

Altivar® 21

Adjustable Speed Drives

Installation Guide

Instruction Bulletin

30072-451-61A

Retain for future use.



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HAZARD CATEGORIES AND SPECIAL SYMBOLS

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 bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of the lightning bolt or ANSI man symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which, as indicated below, can or will result in personal injury if the instructions are not followed.

The exclamation point symbol is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

| Symbol | Name |
|---|-------------------|
|  | Lightning Bolt |
|  | ANSI Man |
|  | Exclamation Point |

| |
|---|
| ⚠ DANGER |
| DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. |

| |
|---|
| ⚠ WARNING |
| WARNING indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury. |

| |
|--|
| ⚠ CAUTION |
| CAUTION indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury. |

| |
|---|
| CAUTION |
| CAUTION , used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, can result in property damage. |

PRODUCT SUPPORT

For support and assistance, contact the Product Support Group. The Product Support Group is staffed from 8:00 am until 6:00 pm Eastern time to assist with product selection, start-up, and diagnosis of product or application problems. Emergency phone support is available 24 hours a day, 365 days a year.

Toll free: 888-SquareD (888-778-2733)
 E-Mail: drive.products.support@us.schneider-electric.com
 Fax: 919-217-6508

BEFORE YOU BEGIN

Read and follow these precautions before beginning any procedure with this drive¹.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Read and understand this manual before installing or operating the Altivar 21 (ATV21) drive. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with all international and national electrical code requirements with respect to grounding of all equipment.
- Many parts of this drive, including the printed circuit boards, operate at the line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- DO NOT touch unshielded components or terminal strip screw connections with voltage present.
- DO NOT short across terminals PA/+ and PC/- or across the DC bus capacitors.
- Before servicing the drive:
 - Disconnect all power, including external control power that may be present, before servicing the drive.
 - Place a “DO NOT TURN ON” label on all power disconnects.
 - Lock all power disconnects in the open position.
 - WAIT 15 MINUTES to allow the DC bus capacitors to discharge. Then follow the “Bus Voltage Measurement Procedure” on page 25 to verify that the DC voltage is less than 42 V. The drive LED is not an indicator of the absence of DC bus voltage.
- Install and close all covers before applying power or starting and stopping the drive.

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

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

Before turning on the drive or upon exiting the configuration menus, ensure that the inputs assigned to the Run command are in a state that will not cause the drive to run. Otherwise, the motor can start immediately.

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

¹ The word “drive” as used in the bulletin refers to the controller portion of the adjustable speed drive according to the NEC (NFPA 70).

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain 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 and overtravel stop.
- 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.¹
- Each implementation of an Altivar 21 drive 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 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."

⚠ WARNING

LOSS OF CONTROL

- Set the communication interruption trip time to stop the drive in case the remote keypad display is deactivated by an unusual event such as tripping, an operation error, or a power outage.
- Ensure that the communication interruption trip time is properly set before deactivating the remote keypad display.

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

⚠ CAUTION

INCOMPATIBLE LINE VOLTAGE

Before turning on and configuring the drive, ensure that the line voltage is compatible with the line voltage range specified on the drive nameplate. The drive can be damaged if the line voltage is not compatible.

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

INTRODUCTION

The Altivar 21 (ATV21) family of adjustable speed AC drives is used for controlling three-phase asynchronous motors. The controllers range from:

- 1 to 40 hp at 208/240 V, three-phase supply
- 1 to 100 hp at 480 V, three-phase supply
- 0.75 to 30 kW at 200 V, three-phase supply
- 0.75 to 75 kW at 400 V, three-phase supply

This bulletin contains complete installation instructions for ATV21 drives. Included are technical specifications, ratings, dimensions and weights, mounting instructions, and wiring instructions.

RELATED DOCUMENTATION

The following documentation is also available for the Altivar 21 drives:

- *Altivar® 21 Programming and Operation Guide*, 30072-451-63
- *Altivar® 21 Remote Keypad Display, VW3A21101*, 30072-451-72
- *Altivar® 21 Quick Start Guide*, 30072-451-90

RECEIVING AND PRELIMINARY INSPECTION

WARNING

DAMAGED PACKAGING

If the packaging appears damaged, it can be dangerous to open it or handle it. Handle with care.

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

WARNING

DAMAGED DRIVE EQUIPMENT

Do not operate or install any drive that appears damaged.

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

Before installing the ATV21 drive, read this manual and follow all precautions.

Before removing the drive from its packaging, verify that the carton was not damaged in shipping. Carton damage usually indicates improper handling and the potential for device damage. If any damage is found, notify the carrier and your Schneider Electric representative.

STORING AND SHIPPING

If the drive is not immediately installed, store it in a clean, dry area where the ambient temperature is between -25 and $+70$ °C (-13 to $+158$ °F). If the drive must be shipped to another location, use the original shipping material and carton to protect the drive.

LIFTING AND HANDLING

⚠ WARNING

HANDLING AND LIFTING HAZARD

Keep the area below any equipment being lifted clear of all personnel and property. Use the lifting method illustrated in Figure 1.

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

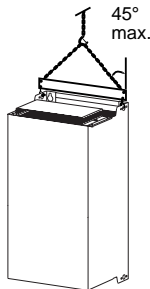
⚠ WARNING

RISK OF TOPPLING

- Keep the drive on the pallet until ready to install.
- Never place the drive in an upright position without proper support, such as a hoist, braces, or other mounting supports.

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

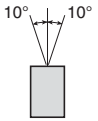
Figure 1: Lifting Method



- Altivar 21 drives up to 25 hp can be removed from their packaging and installed without a handling device.
- A hoist must be used for handling and lifting drives with ratings of 30–100 hp.
- After removing the drive from its packaging, inspect it for damage. If any damage is found, notify the carrier and your sales representative.
- Verify that the drive nameplate and label conform to the packing slip and corresponding purchase order.

TECHNICAL SPECIFICATIONS

Table 1: Environmental Characteristics

| | | |
|--|--|---|
| Environmental conditions | ATV21HpppM3X ¹ ATV21HpppN4 | IEC 60721-3-3 classes 3C1 and 3S2 |
| Enclosure rating | | <ul style="list-style-type: none"> NEMA/UL open type (IP20) with top vent cover removed (see page 17). NEMA/UL Type 1 with the top vent cover in place (see page 17) and with the Conduit Entry Kit installed. IP21 and IP41 on top of the drive |
| Pollution degree (according to UL 840) | 1–25 hp / 0.75–18 kW: ATV21H075M3X–D18M3X ATV21H075N4–D18N4 | Pollution degree 2: Protect the drive against dust, corrosive gas, and falling liquid. |
| | 30 and 40 hp / 22–30 kW: ATV21HD22M3X–D30M3X ATV21HD22N4–D30N4 | Pollution degree 3 |
| Maximum relative humidity | | 5 to 95%, non-condensing and without dripping water (provide a heating system if there is condensation) Conforms to IEC 60068-2-3 |
| Maximum ambient temperature | | Storage: –25 to +70 °C (–13 to +158 °F) Operation: –10 to +40 °C (+14 to +104 °F) without derating –10 to +50 °C (+14 to +122 °F) with derating. Refer to the derating curves on pages 19–22. |
| Operating position Maximum permanent angle in relation to the normal vertical mounting position | |  |
| Altitude | | Up to 1,000 m (3,300 ft) without derating; derate by 1% for each additional 330 ft (100 m) up to 10,000 ft (3,000 m). Limit to 2,000 m (6,600 ft) if supplied by corner grounded distribution system. |
| Vibration resistance | | 1.5 mm peak to peak from 3 to 13 Hz, 1 gn from 13 to 150 Hz, conforming to IEC/EN 60068-2-6 |
| Shock resistance | | 15 gn for 11 ms conforming to IEC/EN 60068-2-27 |
| Drive noise level | ATV21H075M3X– HU75M3X ATV21H075N4–HD11N4 | 51 dBA |
| | ATV21HD11M3X– HD18M3X ATV21HD15N4, HD18N4 | 54 dBA |
| | ATV21HD37N4, HD45N4 | 64 dBA |
| | ATV21HD22M3X ATV21HD22N4, HD30N4 | 59.9 dBA |
| | ATV21HD55N4, HD75N4, ATV21HD30M3X | 63.7 dBA |
| | | Conforming to directive 86-188/EEC |
| | | |

¹ The symbol "*" in a catalog number indicates the part of the number that varies with controller size or rating.

Table 2: Electrical Characteristics

| | |
|---------------------|--|
| Codes and standards | <p>North America:</p> <ul style="list-style-type: none"> UL, CSA, NOM117, NEMA ICS, ISO9001 CSA Certified to CSA Standard C22.2 No 14 File Number 096921_S_000, Class Number 3211-06 <p>Europe:</p> <ul style="list-style-type: none"> CE Marked in accordance with the low voltage directive (73/23/EEC and 93/68/EEC) and EMC directive (89/336/EEC). IEC/EN 61800-5-1 low voltage standard IEC/EN 61800-3 standard on conducted and radiated EMC immunity and emissions <p>Others:</p> <p>C-Tick, GOST</p> |
| Input voltage | ATV21H***M3X (3-phase): 200 V –15% to 240 V +10% ATV21H***N4 (3-phase): 380 V –15% to 480 V +10% |
| Output voltage | Maximum voltage equal to input voltage |
| Output phases | 3 |
| Input frequency | 50/60 Hz ±5% |

Table 2: Electrical Characteristics (continued)

| | | | | |
|---------------------------------|--|--|---|--|
| Output frequency range | 0.5 to 200 Hz | | | |
| Maximum transient current | Up to 110% of nominal drive current for 60 seconds, 180% for 2 seconds | | | |
| Drive protection | Galvanic isolation between power and control (power supplies, inputs, outputs) Protection against short circuits: <ul style="list-style-type: none"> • within internal power supplies • between output phases • between output phases and ground Protection against input phase loss Thermal protection against overheating and overcurrents Undervoltage and overvoltage faults Overbraking detection | | | |
| Dielectric strength | Between ground and power terminals: <ul style="list-style-type: none"> • ATV21H***M3X: 2830 Vdc • ATV21H***N4: 3535 Vdc Between control and power terminals: <ul style="list-style-type: none"> • ATV21H***M3X: 4230 Vac • ATV21H***N4: 5092 Vac | | | |
| Insulation resistance to ground | >1 MΩ (electrical isolation) 500 Vdc for 1 minute | | | |
| Motor protection | Thermal protection integrated in the drive by speed compensated I ² t calculation Protection against motor phase loss Selectable protection by motor type: self-cooled or forced cooled Protection by monitoring motor-embedded PTC thermal probes. | | | |
| EMC emissions | IEC 61800-3: Adjustable speed electrical power drives systems—EMC requirements and specific test methods. <ul style="list-style-type: none"> • First environment includes domestic premises and establishments directly connected without intermediate transformers to a low-voltage power supply network, which supplies buildings used for domestic purposes. • Second environment includes all establishments other than those directly connected to a low-voltage power supply network which supplies buildings used for domestic purposes. | | | |
| | Category | | Conducted emissions for main terminal | |
| | C1 | Product with a rated voltage less than 1000 V, intended for use in the first environment | 0.15–0.50 MHz | 66–56 dBμV log Qpeak (Qp) 56–46 dBμV log Average (Av) |
| | | | 0.50–5 MHz 5–30 MHz | 56 dBμV Qp–46 dBμV Av 60 dBμV Qp–50 dBμV Av |
| | C2 | Product with a rated voltage less than 1000 V, which is neither a plug-in device nor a movable device and which, when used in the first environment, is intended to be installed and commissioned only by a service professional | 0.15–0.50 MHz 0.5–30 MHz | 79 dBμV Qp–66 dBμV Av 73 dBμV Qp–60 dBμV Av |
| C3 I ≤ 100 A | Product with a rated voltage less than 1000 V, intended for use in the second environment and not intended for use in the first environment | 0.15–0.50 MHz 0.50–5 MHz 5–30 MHz | 100 dBμV Qp–90 dBμV Av 86 dBμV Qp–76 dBμV Av 90–70 dBμV log Qp 80–60 dBμV log Av | |
| C3 I ≥ 100 A | | | 130 dBμV Qp–120 dBμV Av 125 dBμV Qp–115 dBμV Av 115 dBμV Qp–105 dBμV Av | |
| EMC high frequency immunities | <ul style="list-style-type: none"> • Electrostatic discharges: IEC 61000-4-2, 6 kV direct discharges, 8 kV air discharges (level 3, criteria A) • Radio-frequency electromagnetic field: IEC 61000-4-3, 80–1000 MHz, 10 V/m (level 3, criteria A) • Fast transient burst: IEC 61000-4-4, 4 kV power interfaces, 2 kV signal interfaces (level 4, criteria A) • Surge 12/50 μs, 8/20 μs: IEC61000-4-5, 2 kV line to earth, 1 kV line to line (level 3, criteria A) • Conducted radio-frequency common mode: IEC 61000-4-6, 0.15–80 MHz, 10 V/m (level 3, criteria A) | | | |

Table 3: Drive Performance

| | | |
|---|--|--|
| Motor control modes | Asynchronous motor | Energy saving mode Quadratic V/Hz mode Constant V/Hz mode Constant V/Hz mode with automatic IR compensation Sensorless Flux Vector Control (FVC) |
| | Synchronous motor | Current flux vector control without speed feedback |
| Speed range | | 1:10 |
| Drive internal frequency loop | | Adjustable PI regulator for a speed response adapted to the application |
| Slip compensation | | Automatic. Can be disabled or adjusted Not available in a V/Hz mode |
| Transient overtorque | | 120% of the motor rated torque (typical value at ±10%) for 60 s |
| Torque accuracy | | ±15% |
| Speed accuracy 20–100% of motor rated torque | | ±10% of nominal slip, without speed feedback |
| Frequency resolution | Display units | 0.1 Hz |
| | Analog input units | 0.0048 Hz (11 bits) |
| Acceleration and deceleration ramps | | Ramp profiles: <ul style="list-style-type: none"> Linear and S pattern, can be adjusted separately from 0.01 to 3200 s Automatic adaptation of acceleration and deceleration ramp times based on the load. |
| Braking to a standstill | | By DC injection, the braking period is adjustable from 0 to 20 s or continuous. Intensity is adjustable from 0 amperes to the drive's nominal current rating. Activated either by a programmable logic input or adjustable frequency threshold (0 Hz to drive's maximum frequency). |
| Switching frequency | 1–20 hp, 0.75–15 kW: ATV21H075M3X–D15M3X ATV21H075N4–D15N4 | Adjustable from 6 to 16 kHz. Factory set for 12 kHz (no derating required). Above 12 kHz, derate the drives per the graphs on pages 19–22. |
| | 25–100 hp, 18.5–75 kW: ATV21HD18M3X–D30M3X ATV21HD18N4–D75N4 | Adjustable from 6 to 16 kHz. Factory set for 8 kHz (no derating required). Above 8 kHz, derate the drives per the graphs on pages 19–22. |
| Signalling | | 1 red LED: Illuminated LED indicates the presence of voltage on the drive DC bus |
| Communication | | Modbus is integrated into the drive and available via an RJ45 connector. |
| <div style="border: 1px solid black; padding: 10px;"> <h2 style="margin: 0;">CAUTION</h2> <p>DRIVE OR PC COMMUNICATION DAMAGE</p> <ul style="list-style-type: none"> This RJ45 connection is designed for RS-485 communications. It is not compatible with PC Ethernet. Do not connect directly to the PC Ethernet port. An optional adapter is required for PC connection. <p>Failure to follow these instructions can result in injury or equipment damage.</p> </div> | | |
| <p>Serial link characteristics:</p> <ul style="list-style-type: none"> Physical interface: 2-wire RS-485 Transmission mode: RTU Transmission speed: 19200 bps (factory setting), 9600 bps (selectable) Format: <ul style="list-style-type: none"> 8 bits, even parity, 1 stop (factory setting) 8 bits, odd parity, 1 stop (selectable) 8 bits, no parity, 1 stop (selectable) Address: 1 to 247 (selectable) Communication time-out: 3 seconds (factory setting), 1 to 100 seconds, or disabled (selectable) <p>With option cards:</p> <ul style="list-style-type: none"> Metasys® N2 Apogee® FLN BACnet LonWorks® | | |

RATINGS

Table 4: 208 V –15% / 240 V +10% at 50/60 Hz, Three-Phase Input, Three-Phase Output

| Altivar 21 Catalog number | Motor Power ratings ¹ | | Line supply (input) | | | Drive (output) | | |
|----------------------------------|---|------|---------------------|----------|---|---|---|--|
| | | | Maximum line supply | | Short-circuit current rating ² | Nominal rated output current ¹ | Transient output current ^{1,3} | Total dissipated power at rated load ¹ |
| | | | at 208 V | at 240 V | | | | |
| hp | kW | A | A | kA | A | A | W | |
| ATV21H075M3X | 1 | 0.75 | 3.3 | 2.7 | 5 | 4.6 | 5.1 | 63 |
| ATV21HU15M3X | 2 | 1.5 | 6.1 | 5.1 | 5 | 7.5 | 8.3 | 101 |
| ATV21HU22M3X | 3 | 2.2 | 8.7 | 7.3 | 5 | 10.6 | 11.7 | 120 |
| ATV21HU30M3X | — | 3 | — | 10 | 5 | 13.7 | 15.1 | 146 |
| ATV21HU40M3X | 5 | 4 | 14.6 | 13 | 5 | 16.7 | 19.3 | 193 |
| ATV21HU55M3X | 7.5 | 5.5 | 20.8 | 17.3 | 22 | 24.2 | 26.6 | 249 |
| ATV21HU75M3X | 10 | 7.5 | 27.9 | 23.3 | 22 | 32.0 | 35.2 | 346 |
| ATV21HD11M3X | 15 | 11 | 42.1 | 34.4 | 22 | 46.2 | 50.8 | 459 |
| ATV21HD15M3X | 20 | 15 | 56.1 | 45.5 | 22 | 61.0 | 67.1 | 629 |
| ATV21HD18M3X | 25 | 18.5 | 67.3 | 55.8 | 22 | 74.8 | 82.3 | 698 |
| ATV21HD22M3X | 30 | 22 | 80.4 | 66.4 | 22 | 88.0 | 96.8 | 763 |
| ATV21HD30M3X | 40 | 30 | 113.3 | 89.5 | 22 | 117 | 128.7 | 1085 |

¹ These power, amperage, and wattage ratings apply to:
• Drives ATV21H075M3X–HD15M3X (1–20 hp at 208/240 V) operating at a switching frequency of 12 kHz and operating in a 40 °C (104 °F) ambient.
• Drives ATV21HD18M3X–HD30M3X (25–40 hp at 208/240 V) operating at a switching frequency of 8 kHz, and operating in a 40 °C (104 °F) ambient.
See pages 19–22 for derating curves as a function of switching frequency, ambient temperature, and mounting conditions.

² Current on a line supply with the indicated short-circuit current rating.

³ For 60 seconds.

Table 5: 380 V –15% / 480 V +10% at 50/60 Hz, Three-Phase Input, Three-Phase Output

| Altivar 21 Catalog number | Motor Power ratings ¹ | | Line supply (input) | | | Drive (output) | | |
|----------------------------------|---|------|---------------------|----------|---|---|---|--|
| | | | Maximum line supply | | Short-circuit current rating ² | Nominal rated output current ¹ | Transient output current ^{1,3} | Total dissipated power at rated load ¹ |
| | | | at 380 V | at 480 V | | | | |
| hp at 460 V | kW at 400 V | A | A | kA | A | A | W | |
| ATV21H075N4 | 1 | 0.75 | 1.7 | 1.4 | 5 | 2.2 | 2.4 | 55 |
| ATV21HU15N4 | 2 | 1.5 | 3.2 | 2.5 | 5 | 3.7 | 4.0 | 78 |
| ATV21HU22N4 | 3 | 2.2 | 4.6 | 3.6 | 5 | 5.1 | 5.6 | 103 |
| ATV21HU30N4 | — | 3 | 6.2 | 4.9 | 5 | 7.2 | 7.9 | 137 |
| ATV21HU40N4 | 5 | 4 | 8.1 | 6.4 | 5 | 8.2 | 10.0 | 176 |
| ATV21HU55N4 | 7.5 | 5.5 | 10.9 | 8.6 | 22 | 12.0 | 13.2 | 215 |
| ATV21HU75N4 | 10 | 7.5 | 14.7 | 11.7 | 22 | 16.0 | 17.6 | 291 |
| ATV21HD11N4 | 15 | 11 | 21.1 | 16.8 | 22 | 22.5 | 24.8 | 430 |
| ATV21HD15N4 | 20 | 15 | 28.5 | 22.8 | 22 | 30.5 | 33.6 | 625 |
| ATV21HD18N4 | 25 | 18.5 | 34.8 | 27.8 | 22 | 37.0 | 40.7 | 603 |
| ATV21HD22N4 | 30 | 22 | 41.6 | 33.1 | 22 | 43.5 | 47.9 | 626 |
| ATV21HD30N4 | 40 | 30 | 56.7 | 44.7 | 22 | 58.5 | 64.4 | 847 |
| ATV21HD37N4 | 50 | 37 | 68.9 | 54.4 | 22 | 79 | 86.9 | 976 |
| ATV21HD45N4 | 60 | 45 | 83.8 | 65.9 | 22 | 94 | 103.4 | 1253 |
| ATV21HD55N4 | 75 | 55 | 102.7 | 89 | 22 | 116 | 127.6 | 1455 |
| ATV21HD75N4 | 100 | 75 | 141.8 | 111.3 | 22 | 160 | 176 | 1945 |

¹ These power, amperage, and wattage ratings apply to:
• Drives ATV21H075M3X–HD15M3X (1–20 hp at 208/240 V) operating at a switching frequency of 12 kHz and operating in a 40 °C (104 °F) ambient.
• Drives ATV21HD18M3X–HD30M3X (25–40 hp at 208/240 V) operating at a switching frequency of 8 kHz, and operating in a 40 °C (104 °F) ambient.
See pages 19–22 for derating curves as a function of switching frequency, ambient temperature, and mounting conditions.

² Current on a line supply with the indicated short-circuit current rating.

³ For 60 seconds.

DIMENSIONS AND WEIGHTS

Figures 2–5 show outline drawings of the ATV21 drives and Tables 6–9 list the dimensions and weights of the various models.

Figure 2: Outline Drawing: 3-Phase, 230 V, 1–5 hp / 460 V, 1–7.5 hp

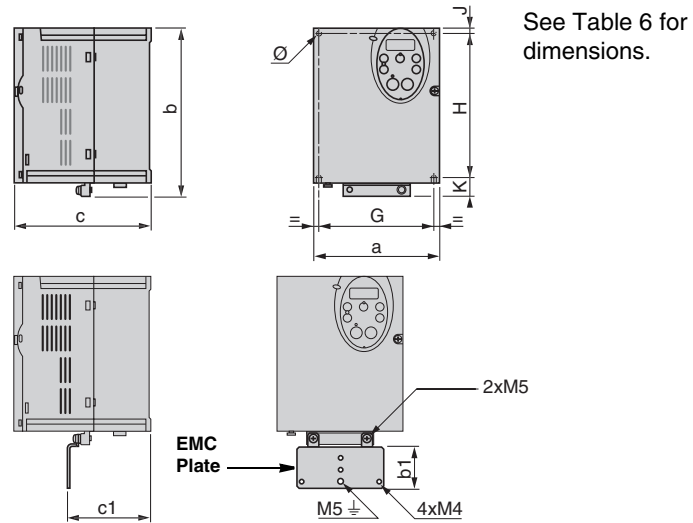


Table 6: Dimensions and Weights: 3-Phase, 230 V, 1–5 hp / 460 V, 1–7.5 hp

| Voltage | Motor hp | Catalog no. ATV21*** ¹ | Dimensions mm (in.) | | | | | | | | | Weight kg (lb) |
|---------------|----------|-----------------------------------|---------------------|--------------|--------------|--------------|----------------|--------------|----------------|---------------|-------------|-----------------|
| | | | a | b | b1 | c | c1 | G | H | J | Ø | |
| 3-phase 230 V | 1 | H075M3X | 107 (4.2) | 143 (5.6) | 49 (1.93) | 150 (5.9) | 67.3 (2.65) | 93 (3.6) | 121.5 (4.7) | 5 (0.20) | 5 (0.20) | 1.80 (3.978) |
| | 2 | HU15M3X | | | | | | | | | | |
| | 3 | HU22M3X | | | | | | | | | | |
| | 4 | HU30M3x | 142 (5.6) | 184 (7.2) | 48 (1.8) | 150 (5.9) | 88.8 (3.50) | 126 (4.9) | 157 (6.1) | 6.5 (0.26) | 5 (0.20) | 3.05 (6.741) |
| | 5 | HU40M3X | | | | | | | | | | |
| 3-phase 460 V | 1 | H075N4 | 107 (4.2) | 143 (5.6) | 49 (1.93) | 150 (5.9) | 67.3 (2.65) | 93 (3.6) | 121.5 (4.7) | 5 (0.20) | 5 (0.20) | 2.00 (4.42) |
| | 2 | HU15N4 | | | | | | | | | | |
| | 3 | HU22N4 | | | | | | | | | | |
| | 4 | HU30N4 | 142 (5.6) | 184 (7.2) | 48 (1.8) | 150 (5.9) | 88.8 (3.50) | 126 (4.9) | 157 (6.1) | 6.5 (0.26) | 5 (0.20) | 3.35 (7.404) |
| | 5 | HU40N4 | | | | | | | | | | |
| | 7.5 | HU55N4 | | | | | | | | | | |

¹ The symbol "*" in a catalog number indicates part of the number that varies with drive size or rating.

Figure 3: Outline Drawing: 3-Phase, 230 V, 7.5–25 hp / 460 V, 10–25 hp

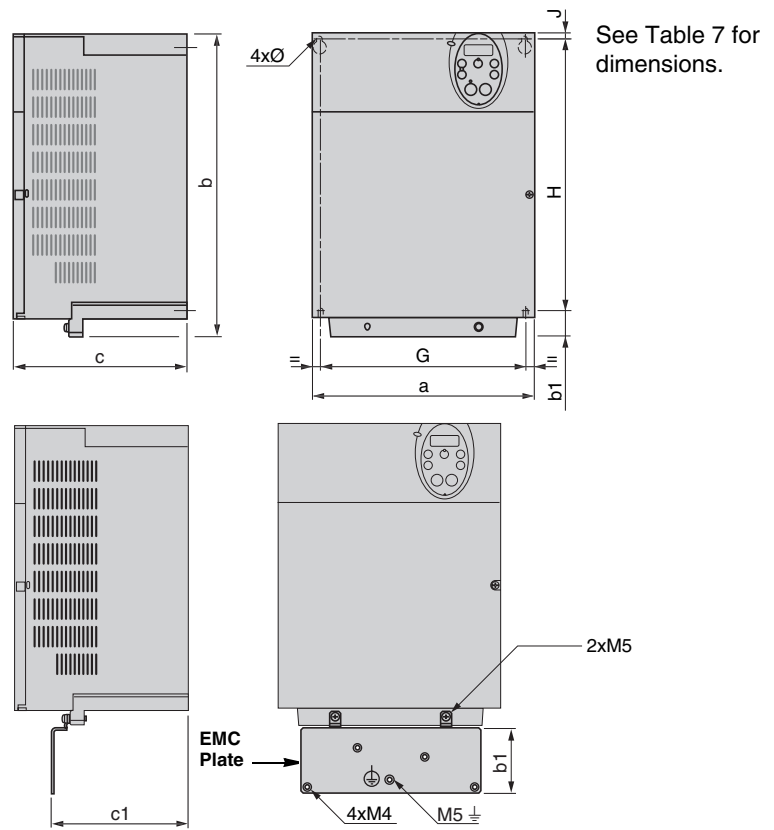


Table 7: Dimensions and Weights: 3-Phase, 230 V, 7.5–25 hp / 460 V, 10–25 hp

| Voltage | Motor hp | Catalog no. ATV21**** ¹ | Dimensions mm (in.) | | | | | | | | | Weight kg (lb) |
|------------------|----------|------------------------------------|---------------------|---------------|-------------|--------------|-----------------|--------------|---------------|-------------|-------------|------------------|
| | | | a | b | b1 | c | c1 | G | H | J | Ø | |
| 3-phase 230 V | 7.5 | HU55M3X | 180 (7) | 232 (9.1) | 75 (2.9) | 170 (6.7) | 134.8 (5.31) | 160 (6.3) | 210 (8.2) | 5 (0.20) | 5 (0.20) | 6.10 (13.481) |
| | 10 | HU75M3X | | | | | | | | | | |
| | 15 | HD11M3X | 245 (9.6) | 329.5 (13) | 75 (2.9) | 190 (7.5) | 147.6 (5.8) | 225 (8.8) | 295 (11.6) | 7 (0.28) | 6 (0.24) | 11.50 (25.4) |
| | 20 | HD15M3X | | | | | | | | | | |
| | 5 | HU40M3X | | | | | | | | | | |

¹ The symbol "*" in a catalog number indicates part of the number that varies with drive size or rating.

Figure 4: Outline Drawing: 3-Phase, 230 V, 30 hp / 460 V, 30–60 hp

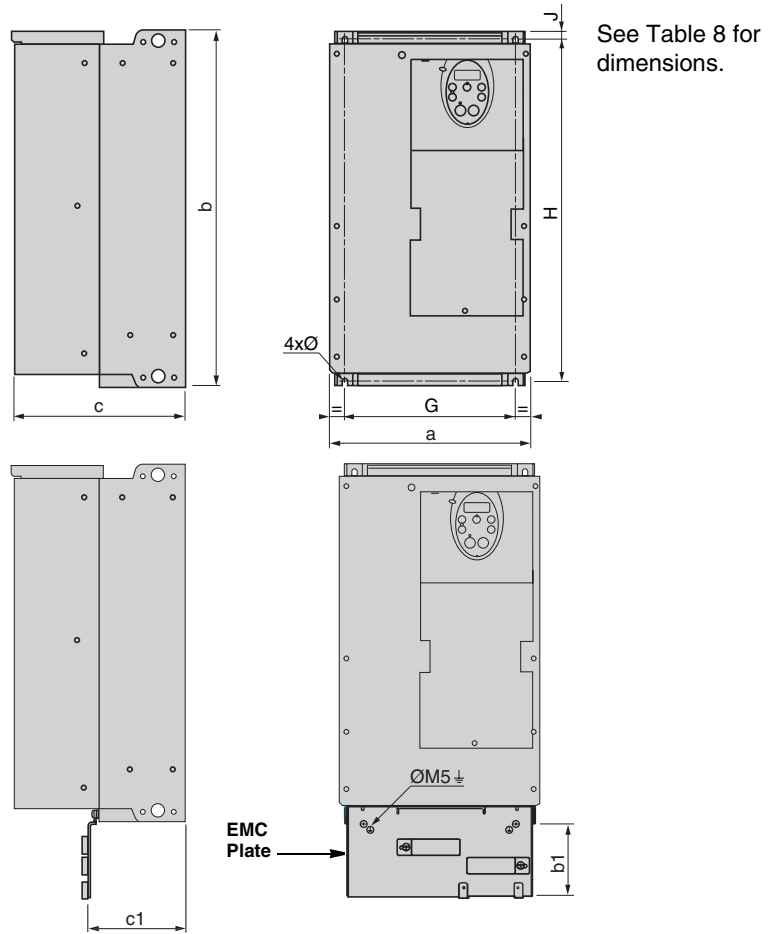


Table 8: Dimensions and Weights: 3-Phase, 230 V, 30 hp / 460 V, 30–60 hp

| Voltage | Motor hp | Catalog no. ATV21**** ¹ | Dimensions mm (in.) | | | | | | | | | Weight kg (lb) |
|---------------|----------|------------------------------------|---------------------|-------------|------------|------------|------------|-----------|-------------|-----------|----------|----------------|
| | | | a | b | b1 | c | c1 | G | H | J | Ø | |
| 3-phase 230 V | 30 | HD22M3X | 240 (9.4) | 420 (16.5) | 122 (4.8) | 214 (8.4) | 120 (4.72) | 206 (8.1) | 403 (15.8) | 10 (0.39) | 6 (0.24) | 27.40 (60.554) |
| | 40 | HD30N4 | 240 (9.4) | 420 (16.5) | 122 (4.8) | 214 (8.4) | 120 (4.72) | 206 (8.1) | 403 (15.8) | 10 (0.39) | 6 (0.24) | 26.40 (58.344) |
| 3-phase 460 V | 50 | HD37N4 | 240 (9.4) | 550 (21.65) | 113 (4.45) | 244 (9.61) | 127 (5.0) | 206 (8.1) | 529 (20.83) | 10 (0.39) | 6 (0.24) | 23.50 (51.81) |
| | 60 | HD45N4 | 240 (9.4) | 550 (21.65) | 113 (4.45) | 244 (9.61) | 127 (5.0) | 206 (8.1) | 529 (20.83) | 10 (0.39) | 6 (0.24) | 23.50 (51.81) |

¹ The symbol "*" in a catalog number indicates part of the number that varies with drive size or rating.

Figure 5: Outline Drawing: 3-Phase, 230 V, 40 hp / 460 V, 75–100 hp

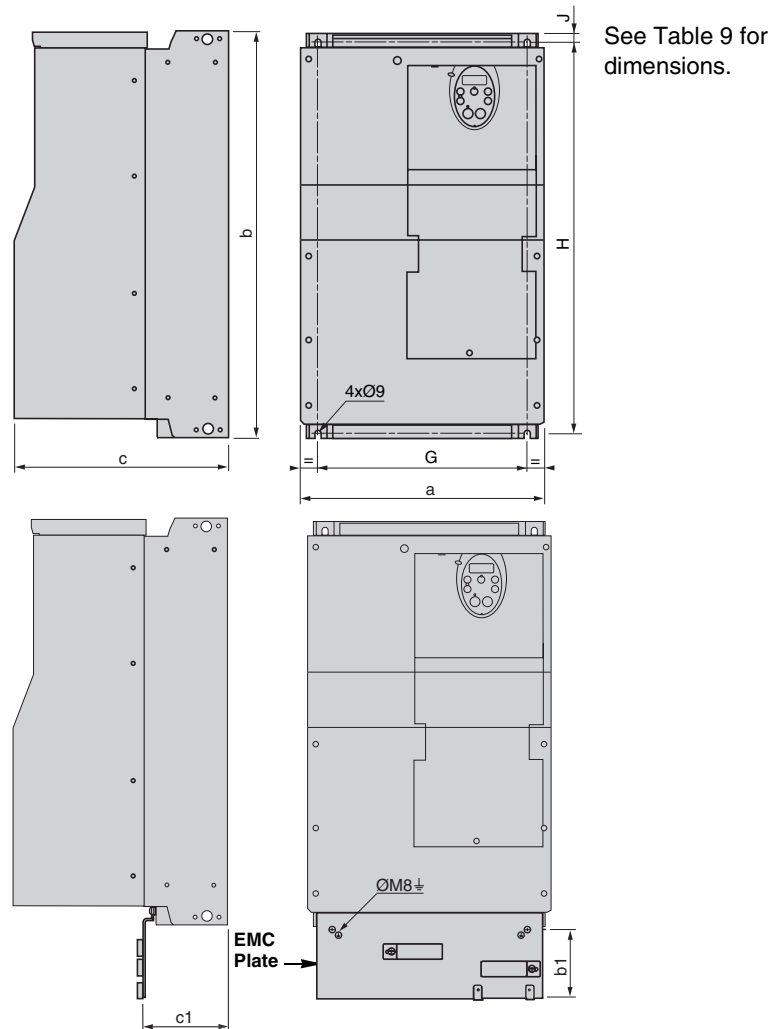


Table 9: Dimensions and Weights: 3-Phase, 230 V, 40 hp / 460 V, 75–100 hp

| Voltage | Motor hp | Catalog no. ATV21*** ¹ | Dimensions mm (in.) | | | | | | | | | Weight kg (lb) |
|---------------|----------|-----------------------------------|---------------------|---------------|---------------|---------------|---------------|-------------|-----------------|--------------|-------------|-------------------|
| | | | a | b | b1 | c | c1 | G | H | J | Ø | |
| 3-phase 230 V | 40 | HD30M3X | 320 (12.5) | 630 (24.8) | 118 (4.65) | 290 (11.4) | 173 (6.81) | 280 (11) | 604.5 (23.8) | 10 (0.39) | 9 (0.35) | 38.650 (85.42) |
| 3-phase 460 V | 75 | HD55N4 | 320 (12.5) | 630 (24.8) | 118 (4.65) | 290 (11.4) | 173 (6.81) | 280 (11) | 604.5 (23.8) | 10 (0.39) | 9 (0.35) | 39.70 |
| | 100 | HD75N4 | | | | | | | | | | (87.74) |

¹ The symbol "*" in a catalog number indicates part of the number that varies with drive size or rating.

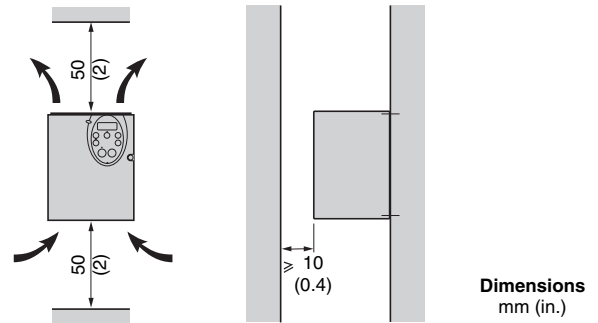
MOUNTING THE DRIVE

Clearances

When mounting an ATV21 drive:

- Install the drive vertically, $\pm 10^\circ$.
- Do not place the drive close to heat sources.
- Leave sufficient free space around the drive to ensure that air can circulate from the bottom to the top of the unit.
- Leave a minimum of 10 mm (0.4 in.) of free space in front of the drive.

Figure 6: Clearances for ATV21 Drives



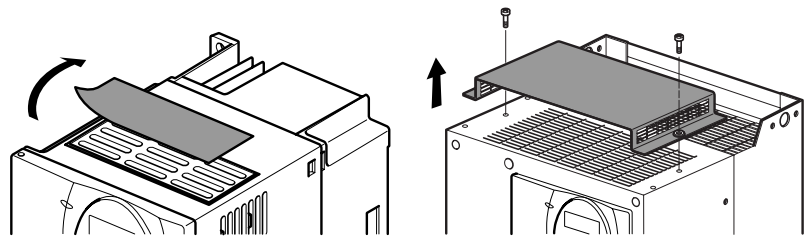
Removing the Top Vent Cover

See "Mounting Methods" to determine the type of mounting appropriate for your application before removing the IP20 protective cover from the drive.

When IP20 protection is adequate, remove the IP20 protective cover on top of the drive as shown in Figure 7.

For UL Type 1 protection, leave the IP20 protective cover on top of the drive and install a conduit entry kit.

Figure 7: Removing the Top Vent Cover



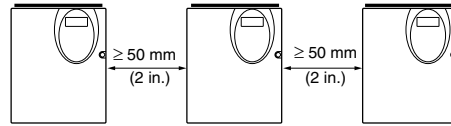
Removing the top vent cover from:
ATV21H075M3X–D18M3X,
ATV21H075N4–D18N4

Removing the top vent cover from:
ATV21HD22M3X, D30M3X,
ATV21HD22N4, D30N4

Mounting Methods

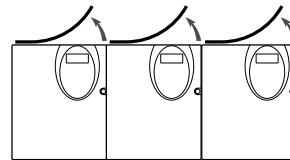
Type A Mounting

Free space ≥ 50 mm (2 in.) on each side, with the top vent cover in place.



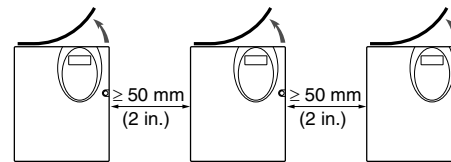
Type B Mounting

Drives mounted side-by-side, with the top vent cover removed (degree of protection becomes open type IP20).



Type C Mounting

Free space ≥ 50 mm (2 in.) on each side, with the top vent cover removed (degree of protection becomes open type IP20).



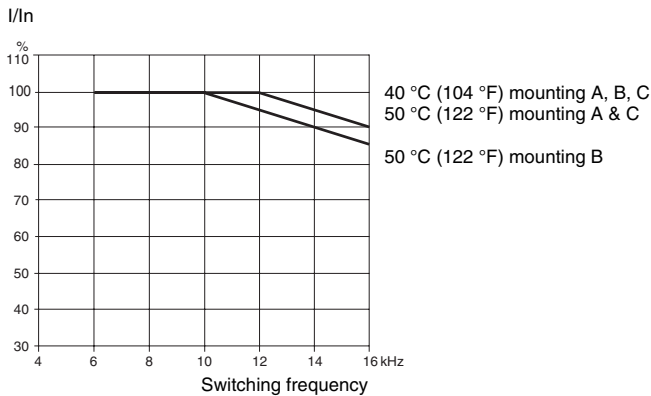
Derating Curves

The figures on pages 19–22 illustrate the drive nominal current derating percentage ($I/I_n\%$) as a function of the temperature, switching frequency, and the type of mounting.

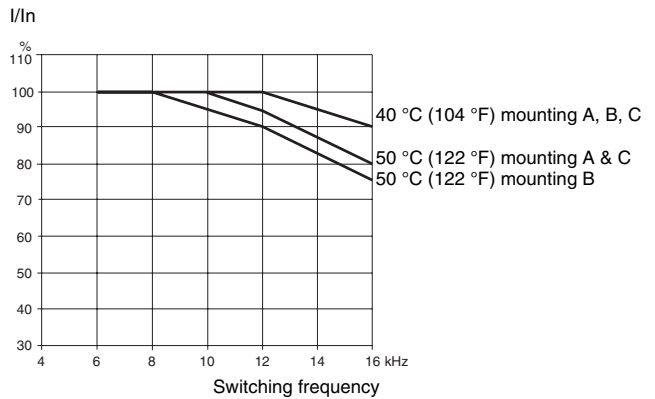
For example, 80% derating of a 20 hp, 460 V ATV21 drive nominally rated for 30.5 amperes continuously: $30.5 \times 0.8 = 24.4$ (15 hp).

For intermediate temperatures, interpolate between two curves.

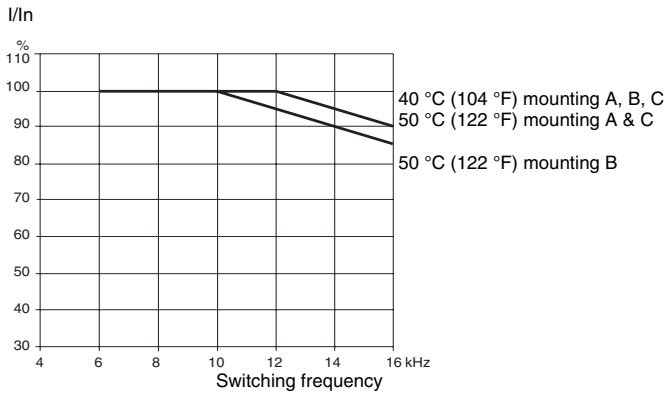
ATV21H075M3X (1 hp at 208/240 V)



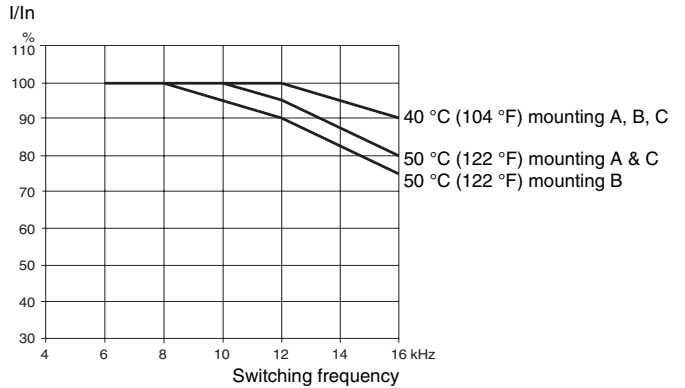
ATV21HU15M3X, ATV21HU22M3X (2–3 hp at 208/240 V)



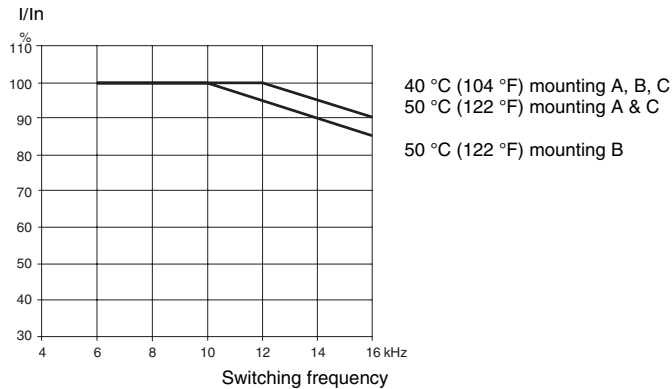
AT21HU30M3X (3 kW at 240 V)



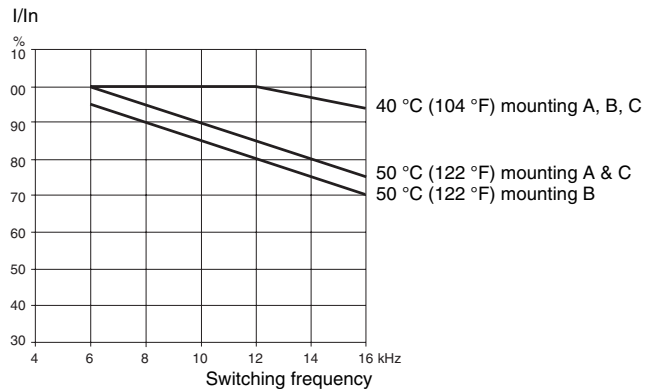
ATV21HU40M3X (5 hp at 208/240 V)



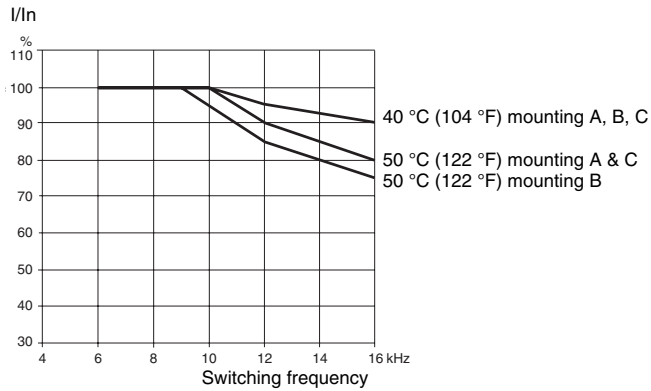
ATV21HU55M3X–HD15M3X (7.5–20 hp at 208/240 V)



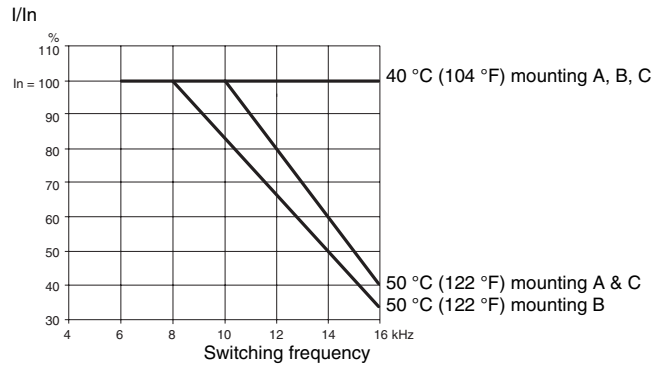
ATV21HD18M3X (25 hp at 208/240 V)



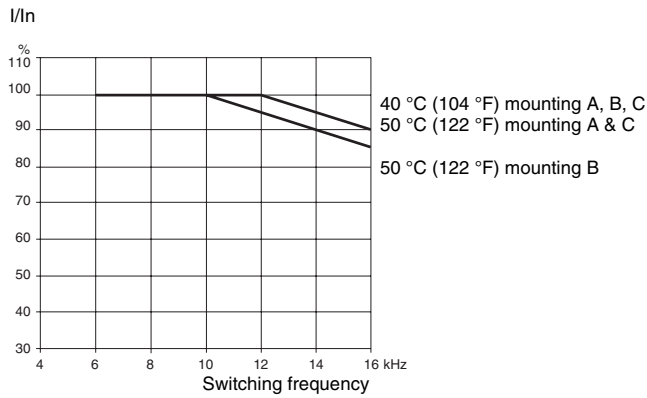
ATV21HD22M3X (30 hp at 208/ 2340 V)



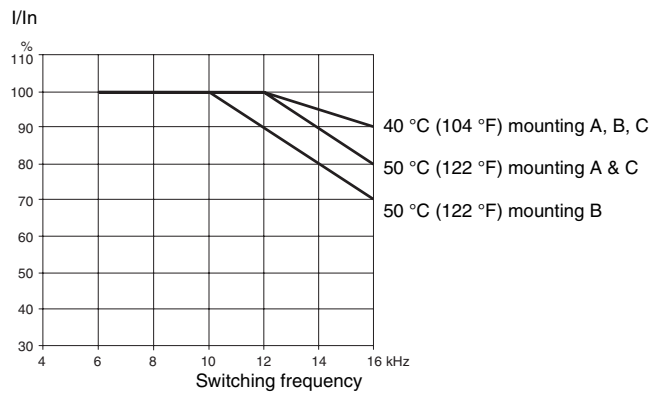
ATV21HD30M3X (40 hp at 208/240 V)



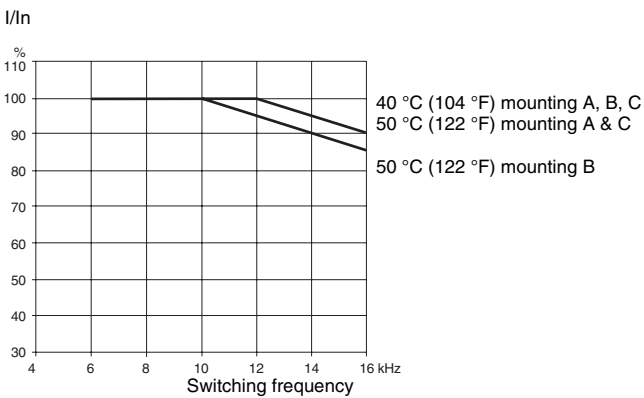
ATV21H075N4, ATV21HU15N4 (1– 2 hp at 460 V)



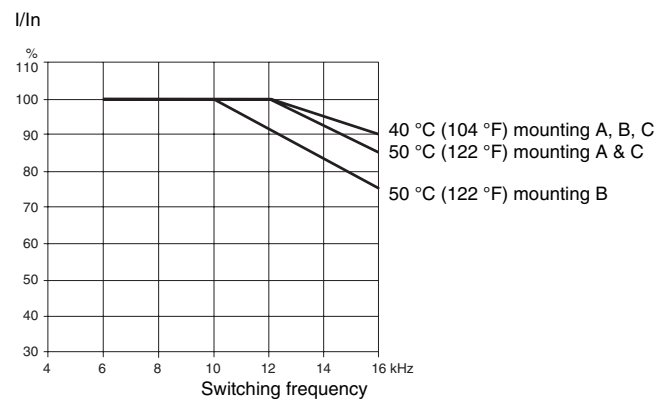
ATV21HU22N4 (3 hp at 460 V)



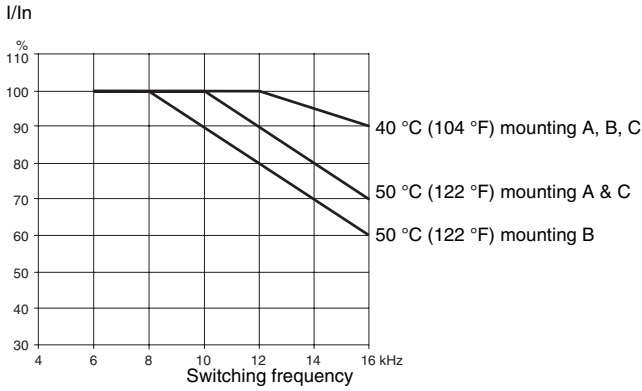
ATV21HU30N4 (3 kW at 400 V)



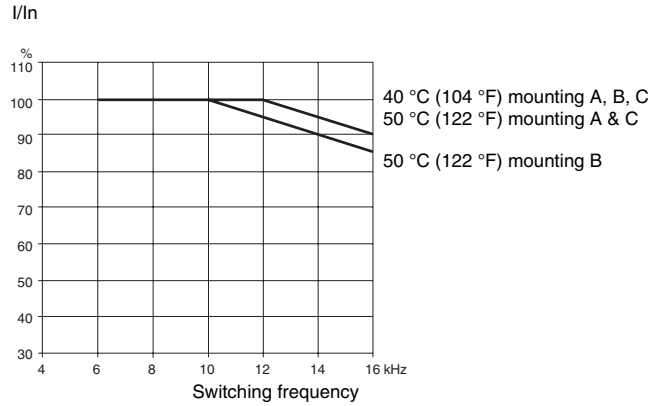
ATV21HU40N4 (5 hp at 460 V)



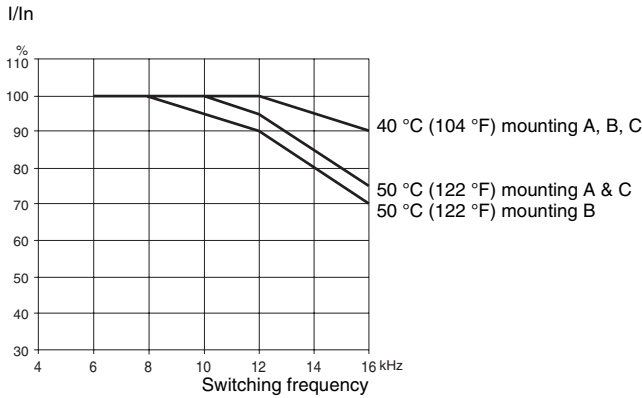
ATV21HU55N4 (7.5 hp at 460 V)



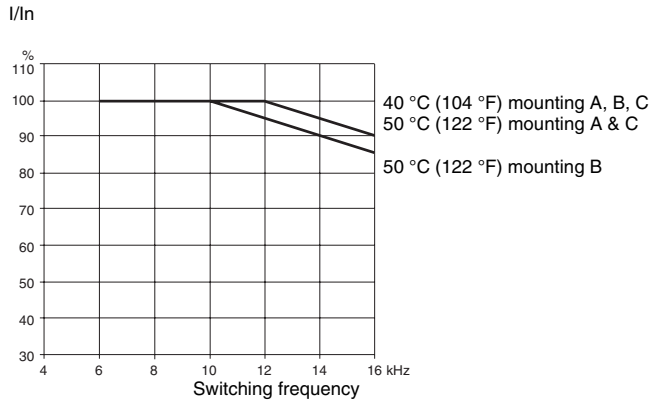
ATV21HU75N4 (10 hp at 460 V)



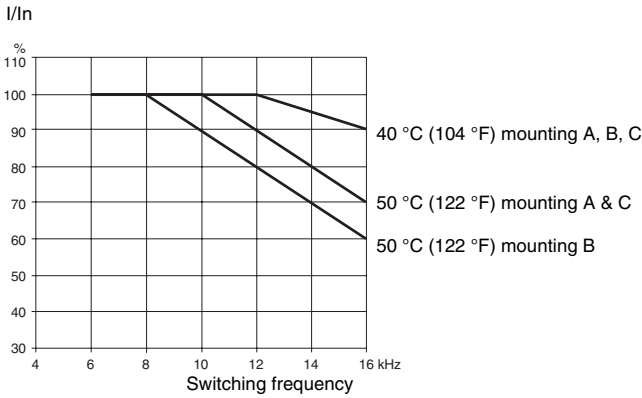
ATV21HD11N4 (15 hp at 460 V)



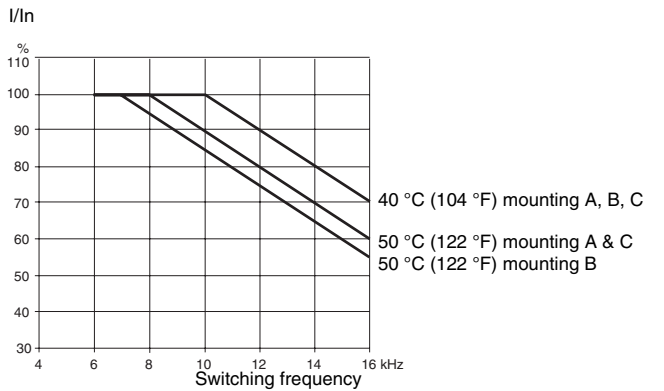
ATV21HD15N4 (20 hp at 460 V)



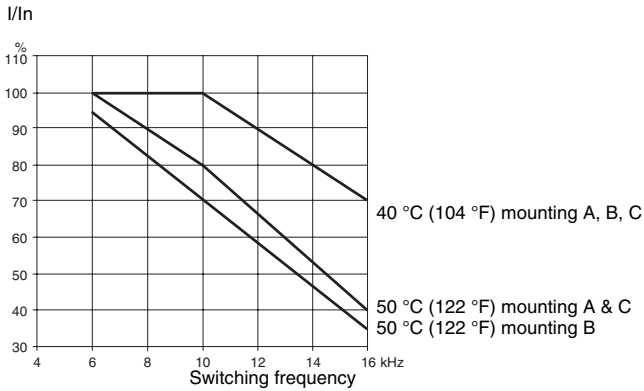
ATV21HD18N4 (25 hp at 460 V)



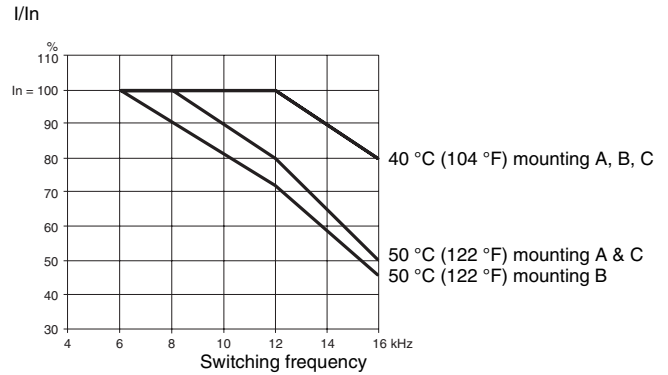
ATV21HD22N4 (30 hp at 460 V)



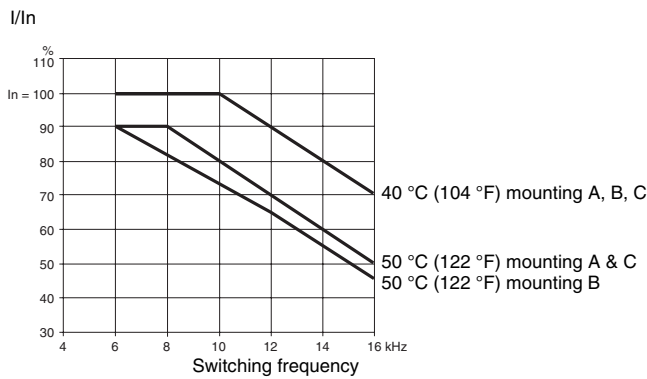
ATV21HD30N4 (40 hp at 460 V)



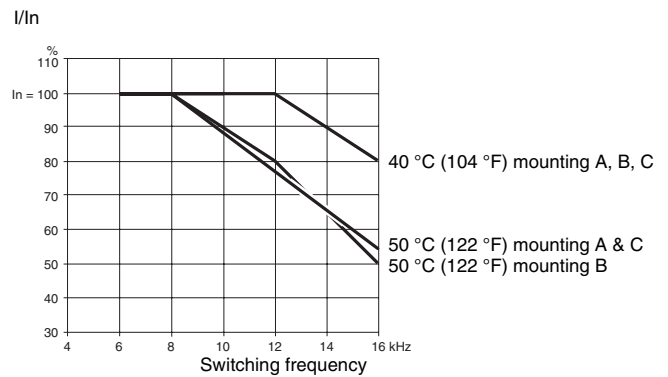
ATV21HD37N4 (50 hp at 460 V)



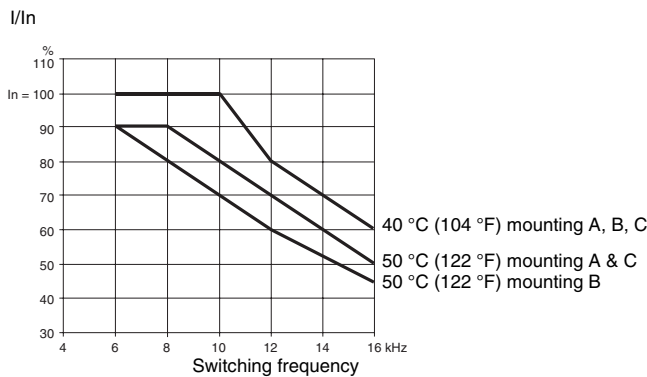
ATV21HD45N4 (60 hp at 460 V)



ATV21HD55N4 (75 hp at 460 V)



ATV21HD75N4 (100 hp at 460 V)



Minimum Air Flow Rates

If you are installing the drive in a Type 1 enclosure, provide forced ventilation at a rate at least equal to the value listed in Table 10 for each drive.

Table 10: Minimum Ventilation Rates

| For drive | m ³ /hour | Cubic feet per minute (CFM) |
|--------------|----------------------|-----------------------------|
| ATV21H075M3X | 22 | 13 |
| ATV21HU15M3X | 35 | 21 |
| ATV21HU22M3X | 41 | 25 |
| ATV21HU30M3X | 50 | 30 |
| ATV21HU40M3X | 66 | 39 |
| ATV21HU55M3X | 85 | 50 |
| ATV21HU75M3X | 118 | 70 |
| ATV21HD11M3X | 157 | 93 |
| ATV21HD15M3X | 215 | 127 |
| ATV21HD18M3X | 239 | 141 |
| ATV21HD22M3X | 261 | 154 |
| ATV21HD30M3X | 371 | 219 |
| ATV21H075N4 | 19 | 12 |
| ATV21HU15N4 | 27 | 16 |
| ATV21HU22N4 | 35 | 21 |
| ATV21HU30N4 | 47 | 28 |
| ATV21HU40N4 | 60 | 36 |
| ATV21HU55N4 | 74 | 44 |
| ATV21HU75N4 | 100 | 59 |
| ATV21HD11N4 | 147 | 87 |
| ATV21HD15N4 | 206 | 122 |
| ATV21HD18N4 | 214 | 126 |
| ATV21HD22N4 | 214 | 126 |
| ATV21HD30N4 | 290 | 171 |
| ATV21HD37N4 | 334 | 197 |
| ATV21HD45N4 | 429 | 252 |
| ATV21HD55N4 | 498 | 293 |
| ATV21HD75N4 | 666 | 392 |

Mounting in a Type 12 or IP54 Metal Enclosure

Calculating Enclosure Size

The equation for calculating R_{th} (°F/W), the maximum allowable thermal resistance of the enclosure, is as follows:

$$R_{th} = \frac{T_i - T_o}{P}$$

T_i = Max. internal ambient temp. (°F) around the controller
 T_o = Max. external ambient temp. (°F) around enclosure
 P = Total power dissipated in enclosure (W)

For the power dissipated by the drives at rated load, see Tables 4 and 5 on page 12.

The useful heat exchange surface area, S (in²), of a wall-mounted enclosure generally consists of the sides, top, and front. The minimum surface area required for a drive enclosure is calculated as follows:

NOTE: Contact the enclosure manufacturer for K factors.

$$S = \frac{K}{R_{th}} \quad \begin{array}{l} K = \text{Thermal resistance per square inch of the enclosure} \\ R_{th} = \text{Thermal resistance of the enclosure (calculated previously)} \end{array}$$

Consider the following points when sizing the enclosure:

- Use only metal enclosures, since they have good thermal conduction.
- Do not install enclosures where external heat sources (such as direct sunlight) can add to the enclosure heat load. This procedure does not consider radiant or convected heat load from external sources.
- If additional devices are present inside the enclosure, consider the heat load of those devices in the calculation.
- The actual useful area for convection cooling of the enclosure will vary depending upon the method of mounting. The mounting method must allow for free air movement over all surfaces considered for convection cooling.

The following sample illustrates calculation of the enclosure size for an ATV21HU40N4 (5 hp) drive mounted in a Type 12 or IP54 enclosure.

- Maximum external temperature: $T_o = 77$ °F
- Power dissipated inside the enclosure: $P = 176$ W
- Maximum internal temperature: $T_i = 104$ °F
- Thermal resistance per square inch of the enclosure: $K = 335$

Calculate the maximum allowable thermal resistance, R_{th} :

$$R_{th} = \frac{104 \text{ °F} - 77 \text{ °F}}{176 \text{ W}} = 0.1534 \text{ °F/W}$$

Calculate the minimum useful heat exchange surface area, S :

$$S = \frac{335}{0.1534} = 2183.8 \text{ in}^2$$

Actual heat exchange surface area (A) of the proposed wall-mounted enclosure:

- Height: 34 in.
- Width: 30 in.
- Depth: 12 in.

$$\begin{array}{ccc} \text{front area} & \text{top area} & \text{side area} \\ \downarrow & \downarrow & \downarrow \\ A = (30 \times 34) + (30 \times 12) + 2(34 \times 12) = 2196 \text{ in}^2 \end{array}$$

If the selected enclosure does not provide the required surface area or does not meet application needs, consider the following:

- Use a larger enclosure.
- Add a passive heat exchanger to the enclosure.
- Add an air conditioning unit to the enclosure.

Ventilation

When mounting the drive inside a Type 12 or IP54 enclosure, follow these ventilation precautions:

- Observe the minimum clearance distances shown on page 17.
- If necessary, install a stirring fan to circulate the air inside the enclosure, to help prevent hot spots in the drive, and to distribute the heat uniformly to surfaces used for convection cooling.

⚠ CAUTION

CONDENSATION

Where condensation is possible, keep the drive powered up when the motor is not running, or install thermostatically controlled strip heaters.

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

BUS VOLTAGE MEASUREMENT PROCEDURE

Before working on the drive, remove all power and wait 15 minutes to allow the DC bus to discharge. Then measure the DC bus voltage between the PA/+ and PC/- terminals.

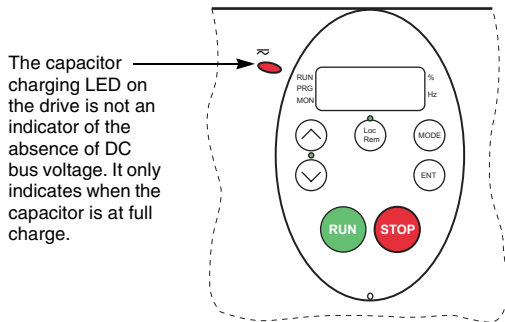
⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Read and understand the precautions in “Before You Begin” starting on page 5 before performing this procedure.

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

Figure 8: Capacitor Charging LED



The DC bus voltage can exceed 1,000 Vdc. Use a properly rated voltage-sensing device when performing this procedure. To measure the DC bus voltage:

1. Disconnect all power.
2. Wait 15 minutes to allow the DC bus to discharge.
3. Measure the voltage of the DC bus between the PA/+ and PC/- terminals to ensure that the voltage is less than 42 Vdc.
4. If the DC bus capacitors do not discharge completely, contact your local Schneider Electric representative. Do not repair or operate the drive.

WIRING

Wiring Recommendations

Good wiring practice requires the separation of control circuit wiring from all power (line) wiring. In addition, power wiring to the motor must have the maximum possible separation from all other power wiring, whether from the same drive or other drives. **Do not run power and control wiring, or multiple power wiring, in the same conduit.** This separation reduces the possibility of coupling electrical transients from power circuits into control circuits or from motor power wiring into other power circuits.

⚠ WARNING

IMPROPER WIRING PRACTICES

- Follow the wiring practices described in this document in addition to those already required by the National Electrical Code and local electrical codes.
- Do not apply input line voltage to the output terminals (U/T1, V/T2, W/T3).
- Check the power connections before energizing the drive.
- If replacing another drive, verify that all wiring connections to the ATV21 drive comply with all wiring instructions in this manual.

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

Follow the practices below when wiring ATV21 drives:

- Verify that the voltage and frequency of the input supply line and the voltage, frequency, and current of the motor match the rating on the drive nameplate.
- Use metallic conduit for all drive wiring. Do not run control and power wiring in the same conduit.
- Separate the metallic conduits carrying power wiring from those carrying control wiring by at least 76 mm (3 in.).
- Separate the non-metallic conduits or cable trays carrying power wiring from the metallic conduit carrying control wiring by at least 305 mm (12 in.).
- Whenever power and control wiring cross, the metallic conduits and non-metallic conduits or trays must cross at right angles.
- Equip all inductive circuits near the drive (such as relays, contactors, and solenoid valves) with noise suppressors.

Branch Circuit Protection

Refer to NEC Article 430 for sizing of branch circuit conductors. Ensure that all branch circuit components and equipment (such as transformers, feeder cables, disconnect devices, and protective devices) are rated for the input current of the ATV21 drive, or for the rated output current, whichever value is larger. The input current of the controller depends on the impedance of the power distribution system and the available short-circuit current at the drive input terminals.

Tables 4 and 5 on page 12 provide input current information to optimally size branch circuit conductors. Do not exceed the short-circuit current rating shown in the tables. The short-circuit current rating is the available short-circuit current capability on the line side of the fuses or circuit breakers. A line reactor can be used to add impedance and reduce the available short-circuit current capability to the level allowed by the drive.

NOTE: Ensure that the branch circuit feeder protection rating is not less than the rated output current of the drive.

When more than two drives are installed in parallel on a common power line voltage, regardless of voltage rating, an individual line reactor per drive is recommended. This provides filtering between controllers and reduces harmonic distortion when the system is partially loaded.

If starting the drive from line power, limit operations of the line contactor to less than once per minute to avoid premature failure of the filter capacitors and precharge resistor. Use the logic inputs to command the drive.

⚠ WARNING

INADEQUATE OVERCURRENT PROTECTION

- Overcurrent protective devices must be properly coordinated.
- The National Electrical Code and the Canadian Electricity Code require branch circuit protection. Use the fuses recommended in Tables 14 and 15 on page 38 to achieve published short-circuit current ratings.
- Do not connect the drive to a power feeder whose short-circuit capacity exceeds the drive short-circuit current rating listed on the drive nameplate or in Tables 4–5 on page 12.

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

Output Wiring

The drive is sensitive to the amount of capacitance (either phase-to-phase or phase-to-ground) present on the output power conductors. Excessive capacitance can cause an overcurrent trip. Follow these guidelines when selecting output cable:

- **Cable type:** The cable selected must have a low capacitance phase-to-phase and phase-to-ground. Do not use mineral-impregnated cable because it has a very high capacitance. Immersion of cables in water increases capacitance.
- **Cable length:** The longer the cable, the greater the capacitance. Cable lengths greater than 30.5 m (100 ft.) can affect the drive and motor performance.
- When the output cable is in close proximity to other output cables, the drive may trip under some conditions because of high frequency switching and increased capacitance.
- **Do not use lightning arrestors and/or power factor correction capacitors on the output of the drive.**

For proper drive short circuit protection, certain values of inductance may be required in the output power wiring. Inductance can be supplied by the power wiring or auxiliary inductors.

⚠ CAUTION

INSUFFICIENT OUTPUT INDUCTANCE

Provide at least 500 mm (20 in.) of cable at the drive output (U/T1, V/T2, W/T3) to ensure a minimum inductance to protect the drive output from short circuits.

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

Grounding

Ground the drive according to the National Electrical Code and all local codes to help ensure safe, dependable operation.

- Connect a copper wire from the equipment ground lug or terminal to the power system ground conductor. Size the wire according to the drive rating and national and local codes.
- Verify that resistance to ground is 1 Ω or less. Improper grounding causes intermittent and unreliable operation.

⚠ DANGER

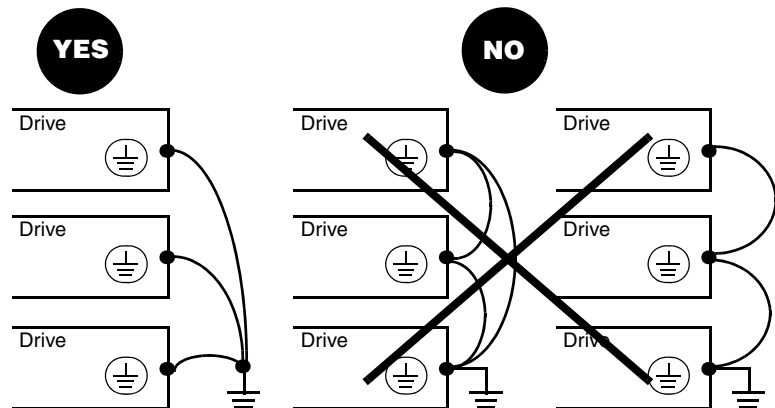
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Ground the equipment using the provided ground connecting point as shown in Figure 9. The drive panel must be properly grounded before power is applied.

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

Ground multiple drives as shown in Figure 9. Do not loop the ground cables or connect them in series.

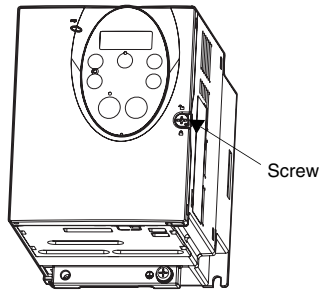
Figure 9: Grounding Multiple Drives



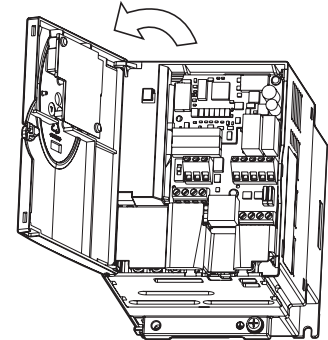
Access to Terminals, Up to 25 hp

To access the terminals of ATV21 drives:

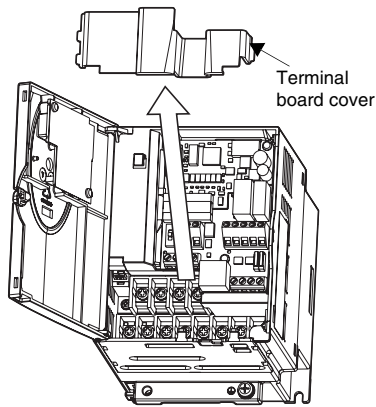
1. Turn the screw on the front panel 90° counter-clockwise to align the dot on the screw with the unlock position.
To avoid damaging the screw, do not apply excessive force or turn the screw more than 90°.



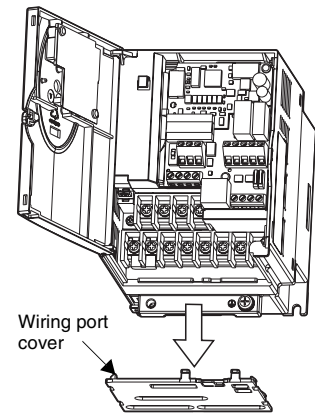
2. Pull the front panel toward you and swing it open to the left.



3. Remove the terminal board cover by pulling it up toward you.



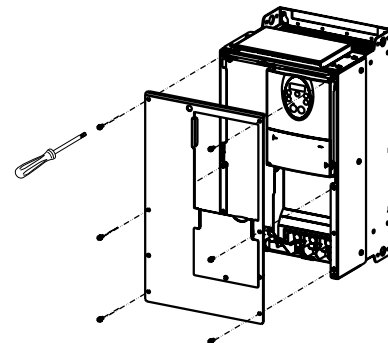
4. Remove the wiring port cover by pulling it down. Pass the cables through the wiring port, and connect them to the terminal board.



Access to Terminals, 30–100 hp

To access the terminals:

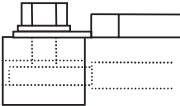
1. Remove the screws.
2. Lift off the cover.



Power Terminals

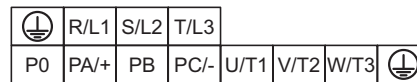
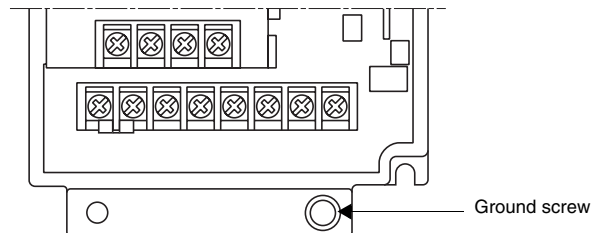
Connect the power terminals before connecting the control terminals.

Arrangement of the Power Terminals

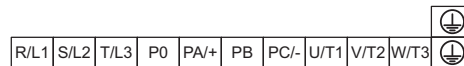
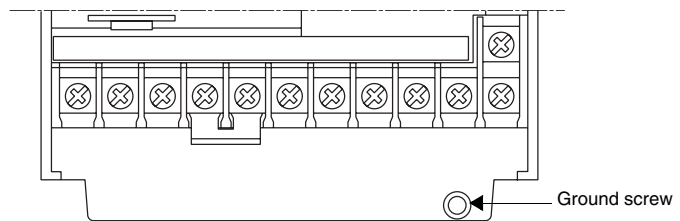
A  Each power terminal has the structure shown in the figure at left. Connect a cable to **A** if it has a ring terminal or to **B** if it does not have a terminal (bare wire).

Parts A and B can accommodate different cable sizes.

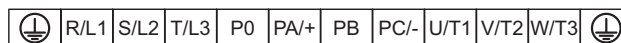
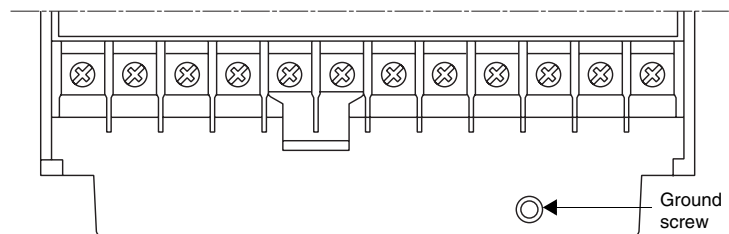
1–5 hp, 208/240 V ATV21H075M3X–ATV21HU40M3X
1–5 hp, 480 V ATV21H075N4–ATV21HU40N4



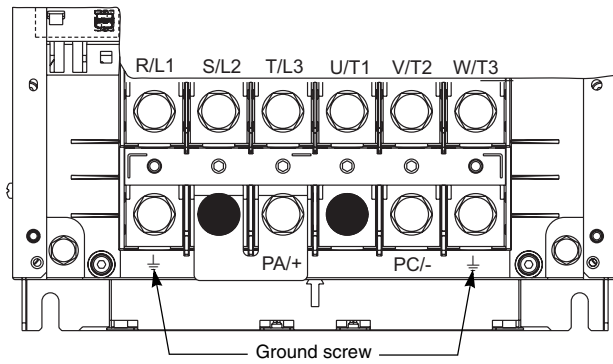
7.5–10 hp, 208/240 V ATV21HU55M3X–ATV21HU75M3X
7.5–15 hp, 480 V ATV21HU55N4–ATV21HD11N4



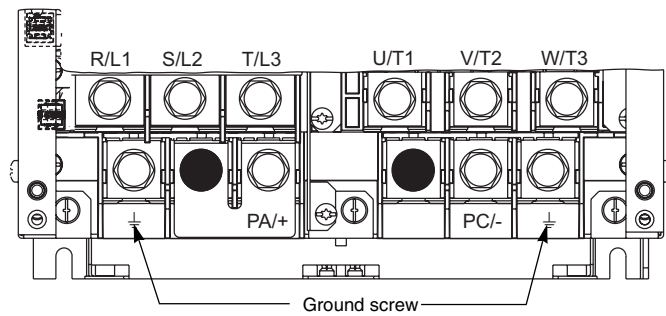
15–25 hp, 208/240 V ATV21HD11M3X–ATV21HD18M3X
20–25 hp, 480 V ATV21HD15N4–ATV21HD18N4



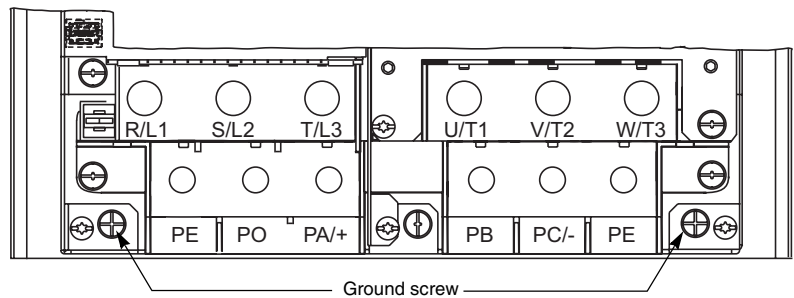
30 hp, 208/240 V **ATV21HD22M3X**
30–40 hp, 480 V **ATV21HD22N4–ATV21HD30N4**



40 hp, 208/240 V **ATV21HD30M3X**



50–60 hp, 480 V **ATV21HD37N4–ATV21HD45N4**



75–100 hp, 480 V **ATV21HD55N4–ATV21HD75N4**

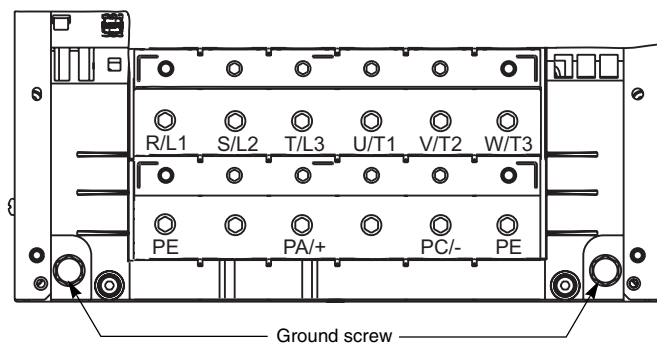


Table 11: Maximum Conductor Sizes for Power Terminals

| Voltage | Drive | | Maximum conductor size ¹ | | | | | | Maximum tightening torque | |
|---------|-------------|----------------|-------------------------------------|---------|------------------------|---------|------------------|---------|---------------------------|-------|
| | hp | Catalog number | Input power terminals | | Output power terminals | | Ground terminals | | N•m | lb-in |
| | | | mm ² | AWG | mm ² | AWG | mm ² | AWG | | |
| 230 Vac | 1 | ATV21H075M3X | 6 | 10 | 6 | 10 | 6 | 10 | 1.3 | 11.5 |
| | 2 | ATV21HU15M3X | 6 | 10 | 6 | 10 | 6 | 10 | 1.3 | 11.5 |
| | 3 | ATV21HU22M3X | 6 | 10 | 6 | 10 | 6 | 10 | 1.3 | 11.5 |
| | 3 kW | ATV21HU30M3X | 6 | 10 | 6 | 10 | 6 | 10 | 1.3 | 11.5 |
| | 5 | ATV21HU40M3X | 6 | 10 | 6 | 10 | 6 | 10 | 1.3 | 11.5 |
| | 7.5 | ATV21HU55M3X | 16 | 6 | 16 | 6 | 16 | 6 | 2.5 | 22.0 |
| | 10 | ATV21HU75M3X | 16 | 6 | 16 | 6 | 16 | 6 | 2.5 | 22.0 |
| | 15 | ATV21HD11M3X | 25 | 3 | 25 | 3 | 25 | 3 | 4.5 | 40.0 |
| | 20 | ATV21HD15M3X | 25 | 3 | 25 | 3 | 25 | 3 | 4.5 | 40.0 |
| | 25 | ATV21HD18M3X | 25 | 3 | 25 | 3 | 25 | 3 | 4.5 | 40.0 |
| | 30 | ATV21HD22M3X | 50 | 1/0 | 50 | 1/0 | 50 | 1/0 | 24 | 212.0 |
| | 40 | ATV21HD30M3X | 150 | 300 mcm | 150 | 300 mcm | 150 | 300 mcm | 41 | 363.0 |
| 460 Vac | 1 | ATV21H075N4 | 6 | 10 | 6 | 10 | 6 | 10 | 1.3 | 11.5 |
| | 2 | ATV21HU15N4 | 6 | 10 | 6 | 10 | 6 | 10 | 1.3 | 11.5 |
| | 3 kW | ATV21HU22N4 | 6 | 10 | 6 | 10 | 6 | 10 | 1.3 | 11.5 |
| | — | ATV21HU30N4 | 6 | 10 | 6 | 10 | 6 | 10 | 1.3 | 11.5 |
| | 5 | ATV21HU40N4 | 6 | 10 | 6 | 10 | 6 | 10 | 1.3 | 11.5 |
| | 7.5 | ATV21HU55N4 | 6 | 10 | 6 | 10 | 6 | 10 | 1.3 | 11.5 |
| | 10 | ATV21HU75N4 | 6 | 6 | 16 | 6 | 16 | 6 | 2.5 | 22.0 |
| | 15 | ATV21HD11N4 | 16 | 6 | 16 | 6 | 16 | 6 | 2.5 | 22.0 |
| | 20 | ATV21HD15N4 | 25 | 3 | 25 | 3 | 25 | 3 | 4.5 | 40.0 |
| | 25 | ATV21HD18N4 | 25 | 3 | 25 | 3 | 25 | 3 | 4.5 | 40.0 |
| | 30 | ATV21HD22N4 | 50 | 1/0 | 50 | 1/0 | 50 | 1/0 | 24 | 212.0 |
| | 40 | ATV21HD30N4 | 50 | 1/0 | 50 | 1/0 | 50 | 1/0 | 24 | 212.0 |
| | 50 | ATV21HD37N4 | 50 | 1/0 | 50 | 1/0 | 50 | 1/0 | 24 | 212.0 |
| | 60 | ATV21HD45N4 | 50 | 1/0 | 50 | 1/0 | 50 | 1/0 | 24 | 212.0 |
| | 75 | ATV21HD55N4 | 150 | 300 mcm | 150 | 300 mcm | 150 | 300 mcm | 41 | 363.0 |
| 100 | ATV21HD75N4 | 150 | 300 mcm | 150 | 300 mcm | 150 | 300 mcm | 41 | 363.0 | |

¹ 75 °C copper.

Table 12: Power Terminal Functions

| Terminals | Function |
|----------------------|----------------------------------|
| t | Ground terminal ¹ |
| R/L1 S/L2 T/L3 | Power supply |
| U/T1 V/T2 W/T3 | Outputs to the motor |
| PO ² | DC bus (+) polarity (do not use) |
| PA/+ ^{2, 3} | DC bus (+) polarity |
| PB | DC bus connection (do not use) |
| PC/- ³ | DC bus (-) polarity |

¹ ATV21 drives have two ground terminals, one on the power terminal strip and one on the heatsink.

² Do not remove the jumper between PO and PA/+.

³ The PA/+ and PC/- terminals can only be used to measure the DC bus voltage.

Control Terminals

Connect the control terminals after connecting the power terminals.

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- Prevent accidental grounding of logic inputs configured for sink logic. Accidental grounding can result in unintended activation of drive functions.
- Protect the signal conductors against damage that could result in unintentional conductor grounding.
- Follow NFPA 79 and EN 60204 guidelines for proper control circuit grounding practices.

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

⚠ WARNING

RISK OF IMPROPER OPERATION

Do not change the setting of switch SW4 unless your system is wired for sink logic.

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

CAUTION

DRIVE OR PC COMMUNICATION DAMAGE

- This RJ45 connection is designed for RS-485 communications. It is not compatible with PC Ethernet.
- Do not connect directly to the PC Ethernet port.
- An optional adapter is required for PC connection.

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

Refer to “Logic Input Switch” on page 36 for recommended circuit diagrams for source and sink logic.

Figure 10: Control Terminals

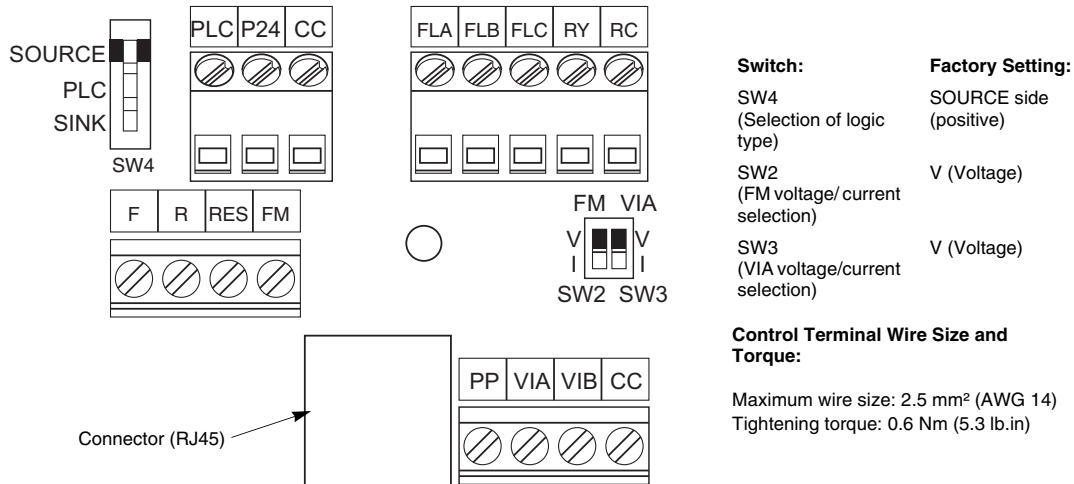


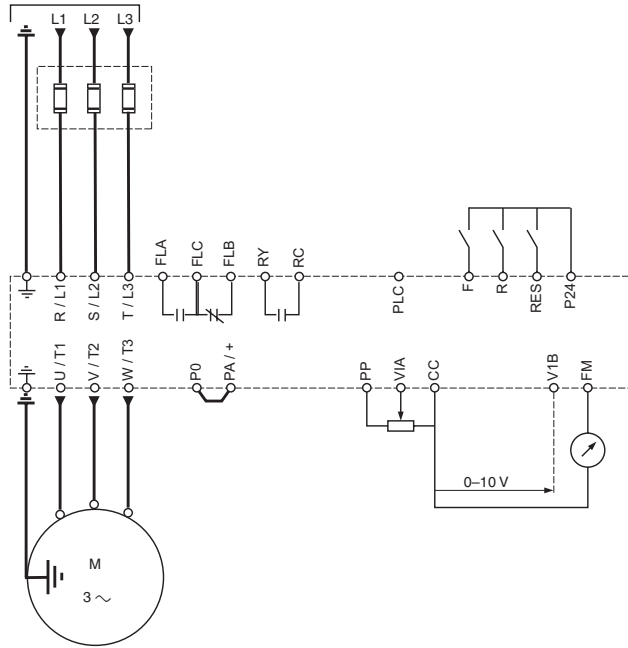
Table 13: Control Terminal Characteristics

| Terminals | Function | Characteristics | Default function setting |
|---------------------|---------------------------------|---|--|
| PLC | External power supply input | +24 Vdc input for external power supply for logic inputs Max. permissible voltage: 50 Vdc | — |
| P24 | Internal supply | Short-circuit and overload protection: 24 Vdc supply (min. 21 Vdc, max. 27 Vdc), maximum current: 200 mA | |
| CC | Common | 0 Vdc common (2 terminals) | |
| FLA, FLB, FLC | Configurable relay outputs | 1 relay logic output, 1 N/C contact, and 1 N/O contact with common point Minimum switching capacity: 3 mA for 24 Vdc Maximum switching capacity: <ul style="list-style-type: none"> On resistive load ($\cos \varphi = 1$): 5 A for 250 Vac or 30 Vdc On inductive load ($\cos \varphi = 0.4$ and $L/R = 7$ ms): 2 A for 250 Vac or 30 Vdc Max. response time: 7 ms \pm 0.5 ms | Trip when fault detected |
| RY, RC | | 1 relay logic output, 1 N/O contact Minimum switching capacity: 3 mA for 24 Vdc Maximum switching capacity: <ul style="list-style-type: none"> On resistive load ($\cos \varphi = 1$): 5 A for 250 Vac or 30 Vdc On inductive load ($\cos \varphi = 0.4$ and $L/R = 7$ ms): 2 A for 250 Vac or 30 Vdc Max. response time: 7 ms \pm 0.5 ms | Speed attained |
| F R RES | Configurable logic inputs | 3 programmable logic inputs, 24 Vdc, compatible with level 1 PLC, IEC 65A-68 standard Impedance: 3.5 k Ω Maximum voltage: 30 Vdc Max. sampling time: 2 ms \pm 0.5 ms Multiple assignment makes it possible to configure several functions on one input | F: Run forward (2-wire control) R: Preset speed 1 command (15 Hz) RES: Reset |
| | | Positive logic (Source): State 0 if γ 5 Vdc or logic input not wired, state 1 if μ 11 Vdc | |
| | | Negative logic (Sink): State 0 if μ 16 Vdc or logic input not wired, state 1 if γ 10 Vdc | |
| FM | Configurable analog output | 1 switch-configurable voltage or current analog output: <ul style="list-style-type: none"> 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 mA, maximum load impedance: 500 Ω Max. sampling time: 2 ms \pm 0.5 ms Resolution: 10 bits Accuracy: \pm 1 % for a temperature variation of 60 °C Linearity: \pm 0.2% | Output frequency |
| PP | Internal supply available | Short-circuit and overload protection: One 10.5 Vdc \pm 5% supply for the reference potentiometer (1 to 10 k Ω), maximum current: 10 mA | — |
| VIA | Configurable analog/logic input | Switch-configurable voltage or current analog input: <ul style="list-style-type: none"> Voltage analog input 0–10 Vdc, impedance 30 kΩ (max. safe voltage: 24 Vdc) Analog current input X–Y mA by programming X and Y from 0 to 20 mA, with impedance 242 Ω Max. sampling time: 2 ms \pm 0.5 ms Resolution: 11 bits Accuracy: \pm 0.6% for a temperature variation of 60 °C Linearity: \pm 0.15% of the maximum value This analog input is also configurable as a logic input. Consult the <i>Altivar 21 Programming and Operation Guide</i> (30072-451-63) for more information. | Primary speed reference, 0–10 V |
| VIB | Configurable analog input | Voltage analog input, configurable as an analog input or as a PTC probe input. Voltage analog input: <ul style="list-style-type: none"> 0–10 Vdc, impedance 30 kΩ (max. safe voltage 24 Vdc) Max. sampling time: 2 ms \pm 0.5 ms Resolution: 11 bits Accuracy: \pm0.6% for a temperature variation of 60 °C Linearity: \pm0.15% of the maximum value PTC probe input: <ul style="list-style-type: none"> 6 probes max. mounted in series Nominal value < 1.5 kΩ Trip resistance 3 kΩ, reset value 1.8 kΩ Short-circuit protection < 50 Ω | Secondary speed reference, 1–10 V |

Connection Diagram

Figure 11 is a three-phase connection diagram for the drive at the factory settings.

Figure 11: 3-Phase Connection Diagram



NOTE: Connect the power terminals before connecting the control terminals. Install surge suppressors on all inductive circuits located near the drive or coupled to the same circuit.

Refer to the drive nameplate or Tables 14 and 15 on page 38 for recommended fuses. Fast acting or time delay Class J fuses can be used.

Logic Input Switch

The logic input switch SW4 assigns the logic input type to either 24 V (source logic) or 0 V (sink logic).

NOTE: When the logic input is configured for sink logic, grounding the input signals can result in unintended activation of drive functions.

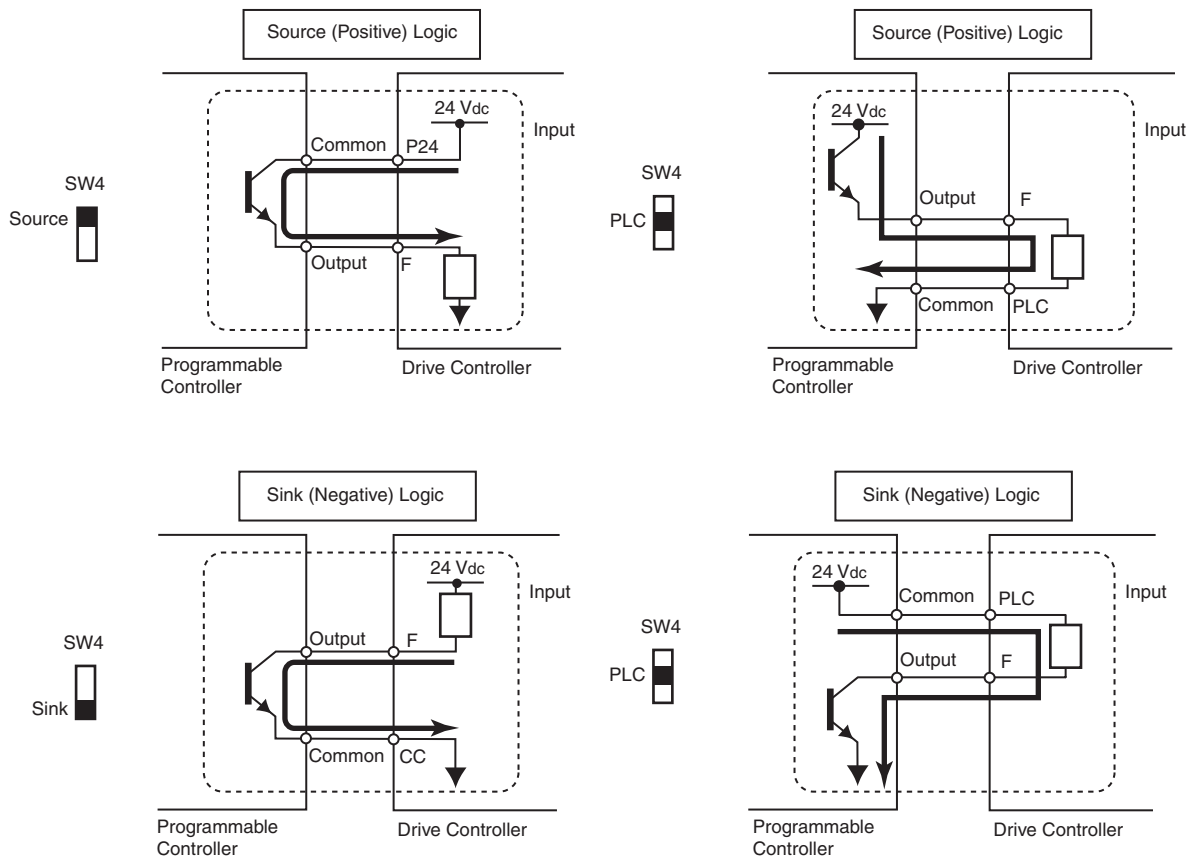
⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- Protect the signal conductors against damage that could result in unintentional conductor grounding.
- Follow NFPA 79 and EN 60204 guidelines for proper control circuit grounding practices.

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

Figure 12: Recommended Circuit Diagrams for Source and Sink Logic

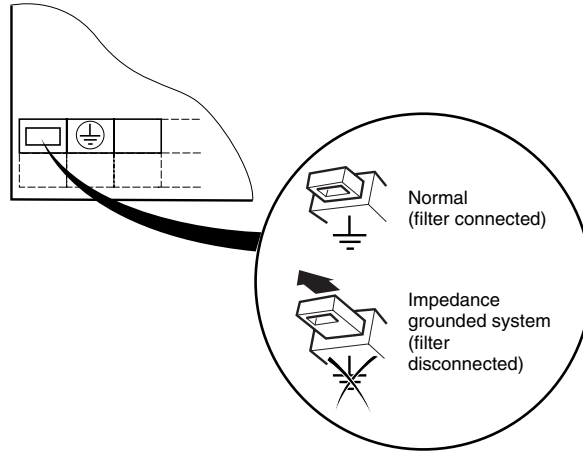


Operation on an Impedance Grounded System

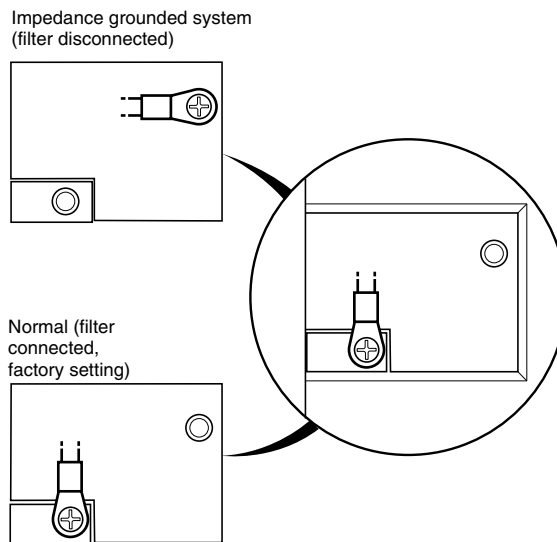
When using the ATV21 drive on a system with an isolated or impedance grounded neutral, use a permanent insulation monitor compatible with non-linear loads.

ATV21 480 V rated drives feature built-in radio frequency interference (RFI) filters with grounded capacitors. When using the drive on an impedance grounded system, we recommend that you isolate the RFI filters from ground to prevent reduction of their operating life.

- 1–7.5 hp and 30–40 hp (ATV21H075N4 to U55N4, ATV21HD22N4 to D30N4): Pull out the jumper to the left of the ground terminal as illustrated below to isolate the RFI filters.



- 10–25 hp (ATV21HU75N4 to D18N4): Connect the cable to the top left of the power terminals as illustrated below to isolate the filters.



RECOMMENDED FUSES

Tables 14 and 15 contain fuse recommendations for Altivar 21 drives. Refer to “Recommended Branch Circuit Protection Devices” on page 43 for circuit breaker ratings, manual motor controller ratings, and fuse ratings up to 100 kA.

Table 14: Recommended Fuses for 208/240 V Drives

| Motor | | Drive | 600 V fuses |
|-------|------|--------------------------|----------------------|
| hp | kW | ATV21H***** ¹ | Class J ² |
| 1 | 0.75 | 075M3X | 6 A |
| 2 | 1.5 | U15M3X | 10 A |
| 3 | 2.2 | U22M3X | 15 A |
| — | 3.0 | U30M3X | 20 A |
| 5 | 4.0 | U40M3X | 25 A |
| 7.5 | 5.5 | U55M3X | 35 A |
| 10 | 7.5 | U75M3X | 45 A |
| 15 | 11 | D11M3X | 70A |
| 20 | 15 | D15M3X | 90 A |
| 25 | 18.5 | D18M3X | 100 A |
| 30 | 22 | D22M3X | 125 A |
| 40 | 30 | D30M3X | 175 A |

¹ The symbol “*” in a catalog number indicates the part of the number that varies with controller size or rating.

² Fast acting or time delay.

Table 15: Recommended Fuses for 480 V Drives

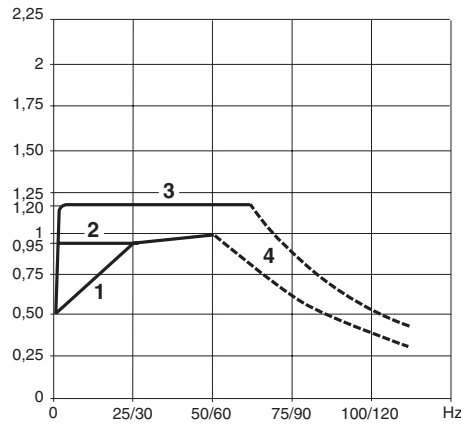
| Motor | | Drive | 600 V fuses |
|-------|------|--------------------------|----------------------|
| hp | kW | ATV21H***** ¹ | Class J ² |
| 1 | 0.75 | 075N4 | 3 A |
| 2 | 1.5 | U15N4 | 6 A |
| 3 | 2.2 | U22N4 | 10 A |
| — | 3.0 | U30N4 | 10 A |
| 5 | 4.0 | U40N4 | 15 A |
| 7.5 | 5.5 | U55N4 | 20 A |
| 10 | 7.5 | U75N4 | 25 A |
| 15 | 11 | D11N4 | 35 A |
| 20 | 15 | D15N4 | 45 A |
| 25 | 18.5 | D18N4 | 60 A |
| 30 | 22 | D22N4 | 70 A |
| 40 | 30 | D30N4 | 90 A |
| 50 | 37 | D37N4 | 110 A |
| 60 | 45 | D45N4 | 125 A |
| 75 | 55 | D55N4 | 175 A |
| 100 | 75 | D75N4 | 225 A |

¹ The symbol “*” in a catalog number indicates the part of the number that varies with controller size or rating.

² Fast acting or time delay.

AVAILABLE TORQUE

Figure 13: Available Torque



1. Self-cooled motor: continuous useful torque
2. Force-cooled motor: continuous useful torque
3. Overtorque for 60 seconds maximum
4. Torque above nameplate motor speed at constant power

For continuous duty operation:

- With self-cooled motors, motor cooling depends on speed.
- When running at speeds less than 50% of the nameplate motor speed, it may be necessary to derate the motor.

For operation above nameplate motor speed:

- Since the voltage does not increase with the frequency, reduced induction in the motor and loss of torque occur. Consult the motor manufacturer to ensure that the motor can operate above nameplate motor speed.
- For a special motor, the nominal frequency and the maximum frequency are adjustable between 10 and 200 Hz.

▲ CAUTION

MACHINERY OVERSPEED

Some motors and/or loads may not be suited for operation above the nameplate motor speed and frequency. Consult the motor manufacturer before operating the motor above its rated speed.

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

DRIVE VENTILATION

The fan starts automatically when the drive is commanded to run (receives a run command and a speed reference). It stops a few seconds after the drive is stopped (when output frequency is less than 0.5 Hz and DC injection braking is completed).

NOTE: The fan may start without a run command if the drive temperature exceeds allowable limits.

MOTOR THERMAL PROTECTION

Thermal protection is integrated into the drive by continuous calculation of I^2t , taking motor speed into account. The motor power rating must be between 10% and 100% of the drive rating.

▲ CAUTION

LOSS OF MOTOR OVERLOAD PROTECTION

- Setting the parameter OLn to 2, 3, 6, or 7 (not factory setting) disables the internal motor overload protection function. In this case, external motor overload protection must be provided. For more information, refer to the *Altivar® 21 Programming and Operation Guide*, 30072-451-63.
- When using external overload relays connected to the drive output, the overload relay must be capable of operation across the expected range of drive output frequencies (including direct current).
- When using DC injection braking, the overload relay must be suitable for operation with direct current flowing in the motor. Do not use overload relays equipped with current transformers for sensing the motor current.

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

If parameter F632 is set to zero (factory setting), the motor thermal state memory is reset to zero when the drive is powered down. For more information, refer to the *Altivar® 21 Programming and Operation Guide*, 30072-451-63.

This drive does not provide direct thermal protection for the motor. Consult the motor manufacturer for the thermal capability of the motor when operated over the desired speed range.

▲ CAUTION

MOTOR OVERHEATING

- If parameter F632 is set to zero (factory setting), the motor thermal state memory is reset to zero when the drive is powered down. For more information, refer to the *Altivar® 21 Programming and Operation Guide*, 30072-451-63.
- Use a thermal sensor in the motor as required by the motor manufacturer for protection at all speeds and load conditions.

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

ELECTROMAGNETIC COMPATIBILITY

The ATV21 controller is considered to be a component. It is neither a machine nor a piece of equipment ready for use in accordance with the European Community directives (machinery directive or electromagnetic compatibility directive). It is the user's responsibility to ensure that the machine meets those standards.

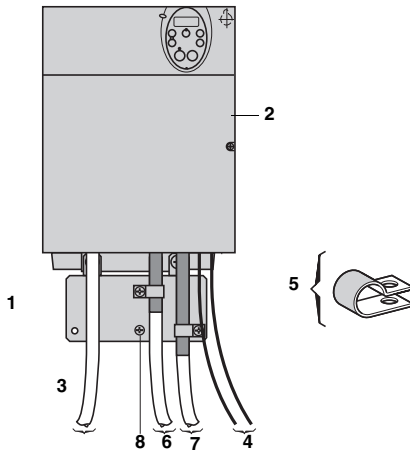
Principle and Precautions

IMPORTANT: The high frequency equipotential ground connection between the drive, motor, and cable shielding does not eliminate the need to connect the ground (PE) conductors (green-yellow) to the appropriate terminals on each unit. To help accomplish this, the user must follow the following points:

- Grounds between the drive, motor, and cable shielding must have high-frequency equipotentiality.
- When using shielded cable for the motor, use a 4-conductor cable so that one wire will be the ground connection between the motor and the drive. Size of the ground conductor must be selected in compliance with local and national codes. The shield can then be grounded at both ends. Metal ducting or conduit can be used for part or all of the shielding length, provided there is no break in continuity.
- When using shielded cable for the Dynamic Brake (DB) resistors, use a 3-conductor cable so that one wire will be the ground connection between the DB resistor assembly and the drive. Size of the ground conductor must be selected in compliance with local and national codes. The shield can then be grounded at both ends. Metal ducting or conduit can be used for part or all of the shielding length, provided there is no break in continuity.
- When using shielded cable for control signals, if the cable is connecting equipment that is close together and the grounds are bonded together, then both ends of the shield can be grounded. If the cable is connected to equipment that may have a different ground potential, then ground the shield at one end only to prevent large currents from flowing in the shield. The shield on the ungrounded end may be tied to ground with a capacitor (for example: 10 nF, 100V or higher) in order to provide a path for the higher frequency noise.
- Keep the control circuits away from the power circuits. For control and speed reference circuits, use of shielded twisted cables with a pitch of between 25 and 50 mm (0.98 and 1.97 in.) is recommended.
- Ensure maximum separation between the power supply cable (line supply) and the motor cable and also ensure maximum separation between the control cables and any power cables.
- The motor cables must be at least 0.5 m (20 in.) long.
- Do not use surge arresters or power factor correction capacitors on the variable speed drive output.
- If using an additional input filter, refer to the Installation Guide for more information.
- For installation of the EMC plate provided with the drive and instructions for meeting EN55011 Class A directive, refer to the instructions below.

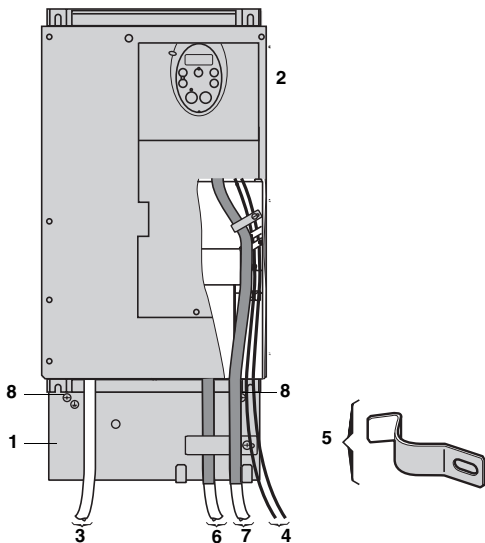
Installation Recommendations for Meeting EN 55011 Class A

Figure 14: 0.75–18.5 kW, ATV21H075M3X–D18M3X
ATV21H075N4–D18N4



1. EMC plate supplied with the ATV21 drive.
2. ATV21 drive.
3. Non-shielded power supply wires or cables.
4. Non-shielded wires for the output of the safety relay contacts.
5. The shields for cables 6 and 7 must be securely attached to the EMC plate with stainless steel clamps (item 5). Strip cables 6 and 7 to expose the shields. Apply appropriately-sized clamps around the stripped portion of the cables and fasten them to the EMC plate.
6. Shielded cable for connection to the motor, with shield connected to ground at both ends. This shield must not be interrupted. If intermediate terminal blocks are used, they must be in EMC-shielded metal boxes.
7. Shielded cable for connection to control/command devices. For applications which require a large number of conductors, small cross-sections must be used (0.5 mm², 20 AWG). This shield must not be interrupted. If intermediate terminal blocks are used, they must be in EMC-shielded metal boxes.
8. Ground screw. Use this screw for the motor cables on the low power rated drives, as the ground screw on the heatsink is inaccessible.

Figure 15: 22 and 30 kW, AV21HD22M3X–D30M3X
ATV21HD22N4–D75N4



If using an additional input filter, connect it directly to the line supply with an unshielded cable. Then make connection 3 on the drive using the filter output cable.

Although there is a high frequency equipotential ground connection between the drive, motor, and cable shielding, you must still connect the PE protective conductors (green-yellow) to the appropriate terminals on each of the devices. You may also need to disconnect the shield at the motor end for very long cable runs to alleviate noise generation.

RECOMMENDED BRANCH CIRCUIT PROTECTION DEVICES

Circuit Breakers and Manual Motor Controllers

Table 16: Circuit Breakers and Manual Motor Controllers for 208/230 V Drives

| Drive catalog no. | Maximum size protective device for short-circuit current ratings | | | | Short-circuit current rating (kA) ¹ | Short-circuit current rating (kA) ² | |
|-------------------|--|----------|---------------------------------------|--------|--|--|----|
| | Thermal-magnetic circuit breakers ^{3,4} | | Manual motor controllers ⁵ | | | | |
| 208 V | | | | | | | |
| ATV21H075M3X | FAL34015 | HDL36015 | GJL36015 | GV2P08 | — | 22 | 22 |
| ATV21H075M3X | FAL34015 | HDL36015 | GJL36015 | GV2P10 | — | 22 | 22 |
| ATV21HU15M3X | FAL34015 | HDL36015 | GJL36015 | GV2P14 | — | 22 | 22 |
| ATV21HU22M3X | FAL34020 | HDL36020 | GJL36020 | GV2P16 | — | 22 | 22 |
| ATV21HU40M3X | FAL34040 | HDL36040 | GJL36040 | GV2P20 | — | 22 | 22 |
| ATV21HU55M3X | FAL34050 | HDL36050 | GJL36050 | GV2P22 | — | 22 | 22 |
| ATV21HU75M3X | FAL34070 | HDL36070 | GJL36070 | GV2P32 | GPS2BHAS | 22 | 22 |
| ATV21HD11M3X | FAL34100 | HDL36100 | GJL36100 | — | GPS2BHAT | 22 | 22 |
| ATV21HD15M3X | HDL36125 | — | — | — | GPS2BHAU | 22 | 22 |
| ATV21HD18M3X | JDL36175 | — | — | — | — | 22 | 22 |
| ATV21HD22M3X | JDL36200 | — | — | — | — | 22 | 22 |
| ATV21HD30M3X | JDL36250 | — | — | — | — | 22 | 22 |
| 230 V | | | | | | | |
| ATV21H075M3X | FAL34015 | HDL36015 | GJL36015 | GV2P08 | — | 22 | 22 |
| ATV21H075M3X | FAL34015 | HDL36015 | GJL36015 | GV2P10 | — | 22 | 22 |
| ATV21HU15M3X | FAL34015 | HDL36015 | GJL36015 | GV2P10 | — | 22 | 22 |
| ATV21HU22M3X | FAL34020 | HDL36020 | GJL36020 | GV2P14 | — | 22 | 22 |
| ATV21HU40M3X | FAL34035 | HDL36035 | GJL36035 | GV2P20 | — | 22 | 22 |
| ATV21HU55M3X | FAL34045 | HDL36045 | GJL36045 | GV2P21 | — | 22 | 22 |
| ATV21HU75M3X | FAL34060 | HDL36060 | GJL36060 | GV2P32 | GPS2BHAS | 22 | 22 |
| ATV21HD11M3X | FAL34090 | HDL36090 | GJL36090 | — | GPS2BHAT | 22 | 22 |
| ATV21HD15M3X | HDL36125 | — | — | — | GPS2BHAU | 22 | 22 |
| ATV21HD18M3X | HDL36150 | — | — | — | — | 22 | 22 |
| ATV21HD22M3X | JDL36175 | — | — | — | — | 22 | 22 |
| ATV21HD30M3X | JDL36225 | — | — | — | — | 22 | 22 |

¹ Type 1 (open drive with a conduit box installed).

² Drive installed in a 8640 cu. in. (minimum) metallic enclosure.

³ Square D Type FA, HD, or JD, or Merlin Gerin Type GJL. The third character of the Square D circuit breaker catalog number may be L, F, M, or P indicating: line/load side lugs (L); line side lugs (M); load side lugs (P); or bus bar (F). A "4" as the fifth character of the Square D circuit breaker catalog number indicates 480 V; a "6" indicates 600 V.

⁴ Square D circuit-breakers with the following prefixes are also covered at the same amperage rating: FH, HG, HJ, HL, JG, JJ, JL, LH, MH. These prefixes indicate higher interrupting ratings.

⁵ Self-protected control device, UL 508 Type E. Square D Type GV2.

Table 17: Circuit Breakers and Manual Motor Controllers for 480/460 V Drive

| Drive catalog no. | Maximum size protective device for short-circuit current ratings | | | | Short-circuit current rating (kA) ¹ | Short-circuit current rating (kA) ² | Minimum Type 12 Metallic Enclosure Volume (cu. in) | |
|--------------------|--|----------|---------------------------------------|--------|--|--|--|------|
| | Thermal-magnetic circuit breakers ^{3,4} | | Manual motor controllers ⁵ | | | | | |
| 480 Y/277 V | | | | | | | | |
| ATV21H075N4 | — | — | — | GV2P06 | — | 22 | 8640 | |
| ATV21H075N4 | — | — | — | GV2P07 | — | 22 | | |
| ATV21HU15N4 | — | — | — | GV2P08 | — | 22 | | |
| ATV21HU22N4 | — | — | — | GV2P10 | — | 22 | | |
| ATV21HU30N4 | — | — | — | GV2P14 | — | 22 | | |
| ATV21HU55N4 | — | — | — | GV2P16 | — | 22 | | |
| ATV21HU75N4 | — | — | — | GV2P20 | — | 22 | | |
| ATV21HD11N4 | — | — | — | GV2P21 | — | 22 | | |
| ATV21HD15N4 | — | — | — | GV2P22 | — | 22 | | |
| ATV21HD18N4 | — | — | — | GV2P32 | GPS2BHAS | 22 | | |
| ATV21HD22N4 | — | — | — | — | GPS2BHAT | — | | |
| ATV21HD30N4 | — | — | — | — | GPS2BAHU | — | | |
| 480 V | | | | | | | | |
| ATV21H075N4 | FAL34015 | HDL36015 | GJL36015 | — | — | — | 22 | 8640 |
| ATV21H075N4 | FAL34015 | HDL36015 | GJL36015 | — | — | — | 22 | |
| ATV21HU15N4 | FAL34015 | HDL36015 | GJL36015 | — | — | — | 22 | |
| ATV21HU22N4 | FAL34015 | HDL36015 | GJL36015 | — | — | — | 22 | |
| ATV21HU30N4 | FAL34020 | HDL36020 | GJL36020 | — | — | — | 22 | |
| ATV21HU55N4 | FAL34025 | HDL36025 | GJL36025 | — | — | — | 22 | |
| ATV21HU75N4 | FAL34030 | HDL36030 | GJL36030 | — | — | — | 22 | |
| ATV21HD11N4 | FAL34045 | HDL36045 | GJL36045 | — | — | — | 22 | |
| ATV21HD15N4 | HDL34060 | HDL36060 | GJL36060 | — | — | — | 22 | |
| ATV21HD18N4 | HDL34070 | HDL36070 | GJL36070 | — | — | — | 22 | |
| ATV21HD22N4 | JDL34090 | HDL36090 | GJL36090 | — | — | — | 22 | |
| ATV21HD30N4 | JDL36125 | — | — | — | — | — | 22 | |
| ATV21HD37N4 | HDL36125 | — | — | — | — | 10 | 10 | |
| ATV21HD45N4 | HDL36150 | — | — | — | — | 10 | 10 | |
| ATV21HD55N4 | JDL36175 | — | — | — | — | 10 | 10 | 9792 |

¹ Type 1 (open drive with a conduit box installed).

² Drive installed in a minimum volume Type 12 metallic enclosure as noted.

³ Square D Type FA, HD, or JD, or Merlin Gerin Type GJL. The third character of the Square D circuit breaker catalog number may be L, F, M, or P indicating: line/load side lugs (L); line side lugs (M); load side lugs (P); or bus bar (F). A "4" as the fifth character of the Square D circuit breaker catalog number indicates 480 V; a "6" indicates 600 V.

⁴ Square D circuit-breakers with the following prefixes are also covered at the same amperage rating: FH, HG, HJ, HL, JG, JJ, JL, LH, MH. These prefixes indicate higher interrupting ratings.

⁵ Self-protected control device, UL 508 Type E. Square D Type GV2.

Fuses

Table 18: Fuses for 208/230/460 V Drives

| Line Voltage | Drive catalog no. | Maximum fuse size | | Short-circuit current rating (kA) ¹ | Short-circuit current rating (kA) ² | Minimum Type 12 Metallic Enclosure Volume (cu. in.) |
|--------------|-------------------|-------------------|-----------------|--|--|---|
| | | Amperage (A) | Class (J or CC) | | | |
| 208 | ATV21H075M3X | 7 | Class J or CC | — | 100 | 8640 |
| | ATV21H075M3X | 10 | Class J or CC | — | | |
| | ATV21HU15M3X | 15 | Class J or CC | — | | |
| | ATV21HU22M3X | 30 | Class J or CC | — | | |
| | ATV21HU40M3X | 35 | Class J | — | | |
| | ATV21HU55M3X | 50 | Class J | — | | |
| | ATV21HU75M3X | 60 | Class J | — | | |
| | ATV21HD1M3X | 100 | Class J | — | | |
| | ATV21HD15M3X | 125 | Class J | — | | |
| | ATV21HD18M3X | 150 | Class J | — | | |
| 240 | ATV21H075M3X | 6-1/4 | Class J or CC | — | 100 | 8640 |
| | ATV21H075M3X | 10 | Class J or CC | — | | |
| | ATV21HU15M3X | 15 | Class J or CC | — | | |
| | ATV21HU22M3X | 30 | Class J or CC | — | | |
| | ATV21HU40M3X | 35 | Class J | — | | |
| | ATV21HU55M3X | 45 | Class J | — | | |
| | ATV21HU75M3X | 60 | Class J | — | | |
| | ATV21HD1M3X | 90 | Class J | — | | |
| | ATV21HD15M3X | 110 | Class J | — | | |
| | ATV21HD18M3X | 150 | Class J | — | | |
| | ATV21HD22M3X | 175 | Class J | 50 | | |
| | ATV21HD30M3X | 200 | Class J | — | 9792 | |
| 480 | ATV21H075N4 | 3 | Class J or CC | — | 100 | 8640 |
| | ATV21H075N4 | 5 | Class J or CC | — | | |
| | ATV21HU15N4 | 7.5 | Class J or CC | — | | |
| | ATV21HU22N4 | 10 | Class J or CC | — | | |
| | ATV21HU30N4 | 15 | Class J or CC | — | | |
| | ATV21HU55N4 | 20 | Class J or CC | — | | |
| | ATV21HU75N4 | 30 | Class J or CC | — | | |
| | ATV21HD1N4 | 45 | Class J | — | | |
| | ATV21HD15N4 | 60 | Class J | — | | |
| | ATV21HD18N4 | 80 | Class J | — | | |
| | ATV21HD22N4 | 90 | Class J | — | | |
| | ATV21HD30N4 | 110 | Class J | — | | |
| | ATV21HD37N4 | 125 | Class J | 100 | 8640 | |
| | ATV21HD45N4 | 150 | Class J | 100 | 8640 | |
| | ATV21HD55N4 | 200 | Class J | 100 | 9792 | |

¹ Type 1 (open drive with a conduit box installed).

² Drive installed in a minimum volume Type 12 metallic enclosure as noted.

Instruction Bulletin
Altivar® 21 Adjustable Speed Drive Controllers Installation Guide

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