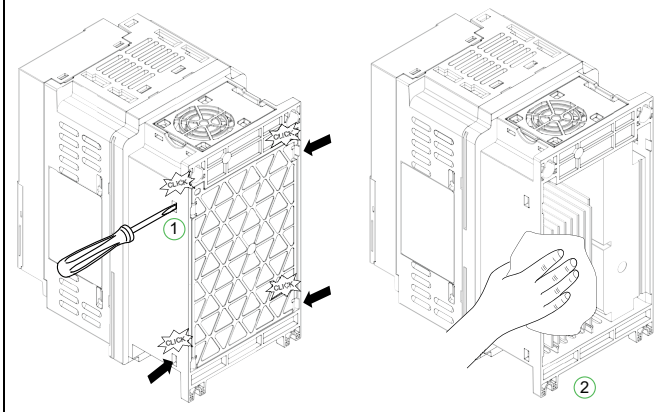
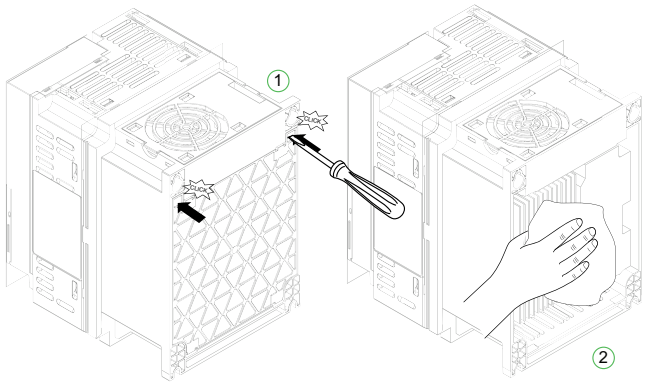
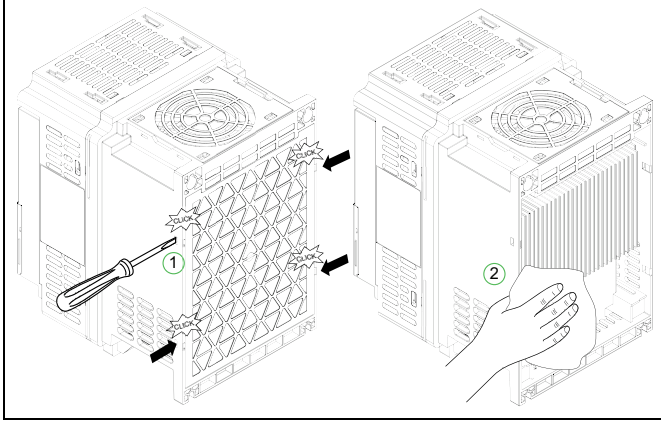
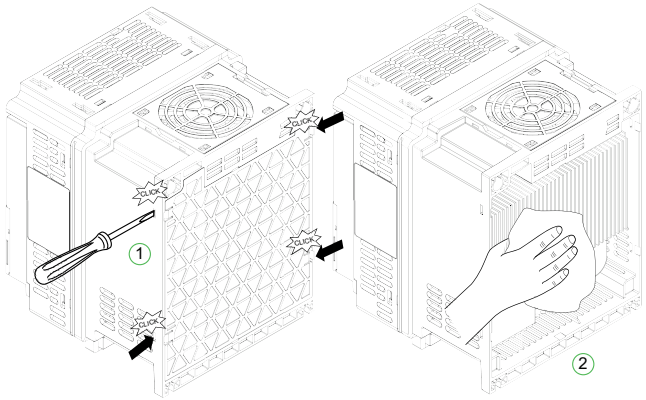
About Fans

Products are equipped with internal fans. They can be monitored via **[Fan mode]** FFM. For more information, refer to the programming manual.

NOTE: ATH650 are equipped with additional fans that operate continuously without control after the product is powered on.

Cleaning the heatsink – Frame Size 0 to 2B

Remove the cover of heatsink and take out it, then clean the product.

Frame Size 0	Frame Size 1
	
Frame Size 2A	**Frame Size 2B**
	

Replace the Battery

NOTICE

INCORRECT BATTERY REPLACEMENT

- Power off the device before replacing the battery.
- Use only the battery type specified in the product documentation.
- Dispose of used batteries according to local regulations.

Failure to follow these instructions can result in equipment damage.

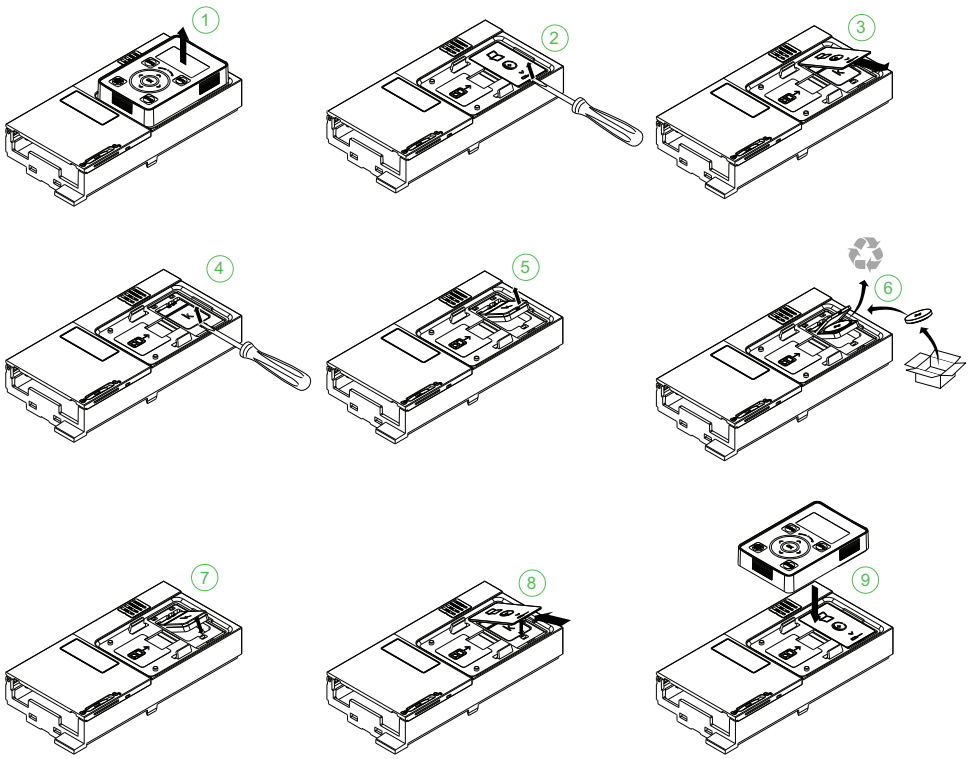
NOTE: Battery type must be CR2032.

NOTICE

ELECTROSTATIC DISCHARGE

Use appropriate ESD-protection equipment when replacing the battery of the control block.

Failure to follow these instructions can result in equipment damage.



Step	Actions
1	Remove the display terminal.
2	Use a flathead screwdriver to lift the battery cover.
3	Remove the battery cover.
4	Use a flathead screwdriver to lift the battery compartment.
5	Use a flathead screwdriver or your hands to open the battery compartment.
6	Remove the battery and replace it with a new one. Close the battery box.
7	Put the battery compartment back in its housing.
8	Replace the battery cover.
9	Replace the display terminal.

Decommissioning

Uninstall the Product

Observe the following procedure when uninstalling the product.

- Switch off all supply voltage. Verify that no voltages are present - refer to the Verifying the Absence of Hazardous Voltage, page 17.
- Remove all connection cables.
- Uninstall the product.

End of Life

The components of the product consist of different materials which can be recycled and which must be disposed of separately.

- Dispose of the packaging in compliance with all applicable regulations.
- Dispose of the product in compliance with all applicable regulations.

Refer to the Environmental Data Program for information and documents on environmental protection such as EoLI (End of Life instruction).

Additional Support

Customer Care Center

For additional support, you can contact our Customer Care Center on:

www.se.com/CCC.

Glossary

A

Abbreviations:

Req. = Required

Opt. = Optional

AC:

Alternating Current

D

DC:

Direct Current

DI: Digital Input

E

ELV:

Extra-Low Voltage. For more information: IEC 60449

Error :

Discrepancy between a detected (computed, measured, or signaled) value or condition and the specified or theoretically correct value or condition.

F

Factory setting:

Machine status in factory settings when the product was shipped.

Fault Reset:

A function used to restore the drive to an operational state after a detected error is cleared by removing the cause of the error so that the error is no longer active.

Fault:

Fault is an operating state. If the monitoring functions detect an error, a transition to this operating state is triggered, depending on the error class. A "Fault reset" is required to exit this operating state after the cause of the detected error has been removed.

G

GP:

General-Purpose

L

L/R:

Time constant equal to the quotient of inductance value (L) over the resistance value (R).

N

NC contact:

Normally Closed contact

NO contact:

Normally Open contact

O

OEM:

Original Equipment Manufacturer

OVCII:

Overvoltage Category II, according IEC 61800-5-1

P

PA/+:

Positive differential DC bus terminal

PC/-:

Negative differential DC bus terminal

PELV:

Protective Extra Low Voltage, low voltage with isolation. For more information: IEC 60364-4-41.

PLC:

Programmable logic controller.

Power stage:

The power stage controls the motor. The power stage generates current for controlling the motor.

PTC:

Positive Temperature Coefficient. PTC thermistor probes integrated in the motor or application to measure its temperature

R

REACh:

Registration, Evaluation, Authorisation and restriction of Chemicals regulation

RoHS:

Restriction of Hazardous Substances

S

SCPD:

Short-Circuit Protective Device

SF: Switch Frequency

STO:

Safe Torque Off: No power that could cause torque or force is supplied to the motor

T

TVS Diode:

Transient Voltage Suppression Diode

V

VHP:

Very High Horse Power (> 800 kW)

VSD:

Variable Speed Drive

W

Warning:

If the term is used outside the context of safety instructions, a warning alerts to a potential error that was detected by a monitoring function. A warning does not cause a transition of the operating state.

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